Date Due

ANNUAL REPORT

OF THE

AMERICAN INSTITUTE,

OF THE

CITY OF NEW YORK,

FOR THE

YEARS 1864, '65.

ALBANY:
C. WENDELL, PRINTER.
1865.

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AMERICAN INSTITUTE.

Trustees and Committees.

1864.

President—WILLIAM HALL.

Vice-Presidents—DUDLEY S. GREGORY, EDWARD WALKER, JOHN GRAY.

Recording Secretary—JIREH BULL.

Corresponding Secretary—THOMAS McELRATH.

Treasurer—SYLVESTER R. COMSTOCK.

Finance Committee—Thos. M. Adriance, Nathan C. Ely, Cyrus H. Loutrel, Thos. Williams, jr., George Peyton.

Managers of the Fair—William H. Butler, James C. Baldwin, Wm. Ebbitt, William S. Carpenter, Thomas F. De Voe, George Timpson, Andrew Bridgeman, John B. Peck, Jas. Knight, William Cotheal, J. Groshon Herriot, J. Owen Rouse, George M. Woodward, George R. Jackson, James R. Smith, John B. Rich, I. M. Ward, Isaac Buchanan, Jonathan N. Tifft, J. S. Underhill, Jeremiah Simonson, William W. Marston, R. G. Hatfield, Thomas Small.

Committee on the Library—William Hibbard, James K. Campbell, Chas. P. Daly, Jacob L. Baldwin, Ebenezer H. Brown.

Committee on Agriculture—James J. Mapes, Isaac P. Trimble, John G. Bergen, William S. Carpenter, William West.

Committee on Manufactures, Science and Art—John D. Ward, Joseph Dixon, Charles A. Joy, James L. Jackson, Samuel D. Tillman.

Committee on Commerce—Rush Patterson, Luther B. Wyman, Wm. K. Strong, T. Spencer Kirby, John P. Veeder.

Committee on the Admission of Members—Robert Lovett, John W. Chambers, William A. Leffingwell, Charles E. Burd, Charles Pilla.

Committee on Correspondence—John H. White, Joseph Hoxie, Henry L. Stuart, John W. Avery, George F. Barnard.

Committee on Repository—Martin E. Thompson, James Bogardus, Albro Howell, Thomas D. Stetson, Frank Dibben.

Clerk and Librarian—John W. Chambers.

Messenger—David N. Jacobus.

1865.

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Committee on Agriculture—Nathan C. Ely, James J. Mapes, Isaac P. Trimble, John G. Bergen, George Bartlett.

Committee on Horticulture—William S. Carpenter, Benjamin C. Townsend, Andrew Bridgeman, Peter B. Mead, John Henderson.

Committee on the Admission of Members—Robert Lovett, John W. Chambers, Wm. A. Leffingwell, Charles E. Burd, Charles Pilla.

Committee on Commerce—Rush Patterson, Luther B. Wyman, John P. Veeder, Edward D. Bassford, Warren Rowell.

Committee on Correspondence—John H. White, Joseph Hoxie, Henry L. Stewart, John W. Avery, George F. Barnard.

Clerk and Librarian—John W. Chambers.

Messenger—David N. Jacobus.

Faculty.

James J. Mapes, LL. D., Professor of Natural Philosophy and Chemistry as applicable to the Useful Arts.

Julius G. Pohlé, M. D., Professor of Analytical Chemistry.

Samuel D. Tillman, A. M., Professor of Mechanical Philosophy and Technology.

State of New York.

No. 202.

IN ASSEMBLY,

March 29, 1865.

TRANSACTIONS OF THE AMERICAN INSTITUTE.

AMERICAN INSTITUTE,
NEW YORK, *March 27th*, 1865.

To the Honorable GEORGE G. HOSKINS,

Speaker of the Assembly of the State of New York:

SIR—I herewith transmit the Annual Report of the American Institute of the City of New York for the years 1864–5.

I have the honor to be,

Very respectfully,

Your obedient servant,

SAMUEL D. TILLMAN,

Corresponding Secretary.

REPORT OF THE TRUSTEES

OF THE AMERICAN INSTITUTE OF THE CITY OF NEW YORK.

To the Honorable the Legislature of the State of New York:

The Trustees of the American Institute of the City of New York respectfully report—

That during the last session of [illegible] a law was passed authorizing the Common Council of the City of New York to convey to the American Institute [illegible] a building [illegible] Annual Exhibitions.

Immediately after the [illegible] the Trustees memorialized the Common Council of the City of New York to make the Institution [illegible] to convey to the [illegible] the contemplated building. [illegible] This delay [illegible] of the Legislature [illegible].

The [illegible] will [illegible] Board of Managers.

[illegible] within [illegible] that [illegible] American Institute [illegible] public [illegible] people [illegible]

[illegible] visitors [illegible]

guard against temptations which are presented to them on every side. It is to be regretted that but few attractions of the character alluded to, commensurate with the greatness of this metropolis, have thus far been inaugurated.

In the principal cities of foreign countries it is deemed important to encourage all enterprises the tendencies of which are to instruct and amuse the masses of the people; hence large appropriations are made for the support of museums, galleries of statuaries and paintings, polytechnic schools and other similar institutions which contribute largely to make useful and intelligent citizens, while they attract those [illegible] in pursuit of useful and valuable information.

Philadelphia, Boston, Baltimore, and other sister cities are not without [illegible] of patronage to such and encourage the [illegible] objects which prompts the American Institute to enlarge its sphere of usefulness.

The Board of Trustees take great pleasure in stating that the weekly meetings of the Farmers' Club and the Polytechnic Association have been well attended during the year, and the increasing interest manifested in the subjects discussed leads us to anticipate that the material furnished from these sources to the next volume of Transactions will exceed in interest and importance any that have preceded it.

Through the instrumentality of some of the active members of the Institute, a Horticultural Association has been added as a new department. The proceedings of this Association will form a very interesting portion of the volume of Transactions.

A series of lectures has already been inaugurated by this Association, which has drawn large and appreciative audiences.

The Board of Managers finding insurmountable obstacles to the holding of the usual Annual Fair, the Institute made an appropriation of [illegible] dollars, to be expended under the direction of the Board of Managers, for the purpose of enabling the Horticultural branch of the Institute to give, during the autumn, an Exhibition of fruits and flowers.

The Exhibition was held during the latter part of the month of September, [illegible] of the Horticultural Committee of the Institute [illegible] a very superior collection of fruit and flowers. One hundred and fifty varieties of fruit from France were [illegible], and from the attention devoted to them by prominent American fruit growers, we may reasonably infer that many of these varieties will soon be found as a product of our own soil.

The Library has received during the year many valuable additions, and is consulted by those who are always anxious to examine the latest scientific publications.

By reference to the report of the Finance Committee, it will be perceived that the finances of the Institute are in a more prosperous condition than at any other period of our great National crisis. In the month of August last the sum of one thousand dollars was paid by a stranger to the Recording Secretary, with a request that the same should be placed in the Treasury of the Institute, where it rightfully belonged. That he was prompted to make this restitution to satisfy the clamors of an awakened and disturbed conscience.

The Trustees report with much gratification a constant accession of members to the Institute, as well as a growing interest in its daily operations. And they indulge the pleasing anticipation that the time is not far distant when, with a united country, restored to the obligations of one Constitution and one triumphant and victorious flag, this corporation will pursue with renewed vigor its career of usefulness, and continue to foster the spirit of emulation and improvement which has long characterized its operations.

All of which is respectfully submitted.

WILLIAM HALL,
D. S. GREGORY,
EDWARD WALKER,
JOHN GRAY,
THOMAS McELRATH,
JIREH BULL,
S. R. COMSTOCK,
Trustees.

NEW YORK, *March 27th*, 1865.

REPORT OF THE COMMITTEE ON FINANCE.

The following is a statement of the receipts and expenditures of the American Institute from the 1st day of February, 1864, to the 1st day of February, 1865:

Balance in the treasury, February 1st, 1864			$158 55
The Receipts of the year have been:			
For real estate.—Rent of No. 351 Broadway and No. 89½ Leonard street, 1 year		$6,745 81	
For admission fees and annual dues from members, viz: Initiation fees, $155; annual dues, $400; life membership, $195		750 00	
For restitution money paid to the Recording Secretary from an unknown source ...		1,000 00	
For duplicate medal		6 00	
" certificates of award		36 00	
" sales of old newspapers, &c		17 74	
" library, books lost, &c		7 50	
" use of rooms		7 50	
From Treasurer State of New York:			
Appropriation 1863	$950 00		
Less collection	1 50		
		948 50	
			9,549 05
			$9,707 60

EXPENDITURES.

Real Estate.

Interest on bond and mortgage, $20,000	$1,200 00		
Taxes No. 351 Broadway and 89½ Leonard street	1,533 74		
New water-closets and connection with sewer	350 00		
Painting iron shutters and repairs,	45 01		
		$3,128 75	

Library.

Books	$76 40		
Periodicals	80 80		
Binding	36 48		
		193 68	
Carried forward		$3,322 43	$9,707 60

Brought forward		$3,322 43	$9,707 60
On account of 35th Annual Fair.			
Silver-ware for premiums and engraving	$208 56		
Diplomas—paper, printing and engrossing	79 40		
Books and freight	13 00		
Printing list of awards and postage.	23 25		
		324 21	
On ac't of Horticultural Exhibition.			
Appropriation	$424 11		
		424 11	
On ac't of Polytechnic Association.			
Preparing reports of the Association for Transactions	$500 00		
Reporting meetings	84 00		
		584 00	
Miscellaneous.			
Rent of rooms in the Cooper Union building 1 year	$1,325 00		
Insurance, real estate	81 75		
library	32 00		
Newspapers	43 67		
Advertising	58 33		
Printing	19 38		
Stationery	41 62		
Gas	88 00		
Painting iron railings, &c., in Greenwood Cemetery	15 00		
Library, carpenters' work, &c	11 86		
Engrossing certificates of award	3 20		
Engraving and re-striking medals.	6 95		
Freight on Transactions	5 99		
Painting and glazing	8 48		
Incidental expenses	251 97		
		1,996 20	
Salaries.			
Clerk	$1,875 00		
Messenger	212 00		
		2,087 00	
			8,737 95
Balance in the treasury Feb. 1, 1865			$969 65

THOMAS M. ADRIANCE,
THOMAS WILLIAMS, Jr.,
NATHAN C. ELY,
GEORGE PEYTON,
CYRUS H. LOUTREL,
} *Finance Committee.*

NEW YORK, *February 2d*, 1865.

Amount of property held by the American Institute Feb. 1st, 1865.

Real estate — No. 351 Broadway and No. 89½ Leonard street, cost	$45,800 00	
Less mortgage	20,000 00	
		$25,800 00
Library and fixtures		13,949 56
Office furniture and fixtures, iron safes, case of models of fruit, &c		934 00
Property used at the fairs		350 00
		$41,033 56
Cash in the treasury February 1st, 1865		969 65
Total		$42,003 21

PROCEEDINGS OF THE INSTITUTE.

REPORT OF THE COMMITTEE ON AGRICULTURE.

The Committee on Agriculture of the American Institute respectfully report—

That they take great pleasure in informing the Institute that the Farmers' Club, which is under the immediate charge of your Committee, have regularly held its weekly meetings during the past year, and at which some of the Committee have been present at every meeting.

The attendance has been very numerous, and a number of farmers and others from distant parts of our country, who take an interest in agricultural improvement, have visited the Club during its discussions, and have given the results of the experiments in this important branch of American industry.

The doings of the Club have been fully reported and published in some of the leading papers of the city, and, to show how widely these reports have been circulated, the Secretary has received many hundred letters, from different sections of the United States, asking advice or furnishing the results of experiments made by the writers.

The Committee cannot let this opportunity pass without acknowledging their indebtedness to Mr. Wm. R. Prince, of the Linnaean Nurseries, Flushing, for over thirty varieties of seeds of hardy, flowering perennial plants and shrubs. These seeds have been put up into small bags and distributed. The demand for these seeds has been so great that two hundred and fifty letters have been received in one day containing applications for them. During the last sixty days over 11,500 of these packages have been gratuitously distributed.

The Farmers' Club was established in the year 1843, and was the first of its kind in this country. Its regulations are very simple, and constant applications for information are made by persons desiring to establish similar societies in various parts of our extended country.

The discussions have been very interesting and instructive; many of the persons taking a part in them are known as able pomologists and practical farmers.

In addition to the discussion of miscellaneous matters, the following subjects have occupied the attention of the Club:

Agricultural implements and improved agricultural machinery.

Cultivation of corn, wheat, potatoes, fruit and fruit trees.

Insects injurious to vegetation.
Blight on trees.
Forest trees—circulation of sap.
Grasses—restoring worn out meadows.
Hop raising.
Sugar making.
Sorghum.
Diseases of sheep—wool.
Hedges and hedge plants.
Evergreens.
Emigration to Maryland and Missouri.
Consumption of meat in cities.
Textile plants—flax.
Climatic influences.
Poultry.
City sewerage.
Cisterns.
White willow, &c.

All of which is respectfully submitted.

JAMES J. MAPES,
JOHN G. BERGEN,
WM. S. CARPENTER,
ISAAC P. TRIMBLE,
WILLIAM WEST,
Committee.

NEW YORK, *February 2d*, 1865.

REPORT

OF THE COMMITTEE ON MANUFACTURES, SCIENCE AND ART, OF THE AMERICAN INSTITUTE.

The Committee on Manufactures, Science and Art, report:

That the several subjects referred to them during the past year, with one exception, have been carefully examined, and their conclusions are embodied in reports previously presented.

The investigation as to the merits of the new Chemical Nomenclature and notation, has been postponed at the request of the author until he can present his paper in print.

The Managers of the Institute having decided that it was inexpedient to hold a Fair in 1864, the large class of inventors and manufacturers, who are attracted by a liberal offer of premiums, have not made their annual contributions of Mechanical and Chemical novelties.

The Polytechnic Association, under the charge of your Committee, was organized for the year by the re-appointment of its officers whose term of service will expire on the first day of May next. Of the punctual discharge of official duties it is only necessary to remark that the Chairman has not failed to attend a single meeting since his first appointment, more than two years ago. During the past year he has made weekly reports to the Association, on the progress of invention and discovery, in which are briefly described the principal novelties brought out in both the old and new world.

The debates of the Polytechnic have embraced a wide range of topics. Those relating to the Army and Navy, and to the wonderful development of the Petroleum region of our own country, having elicited more than ordinary interest.

In the volume of Transactions for 1863, just published, will be found several extended discussions on iron clad vessels-of-war. At one of these debates, in which the late Com. Wm. B. Porter participated, a large delegation of officers from the Russian fleet, under Admiral Lessoffsky, was in attendance. The principal novelties described in the volume alluded to are steam surface condensers, the new steam engine invented by J. B. Root, the new steam gauge by Shaw & Justice, the Harison globe lens, the glass reflector by Dr.

II. During the year a large number of measuring instruments, including those relating to Horology, are described. The most important paper having a sanitary bearing is upon the chemistry of lead pipe.

The principal topics of discussion in 1864 were: The value of different kinds of fuel; the best mode of using steam expansively; the utilization of sewage products; the form of water pipes; oil wells and the products of crude petroleum; the best methods of preserving fruit; the manufacture of glass; pneumatic railways, elevated railways and tunnel railways for cities; the manufacture and use of [illegible]; the manufacture of [illegible]; the manufacture of salt; the causes of the unwholesomeness of our city atmosphere; the manufacture of [illegible]; the manufacture of ether, chloroform and bisulphide of carbon; and pumps and other apparatus for raising water.

The discussion of these subjects, as well as the criticisms on the scientific items presented by the Chairman, and on the various machines exhibited, show the high mechanical and chemical attainments of the members of the Polytechnic, and that peculiar acumen essential to the complete comprehension and elucidation of all questions relating to technology.

In addition to other gratifications, occasional visitors are attracted to the meetings by the invitation extended to them through two of the daily papers of the city. Distinguished scientific gentlemen have casually participated in the debates and contributed valuable information.

It has been the aim of your Committee to offer through the Polytechnic every facility to inventors for the free exhibition and explanation of their models of art, and for full and impartial criticism. The wise provision of the Association to appoint no special committees to examine inventions, effectually precludes all chance of favoritism, and prevents the perversion of their organization from its legitimate purposes.

Your Committee are fully impressed with the importance of properly reporting the discussions of the Polytechnic, which, with the other transactions of the American Institute, are published by legislative authority, and distributed equally in each assembly district of the State, [illegible] of the Institute, and which also find a place in [illegible] on both sides of the Atlantic. Our [illegible] greatly increased in circulation [illegible] in facilities for [illegible] information alike useful to the [illegible]. It may therefore be safely asserted that the American Institute by means of the annual volume as well as by weekly notices appearing in newspapers, now exerts a wider influence than any similar association in the world, and your Committee feel justified in expressing the opinion that the reports of the proceedings of the Polytechnic branch are worthy of such a volume and of your cordial approval.

Respectfully submitted,

JOHN D. WARD,
CHARLES A. JOY,
JAMES L. JACKSON,
JOSEPH DIXON,
SAMUEL D. TILLMAN,

NEW YORK, *January 25th*, 1865. *Committee.*

REPORT

OF THE LIBRARY COMMITTEE OF THE AMERICAN INSTITUTE.

The Library Committee, in making its report for the year 1864, conformably with the provisions of the by-laws of the American Institute, beg leave to submit the following:

During this great national crisis its operations have been greatly embarrassed in consequence of the difficulty experienced in obtaining that class of books which the necessities of the Institute require. The aim and policy of your Committee is, and has been, to be possessed of all recent publications, both in this and foreign countries, treating upon those subjects which are the specialty of the Institute, rather than the more miscellaneous works, which, while they are more attractive to the general reader, do not tend to promote the objects contemplated in the organization of our Institution. The rate of foreign exchange, and the increased price of all American publications, have restricted your Committee to the purchase of only such books as have been deemed indispensable.

The regular increase of the number of volumes to the Library renders it necessary that enlarged accommodations should be provided, in order that the new volumes may find a convenient resting place. Your Committee therefore recommend that the Trustees be authorized and empowered to make such additions of cases and shelving as is required for this purpose.

The Library now contains 8,083 volumes, all in excellent condition, and is probably one of the finest collections of scientific books in the country. And the Committee are desirous that this fact be extensively known, believing that this knowledge would have the effect of inducing many who are probably ignorant of it to become members of the Institute.

While the Farmers' Club, the Polytechnic, and the Horticultural Associations are disseminating widely useful and valuable information without money and without price, the Library, though less publicly, is quietly performing its important part by silently imparting that intellectual element whose results are not confined to the individual recipient.

It has been suggested to the Committee that the interests of the Institute would be promoted by having on our tables some of the best and newest atlases and also maps of the more recently explored parts of our own vast territories, and especially of those States where new and important discoveries have been made, and where large enterprises are now being carried forward with great activity.

Your Committee cannot well refrain from commending the efficiency of John W. Chambers, the Librarian, in the arrangement of all that pertains to the Library, and the watchful care of its interests, which characterises his efforts to make the reading rooms a pleasant, agreeable and profitable place of resort to all the members of the Institute.

The number of volumes in the Library at the date of the last report was		8,579
There have been added during the year,		
By purchase	24	
subscription	16	
exchanges	6	
donations	58	
	—	104
Making a total number of volumes now in Library		8,683

For a detailed statement of the purchases and donations, reference is made to the list hereunto appended.

From the liberal appropriation made by the Institute to this Committee last year, it is to be hoped that our successors will have ample means for all necessary expenditures for the coming year.

Literature, agriculture, science and the arts are not foes to the government which fosters and protects them; and although, for the past four years, darkness visible has surrounded our governmental domain, we can now offer congratulations that the bright streaks of re-union light are rapidly becoming more and more visible to the true patriot's eye, and with it the assurance that soon no longer the noise of war and the clash of rebellion will be heard in the land.

With a speedy establishment of a lasting peace, and a bright, prosperous and glorious future dissipating our long winter of discontent, may we not indulge the hope that the labors in which we are engaged will be prosecuted with increased vigor and be attended with a far greater amount of usefulness.

All of which is respectfully submitted.

WILLIAM HIBBARD,
JAMES K. CAMPBELL,
JACOB L. BALDWIN,

Committee.

REPORT

OF THE COMMITTEE ON HORTICULTURE OF THE AMERICAN INSTITUTE.

The Committee on Horticulture, first of all, take great pleasure in announcing the formation of a new branch of the Institute, under the name of the Horticultural Association of the American Institute. It may not be out of place to state here briefly that the gentlemen who chiefly interested themselves in its formation, were of opinion that Horticulture did not occupy in the Institute that prominent position to which its importance justly entitled it. Embracing, as it does, so many objects which contribute largely to the necessities and comfort of man, and scarcely less to his enjoyment and pleasures, it was thought that something more than an annual exhibition was needed to bring and keep it prominently before the public and make them familiar with its practical and aesthetic truths. It is only by making people familiar with our beautiful art that we can hope to make them love and patronize it. It was determined, therefore, to organize this association, and hold frequent meetings for conversational purposes, to read essays, listen to lectures, and in all possible ways to promote and diffuse a love of horticulture.

An informal meeting was held on the 10th day of March, 1864, the subject fully discussed, and a committee appointed to nominate officers and committees and draw up by-laws. The next meeting was held on the 6th day of April, when officers and committees were elected, the by-laws adopted, and the association formally organized. The proceedings from this time forward, as kept by the secretary, are presented as a part of this report. They contain a full history of the association up to the present time. The committee may add that the experiment has thus far been entirely successful and gratifying to a degree that was hardly anticipated. The meetings of the association have been well, and in many instances largely attended. Flowers have been exhibited; the conversations have been interesting and instructive, and a record of them, as far as preserved, is herewith presented. They will constitute a valuable addition to our annual volume of Transactions.

For reasons not necessary to mention here, it was deemed inexpedient to hold an annual fair; but it was, nevertheless, considered very desirable to hold a horticultural exhibition. It is mortifying to be compelled to state that the city of New York does not possess a room suited to an exhibition of this kind. After much time spent in fruitless efforts to hire some kind of a room, it was finally determined to hold the exhibition in our own rooms, and admit only fruits and flowers. The size of these rooms precluded the idea of a full exhibition, very much to the committee's regret. It was near the first of September before public notice could be given, but notwithstanding the shortness of the time, the rooms were crowded with choice specimens. It must be stated that the season was a poor one for all fruits except grapes. Plums were mostly destroyed by the curculio, and the apple and pear were generally much disfigured by the curculio and the apple moth, the last having caused a large part of the crop to fall prematurely to the ground: yet such are the care and skill of some of our cultivators, we had an excellent show of apples, and better pears were never seen on our tables. Grapes were shown in great abundance and variety. The display of foreign grapes was conspicuous for the number of large bunches, one bunch of the Barbarossa weighing some six pounds. The native grapes were particularly noteworthy for their abundance, variety and excellence. There were several new kinds on the tables, some of which promises to rank very high. So many fine specimens of native grapes were probably never before seen together in New York. We have seen about the last of the reproach that we have no native grapes fit to eat. Several beautiful pine apples, grown in pots, attracted much notice. The fruit was large and very fine.

The exhibition of flowers was confined chiefly to bouquets, baskets and cut flowers, the first two predominating. The display was beautiful. Pot plants and some others were not called for, as they could not be shown in these rooms without the risk of much damage. There were, notwithstanding, a few remarkably handsome specimens of ornamental leaved plants. There were specimens also of rare and beautiful orchids, displaying their very remarkable and unique flowers. Vegetables were not shown, there being no room for them. Notwithstanding its curtailments, the exhibition was one that will be looked back to with pride. A list of the awards is herewith presented, as well as a statement of the expenses of the exhibition.

It ought to be stated here that a public spirited member offered $100 in prizes, $50 of this being for a set of ornaments for the dinner table. Though the ornaments exhibited did not meet the requirements, the gentlemen alluded to none the less deserves our thanks. Two other members offered $50 for a native seedling grape, to possess specified qualities. This prize was not awarded, but is still open for competition. The Hon. Horace Greely, with a spirit worthy of all praise, offered three prizes, of $100 each, for an apple, a pear and a grape, each possessing specified qualities and adapted to general cultivation in the middle States. The grape prize was awarded to the Iona.* The apple and pear premiums have been laid over until next fall.

It may also be stated in this connection that we were greatly indebted to Mr. Andre Leroy, of Angers, France, for a very fine collection of apples and pears. The specimens were large and handsome, and added a very interesting feature to the exhibition. A suitable acknowledgment has been made to Mr. Leroy for this public spirit and enterprise.

The committee would state, in conclusion, that a course of free lectures is now being delivered before the association, which promises to add materially to its character and usefulness. The subjects of these lectures relate directly to horticulture, and many of them will illustrate its principles and practice in a manner highly conducive to a more thorough understanding of its so called mysteries. The following are the names of the gentlemen who have thus far consented to lecture: Horace Greely, James Hogg, John Henderson, Henry Ward Beecher, Geo. Thurber, Mason C. Weld, I. M. Trimble, Samuel Osgood, Wm. C. Bryant, Peter Henderson, G. W. Huntsman, I. M. Ward, Andrew Bridgeman, Peter B. Mead. Lectures have already been delivered by Messrs. Osgood, Campbell, Henderson and Hogg. These lectures, as far as delivered, are presented as a part of this report. They will add another interesting and useful feature to our volume of Transactions.

On the whole the Institute has much reason to feel proud of this last outgrowth from its body.

All of which is respectfully submitted.

B. C. TOWNSEND,
J. W. BARROW,
PETER B. MEAD,
JOHN HENDERSON,
JAMES HOGG,

NEW YORK, *February* 2, 1865. *Committee.*

* Dr. Grant, to whom the premium was awarded, being anxious to meet more competitors than at the last exhibition, declined to receive it. The $100 prize will, therefore, be given for the best grape shown at the autumn exhibition of 1865.

PREMIUMS AWARDED at the Horticultural Exhibition of the American Institute, September 27th, 28th, 29th and 30th, 1861.

PEARS.

Ellwanger & Barry, Rochester, N. Y., for the best fifty named varieties of pears.......... $35
Hovey & Co., Cambridge, Mass., for the second best fifty named varieties of pears.......... 20
Wm. L. Ferris, Throg's Neck, N. Y., for the best thirty named varieties of pears.......... 20
John Saul, Washington, D. C., for the second best thirty named varieties of pears.......... 15
R. W. Ward, Newark, N. J., for the best twelve named varieties of pears.......... 10
John Egan, gardener to E. H. Stevens, Hoboken, N. J., for the second best twelve named varieties of pears.......... 5
P. T. Quinn, (Superintendent for Jas. J. Mapes, Newark, N. J.,) for the best six named varieties of pears.......... 5
E. Williams, Mt. Clair, N. J., for the second best six named varieties of pears.......... 3
P. T. Quinn, (Superintendent for J. J. Mapes.) Newark, N. J., for the best twelve table pears, one named variety.......... 3

Special.

D. D. Buchanan, Elizabeth, N. J., for sixty varieties of pears, Silver Medal.
Francis Brill, Newark, N. J., for nineteen varieties of pears... $10
Francis Brill, Newark, N. J., for twelve Beurre Bose pears.... 2
Spencer Springstead, Union Port, N. Y., for twelve varieties of pears.......... 5

APPLES.

O. S. Hathaway, Newburgh, N. Y., for the best fifty varieties of apples.......... 25
E. Williams, Mt. Clair, N. J., for the best six varieties of apples, 4
E. Williams, Mt. Clair, N. J., for the best twelve apples, one variety.......... 3

PLUMS.

Ellwanger & Barry, Rochester, N. Y., for the best six named varieties of plums.......... 10

PEACHES.

Spencer Springstead, Union Port, N. Y., for the best twelve peaches.......... 3

QUINCES.

Ellwanger & Barry, Rochester, N. Y., for the best twelve apple quinces.......... 3
Francis Brill, Newark, N. J., for the best twelve pear quinces.. 3

Grapes grown under Glass.

J. McMillen, gardener to Francis Morris, Throg's Neck, N. Y., for the best six varieties of foreign grapes $20

Thomas Wade, gardener to Gen. J. H. Van Alen, New Hamburgh, N. Y., for the second best six varieties of foreign grapes 15

John Egan, gardener to E. A. Stevens, Hoboken, N. J., for the best three varieties of foreign grapes 10

John Cheney, South Manchester, Conn., for the second best three varieties of foreign grapes 5

John Ellis, gardener to Charles Butler, Fox Meadow Gardens, Westchester county, N. Y., for the heaviest bunch of grapes, Barbarossa, weighing nearly six pounds 5

Native Grapes.

C. Marie, Tubby Hook, N. Y., for the best three bunches of Delaware grapes 3

C. Marie, Tubby Hook, N. Y., for the best three bunches of Iona grapes 3

Stephen Underhill, Croton Point, N. Y., for the best three bunches of Catawba grapes 3

C. W. Grant, Iona Island, N. Y., for the best three bunches of Israelia grapes 3

Isaac Merritt, Hart's Village, N. Y., for the best three bunches of Concord grapes 3

Van Brunt Wyckoff, Brooklyn, L. I., for the best three bunches of Hartford prolific grapes 3

John Dingwall, Albany, N. Y., for the best three bunches of Anna grapes 3

S. Underhill, Croton Point, N. Y., for the best three bunches of Isabella grapes 3

Geo. H. Hite, Morrisania, N. Y., for the best three bunches of Union Village grapes 3

Van Brunt Wyckoff, Seventeenth street, Brooklyn, L. I., for the best three bunches of Rebecca grapes 3

Stephen Underhill, Croton Point, N. Y., for the best three bunches of Allen's hybrid grapes 3

Isaac Merritt, Hart's Village, Dutchess county, N. Y., for the best three bunches of Diana grapes 3

Geo. W. Martin, Williamsburgh, L. I., for the best three bunches of Elsingburgh grapes 3

John G. Bergen, Gowanus, L. I., for the best Rogers' hybrid grapes, (No. 1.) 3

Van Brunt Wyckoff, Seventeenth street, Brooklyn, L. I., for the best Clinton grapes 3

John Dingwall, Albany, N. Y., for the best three bunches of any other kind, To-Kalon 3

C. W. Grant, Iona Island, N. Y., the "Greely prize" of $100 for the "Iona" grape.

MELONS.

Francis Brill, Newark, N. J., for the best three musk melons, (Allen's superb,) 3

PINE APPLES.

James Skinner, gardener to Edwin Hoyt, Esq., Astoria, N. Y., for the best pine apples in pots........ $15

CRANBERRIES.

J. C. Young, Lakeland, L. I., for the best cranberries 3

CUT FLOWERS.

Wm. A. Burgess, Glen Cove, L. I., for the best twelve named varieties of roses........ 5

Isaac Buchanan, No. 9 West 17th street, for the best twelve hybrid gladiolus 5

Peter Henderson, Jersey City, N. J., for the best twelve named verbenas 3

A. G. Burgess, East New York, L. I., for the best twelve named varieties of dahlias........ 5

BASKETS AND BOUQUETS.

P. Reid & Son, Brooklyn, L. I., for the best basket of flowers.. 10

Ekirch & Fitzpatrick, 19 Union Square, for the best hand-bouquet, geometrically arranged 5

W. & J. Cranstoun, Hoboken, N. J., for the best naturally arranged bouquet 5

Mrs. J. W. Faulkner, Stamford, Conn., for the best phantom bouquet 5

Mrs. W. Prager, 21 West 11th street, for a beautiful specimen of flowers naturally preserved........ 5

Special.

Wm. Fitzpatrick, No. 1213 Broadway, for a set of floral decorations for the table 25

Isaac Buchanan, No. 9 West 17th street, for the best six orchids in bloom, Barrow premium 20

Wm. Baker, No. 164 East 42d street, for the best orchids in bloom, Barrow premium........ 8

James C. Provost, Greenpoint, L. I., for an excellent specimen of brandy .... Diploma.

Andre LeRoy, Angers, France, for his efforts in introducing the choicest fruit of France, to be cultivated in this country, Large Gold Medal.

John Henderson, Jersey City, N. J., for a superior exhibition of plants in bloom .... Silver Medal.

Receipts and expenditures of the Horticultural Exhibition, held under the direction of the Committee on Horticulture of the American Institute, September 27th, 28th, 29th and 30th, 1864.

RECEIPTS.

From sales of tickets	$175 50	
J. W. Barrow, special premium	28 00	
From Mrs J. W. Faulkner, donation	5 00	
John G. Bergen, donation	3 00	
		$211 50
Appropriation American Institute, passed Aug. 11, 1864,		424 11
		$635 61

EXPENDITURES.

Printing circulars, posting bills, &c	$95 58	
Ticket-seller and door-keeper	14 00	
Carpenters' work, &c.—tables	17 25	
Gas fixtures	5 20	
Use of crockery and glass	26 00	
Freight and cartage	36 00	
Postage, cleaning, &c	23 08	
Premiums	418 50	
		$635 61

Amount outstanding, chargeable to this account.

Premiums	$54 00	
Tables, &c	30 00	
Gas light	15 00	
Clerk hire and labor	186 00	
		$285 00

PROCEEDINGS OF THE FARMERS' CLUB.

RULES AND REGULATIONS OF THE FARMERS' CLUB OF THE AMERICAN INSTITUTE, ADOPTED BY THE COMMITTEE OF AGRICULTURE.

1. Any person may become a member of this Club, and take part in the debate by simply conforming to its rules.
2. Any member, for disorderly conduct, may be expelled by a vote of the majority.
3. The minutes of the Club, notices of meetings, etc., shall, as formerly, be under the control of the Secretary.
4 The Club shall be called together Tuesday, at 1½ o'clock, P. M., of each week.
5. A chairman pro tem. shall be chosen at each meeting.
6. The first hour of the meeting may be devoted to miscellaneous subjects, as follows: papers or communications by the Secretary, communications in writing, reports from special committees, subjects for subsequent debate proposed, desultory or incidental subjects considered.
7. The principal subject of debate shall be taken up at 2½ o'clock (but may be introduced earlier by a vote of the meeting), and continue until 3½ o'clock, unless a motion to adjourn prevail.
8. No person shall speak more than fifteen minutes on the principal subject, unless by consent of the meeting.
9. All controversy or personalities must be avoided, and the subject before the meeting be strictly adhered to.
10. Questions pertinent to the subject of debate, may be asked of each through the chairman, but answers must be brief, and not lead to debate.
11. The chairman may, at any time, call a person to order, and require him to discontinue his remarks.
12. When any committee is appointed by the Farmers' Club, the members of said committee shall be members of the American Institute.
13. No discussion shall be allowed that is not connected with the great subjects of Agriculture and Rural Improvement.

May 3, 1864.

Mr. Nathan C. Ely, in the chair.

IS THE RHUBARB PLANT WHOLESOME?

Mr. Geo. Carpenter.—The stalk of the rhubarb properly cooked is a very delicate food, and is very grateful to some palates, but it has proved so detrimental to my general health that my physician has forbidden its use.,

A gentleman related a case of a family that used pie-plant leaves for greens, and two of the family sickened and died, the physicians said from the poison in the leaves. He had never known an injury from the use of the stalks, though he had often heard it said that the acid was injurious to teeth. This, if true, should be extensively known, as people's teeth are generally poor enough in this country, without making them worse by using an article that can be easily dispensed with.

A New Fertilizer.

Mr. Wm. Van Graweritz, 103 West 49th street, exhibited specimens of furriers' waste, and enquired whether its value as a fertilizer was known here. He stated that the kind composed mostly of hair could be bought for $2\frac{1}{2}$ cents a pound, and that composed mostly of skin at $3\frac{3}{4}$ cents a pound, and that 100 tons could now be obtained if farmers would like to try it for manure. This substance is extensively used in France, but he is not aware that it has been used in this country.

Mr. John G. Bergen.—I notice that a considerable portion of this sample is saw-dust, which the gentleman states is used in the preparation of the skins to absorb the grease. Now, as saw-dust is not a valuable manure, I should be afraid that it would be mixed in too large quantities, if the article became suitable for manure, so as to make a great demand.

Mr. Adrian Bergen.—We Long Island farmers have found adulteration one of the great evils of all concentrated manures. At first I found bone dust and superphosphate, and poudrette, all very excellent, and thought that I should be able to manure my land very easily—much more so than with bulky manures. I am sorry to say that the manufacturers have so reduced the standard of their wares, that it is not worth while for any farmer to buy.

Mr. Solon Robinson.—Mr. E. P. Prentice, Albany, N. Y., carried on an extensive furrier business some years ago, and he tried to induce farmers to accept of the waste and use it for manure, but could not. He then bought a poor, sandy farm, and used the waste upon it, and it proved to be a most valuable manure, for it made an almost barren land very fertile. It is not a question now whether furriers' waste is a good fertilizer. The true question is whether farmers can afford to pay the price named, in preference to buying other fertilizers, or the bulky manures of the city.

Mr. John G. Bergen.—All my experiments with concentrated manures have tended to confirm me in the opinion that all farmers who are so situated that they can obtain city manures at a moderate cost for transportation will find them the most economical. The horse-stable manure I have found preferable, and I find that the straw mixed with the droppings, and which has absorbed the liquids, acts not only as a fertilizer to the plants, but has a mechanical action upon the soil that is beneficial. I have found that our best soil, under a continued use of concentrated fertilizers and clean culture, deteriorates. I find that such land is actually benefited by a growth of weeds after the crop, which, being turned under, act mechanically upon the soil and benefit the next crop. As to the question, which I would prefer at the same cost, horse or hog manure? I must say that that depends upon the crop I wish to grow. For pumpkins and coarse squashes, hog manure is the most valuable of any kind. For melons, I should prefer hog and horse manure mixed. It is important for many kinds of early market vegetables that we should have the bottom heat which horse manure gives. For others, the cold nature of hog manure is valuable.

The Chairman inquired: "How about hog manure giving a bad taste to squashes and other culinary vegetables?"

Mr. John G. Bergen replied that he never had found it so in all his experience as a market gardener.

Sorgo Bagasse as Manure.

Mr. John Willett, West Cosco, Michigan, says that he put sorgo bagasse upon wet land, employing a boy to pitch it in the furrow as he plowed, and it did not prove deleterious, but on the contrary he had a good crop of corn.

Mr. Wm. Bliss, Davenport, Illinois, says that he has used bagasse with success, as follows: "After pruning my grape vines in the fall, I lay them down and cover them with it. This covering is left on the ground as mulch The quantity is so great that it prevents the growth of weeds, rendering hoeing unnecessary. Late in the fall I cover my strawberry beds with it; in the spring remove it to the currant bushes and other shrubbery, and lay it quite thick on the ground. The pith very soon decays, the other part mostly within a year, leaving the surface of the ground very loose and mellow. You need not be afraid of any acid about it being detrimental to vegetation. People who are not able or willing to pave their walks from dwelling to out-houses can put the crushed cane on, and thus by having a cleanly walk save the women folks an immense amount of labor. The earth among my currant bushes is as loose as though it had been spaded; and under this treatment it was astonishing to see how they are laden with fruit. I left a Diana, Rebecca and two or three Catawbas on the trellis exposed to the climate, and they do not appear to be injured."

Gas Lime—Its Value as a Manure.

Mr. Solon Robinson.—We have frequently had this question before the Club: "What is the value of gas lime as a fertilizer?" The question has never been definitely anwered. Here is what is thought of it in Scotland. An Edinburgh gas maker says: "I believe that waste gas lime is equal in efficiency to fresh lime for most of the purposes aimed at in its use in farm lands. I sold all the lime thus produced at a gas work in Forfarshire for sixteen years to several farmers, who uniformly expressed their satisfaction therewith. One very usual application of it was its mixture with the 'wrack,' viz: the large piles of weeds and tangled roots of grass cleared off the fields annually. On being composted in this way the lime gradually killed all the vitality of these weeds, and returned them to the land in the way of manure. It also served the purpose of opening up stiff clay soil, being first spread over the surface and then plowed down. But the chief and most beneficial use of gas lime is found in its admixture with farm yard manure at the time it is applied to the fields. This is explained by the fact that the lime from gas works, while retaining all its original properties as a hydrate of lime, has acquired, in addition, a large amount of sulphur, much of which is *free*, and when openly exposed is taken up readily by the oxygen of the atmosphere. This sulphur, so readily parting from the lime, enters into combination with the volatile ammoniacal elements of the fresh manure, retaining them in the form of sulphate of ammonia, to be afterward taken up gradually by the crop to which it has thus been applied. It is in the first and last mentioned application that gas lime has proved most beneficial in those cases coming within my own knowledge. It is not equal to newly burned lime shells for breaking up stiff clays."

The Secretary said that it was an axiom of Prof. Mapes that gas lime should not be used until it had been several years exposed to the atmosphere.

Mr. Martin E. Thompson.—That is because it contains some of the gas when first thrown out of the gas works, and that, we know, is poisonous to all vegetation.

Mr. John G. Bergen.—Yet I understand that gas lime is much sought after by many farmers, who consider it valuable. I have never used it.

Mr. George Bartlett.—I have been told by the gas makers of this city that they sell all of their lime for agricultural purposes. If that is the case its value ought not to be a matter of doubt in this vicinity, and those who have used it ought to give their experience.

Liquid Grafting Wax.

Mr. L'Homme Lefort invented, not many years ago, a grafting composition, which is very cheap, very easily prepared, and keeps, corked up in a bottle with a tolerably wide mouth, at least six months unaltered. It is laid on as thin a coat as possible, by means of a flat piece of wood. Within a few days it will be as hard as a stone. It is not affected by severe cold; it never softens or cracks when exposed to atmospheric action. When applied to wounds in trees it acts as an artificial cuticle. After a few days' exposure to the atmosphere in a thin coat, it assumes a whitish color and becomes as hard as stone, being impervious to water and air. As long as the inventor kept the preparation secret it was sold at very high prices.

It is made after the following formula: Melt one pound of common rosin over a gentle fire. Add to it an ounce of beef tallow and stir it well. Take it from the fire, let it cool down a little, and then mix with it a tablespoonful of spirits turpentine, and after that about seven ounces of very strong alcohol (95 per cent.), to be had at any druggist's store. The alcohol cools it down so rapidly that it will be necessary to put it again on the fire, stirring it constantly. Still the utmost care must be exercised to prevent the alcohol from getting inflamed. To avoid it the best way is to remove the vessel from the fire when the lump that may have been formed commences melting again. This must be continued till the whole is a homogeneous mass, similar to honey.

Mr. Geo. Bartlett—This is undoubtedly a valuable recipe. I have found that gum shellac, dissolved in alcohol, was one of the most useful preparations that a gardener could have, and it should always be kept on hand and used like paint to coat over any wounds in trees. In budding, it is a great saving of labor, when you wish to cut away branches, to give the new one from the bud an opportunity to grow, as it excludes the air until the wound heals.

Hops—How to Save Expense of Poles.

Mr. Solon Robinson—The common method of poling hops with two poles to each hill, is estimated at $150 an acre. Various devices have been made to save a portion of this expense.

Mr. Wm. Rhoads, Babcock Hill, N. Y., says (in *The Country Gentleman*). "One way is to set the rows six or seven feet apart—then the hills nine feet apart in the rows. Then use stakes seven feet long out of the ground—stakes square on the top. Set them between every third and fourth hill, then use No. 9 wire, strained tight over the top of these stakes—then one-third of the distance from the wire to the ground, use a line of marline, drawn tight and wound around each stake, parallel with the wire—then from each hill run two small strings to the wire ; fasten them two or three feet apart.

Training the Vines.—"Start two green heads up each string. When they reach the wire, then train them each way ; the arms will hang down so as to fasten on the marline below—train them as above.

"Concerning the yield, I can only tell from observation and hearsay, which was very flattering indeed, compared with the expense of the common way of two poles to each hill, at a cost of $150 per acre.

"Ballooning is my favorite way. Use one pole for nine hills; hills seven by eight feet apart—short stakes to each hill except the one the pole is at; pole 18 or 20 feet long; use common wool twine from the top of the stakes to the top of the pole, to train the vines on.

"I have one yard, about five acres, that is wired with No. 8 wire, which I like very well. The poles are set at each end, and between the seventh and eighth hills. I have noticed some yards with short stakes running one row and a half to each wire; then run strings from the top of each stake to the wire."

The Chairman—This is important information, as the consumption of malt liquor is so rapidly increasing that the growing of hops becomes an item of some account in American farming. Indeed, the crop now is a very important one in some counties in this State.

How to Trap Ants.

Mr. Solon Robinson.—Houses that are infested with ants, black or red, may be disinfected by a little attention to trapping them. A sponge is one of the best things for trapping them. Sprinkle it with dry white sugar, the sponge being slightly moist, it will adhere. The ants will go into the cells of the sponge after the sugar in large numbers, and can be destroyed in hot water, and the sponge squeezed out and sugared again, and returned to the closet for another haul, until all are caught. Housekeepers will please not to complain any more, after they learn this, about the way they are tormented with ants.

Mr. John G. Bergen—I am much obliged to Mr. Robinson for presenting that receipt. It looks reasonable and will prove valuable to many housekeepers. I would also suggest a large coarse sponge to trap croton bugs, as we call the small cockroaches that infest some of the houses in this city to such an extent as render them unfit for comfortable habitations. The plan is certainly worth trying for both bugs and ants.

The Maguey Plant in California.

Mr. Solon Robinson—The following very interesting account I find in a late number of the *San Francisco Bulletin*. It says:

This beautiful species of the Agave family is exceedingly abundant in all the elevated and mountain land of South California. Its range is as extensive as from Cedros Island, in latitude 28 degrees, to the northern line of Monterey county. It is also met with in some parts of the southern division of the Sierra Nevadas. It is also well known in North Mexico. It generally prefers the coast line at from 1,000 to 3,000 feet elevation, and grows in the most arid and rocky localities. It is particularly abundant in the mountains around Santa Barbara, Santa Ynez, and San Buenaventura, where it is known among the Indians and native Californians as *Kahote*, or the Little Magney. It is a species allied to the American Aloe or century plant of Mexico. The latter is a great curiosity in Europe and the United States, and is the article from which is made the pulque of the Mexicans, and also rope, paper, and a thousand other useful things.

"The California Maguey is mentioned by all the old Spanish expeditions before 1545, even from the times of Cortez, as extensively used by the Indians of the Californias, who roasted the stem until it turned as sweet as the sugar-cane In this state it was invariably brought as presents to the Spanish sailors as one of the most desirable of gifts.

"The habit of the plant and its outlines are similar to the century plant, except that it is in every respect more graceful and beautiful. The size of the leaves is not a seventh part of that of the Mexican Maguey, nor are they serrated on the edges. They are not thicker than the rind of an orange, whereas its magnificent Mexican relative has leaves a yard or two long, and an inch thick at the base. The stem of the California plant is also generally much smaller, though it is often found growing fifteen feet in height in favorable localities, and three inches in diameter, which is nearly that of the other species named. The stem grows straight up, and is bright green in color; and when in bloom, from April to August, according to latitude and elevation in our southern countries, the flowers are disposed in alternate panicles of little bells.

"When in full blow the flowers are as white as the purest snow, forming one of the most unique and magnificent floral displays when a number of them are neighbors it is possible to conceive. Imagine the sides of Telegraph Hill all covered with green telegraph poles, adorned from top to bottom with snow white bell flowers, each flower as large as a pigeon's egg, and emitting a faint violet order, and some idea may be formed of their appearance and perfume on their native mountain sides at particular seasons.

"The leaves of the Maguey are bayonet shape, of a light green, with a point sharp and hard as a needle, and the plant, instead of occupying two yards diameter, like the Mexican Maguey, would only fill a bushel basket leaving out the stalk or pillar, which is of extreme symmetry and beauty. The flowers commence to arrange themselves alternately two or three feet from the base, and hang their little white banner cups to the breeze, one or two hundred to each plant from small arm stalks. The seeds, which are very numerous, are flat and black, and the size of those of a parsnip, and their receptacle is of the dimensions and figure of a green gage.

"The native Californians and Indians roast the green stems and roots in an earthen oven, and when properly cooked they are very sweet and nutritious, and favorite articles of food. The plant is said to be found in some of the mountains around San Francisco, and is well known to every Californian boy and Indian. In the southern counties they bloom every three or four years, and then die; but in the cold latitude of the bay it is probable they are more tardy in flowering and seeding. They are the very home of rattlesnakes, and the road-runner birds or correo del camino, and the humming bird and little native canary of the country find abundance of insect food in its bell flowers. Nothing can surpass the evident sense of life and enjoyment of these feathery admirers of the Maguey blossoms, as they dart in and out of each snow-white habitation of their musketo prey. The plant is called stackay by the indians around San Buenaventura and Santa Barbara; and akol by those of St. Diego, in which last locality it is very abundant."

How to Seed Michigan Marshes.

Mr. L. M. Rose, Amboy, Hillsdale County, Mich., gives the following directions:

"I have had some experience during the last five years in reclaiming Michigan marsh land—on a small scale—and am willing that others should be benefited by my experience. I have tried a variety of experiments and have now good timothy growing on muck five feet thick, where five years ago nothing grew but the rankest, coarsest kind of sickle grass. The subsoil is clay. A part of it has been mowed two years, yielding a very heavy crop of the very best kind of hay. If farmers will exercise a little common sense, and a great deal of perseverance, I think they will succeed. If I had another marsh to subdue I should proceed as follows: First: Draw off the surface water but nothing more. Deep draining leaves the land too dry. Second: If it could be plowed I should mow it in August, take off the grass and then turn it over with a sharp plow; harrow well and put on the seed—pure timothy. If it could not be plowed, or if I had not time to do it I would sow any kind of grass seed that I could get most easily, each spring and fall mowing and removing the grass and weeds each year until I got something better than sickle grass. Stock of all kinds should be kept off." Adjourned.

John W. Chambers, *Secretary*.

May 10, 1864.

Mr. Nathan C. Ely, in the chair.

Pear Tree Blight.

A. W. Wheat, Oberlin, Ohio, writes that a great many pear trees in that vicinity are affected with blight, and wants to know if the Club can give the cause and cure.

Dr. Trimble said it was remarkable that the disease was unknown in New-Jersey.

Mr. Wm. R. Prince said that he had never had any pear trees affected, except the St. Michael, at Flushing. His father thought that it was occasioned by the sap becoming overheated upon the south side of the tree. His remedy is to saw off the affected limb as soon as the blight is discovered.

Mr. John G. Bergen.—There are two kinds of pear blight—one summer and one winter. I do not think that any one can say what is the cause, nor give a cure. It is much worse upon some soils than others.

Filtering Cistern.

Jesse Hawley, Salem Columbia County, Ohio, gives the following as the plan upon which he built a filtering cistern that works well, and hopes it will be of use to others He says:

"I dug my well about 30 or 35 feet deep, 10 or 15 feet in the rock, walled from the rock up, dug or picked the well largest at the bottom, cemented as high as I wanted the water to rise. On one side of the well I dug about six or seven feet deep, and made the bottom in the form of half an egg, with the little end down, in order to bring the filtered water to one point, and then conveyed the same into the well, through a hole made for that purpose. I filled the filterer, with gravel and charcoal, putting the fine gravel in the bottom; then a layer of sand, then coal, and so on until full, putting coarse gravel on the top to receive the water from the conducter. I leave the top of the filter in the form of a basin. Where there is no rock the well for the cistern should be dug not less than 25 feet deep. If the wall is too loose to plaster, it must be walled six or eight feet at bottom, and only two or three feet at top, the mouth being secured by an iron ring. Such a cistern will give cool healthy water."

How to Grow Mushrooms.

Mr. Solon Robinson.—Mushroom beds are made in cellars or caves, artificial or natural. Horses' droppings are piled compactly ten or twelve inches deep, and pieces of the mushroom spawn are inserted in holes about six inches apart, and slightly covered. The bed is then smoothly covered with rich earth one or two inches deep, and the bed kept at the temperature of about 75 deg. Fahrenheit. It may need watering occasionally with luke-warm water. It will take five or six weeks for the plants to show, and they will mature in two days and continue in bearing several months. The mushroom spawn can be obtained at seed stores. It comes in form, and has somewhat the appearance of a sun-dried brick. It would be useless to make the roof of the caves of wood, as the room is kept so close and warm that it will decay and fall in within three years.

Crimson Peas.

Jonathan Lee, Salisbury, Ct., sends a sample of crimson peas obtained from an accidental seedling found in his garden, which he supposed might have been produced by a hybridization of the Black-eyed Marrowfat with the Victoria or Champion. These are from the third crop. The vines grow upon richly manured land ten or twelve feet long, thick set with pods, and independent of their value as food, Mr. Lee thinks they may be useful for coloring, as they afford a good crimson dye. He inquires whether such a pea is well known, and if so, what is its history. The flower of the vine is of a purple color, as are those of some other late bearers.

Mr. Prince said that these peas are common in England, and it is probable that a single one was mixed with those which the gentleman bought and planted. They are always mentioned in the London catalogues, and appear to be more esteemed there than here. I imported them thirty years since.

Laws of Maine which every other State should Copy.

Mr. Solon Robinson.—The following interesting letter from Mr. A. Drew, Augusta, Maine, I read in hopes that other States will follow the example:

"By a law of this State any person, to the acceptance of the selectmen of towns or the mayors of cities, who will construct a watering trough or tub by the roadside, into which a constant stream of pure spring water shall be discharged, acceptable to man and beast, shall be entitled to $3 annually from the municipal authorities, to be deducted from his amount of yearly taxes. In consequence of this law there is not a town, and hardly a road, in Maine where the traveler will not find, at convenient distances, the refreshment of a fountain of clean, living water, where he can conveniently water his horse, and where, generally by means of a tin vessel hanging upon a post near by, he may slake his own thirst with the real "Maine law" beverage. (This State, you know, by law prohibits all *stronger* waters.)

"Ex-Gov. John Hubbard, of the neighboring city of Hallowell, is entitled to the credit of originating this law. In the course of an extensive professional practice as physician and surgeon, he had often been called into various and distant parts of the State, journeying with his own beast he realized the want of frequent and accessible watering places; and a dozen or fifteen years ago, when he was Governor, he suggested to the Legislature the expedience of a law encouraging people residing upon the highways to provide watering troughs or tubs for the refreshment of horses, oxen and even human travelers, and offering them a bounty therefor by an abatement on their taxes. The Legislature saw the propriety of his idea, and legalized it at once. Since which time you can travel far on no settled road in Maine without meeting with a neat watering privilege, always kept in order. This Maine law for the provision of Adam's ale on all public roads, and the other Maine law for the prohibition of intoxicating liquors, as well as his paternity of the State Reform School for Juvenile Offenders, are three measures of Dr. Hubbard's administration, which are enough to give him a historic record on the archives of his native State.

"There is another law of the Dirigo State which I think is entitled to national commendation. By this law the authorities of towns and cities are authorized to give bounties to farmers or other citizens who shall ornament streets and roads where they reside, by planting out and protecting rows of hardy shade trees. This is already done to a great extent in many of our towns. True, the trees are yet young, but time and care will secure their full growth, when nothing can be handsomer than the view of roads and avenues made green and shady by the over-arching tops of magnificent trees. Had this work been done fifty years ago, farms would have risen a high percentage in market value, and Maine at this day would have been the most beautiful State in the Union for the traveler, as she will be, under the operation of this law, fifty years hence. All our highways, then, will be as refreshing and beautiful as any of the avenues of the Rhine.

"We have a great variety of excellent forest trees for this purpose, among which may be reckoned the elm, (both the erect and the weeping,) the maple, (sugar and white,) the linden or basswood, ash, hickory, cherry, butternut, willow, and other deciduous varieties, beside evergreens; the silver fir, spruce, arbor vitæ, hemlock and pines. By a good taste in arranging these roadside linings, having reference to summer and winter ornamentations, the effect may be greatly enhanced. What, in the hot season, is more refreshing than a shaded highway, especially if to this is added the Maine law luxury of cool water fountains every mile or two?

"A word or two with regard to the rock or sugar maple. These are indigenous to our State. The forests are full of them. Some of the largest and handsomest trees I ever saw are in the native forests of Aroostook. Our white oaks or pines are hardly more valuable than the rock maples. For fuel they are about equal to hickory; for ship timber they are excellent; for furniture, especially the bird's-eye species, they are valuable, and for the saccharine quality of their sap everybody knows their sweetness. As ornamental trees, too, they excel. The forms are symmetrically conical, the branches and foliage thick and dense; and then they are remarkably clean, never being polluted by vermin as the elm is. True, they are liable to borers, like apple, pear, linden and accacia trees, but these make no external offences.

"Many years ago the streets of our city (Augusta) were nearly all lined with shade trees, consisting mostly of sugar maples. This was done at the instance of the late Judge Fuller. But he, and others after him, have committed one great error. Before setting out the young trees they decapitated them, in order to make them send out lateral branches. This contradicted the intentions of nature, which never intended to have the head of anything cut off; and the consequence has been that a weakened, rotten place was occasioned where the decapitation took place, and the uppermost lateral branches, on becoming large, have split off from the main stem, and thus ruined very many of our otherwise beautiful trees.

The Chairman—Dr. Hubbard, who is mentioned in the letter, and with whom I am intimately acquainted, is a gentleman that deserves well of his country.

Mr. John G. Bergen said: I cannot too highly commend the whole of this letter to public attention, and particularly that part of it that recommends planting shade trees by the road-side. There are a great many places where road-side watering places cannot be provided, but none where trees cannot be planted—none where the value of farms would not be increased. I must differ from the direction which seems to indicate that the tops of trees never should be cut off. If it is correct in regard to the maple, it is not in most trees, for they are apt to grow so tall in nurseries that the head will not assume a handsome shape unless cut off when transplanted.

How to Plant Fruit Trees.

The Chairman inquired how he should plant a lot of pear trees, ordered from Rochester six weeks ago, which he is now advised have been shipped, and will probably be in a bad condition when they arrive. Will it be best to water them freely?

Mr. Wm. S. Carpenter.—The roots of the trees should be cut off to about ten inches each side the tree before it is planted. The roots should be well spread out and the earth placed round all the roots with the fingers; it is useless to use water; the earth should be well pulverized, and the trees should be mulched with litter. I received some choice trees and plants from France; these trees had been packed two months, and I was surprised on opening the boxes to find the trees in perfect order. Among them were some Rhododendrons and Magnolias. These plants were in splendid condition. They were in full blossom. The roots were well packed in moss, which had been slightly moistened. The subject of packing trees is an important one and is hardly known among our nurserymen.

The Secretary enquired how they were packed?

Mr. Wm. S. Carpenter.—They came in a large box, the roots closely packed with moss at each end of the box; the tops of the trees were towards the center, and were loose.

Mr. Geo. Bartlett said that, in planting a great number of trees, he had been most successful in the following practice: When the tree is placed in the hole it is held in position by one man, while another pours two pails of water in, and immediately sifts in fine soil, previously prepared. The water causes it to pack so firmly about the roots that the tree will stand without staking better than with stakes if planted dry, and, what is better, never fails to live. That is the way I would plant those which the Chairman supposes will be somewhat dried up when he gets them.

Mr. John G. Bergen.—I think the ideas advanced by Mr. Carpenter are correct. I consider it very important that the soil should be well prepared, it is necessary that the branches should be shortened also; in very dry weather I use a little water; the earth should be well packed round the roots.

Mr. Geo. Bartlett.—I fully concur in the mode of pruning the roots and tops, but my plan is to dig the hole large, and, after putting in the tree, I pour two pails of water into the hole and sift the well-pulverized earth round the tree; by this means I have always been successful with the trees I have set out.

Hard Soap for Family Use.

Mrs. Mary A. Walker writes the following letter from Burlington, Vt.:

"I have noticed in your reports of the Farmers' Club that occasionally you favored the ladies and kindly lent a helping hand whenever they asked for information. And now, don't turn a deaf ear just because this communication does not come from a man, upon grape culture, potato rot, or moon theories. Do you not know, fathers, that of the 200,000 that listen weekly to your words, nearly one-half are females, and, of course, they watch eagerly for anything which will benefit them. In short, as letters must be brief, we want to know how to make hard soap. Farmers' wives all have a will, and would it not be a luxury for them to make and lay by for the 365 days 100 pounds of white hard soap? Remember that for every pound of hard soap we buy we have to pay 28 cents. So please donate a part of a session to us."

The Secretary.—I have seen hard soap made in the following way: "Take 25 pounds of tallow and two quarts of olive oil—put this in your boiler and set it over the fire until the tallow is melted, then add 10 pounds of caustic soda ley, strength 32 per cent., stir with a wooden spatula; the heat must now be increased and the mixture kept constantly stirred to prevent it adhering to the bottom and sides of the boiler; at the end of three or four hours the mixture assumes a whitish appearance, as, by continuing the heat, the aqueous part is entirely evaporated and the mass reduced to a perfectly dry state. The heat is now increased, and in a short time the mass becomes again of a liquid form and changes to a brownish color, which indicates that the combination of the fat with the alkali is effected. The boiler is then lifted off the fire, but the stirring is continued so long as any danger of scorching is apprehended. The second part of the operation consists in breaking up the product which is now in a solid form. To this add one gallon of pure water and thoroughly agitate the mixture for half an hour. The boiler is then set on the fire and the contents raised to the boiling point and kept so for about three hours, during which time the stirring and agitation must be continued. So soon as the evaporation has been carried to the desired extent and the soap appears of a proper consistency, it is allowed to cool gradually. The whole contents of the boiler, while yet in a liquid state, are now put into the ordinary frames and left to cool. The day following the contents of the frame will be found hard enough for cutting."

Mr. B. T. Babbitt, New York, furnishes the following receipt: "Take one pound of concentrated potash dissolved in 12 quarts of water in a kettle calculated to make the soap, add to the ley 5 pounds of grease, and boil slow until it becomes soap, which will take from one to five hours. Add water to the kettle as it boils down; keep about the same quantity in the kettle until it becomes soap. Then add 3 ounces of common salt and boil 10 minutes, which will separate the water from the soap. If rosin is wanted, melt that in a separate kettle; add ley to it until it becomes thick, which will take about one quart to a pound of rosin. Then add the rosin to the boiling soap before the salt is added. The salt causes the soap to separate from the water and rise upon the top. When cold it can be taken off or dipped into molds while hot. The above hard soap may be perfumed just before it is cool. It will be understood that when the ley is too strong it will not make soap, therefore if the kettle, while boiling, is not kept with about the same quantity, the ley would boil down too strong before the soap is made."

A lady correspondent furnishes the following: "This is my receipt, and is easier than the one given: Take two pails of soft soap, add a pint bowl half full of salt; bring it to a boil, and let it stand till cold; cut up and put into a kettle; add half a pound of soda-ash or sal soda and four ounces quick-lime, previously slaked with two quarts of boiling water and settled clear; drain off the clear water into the soap; boil all together till the soda is dissolved, and then cool a little and turn into shallow boxes; when cold, cut into bars and dry in the sun."

Mr. Solon Robinson.—This is doubtless a good process. So is that given by Mr. Babbitt.

Mr. R. S. Hinman, Pleasant Vale, Ct., sends the following for making a first-rate article of hard soap for family use, which is good for clothes-washing or toilet use: Clean white grease, 6 pounds; sal soda, 6 pounds; lime, 3 pounds. Slake the lime in 4 gallons of water, and add the soda and heat to boiling, and then stand till the water will pour off clear, quite free from settlings. Now add the grease and boil till it is soap, and, when cool enough, pour into a suitable form to cut out bars when cold.

Hard soap can also be made by using an article sold under the name of saponifier, by following the directions given on the box.

Wheat and Fruit.

Dr. S. J. Parker of Ithaca. It has been said that the past winter has been a severe one on fruits and wheat and other products. If so, we have a favored spot, here in the Cayuga valley. As to wheat, no more complaints have been made of loss than usual. Most of our wheat of this eastern part of the Genesee country is of the winter variety, little or no snow covered it the past winter. It stands a little thin, yet for miles in the sight of my house the lovely green of thousands of acres attest that we shall have a fine crop if the balance of the season is good. Four years ago much spring wheat was sown as the insect ruined the wheat, but the insect is gone and the winter wheat is sown as the best wheat.

Peaches are opening their blossoms. Cherries and pears and apples will be full bloom. Currants, though denuded by the worm of every leaf by July 25th last year, and had not a leaf for the remainder of the season, are now n full leaf and full of fruit buds just opening.

Grape buds are safe, and expanding finely, though the roots are blackened by the open winter, near the top of the soil, and the grape crop promises to be a rich one.

A letter from Kelly's Island, Ohio, says: "Yours, and your box sent me of grape roots are safe at hand. I see your roots have suffered a good deal, about as much as our's here, by the sudden cold of January. I never saw roots killed half as bad as last winter. Thousands of roots have every fibre dead. One man had Delaware roots for sale, strong plants, and I found every one dead. My Delaware, Concord, Diana, &c., stood well. Allen's hybrid killed to the ground, as were Lincoln, Clara, Herbemont and others."

Now what I want to note is, that though my roots look blackened near the surface, say eight inches off the top of the ground, yet they are not dead, nor are the fruit buds injured. My Lincoln is killed root and all. Taylor Bullet lost all the fibers and spongioles of the root, yet the vine and fruit survives. Diana also swells its buds slowly and has its rootlets injured. Indeed I regard this as peculiar in several grapes and ask attention to it.

The slowness of the expansion of the buds show that the vine has to revive the rootlets before it can grow vigorously. Several of my new seedlings that I hybridized in 1861 and 1862, are dead root and all, even when covered with six inches of earth.

But on the whole, nature wears a smiling face and flourishes well in this vicinity, notwithstanding it has been a winter with less snow than ever before within the memory of man.

Adjourned. John W. Chambers, *Secretary.*

Mr. Nathan C. Ely in the chair. *May* 17, 1864.

Poor Man's Manure.

Mr. Nathan Whitten, Etna, Penobscot county, Me., says: "I wish to give my experience about what has always been termed 'poor man's manure.' Several years ago I was breaking up pasture ground in April, upon which to plant potatoes. A strip about two rods wide and twenty rods long was left unfinished at night. During the night four or five inches of damp snow fell, and the next day that was turned under. No more was thought of the circumstance until the crop made its appearance. This was when good crops of potatoes could be produced without manure; and no manure was applied in this case. The whole piece was treated alike; but when the potatoes came up, this strip developed rank, vigorous plants, while the other portion of the field produced far more feeble plants, and exhibited the same appearance throughout the season. A fair crop was dug from the two sides of the field, but from the middle it was truly marvelous, producing more than twice as many on the same amount of land.

"I have been thus explicit because I consider facts better than theory. Now it makes little difference to the farmer what chemical or philosophical principle is involved in this question; whether one of the thousand and one elements so much talked about now-a-days, or all of them, produced the result; or whether it is some other more subtile gas or fluid, that defies detection, so long as he knows the result is favorable to crops. I know this is an isolated case. I could state others, but think this will do for the present."

There was plenty of theorizing over this statement, but facts of any importance were not adduced. Mr. Bartlett said that as freezing water expels all gases, he could not understand how snow could contain ammonia. Mr. Solon Robinson said that when plowed under it would tend to make the furrow slices lie more lightly and aerate the soil. Turning dew under is beneficial to land. Snow mixed with flour, only dissolving just enough to wet it and make into cakes, and baked immediately, makes light, sweet biscuit. Why not make the land light?

Mr. W. S. Carpenter conceded great benefit to land from spring snows, acting as a mulch, but did not believe that it could be of any benefit, plowed under. He and all other doubters are recommended to try the experiment.

The Goitre in Lambs.

Three letters in answer to the inquiry of Mr. Dean, of Parma, Mich., for a remedy for this disease, were read. One from a correspondent who writes from Ripton, Vt., recommends a surgical operation to remove the lumps in the necks of young lambs. As soon as they are discovered, fix a pair of splints, one upon each side, so as to prevent the lump pressing upon the windpipe, which is the cause of death, and then get a person of sufficient skill to cut out the lump and sew up the wound. It is important, the writer says, to save lambs in that vicinity, since at one year old they often sell from $100 to $1,000 each, and some have been sold at $2,000. One two year old ram sheared a fleece of one year's growth that weighed 23 lbs, and he then weighed only 102 lbs.

Mr. Milo C. Peck, Benson, Vt., says: "One year I lost two-thirds of my pure breed lambs from the same disease; I attribute the cause to high feed on grain, and lack of exercise for the sheep. I consulted 'Youatt, Skinner & Randall's Book on Sheep-Husbandry,' and found that there was no cure for it save by the less use of grain and more exercise. They give the name of goitre or swelled neck, probably not one in a hundred live to mature with them in their throat. Mr. Joseph Sheldon, of Fair Haven, in this county, has a buck bred by Victor Wright, of Cromwell, Vt., which has them, and yet he is hale and hearty, and is the most valuable Spanish Merino buck in this county, and is valued at $3,000. He never entails the bunches in his lambs, and, therefore, it cannot be hereditary. My practice has been since I lost so many lambs from this disease to give my brood ewes good hay and water till about the 1st of March, then I commence giving them lightly of grain till they begin to drop their lambs, then give grain and roots freely. Since I have pursued this course, I have had no trouble with goitre."

Mr. A. G. Percy writes from Newark, Wayne county, N. Y., and contends that the disease is organic, and that "the only cure is to cease breeding from bucks or ewes that have any connection or relation to flocks that have produced them. I have no doubt, in my own mind, that the disease is hereditary, and of a scrofulous nature, as bucks do not always transmit it, for it is well authenticated, that bucks having large lumps in their necks have been used, never producing a single lamb that had lumps in its neck; then again, bucks that had small lumps, have transmitted to almost every lamb that they sire."

Mr. Aaron Reynolds, Jackson, Mich., says he thinks half the lambs in that county die of goitre. "Six years ago I saw the first case of goitre. In two years I did not raise one lamb in five. My ewes were all fat. I sold them to a man who kept them very poor; says he has no trouble with goitre. Two years ago I bought 40 ewes in the fall; all were very poor. In the spring they were all in high order. I raised 37 lambs, and had three or four cases of goitre. This spring the ewes were all fat. Number of ewes, 30. Several had twins. I have raised 8 of them. All had swelled neck but four. Some lived two days, and died. Those that make out to live do well. I have a pet wether four years old that has it, but it never seems to get any larger. If the swelling is close to the jaws, they are sure to die; if down the middle of the neck, they are more apt to live. As many reasons are assigned as there are for potato rot. The poorest kept flocks suffer but little. Ewes in high order have but few lambs that live. I keep but a small flock, from 60 to 100; keep them in yard from December to middle of April; never allow them to get wet while there. I feed clover and timothy hay, with wheat straw, with plenty of water. Thus they are in better order in spring than in the fall—in fact, they are fat."

A Valuable Invention for Strawberry Pickers.

This is a stool only weighing one pound, made with a standard round top attached to an iron sole, which is strapped to the foot, so that a person may use with both hands full, and when he desires to move forward, his foot moves the stool along. It is the invention of E. Whittlesey, Hamilton, N. J., and, we believe, is designed to save many a back ache of gardeners, florists, and strawberry pickers.

How the Risling Grape is Grown in Germany.

Mr. Michael Haas, Mendon, St Joseph County, Mich, gives the following account of the way that the Risling Grape is trained in Germany: A stout trunk of the vine is formed about three feet high. By the side of this a stake seven feet high is planted. Two canes are trained upon this stake, and when they reach the top they are pinched off. In autumn these canes are laid down upon the ground. Next spring they are raised and tied in the form of a bow, and thus produce fruit. In the meantime two other canes are trained to the top of the stake. These are laid down the next winter, and the two canes which fruited, cut away. Some full grown vines are allowed to produce five or six bearing canes. The vines are planted from eight to ten feet apart. Mr. Haas wants to know if the Delaware and other vines cannot be treated in the same way in this country.

Mr. G. H. Greenman, Milton, Rock County, Wis., who wants information about grape culture, particularly under glass, is recommended to buy Chorlton's small book upon cold graperies, and Fuller's Grape Culture, and he will get a thousand times as much information as he could expect from the discussions here.

Sowing Small Grain with Corn.

Mr. Michael Haas, Mendon, St. Joseph County, Mich., wants the Club to advise the farmers to sow small grain with Indian corn, and wants to know if any one has had experience with winter rape, which is much used in Germany. If sown in September, it "comes off the next year time enough to sow wheat. It makes a thick mat in the fall, and remains green all winter, and would be just the stuff to plow under for wheat, as we, now-a-days, don't want it for oil. This is only my say so; I wish to have the Club give us their advice about it." The seed of rape, he thinks, would cost less than rye, and be equally good for winter feed for sheep. Any crop that will cover the ground and prevent baking, even if it has no other value, Mr. Haas thinks, would more than pay the cost of feed and sowing among the growing corn.

This matter was well approved by several persons present who had had some experience with rye, wheat, and turnips sown among corn.

Manuring Strawberries.

Mr. Peleg B. Daniels, Stephentown, N. Y., wants information about top-dressing strawberries in spring.

Mr. Solon Robinson. — The best time is autumn. If coarse manure is then applied, it serves as mulch and fertilizer. If the autumn dressing has been neglected, use fine compost liberally early in the spring. Ground may be too rich for strawberries. It often is too poor. It seldom is too rich.

Opium Poppy.

Mr. A. H. Mills, Middlebury, Vt., says that "the seed distributed by J. Stork, Coventryville, do not produce the opium poppy, but most beautiful flowers, while the real opium poppy flower has no beauty. The seed capsule of the latter is as large as a good sized hen's egg. The two plants are as unlike as crab apples and pound sweetings." The Club will probably be able to distribute seed next year, as some seed sent by Mr. Mills—all he had—has been planted by one of the members.

Mr. Wm. R. Prince.—The opium poppy, about which inquiries are made, is not a handsome flowering sort. The flower is white, single, not large, but the seed bulb is larger than the double-flowering sort. The seed can be obtained at seed-stores, or at apothecaries' shops, where the heads are kept for sale for medicinal purposes.

Apple Trees for Fence-posts.

Mr. G. W. Stebbens, N. Y., writes as follows: "As an item of useful information, I will describe a fence of which apple-trees serve as posts, which has been perfected by Mr. Foy of the Chatauqua County Nurseries. A board fence is made in the usual manner, except that the boards are nailed to light pieces of cheap timber in place of posts, and being set upon flat stones, the whole is fastened by means of hooks and staples. This makes not only a strong and durable fence, but also a profitable one, as we may reasonably expect each post to furnish five or ten bushels of apples in a season."

Cure for Scratches in Horses.

Gardner Griffith, Iowa City, says: "This disease may be speedily and thoroughly cured by shaving closely, but not so closely as to draw the blood, the warty bunches on the inside of the legs called castors I think. I have tried it with perfect success after failing to effect a cure by the use of the usual remedies. I make no claims to horse philosophy, but will suggest that these castors serve as an outlet for matter necessary to be discharged, and when their pores become closed, as they probably do sometimes in muddy travelling, this matter seeking an outlet causes those cracks about the hoof called the scratches."

Mr. W. S. Carpenter stated that white-footed horses are much more liable to this disease than black ones.

Potato Experiment.

Mr. J. W. Leland, Baltimore, Vt., makes the following statement: "In 1862 I put some potatoes on a plot of grass ground, covering them with mulch to the depth of three or four inches, and they grew and produced bulbs to the size of hen's eggs, and about as white. In 1863 I planted them in the centre of a potato patch, and the result was, at digging time, those described above produced potatoes perfectly sound and good, while others in the same neighborhood were badly affected with rot. As the experiment is very easy of trial, I would reccommend to the farmers to try it. It would be a very easy process to raise a supply for seed yearly by the above described method."

Remedy for Worms in Seed Corn.

Mr. H. A. Sheldon, of Middlebury, Vt., sends the following:

"Last season my sweet corn failed to come up, and the planting having been followed by rainy weather, I attributed it to rotting. The second planting also having failed, I examined the hills, and found in the kernels a small chocolate-colored worm, not larger than a small pin, from ½ to 1 inch in length, with pairs of legs extending its whole length. I counted 12 in the husk of one kernel, the inside being all eaten away. Some sprouts an inch long were eaten off. I should like to learn the name of this worm, never having seen it except in my garden. I then took a half an ounce chloride lime and a quarter of an ounce of copperas, with water enough to mix with one pint of corn, leaving all the corn immersed, and allowed it to soak twelve hours. The seed so prepared came up finely."

The Honey-Bee in California.

Mr. S. W. Jewett sends the following:

"Within a few years, many a hive of bees has been imported into this State and Oregon. It is now fairly demonstrated that the climate is congenial, and that they are very prolific, and manufacture a good quality of honey, equal in flavor to any Eastern honey, except that from white clover. Bees on this coast and interior gather much of their sweets from the willow and the oak. Plants in the morning are often covered with the honey dew. When young swarms emigrate, they accept the best accommodations which they can find. Sometimes their lodge consists of a standing hollow tree, or trunk upon the ground, which is often filled with bees and honey. Quite often, they occupy burrows in the ground, the home of wild beasts such as the wolf and the badger. Many cattle annually die in this State; sometimes their flesh is entirely consumed by insects and small animals, leaving only the bones and hide in quite a perfect state. In Santa Barbara, the attention of a gentleman was called to examine the carcass of an ox, then admitting at each end the egress and ingress of numerous winged insects; at one end he soon withdrew his hand, and a comb well filled with honey. This much increased his excitement and curiosity. After well preparing himself for the contest he made an assault and soon came off victor, taking from them a booty of over 200 pounds. I saw the notice of an Aparian who set up 35 large healthy swarms at San José; the season and pasture proved fine for them. They soon multiplied beyond all expectation. When the honey and swarming season was well over, he conveyed them by boat to Stockton. There set them up again. It was said, at the final close of the season, the bees had multiplied their colonies to more than one thousand, and the amount of honey exceeded twenty tons. Good swarms multiply about four times and young colonies twice in favorable years."

Introduction of the Honey-Bee into California.

The Secretary—During the year 1851, Mr. Francis Kelsey, a somewhat noted apiarian, was at the rooms of the Institute, then located at No. 351

Broadway, and, during a conversation with Mr. A. D. Frye, spoke of the advantages of the climate of California for the production of honey. Mr. Frye observed that it would be a fortune to any one that would take the honey-bee to California, as he had not seen any during his travels in that country.

In fact this little creature had never been known in California; the Rocky Mountains were impassable to it, and the great heat of the Isthmus destroyed the wax of the honey-comb, so as to render it extremely difficult to carry the bees across it; even sealing wax on letters melts in the transit.

Mr. Shelton had just returned from California, where he had been engaged in agricultural and horticultural pursuits; he attended some of the meetings of the Club. I mentioned to him the observations made by Mr Frye, and advised him to take out with him some hives of bees.

Mr. Shelton procured fifteen hives. A friend of mine, who went fellow passenger with him, informed me that eleven of the hives were lost in crossing the Isthmus, by the excessive heat melting down the combs and smothering the bees with the honey they contained.

He arrived in San Francisco, in the spring of 1853, with four of the hives in fine condition; he intended to locate them on the Stockton Ranch, at Santa Clara, but Providence ordained it otherwise, as Mr. Shelton was unfortunately killed by the explosion of the boiler on board a steam vessel while making an experimental trip.

Mr. Shelton sold one of the hives on his arrival at San Francisco, at a fabulous price, the others were disposed of after his decease.

I take this opportunity, while the subject is under discussion, of giving credit to Mr. Shelton for introducing the honey-bee into California, as I believe his bees were the first introduced, and their swarms have spread over the whole country.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

May 24, 1864.

Mr. Nathan C. Ely in the chair.

MANURE FOR WHITE BEANS.

Frank B. Mills writes from Dunbarton, N. H.: "What is the best fertilizer for white beans on light, sandy loam?"

Mr. Solon Robinson.—The answer to this is very simple. The best is thoroughly decomposed stable manure. The next best is good compost, of which home-made poudrette stands first. This is the opinion of all present, including some farmers who "know beans."

PROTECTION TO CUCUMBER VINES.

E. M. Bullard, Grand Rapids, Mich., says that he finds the plan fully successful, which has been so often recommended by this Club, to protect squash vines from bugs, by putting a box around the hill. He uses six inch siding. He also says that he is building a machine that will dig ditches for drain tile, and one to fill them again by horse power.

A Cheap Cure for Vermin upon Cattle.

Joseph Nichols, Honesdale, Penn., gives the following simple remedy for lice upon domestic animals: Having an old mare that would not work nor breed, he left her to shift for herself among other stock in the yard, and during the winter she became extremely lousy. In the spring he used her to pack bags of plaster (ground gypsum) out to the field, and it sifted through and covered her so that she looked like a white horse instead of her natural color. The result was that the lice all died. Applications of gypsum to cattle have proved equally successful.

Several members inquired whether the application would be equally efficacious at other seasons, since feeding cattle grass cures lice.

Does Flaxseed Hybridize?

A. Farmer, Burlington, Wis., says:

"I wish to inquire of the Farmers' Club whether flaxseed hybridizes with yellow seed. I sowed a piece of ground last year with flaxseed, in which only now and then a yellow seed could be found—one-tenth of the seed from that crop was of yellow seed."

Mr. Solon Robinson.—How can any one tell what is meant by "yellow seed?" Is it a wild seed, or is it what is known in England and this country as charlock, the *raphanus raphanistrum*, or *sinapis avensis*, the latter being known in some places as wild mustard? If it is either of these, we can assure the inquirer that flax does not hybridize with it, and we do not know any plant with which it does hybridize.

Mr. Wm. R. Prince.—Common flax, *Linum usitatissimum*, as is well known, is cultivated for the fibre or thread obtained from it, and for the oil which we extract from its seeds. It is an annual plant, long cultivated in Europe and America. The flowers are usually blue, but a white flowering variety is extensively cultivated at Riga, in Russia, and in Belgium, where, by way of distinction from the yellow varieties, it is called *Lin royale*. They cultivate in Europe four varieties of the yellow flowering flax, and of these the Riga variety is the most extensive. The plants are of taller growth and less branched than the other varieties, and consequently yield a much larger staple. We have a similar tall growing variety in America, which is probably identical. This length of staple is a most important advantage, and as the flax culture is now being extensively developed, our cultivators ought to make it a point to obtain their supply of seed from the best improved varieties, and some especially of the tall yellow flowering kind.

There is but one species of flax indigenous to North America, the *Linum virginianum*. It attains a height of one and a half to two feet. I am not aware that its textile merits have been tested. The writer of the letter from Burlington, Wis., suggests that our common flax plant had hybridized with a yellow flowering weed of that vicinity. I assert positively not, as the two plants referred to are of distinct genera, and there is no more possibility of hybridizing two distinct families of plants than there is of changing the progeny of horses and cattle merely because they graze in the same field.

Gapes in Chickens.

A gentlemen of intelligence and observation writes from Franklin, New York, upon the above question as follows: "This question has been discussed by the Farmers' Club, as appears in the Transactions of the American Institute for 1862, page No. 81, and several opinions advanced as to the probable cause of the disease. A correspondent, though not directly, yet impliedly, attributes the disorder to in-and-in breeding, want of cleanliness in the roost, &c. Two others, members of the Club, dissent from this view, one of whom says 'he has invariably traced the gapes in chickens to feeding them corn meal recently wetted.' The meal, he adds, should be mixed a day before it is used, if not it swells in the chicken's crop and causes the disease. Neither of these theories appears to me to be sustained by facts. Last year, wishing to change by breed of fowls, I obtained eggs from a neighbor whose chickens were never troubled with the gapes; but I was disappointed by seeing every one of the chickens hatched from those eggs, about 80 in number, more or less severely afflicted with this distressing complaint. I am in the habit of cleaning out the roost once a year, and last year I made a new one in a different part of the barn from that which had hitherto been used for this purpose; and when the young chickens were confined I used to change the situation of the coop daily, so that neither changing the breed, or cleaning the roost, or changing its site, has had, with me, any appreciable effect in preventing the disease. If the gapes are caused by 'recently wetted corn meal swelling in the chicken's crop,' why does not the disease follow the condition of that organ—ceasing altogether in the morning when the crop is nearly or quite empty, and beginning again only after a full feed? and why will not the substitution of some other food for the 'recently wetted corn meal' immediately allay or wholly remove the trouble? Why do not very young chickens—those a week or ten days old, and also goslings and old hens fed on recently wetted corn meal—have the gapes as well as chickens three or four weeks old? Three years ago a late brood of chickens picked their living solely from the fields, the hen, which was very wild, never coming near the house until driven in by a scarcity of forage in the fields; yet the chickens all had the gapes. In this case the disease was not caused by corn meal or whole corn, for they had neither till the approach of cold weather. When we consider that the chickens crop is situated upon the *surface* of the body, and is so elastic that it easily accommodates itself to its contents, it seems to me absurd to suppose that the pressing of the crop, though ever so full, against so firm and rigid an organ as the windpipe could cause the gapes. The recently wetted corn meal theory, therefore, to say the least, rests upon a very *mealy* foundation. A few days since I dissected a chicken which had died of the gapes half an hour before. In the windpipe I found nine worms, one an eighth of an inch in length about an inch from the larynx, and the others some two and a half inches lower down, varying in length from one-half to three-quarters of an inch, and of a deep red color. These eight worms, which were about the size of a pin, were all lying together in the windpipe, and completely obstructed the passage of the air. On placing one of them under the microscope, I had a tolerably fair view of its anatomical structure. The head was oval and a very little larger than the part of the body adjoining, and had a somewhat large opening partly upon one side. The other extremity was pointed, of a dark color, and nearly opaque, having no orifice that I could discover. Two intestines were traced running from the middle of the body to about one-eighth of an inch from the extremity, then returning to the middle, where the folds and convolutions became so numerous that I could follow them no further. Another vessel, extending about two-thirds the length of the body, and of a much larger size than the intestines, I took to be the ovary. It contained hundreds of ova, oblong vesicles, the transverse to the longitudinal diameter being as one to three, or nearly, and packed together in the most regular order, completely filling the sack which contained them. All of the eggs were of the same size, and all presented the same appearance, except that some of them had vacant spaces within, as if they were less mature than the others. On examining one of the eggs with a higher power, it appeared to be filled with granulated matter, and to be divided into two parts by a dark line at a right angle with the longitudinal diameter, and about one-third of the distance from one end. Another peculiarity of the worm was a process or proboscis attached to the body about one-eighth of an inch from the head, and a little more than one-eighth of an inch in length, and considerably smaller than the body. It was tubular, transparent and colorless. The worms seemed to lose their deep red color in part by standing some time in water, but I could discover no blood globules either in them or in the water. I examined all the worms successively, and they all presented the same general appearance. It did not occur to me at the time to search the inner surface of the windpipe for eggs. Not feeling the interest in this subject before having read the discussion by the Farmers' Club, above referred to, that I have since, I did not make as thorough an examination as I might have done, but from what I saw I was and am fully convinced that the immediate or proximate cause of the gapes in chickens is worms in the trachea. The obstruction of the air passage produced by the worm occasions difficulty of breathing, and causes the chicken to open its mouth at each inspiration; and the frequent sneezing or coughing of the little sufferer is its effort to eject the foreign substance. How the worms get into the trachea and what becomes of them is more than I can say. I have no remedy to propose for the disease, but I presume the horse hair or the feather introduced into the windpipe may often allay, and perhaps in some cases wholly remove the trouble. I agree, however, with the members of the Club that prevention is better than the cure, and I have no doubt it will be preferred and generally adopted *when it shall have been found out.*

Protecting Vines from Cut-Worms.

Mr A. W. Davis, Marsfield, Tioga County, Pa., says that he effectually prevents the ravages of the cut-worm upon his choice vines and garden plants in the following manner: He digs a little ditch around the hill, so as to make a steep embankment of dry, fine particles of soil, up which, if the worm attempts to crawl, he tumbles to the bottom of the ditch. Mr. D. also fences them out with little hoops, made by splitting the ash hoops of flour barrels, and tacking the ends together in a circle just large enough to inclose the plant; the edge being inserted in the soil, the worm will not mine under it nor climb over it.

Packing Trees for Transportation.

The Chairman said that he thought that those who do pack trees honestly ought to be commended. He said that he had recently received from two well-known nursury firms in Rochester, 60 standard pear trees, ordered late in the season, and although the bills bear date May 4, they did not reach his country seat, Norwalk, Ct., until the 14th, having, as he supposes, laid a week in Albany or other depot, and yet, owing to great care in packing and plenty of moss and not very wet, they were in fine order. If too wet, the small fibrous roots will be apt to rot. Credit should be given to the firms of Frost & Co., and Gould, Beckwith & Co., and all others who take great care in packing: not carlessly, as if because sold they had nothing more to do or care for, as is sometimes apparently the case. He also stated another case to prove the benefit of good packing. He said in June, 1862, I bought at Jefferson Market, a good large size apricot tree, (as large as my wrist), which was then in full bloom. The seller said it had been there nearly two months, and being crooked, no one would buy it. I set it out on the north side of the street in rear of my residence, the blossoms soon withered, and I thought the tree would die, but after several weeks it leafed out, and in 1863 bore fine fruit, and now has a fine crop maturing, showing that apricot trees can be transplanted safely while in bloom, if well packed, as this was.

Mr. Wm. R. Prince.—Well conducted nurseries always keep men who perfectly understand the business of packing, and I never heard of any trees sent from Flushing that died in their transit; some years ago I sent some trees to Russia, and we never heard of the smallest plant that perished for the want of care in packing. There should be plenty of well prepared moss put around the roots, damp, but not wet.

Mr. Geo. Bartlett said he had no doubt that Mr. Prince knew how to pack trees—he had never heard any complaint upon that point. The trouble was that they did not always turn out according to the labels.

Mr. Wm. S Carpenter.—I have been in the habit of receiving packages of plants from Europe, and from nurserymen in various parts of our country, some of them were well packed, and the trees and shrubs although a long time on the passage, yet they arrived in perfect condition. Some of our nurserymen are very careless in their mode of packing, sometimes only a little wet straw it used, by this careless mode of packing and sending out trees great loss and disappointments are experienced. I received one lot of trees from New-Jersey, that were mis-sent by the nurseryman, so that they were a few days over the expected time, and owing to the very bad packing, not five per cent of them lived.

Mr. Solon Robinson made the same statement in regard to a lot received from Rochester.

Mr. Wm. R. Prince.—We pack our trees in moss from the swamps, and if properly done there is no danger of their dying if they are months in getting to their destination. The proper time to plant trees is when they are in a perfect dormant condition. I prefer the autumn to plant trees, and I think full twenty-five per cent is gained in planting at that season.

The Cause of Blight upon Fruit Blossoms.

Mr. S. writes from Orange, N. J., May, 24: "The fruit trees of all kinds, gave an early promise of an abundant harvest; indeed, I never saw them look better; but within a few days, or weeks, *something* has occured to *blast* all the cherries and most of the currants, and also has affected apple and pear trees to some extent. What can have caused it? Can it be the effect of the recent prolonged and heavy rain-storm? Did you ever hear of fruit blossoms being 'drowned' by such rains? It is a great disappointment to find that the fruit-crops will be light in these days of high prices of meat, &c."

Mr. W. S. Carpenter insisted upon it that it was owing to the storm, and Dr. Trimble that it was caused entirely by the warm wet weather that rotted the capsule of the fruit, particularly white cherries, and caused the fruit to decay.

Mr. John G. Bergen says that the cherry trees are much affected with insects or some other disease, which will very much diminish the crop. Some say it is caused by easterly storms, but he does not believe in that theory.

Dr. Trimble says that he has carefully watched the disease, and insects have nothing to do with the case; it is all caused by changes in the atmosphere. He also declares that he has proved by investigation that the curl-leaf of peach-trees, and all similar diseases, are caused by insects. The aphides will very much lessen the crop this year, and would much more, but for the birds, which destroy vast quantities of them.

Mr. John G. Bergen controverts the theory of insects causing the curl, because he has tried in vain to discover them upon curled leaves with a good microscope. With all of our theories we are still very ignorant.

Fragrant Grass.

Mrs. Mary Treat, Blairstown, Iowa, writes: "Inclosed you will find some specimens of a native fragrant grass. It blossoms with our earliest flowers and is very fragrant, making it a desirable acquisition to our spring bouquets. The specimens I send you were gathered in April. It retains its beauty and fragrance for some weeks. If you would like some seed, I will send it gratuitously as soon as it ripens."

Mr. Wm. S. Carpenter.—It is a very beautiful grass, and I hope the secretary will write to the lady thanking her for her offer.

Mr. Wm. R. Prince—The specimens of grass sent to the club by Mrs. Mary Treat, of Iowa, is the *Hierochloa borealis*, Seneca grass or sweet summer grass, described by Torrey and Gray, and in Eaton's Manual of Botany. It is a perennial, and found abundantly in the Newark and Hackensack meadows, in the environs of Seneca Lake, and in many localities in the western States. It is remarkable for its sweet and pleasant odor. It is a native creeping species and spreads rapidly. A species of Hierocloa growing in Norway and northern Germany greatly resembles, and by some botanists has been deemed identical with this plant. I differ

In the Eastern Hemisphere, however, they possess a grass of a distinct genus, which presents a counterpart of our own Seneca grass as to character. The *Anthoxanthum*, or sweet scented vernal grass which has a similar sweet and agreeable perfume. It is a native of the northern countries of Europe, and the simple circumstance that it is an exotic and far fetched, it is much cultivated in the flower borders of our gardens, while acres of similar, and in some respects of a superior character, which absolutely surround this city, are passed by daily unnoticed and unknown.

Perhaps I may be permitted to comment on this proneness to prefer foreign articles to those of American origin, as it has been so unwisely and inconsiderately applied even to our food and our raiment. This seemingly national defect of judgment is characteristic only of the weak and the giddy portion of our population, and it is itself an exotic passion; for we witness that even in many European countries, the fashionable societies look to Paris for dictation; but with us, as patriotism and economy seem now in the ascendant, we may trust that the nobler independent sentiments, which are truly American, will be amply developed

Then, indeed, we shall be taught to regard our glorious country, yet only in its infancy, as the mightiest demonstration of God's creative wisdom, power and love, combining, in her vast regions of inexhaustible mineral wealth, numerous oceanic lakes, boundless forests, and fertile fields, all the material elements of greatness.

Setting out Trees.

Henry A. Cook, Hillsdale, N. Y.—I set out 310 apple trees with the aid of two boys in two days in the spring of 1862, and on the 1st of September following but six dead ones were to be found. I adopted the following plan: 1st, I staked out my ground both ways, having a line of stakes for each row, I then took an iron beam plow, set it to run as deeply as possible attached to horses, letting a boy drive while I held, now coming to a place where a tree should be, I let the plow dip in suddenly and as suddenly threw it out, and so on to the next place for a tree until I came to the end of the line, then returning, dipping in the same places, but throwing the furrow in the opposite direction, and so on until the holes are all made, thus they were very large each way, and the ground loosened a depth below the tree. I then made a thick solution of muck and water in a wash tub, immersed the roots of as many as I could plant in half a day, sending a boy to place them near the holes, following on to set them. The muck adheres plenteously to the most minute fibre and retains moisture beneath the surface.

This is my practical plan, with the above results.

Mr. Joseph Caller, Pawtucket, R. I., wants to know how to keep rose-bugs off grape-vines.

Mr. Solon Robinson—The only remedy for them is to pick them off and kill them.

Dr. Trimble says toads eat them, and but few birds will eat them.

Mr. Wm R. Prince says that in his nursery they preserve all the birds, and are not troubled with insects.

Fruit Growing.

The following letter from Mr. C. W. Carpenter, Mt. Gilead, Ohio, upon the subject of fruit growing, was read. He says:

"I see this matter discussed in the Farmers' Club; in fact, it is a subject of no small solicitude, for the apple is the standard fruit of the people, rich as well as poor. The general cause of deterioration is want of vigor or vitality, which may arise from several minor causes, such as cropping the soil until it becomes exhausted. This practice is quite general, and the wonder is that the trees maintain their vigor as long as they do, training the tree too high, making of it a weakly consumptive spindle-shanked concern, so that the sap has too far to travel, and the natural efforts of the tree to prepare itself, for sudden climatic changes for which America is noted, are slow and feeble, causing what many term "frozen sap blight." The borer surely follows; it never attacks a healthy tree. More top than the long feeble body and exhausted soil aforesaid can maintain, and so thick that the sun-light and air cannot penetrate. I would add that high winds injure such trees very much. A very good remedy for old orchards is re-grafting; this gives a new and vigorous top, and re-invigorates the whole tree. Yet sour, wet land will not give healthy nourishment to a tree, it must ultimately sicken and die. All of these causes contribute to deterioration and early decay of apple trees, and are applicable more or less to other fruit trees.

How to Grow a Healthy Orchard.

Go to the nursery and get one-year-old trees of such varieties as are not affected by scab or bitter rot, set them out on any dry land, not nearer than thirty feet apart, and if the land is rich, thirty-five feet. I am not in favor of digging holes if the subsoil is stiff clay; it makes a deep hole for the water to stand in. Spread the roots straight, as near as they were in the nursery as possible, fill in with fine top soil, then send for "Barry's Fruit Garden," and follow his instructions for training dwarf pear trees, which are something like this: Keep a straight stem in the middle, let the branches grow out from this main stem, commencing low—if two feet from the ground the better, let them alternate and never grow one opposite the other. The limbs or horizontal branches must be far enough apart on the main stem so that the tree will never need trimming, and so as to give plenty of sun-light and air to the fruit and branches. Your trees will not overbear; almost every specimen will be perfect. The way evergreens are trained will illustrate what I intend. If the orchard is cultivated in beans and potatoes, as much must be put on as is taken off. The best manure is soil from the roadside and well rotted manure. Every farmer ought to make use of the waste soil along the highway; he has a perfect right to it, and ought to make use of it, even if it spoils a little poor pasturage for the poor man's cow.

Fruit Gardens for Women.

Every farmer whose wife desires it ought to give her a fruit garden of a quarter, a half, or even one acre, to plant to grapes, blackberries, raspberries, or strawberries. It would afford more pleasure in many ways than the cultivation of flowers. It would be a good place to leave nervous headaches, &c., caused by too much indoor work. But, say many, I have as much to do as I can, to drag myself around and do my housework;

women's work is never done, &c. We know it, but such exercise will give increased vigor of body and mind, and the light elastic step; then you can fly around and do your housework in a jiffy. If a woman takes good care of her fruit garden, besides supplying her family with health giving luxuries, she can have a hundred dollars' worth or more of fruit to sell every year. Women want a thousand little et ceteras which the husband does not see the need of, and he has so many ways for his money she is put off; besides, she wants something besides politics to read. All of these extras she can purchase with the proceeds of her fruit garden. It will drive away ill health caused by too much indoor work, bring health, peace, and happiness to the hearthstone. She will soon learn to love her miniature-fruit-farm, take pride to show it to her neighbors, the example would benefit the neighborhood, and who knows but regenerate the rickety, sickly women of America."

Adjourned JOHN W. CHAMBERS, *Secretary*.

May 31, 1864.

Mr. Nathan C. Ely in the Chair.

LEAF BLIGHT.

The Chairman called attention to the state of the weather, which was cold and stormy last week, and dry and cold on Sunday, but to-day hot enough for summer. He also called attention to the almost universal blight that has fallen upon cherries, and exhibited branches showing not only the loss of fruit, but the foliage badly damaged by insects. He also exhibited limbs of the apricot tree mentioned last week as having been so well packed that it bloomed in the packing, and was planted in that State, and this year has a full crop of fruit. Now, almost every apricot has been destroyed by some animal that eats away half of the substance. "What this destructor is I have failed to discover, as I find no living animal about the tree except a large fly. Can any one tell what it is that has made such sudden havoc with the fruit?"

Dr. Trimble replied that he thought it was one of the leaf-curling caterpillars. The blast of cherry leaves exhibited is the work of aphides. The blast of the cherries, I stated last week was occasioned by the warm, wet weather, which rotted the calix, and the young fruit inclosed. Here are specimens and here you see limbs of the black Tartarian cherry, which is hardier, or later, with the fruit all sound. But the great bulk of the cherry crop, most of the plums, and some of the pears, in this region, were destroyed by the peculiar state of the weather, just as they were shedding the blossoms. Now look at these apple-tree limbs. This one looks as though it had been scorched by a blaze of fire, shows the work of the canker-worm. This one, with every leaf curled or corrugated, shows the effect of little plant lice, which are so small that they are almost imperceptible, yet so numerous as to cover every leaf during the very short period of their existence, producing this blight which some people attribute to the east wind. Where large trees are infested there is no remedy but to preserve the birds. For small plants I found a remedy in a strong decoction of plug tobacco. Dip the leaves into the liquid if convenient to do so, and if not, wet them by sprinkling, or with a brush. There is one pest that tobacco won't kill, any more than it will men. That is the curculio. I have soaked them in a strong solution of tobacco, and the effect was to increase their propensity to propagate their species. For many things, the tobacco decoction is valuable—much more so than snuff.

Mr. Wm. R. Prince—We have used it many years in our nursery. We buy stems, soak them in a cask, and use the liquid with a common watering-pot.

The chairman exhibited a shoot of the Peonia that had been set out six years since, but has never produced a flower; there is a large number of these shoots.

Mr. Wm. R. Prince—I would advise that next fall you dig up the plant and divide it; every part that has an eye will produce flowers next season. Most people think that the Peonia should be planted in the warmest place in your garden, this is an error, nearly all the Peonias are natives of Siberia and northern China, and will stand a great degree of cold, so they may be placed in the coldest part of the garden.

The Currant-Bush Destroyer.

Mr. Fisk, LaGrange, Wyoming county, N. Y., says:

"Our currant and gooseberry bushes in this vicinity, have been for the past few years, and are still being destroyed by small green worms, which come in such multitudes as to make the protection of the bushes quite impossible. We have tried unleached ashes, lime, and soapsuds; but if we clear the bushes of worms to-day, there will be about as many on again to-morrow, and so we are giving up in despair. Some of my neighbors have taken up their bushes and burned them. The worm comes from the egg deposited by a fly on the underside of the leaf. I send you herewith a specimen of the insect caught while depositing its eggs. I have counted over 40 eggs on a single leaf. Can your Club tell us anything about this fly, or how to keep the worm it breeds from destroying our bushes?"

Mr. Solon Robinson—I regret to be obliged to say that no remedy has been discovered for this pest to the farmer, which is well described in the above letter, and which is very prevalent in Central New York, and bids fair to spread over the country and totally destroy the currant bushes. It is barely possible that the worms might be got rid of in a small way by smoking them with sulphur. A lady says: "The Club often speaks of slugs upon rose bushes, mine have been saved by smoking with sulphur, the 1st of May with you and the middle of May in the north part of the State. Then about two weeks later smoke again, for there are two crops at least in a season; but bushes so treated never look seared, turning brown. Why will not this treatment do for the slugs upon the currant and gooseberry bushes?"

Dr. Trimble—I think if the bushes were washed with a strong decoction of tobacco two or three times during the season it would clear them of these worms.

Mr. Manlius Smith, Manlius, N. Y., says:

"I have made a few observations on currant worms that give a hint as to the best way of exterminating these pests. In examining a bush that has recently been attacked one will find leaves with numerous small holes in them. On examining the under surface of such a leaf many small worms may be found which have gnawed these holes, and in the veins of the leaf, more especially on the midrib, will be found the remains of the eggs from which they hatched. Very commonly in close proximity to the perforated leaves will be found others, on the under surface of which are unhatched eggs. These are white, about the twentieth of an inch long and one fourth as wide, laid end to end along the midrib and larger veins. On larger leaves there may be found several groups—evidently distinct litters, as some are diminutive and show no appearance of embryo under a magnifying glass—while others are swollen and exhibit clearly the unhatched worm within. About twenty-five eggs appear to constitute a litter, and the average number of eggs on a leaf is perhaps fifty, many large leaves have over one hundred on them. When first hatched the worms eat little holes through the leaf. When they have finished this, they begin on another, commonly eating from the edge of the leaf. The large veins are left untouched, and this is in harmony with the fact that the eggs are laid on these portions of the leaf. I have found leaves with all the intervening substance devoured, while the veins are left covered with unhatched eggs. The practical deduction from these facts is the plan of searching for these leaves with eggs on them, as well as those with small holes in them. They may be picked off into a pan, the larger worms that are found being added to the collection. They stay contentedly in the pan if there are leaves in it also. At convenient intervals empty the contents of the pan into a fire. Of course this method must be adopted early to be successful. From one currant bush in a few minutes I picked over one hundred leaves with eggs equivalent to, perhaps, 5,000 worms. It appears, also, from these facts why simply picking off the worm does not rid the bushes from the evil, as in a few days, or perhaps hours, the eggs left behind send out new legions of devourers. Probably lime and other applications reach only the worms, without affecting the unhatched eggs. I suppose these eggs are laid by a winged insect, but have not yet ascertained what insect it is."

How to Make Asparagus Beds.

Mr. Wm. R. Prince—I prefer in making my asparagus beds to trench the ground at least twenty inches deep, and see that the bed is situated so that no water stands in it. Put an abundance of strong manure at the bottom, and make the soil fine and rich, and set the roots fifteen inches apart, with the crown of the roots four inches below the surface. Those of two or three years old are the most suitable for making a bed, and the best time to set the roots is in autumn.

In the winter the top of the bed is covered with litter, early in the spring this should be forked in. A small quantity of salt, sprinkled over the bed will be found of great advantage.

Farmers Should Economize Time.

Mr. Robert Willis, Hamilton county, Iowa, wishes the following question discussed by farmers' clubs. He says:

"There is one important subject to which I would respectfully call the attention of your club, and that is, the inauguration of some regular system for the division of a farmer's time: This becomes apparent when we see Farmer A rising at daylight, and laboring might and main for fourteen or fifteen hours a day, while Farmer B—a man of less physical and mental activity—becomes discouraged at such desperate efforts to gain a livelihood, and hence concludes that the savage's life is the most congenial to man; and, without any more reflection, takes his fowling-piece in hand, and spends his precious time in killing innocent birds, leaving his dilapidated fences to take care of themselves. My theory is that proper division and application of the powers of man is the only direct road to true happiness. The club may object to the inaugurating of systems for the regulation of society. If so, I would ask that some of your experienced correspondents would suggest rules and propound queries on this subject. What ails me is, I have had no system, and am consequently nothing but an old, worn-out pack-horse."

Mr. Solon Robinson—I think that is what ails a great many farmers. The want of system, and the want of improved tools and modes of cultivation, and better adaptation of crops to climate and soil, makes them prematurely "old, worn-out pack-horses." Who can devise any feasible remedy for this unfortunate condition of farmers?

Seed Corn—Remedy against Worms.

Mr. John Graves, Poughkeepsie, N. Y., says: "Some years since I planted a piece of ground that was much infested by worms. I planted four times, three plantings being appropriated by worms. I afterward read in some periodical that soaking the seed for twenty-four hours in a decoction of tobacco would be found a sure preventive. I have followed that direction ever since, and the worms have never deprived me of a single seed. It is the only use I have ever made of tobacco, having often wondered previously of what possible use it could be to mankind."

A Pestiferous Weed Described.

Mr. G. Churchill, of Troy, Medina county, Ill., gives the following useful description and name of a weed which, according to this description, would not be a valuable "fibrous plant" for cultivation. Mr. Churchill says:

"In the report of one of your meetings, J. W. Bennett, near Terra Haute, Ind., speaks of a fibrous weed that 'abounds in cornfields,' but 'does not know its name.' Its name is 'Indian Mallow.' 'Cultor,' a scientific writer, in *The Iowa Farmer*, for December, 1855, p. 152, gives the following description of it:

"Indian Mallow, Abutilon Avicennae (Sida Abutilon, Linn.), demands attention from its size and rapid spread. It is an upright plant, from three to five feet in height, with pale-green bark and foliage, and orange-yellow flowers, three-fourths of an inch in diameter. The leaves are roundish, heart-shaped, soft and velvety. The capsules are divided into about fifteen carpels, each of which contains about three seeds, and is surmounted by two points or beaks, which project, forming a kind of cup on the upper side. The bark of this plant, together with the woody part, which is very white, I doubt not might be made into good paper.'

"As an enemy to the farmer, the Indian mallow is second only to the Canada Thistle, which somebody, not long ago, recommended as a paper-making plant. The man who shall devise practical means of exterminating both plants will be a public benefactor. The 'rank, sickening odor' of the Indian Mallow is so offensive that no animal will eat it. Though an annual plant, it is almost impossible to extirpate it. It will flourish and ripen, and spread its seeds in the well traveled highway. It is so tenacious of life that you cannot trample it to death. Somebody has also been trying to revive the memory of the 'Urtica Whitlowi, or Whitlow's Nettle,' as a fibrous plant. I remember 'Professor Whitlow' very well, and the favorable report which Citizen Genet and some other men made respecting the professor's nettle. I resided at Albany, N. Y., when the professor was trying to bring his nettle into public notice. This was a great while ago: yet I trust there is yet sufficient common sense among the people to prevent them from cultivating thistles, nettles, or Indian mallows—at least so long as they can raise flax and hemp."

Mr. Wm. R. Prince.—It is "*Abutilon Avicenna* of Torrey and Gray—*Sida Abutilon* of most previous authors. It is an annual weed of very repelling appearance, three or four feet high, much branched, found wild along our highways, in numerous waste places and more especially where there are manure heaps, or where the manure has been removed, leaving the soil enriched. It is a native of the East Indies, and produces abundant seeds. As it appears to be such a pest in some parts of Illinois, I will suggest a very sure mode by which it may be nearly or quite extirpated, if all the neighborhood will adopt the same means of riddance. At the commencement of its blooming, mow down or cut down with a sickle every plant. Do this for three years, and the seeds which may still remain in the earth to be germinated will be few and easily subdued."

The view of the question expressed in the closing sentence of the above letter is that of every member of this Club—that is, that no plant has yet been discovered that can compete with flax and hemp, and all the talk about substituting this weed or that is worse than idle talking—it is mischievous.

Sorgo Begasse—Its Use.

Geo. L. Dinsmore, Eagle P. O., Lasalle County, Ill., says: Sorgo Begasse is very useful for mulching fruit trees; and for bedding cattle, horses and hogs, there is nothing better.

Blackberries—Selecting Wild Ones.

Mr. Dinsmore also writes as follows, and we recommend others to do as he has done: "I am trying some of our wild blackberries, which I found last season in rambling through our barrens; they were the largest I ever saw. I marked them, and this spring I transplanted them to my garden, and the most of them are now doing well. I am not very sanguine in producing another Lawton, although I have faith in some improvement. We have abundance of the black raspberry from the wild, transplanted to the garden. Yet it was not till the third year after transplanting that they bore any. I was about to pull them up, but other labor prevented and now money would hardly buy them if I could not replace them."

Fruit at the West.

Mr. William Gray, writes May 23, from Davenport, Iowa, that he has resided there twenty years, and has never seen a greater promise of fruit, peaches excepted. "Notwithstanding the severe winter, the raspberry plants never did better. I observe that quite a number of the buds on the grape vines have failed to push out, still there are enough to give us a large crop. I have about 200 vines of eight or ten varieties, all of which are kept low, and pruned on the long-cane system, and laid down and covered with earth during winter, except the Clinton. This place is in latitude 41½°, and exposed to severe north-west winds during winter (excepting some sheltered spots). What do the vine-growers of your Club think of leaving unprotected during winter such vines as the Delaware, Concord, Hartford Prolific and Diana in such a locality as this? How can those who grow grapes here give counsel to grape-growers in Iowa, where all the circumstances are so different? The vine growers of Missouri are much more competent to give advice. The most interesting thing is to see the growing interest in the culture of the vine."

Moles.

Mr. Wm. H. Benham, Wrightstown, Pa., says: "The discussions before your Farmers' Club are very interesting. May I ask you to give us some information, about getting rid of moles in the garden. Is there any remedy other than trapping? Is there any poison to exterminate them, or is there anything known so unpleasant to them, which if put into their holes or routes would drive them away?"

Mr. Solon Robinson.—I have sometimes felt in need of the same information, yet I am not sure if I knew how to drive the moles away, whether I should do wisely if I did so. I know that they never live in ground that is not infested with worms. I have used salt to such an extent that it killed the worms and then the moles left, but a year or two after they came back again. They have done me some damage, but I am not certain but they are like the birds, of more advantage than damage to the farmer.

Dr. Trimble.—If the gentleman will dissect some moles as I have birds, to learn what their food is, he will be better able to satisfy himself whether it is worth his while to try to get rid of them. Some folks would get rid of toads, not knowing that their food is bugs and beetles, whose progeny would eat up all the crops if not destroyed by toads, frogs, moles, skunks and birds.

Mr. Adrian Bergen.—The moles are so troublesome on Long Island, that they sometimes root up a row of corn. Perhaps if they did not the worms would eat it up. I find that plowing the field often, or spading and hoeing the garden, will drive them away. That is the only remedy that we know of for moles.

Mr. Wm. R. Prince.—Nature has arranged that we have enough birds to keep the insects under; if the birds are destroyed, then the insects increase in great quantities. Neither my father or myself allow a bird to be killed on our premises. Adjourned.

JOHN W. CHAMBERS, *Secretary.*

June 7, 1864.

Mr. Nathan C. Ely in the chair.

INSECTS DESTRUCTIVE TO STRAWBERRIES.

Mr. D. H. Cole, Memphis, Mich., writes:

"I enclose you some insects that are destroying my strawberries, also some leaves of the plants to show their ravages. Will the Club inform us what they are, and also a remedy, if there is one?"

Dr. Trimble, State Entomologist of New Jersey—This appears to be a new pest. I think it is unknown in this vicinity. It appears to be a beetle of the same genus of the curculio, though not half as large. I see by the plants that it eats holes in the leaves and would probably so destroy the foliage as to ruin the crop where the insect is very abundant. As a general rule, insects in their perfected state do not eat; this class do. Here is a specimen of the asparagus beetle and its work. Look at this stalk, studded full of eggs, set in endwise. I find the best remedy for these insects is poultry. A hen and chickens would destroy an immense number of them. The best remedy against all kinds of insects is to encourage the increase of birds. I have been making careful examinations this summer of the crops of various birds, swallows and martins included, and have found that they consume a multitude of beetles which are destructive to farmer's crops.

The Chairman said—I have placed all my coops of chickens in the garden near the asparagus bed, and it is interesting to see how readily the young chickens run to catch the beetles, and what numbers of them they destroy.

Mr. Solon Robinson—Several tobacco growers of West Tennessee assured me they could not raise a crop of tobacco without the aid of turkeys. I think as a general thing farmers do not appreciate the value of poultry in destroying insects.

DESCRIPTION OF THE BEETLE WHICH DESTROYS APPLE-TWIGS.

Mr. Benj. D. Walsh, Rock Island, Ill., gives the following interesting and valuable description of the insect mentioned by Horace Everett, Council Bluff, Iowa, which perforates the twig of the apple tree just above the buds, and works into the pith, which he follows downward. Mr. Everett described the insect as a fly. Mr. Walsh says:

"I have no doubt from the description of the operations of this little pest that is the *bostrichus bicaudatus* of Say, which commonly attacks apple-tree twigs in the West in this manner, though, so far as has been hitherto recorded, it is unknown in the East. In the year 1860, early in May, I published in *The Prairie Farmer* (pp. 308–9) a figure of this insect, with an account of its mode of boring, and a figure of a bored twig; and that you may identify the specimens sent by Mr. Everett, with the greater certainty, I enclose copies of the above figures. Your readers may know it by its being cylindrical in shape, almost squarely docked at each end, from $\frac{1}{5}$ to $\frac{1}{4}$ of an inch long, and rather more than three times as long as wide.

Before I wrote the above account, Dr. Fitch had also published a brief notice of the operations of this beetle, in his excellent *Reports on Noxious Insects*, volume II., section 12. He says that it "occurs from Pennsylvania to Mississippi, but has never been met with as yet in New York or New England." To distinguish it from the other two borers which infest the apple-tree—two-striped *Saperda*, common both east and west, and the apple buprestis (*Chrysobothris femorata*,) which is peculiar to the west—I have proposed for this insect the English name of the "Apple-twig Borer."

Mr. Everett, being probably not familiar with the technical language used by entomologists, calls his little enemy a "black fly." It is, however, not a fly, but a true beetle, belonging to the great order *Coleoptera*, or Shelly-backs, to which appertain the well-known horn-bugs, lightning-bugs, cucumber-bugs, May-bugs, and rose-bugs, besides the two above-mentioned borers of the apple-tree. Moreover, although it is black underneath, its upper surface is not black, but a very dark chestnut brown. I have never seen it so abundant as to do any material damage to apple trees. Indeed, I question if its presence in small numbers is not rather a benefit to the tree than otherwise, by acting in the manner of a summer pruning.

Blight on Pear Trees.

Mr. E. G. Hunt writes from Emporia, Kansas, in relation to a discussion in the Club upon blight on pear trees, as follows: "Some years since, where I was raised in the central part of the State of North Carolina, the pear tree was seriously affected with the blight; my father's trees were very much injured. A friend informed him that if he would bore a hole with a large gimlet into the body of the tree some inches, and fill nearly full of roll sulphur, and plug up close, cutting off the plug even with the bark, so that it could grow over it, that a cure could be effected. My father adopted the plan, and the blight disappeared."

Dr. Trimble.—The pear tree blight is not known in New Jersey, but I hope we shall frown down all attempts to destroy the blight by boring a hole in the tree and filling it with sulphur, or driving a nail into the tree. These foolish notions should not be for one moment tolerated.

Mr. Solon Robinson.—I do not think that it is the business of this Club to ridicule this or any other statement of a fact which may be made. This gentleman says distinctly that the pear trees were diseased, that a certain remedy was applied, and the disease disappeared. Now, who knows whether it was cured by the sulphur or not? It may appear to us very ridiculous that disease should be cured by homœopathic doses, but, ridiculous as it is, it is nevertheless true.

Dr. Ward.—The form of blight that has affected the orchards in Northern and Western New York I have never seen in New Jersey, and I have seen thousands of trees. The only way to test this mode of cure by the use of sulphur, is by actual experiment. We know that sulphur is used in graperies with great success. We do know that the introduction of poison into the animal system in the minutest quantity possible to conceive, as in the case of the bite of a snake or rabid dog, or sting of a bee, produces the most painful effect. We also know that the animal and vegetable kingdoms have many characteristics which are analogous. Do we know that sulphur thus introduced will not so affect the tree as to prevent disease, as the writer states?

Mr. John G. Bergen.—This matter must be settled by experimental facts and not by theory, and it must be by a series of experiments—one never determines a fact. There is a gentleman present who states to me that he has tried the experiment of plugging sulphur in cherry trees, and it produced no effect. But that does not disprove the fact stated by the gentleman that sulphur did apparently cure the pear blight in North Carolina. I wish he had stated whether it was the summer or winter blight, for they are distinct and their effect very different. The progress of the winter blight is sometimes very slow, while that of the summer blight is often so rapid that the trees are often past recovery before the disease is discovered. The best remedy for the winter blight is to carefully prune off all the limbs down to the sound wood. The same remedy might be applied to the summer blight if discovered in time

Mr. Wm. S. Carpenter.—I should like to know how a remedy could be applied to such a blight as swept over the country this year, withering the leaves upon one side of all the trees in an orchard in one day, indeed, almost instantly. I believe the ordinary winter blight, common all over the United States, is caused by strong growth and immature wood suddenly frozen in autumn. The cause of the summer blight is less certain; it affects large and small trees alike.

Mr. Wm. R. Prince.—I believe the cause of summer blight is as much atmospheric as that of winter blight. It appears to be caused by intense heat upon vigorous branches. The most vigorous growers, such as the Madeleine and White Doyenne, have been more affected than others; that is, in our vicinity. The Bartlett produces much immature wood, and is more apt than others to be affected by winter blight. It was the practice of my father to cut the trees down some ten or fifteen inches below where the tree was affected. I do not remember losing one.

Mr. R. G. Pardee.—The blight which has been most common in Western New York does not attack and destroy suddenly, but may be seen first upon one leaf on the end of a twig, then upon another and another, gradually working its way down, and during the summer a long portion of the shoot will be found to be dead. If, as Mr. Prince recommends, the limb is cut off below where it is affected, the tree, in all probability, will be saved.

Gas Lime.

Mr. Marcus Spring, Perth Amboy, N. J., asks: "How, and to what extent, are the fertilizing qualities of lime affected by its use as a purifier of coal gas? Please also say what is the best mode of using gas lime as a fertilizer."

Mr. Solon Robinson.—This question has been repeatedly answered in the discussions of this Club; I suppose it must be again. Experience, I believe, has invariably proved that gas lime is injurious to crops. I will ask Mr. Bartlett, who is better authority in this matter than I am, to state the reason why.

Mr. George Bartlett said: It is because the lime becomes charged with carbonic acid and sulphuretted hydrogen, which it abstracts from the gas. That is the purpose for which the lime is used. In its fresh condition these substances are so acrid they are destructive to vegetable life. It should be then composted with muck or some other substance. If the lime is kept exposed to the atmosphere for a year or two, it may then be used in the same way as sulphate of lime (plaster), and with about the same effect. Where the action produced by quick lime is required, gas lime is not valuable.

Preserving Meat without Salt.

Mr. George Bartlett stated an important fact which has lately been published, in regard to a discovery lately made by Prof. Morgan, of Dublin, for preserving meat by infusing brine into the arteries of an animal as soon as life is extinct. A reservoir containing the brine has an elevation of 20 feet. An incision is then made into the great artery of the heart, and the nozzle of a flexible pipe inserted and made fast. A corresponding opening is then made upon the other side of the heart, and the stop-cock of the pipe opened, and the pressure forces out all the blood from the body of the animal. When the brine begins to run clear, the discharge opening is closed and the veins remain filled with brine. The salt is somewhat absorbed through all the tissues of the meat, which, it is said, will then keep almost any length of time required, without any further addition of salt. Prof. Graham, London, has discovered a process by which he is enabled, at slight expense, to extract a large amount of nutriment from brine which has been used in the preservation of meat, as it is well known that the action of brine on meat extracts much of its nutritious quality. The process of Prof. Morgan preserves all this nutriment in the meat.

Flower Culture — How to Increase It.

A lady in Vermont sends the following interesting letter to the Club:

"Having been disappointed in trying to procure some seed of the ailanthus in another quarter to which I applied, I have the assurance to ask you to assist me to some. All my life I have devoted a few leisure hours to the cultivation of flowers, and for the ten years last past I have had the pleasure of seeing my neighbors one after another engaging in gardening, and many quite thriving flower gardens can now be seen in this neighborhood, and there is a pleasant rivalry among us for the finest flowers and the rarest and newest seeds. I dispense seeds (such as I have myself, or can procure) to the young people for many miles around my own home — and every year I try for new ones. I have read the debates of your Club and wished I might be a hearer instead of a reader, and share in the choice seeds dispensed there. I observed yesterday in a ride of some seven or eight miles, some new things that I liked — many little pieces of ground formerly neglected as considered worthless for cultivation now dug up nicely, the brush pulled out, and the stones piled up and the ground planted. Many acres used as pasture and partly overrun with bushes and briers have been brought into fine condition. But I am making too long a letter, when I do not even know that you will think it worth looking at. I have long wished to be one of your correspondents. Do you know anything about our elms, in this part of the State? At this season the seeds fall from the trees and are carried in little clouds of flakes in the air, if there is a light wind particularly, and they settle on the ground and in a few days they come up in hundreds and grow rapidly. If our friends out on the prairies could see the quantities I pull up each Spring, and their rapid growth, he would know what to get to plant upon his lands. I don't know as this letter will reach the distinct person, as I hardly know how to direct, but I must make another effort to get some ailanthus seed, as I wish to go into the silk worm business if I can procure the required materials.

Mr. Wm. R. Prince took the address of the lady and promised to furnish her with some ailanthus seed. We fear it is a little too far north, though the tree is decidedly hardy here. Mr. Prince states that a few years since he had an order from Paris for 15 barrels of ailanthus seed, which he procured readily by hiring boys to gather it from the trees growing in city streets and along the country roadside. A great number of acres are now covered with ailanthus trees in France, and rapid progress is making in the business of producing silk from worms fed upon their foliage. He thought it full time that a patriotic effort should be made to revivify the silk business in this country and stop silk importation. It is an ascertained fact that nearly all the silk of Japan is produced from the ailanthus tree; and undoubtedly the same material could be as well produced in this country as in Japan. The trees are kept cut down so that they formed shrubs, and were about six feet high.

Mr. George Bartlett said that he had observed in some of the French papers, statements that the Japanese silk-producing ailanthus was of a different species from that commonly grown in this country.

Mr. Wm. R. Prince replied to this statement that the French writers must certainly be mistaken. He had read descriptions and seen drawings of the trees, which fully accorded with those to be seen so common in our streets.

Gapes in Chickens—Cause and Cure.

Mr. Solon Robinson.—I will read the following letter from a gentleman who has had great experience in raising chickens:

"Perhaps I can add a little to the information of the gentleman from Franklin upon the subject of gapes in young poultry.

"His description of the worm in the trachea is correct, except the part he describes as a proboscis appears to me to be a limb with a true foot. I used a glass of low power, but the part in question appeared muscular, and the fringed extremity like a claw, by which the parasite progressed downward and fixed itself to the lining of the windpipe. The mouth appeared like that of the leech, and I thought I could discover a piercer in its center, but am not sure. It moves, I think, by fastening its mouth to the side of the trachea, then stretching out its arm and claw to a new place, thus drawing itself along, sucking the blood of its victim for its nourishment.

"The chicken dies with the animal filled with eggs in it. These must hatch and become more or less developed in the decomposed remains, then remaining in the dust attach themselves to the living chickens or the old fowls to get in the throats to become perfected into the uniped or one footed leach.

"Now, the poultry raisers say, 'no lice no gapes,' believing that lice creep in the nostrils, changing as they proceed downward to these worms. This is not so absurd as it at first appears. Two kinds of lice infest fowls. The common poultry louse, fine almost as dust, covering everything in the roost like powder. This kind has nothing to do with gapes. Many henneries infested with these, have no trouble with gapes of the chicken. There is another louse, large and few in number, found under the wings of the mother, and on the heads of the young. This, by creeping in the nostrils, causes the disease in question The action of the chicken in the commencement of the disease shows the irritation to be located in the nostrils, later in the throat, and finally we witness the long noiseless gape proceeding from obstructed windpipe.

"PREVENTION.

"In setting the hen have the nest clean, and sprinkle the nest and eggs with sulphur. This drives off all lice, which is good at any rate. When hatched remove from the head any lice that may be found there. Grease their heads, and under the wings of the mother. Have coops with loose board bottoms, so that the chickens shall not have to keep their feet on the damp ground, as this chills them and makes them rheumatic and weak—an easy prey to parasites. Feed peppers, cayenne or common garden pepper. The last made in a tea and their food moistened with it. This, with onion tops or chives chopped, strengthens the digestive organs and the whole system. *Cure.*—Keep them strong, as above, and they will be able to expel most of the intruders. To help them do this, do something to make the habitations of the worms disagreeable to them.

"The feed of onions and chives makes the breath unpleasant, compelling the animals in the throat to relax their hold, when they will be coughed out; assafœtida (the tincture) mixed with the food, is more effectual in the same way—it acts likewise as a tonic. I think the most effectual remedy, however, to be sulphur mixed with the food. It seems to taint the breath so as to disgust the worms entirely, when they are easily thrown out by sneezing.

"If this theory or hypothesis of the cause of gapes be correct, it will be necessary to bury deeply or burn the dead chickens. The old yards are the ones most infected with this disease. If your correspondent observed in the worms taken from dead chickens numerous eggs, these must become developed in the dead body, from thence in some way infesting the living.

"Some person will yet trace this animal from the germ through all its transformations, observing its habits and peculiarities. We can then speak of its suppression and eradication with knowledge and certainty, till then we can but guess."

Mr. J. A. Pond, Kingsley, Crawford county, Pa., says he has ascertained that the cause of the worms which produce gapes in chickens arises from their feeding upon angle worms, because his chickens always have gapes when they run where they can obtain these worms, and never when shut in close coops. Young turkeys which run with hens have gapes because hens scratch and feed them worms. When they run with their natural mothers they do not have gapes. Young goslings brought up by hand were fed with angle worms, had gapes and died; others of the same age raised by their mothers were healthy.

Mr. J. R. Buckbee, Naples, Ontario county, N. Y., in commenting upon what has been said in the club, says: "One writer declares that the disease is caused by filthy roosts. That is true. Another says it is caused by worms in the throat of the chicken. That is also true. So it is that hens and hen roosts become infested with vermin, the ovary of which is inhaled by the young chickens, which produces the worms, and consequently the gapes in the chickens. This is more easily prevented than cured. Anything that will kill the vermin upon the brood hen will prevent the gapes. A little sulphur scattered about the roost will destroy vermin. Places where hens can wallow in dry plaster (gypsum) will destroy vermin, because it contains sulphur. Places for hens to wallow in dry lime and ashes are good. Sassafras poles in the hen roost and penny royal in the nests, will effectually destroy vermin and prevent the gapes in chickens. Now for the cure of the gapes after it shows itself in chickens. Dough, such as wheat bread is made from, allowed to get quite sour, is a cure. I think any ground grain wetted and allowed to ferment will cure the gapes."

Peonias.

The Chairman.—Before we adjourn I wish to call your attention to the magnificent bouquet of peonias presented to the Club by Mr. Prince, who informs me that he has upwards of one hundred varieties of this plant now in bloom.

Adjourned. John W. Chambers, *Secretary*

June 14, 1864.

Mr. Nathan C. Ely in the chair.

What is Yellow Seed?

Mr. Solon Robinson.—I present to the Club some specimens of the yellow seed which was found growing with flax, and which was supposed hybridized with the flax. The gentleman who sent it says: "It is no wild seed or charlock, neither is it wild mustard, I never saw it growing except among flax. The best way to get rid of it is to pull it up when small."

Mr. Wm. R. Prince.—This is the seed sown under the name of yellow-bird seed. I do not now recollect its botanical name, but I am sure that the two will not hybridize.

The Secretary.—The seed sent, is known here as the yellow-bird seed. In the Farmer's Dictionary it is described as the weed *Thlaspi campestre*, false flax, mithridate mustard, a cruciferous annual with mustard-flavored pods, which abounds in flax fields, and is very troublesome. It can only be avoided by screening the flax seed carefully, and omitting the cultivation of flax for a season, introducing cleaning or hoed crops instead. There is also a plant *Camelina sativa*, Gold of Pleasure, which it very much resembles. It is cultivated in Europe, and is a common crop in many localities. Its seed is manufactured into oil, which is edible when fresh, but is apt to become rancid. It burns well in lamps and is hard to freeze. This crop is sown in the spring of the year, but may be deferred until June in countries having a warm, dry autumn. It is sown broadcast at the rate of four pounds per acre, and is harvested when the seed pods begin to turn yellow. If too ripe it is apt to shell. In England the crop is averaged at from 24 to 32 bushels per acre.

Can we Produce Silk?

Mr. Theodore Martindale, Kirtland, Ohio, wants the Club to discuss the question in regard to the practicability of profitably growing silk in the United States. He thinks "if we can ever raise our own silk, now is the time to commence, as we must necessarily have a high protective tariff on all articles of luxury like silk."

Mr. Solon Robinson.—The writer probably is not as well aware as many members of this Club, that the practicability of producing silk in this country was thoroughly demonstrated more than fifty years ago.

Mr. Wm. R. Prince gave a brief review of the history of some early efforts in this behalf, and the reason why they failed. It was simply the want of protection to the early producers and manufacturers.

The Canada Thistle on Western Prairies.

Mr. J. Wesley Philips writes from Washington, Ill., as follows:

"I wish to call the attention of the Farmers' Club to a question I regard of much importance to the farming community in the west. The Canada thistle is now making its appearance in many parts of this State, brought here in various ways, to wit: with trees from eastern nurseries; seed grain, roots, hay and straw packing about various wares. It was brought here to Washington in the spring of 1863 with apple trees from a Rochester nursery. The owner of the soil discovered it during the summer in vast numbers about one tree, when his suspicion was aroused, and he used great exertion to subdue it; but, to his astonishment, this spring it was thicker than ever. Now, it is claimed by some that the Canada thistle will not live and mature in this rich prairie soil of the west, but being so well acquainted with it in New York State, feel quite sure it will be a much more stubborn thing to deal with here than where the soil is less fertile. I wish the opinion of the Club on this subject, and the manner in which the thing should be dealt with from the beginning."

Mr. Solon Robinson.—There is but one course for prairie farmers to pursue with this pest. It is to wage upon it a war of utter extermination. No matter that it may be like the present war of the Nation. The thistles are like the rebels—they must be conquered and subdued, or they will conquer and subdue the farmers. Whenever the prairie soil becomes as thickly studded with thistles as some of the farms of Canada, the land will be no more valuable. Indeed, it will be less valuable, because, the soil being so much deeper and richer, the thistles will grow ranker, and when they once become fixed, will be more difficult to exterminate than they are in the poor, hard soil of the north; and there they have obtained such a firm hold that all attempts to exterminate them have been given up. Of all the pests ever inflicted upon Illinois, there is nothing but Copperheads that can be worse for its industrious farmers.

Wild Flowers from Iowa.

Mrs. Mary Treat of Blairstown, Iowa, sends some specimens of grasses grown in Iowa — one a pretty flowering grass with white blossoms, others with blue, and still another with a pinkish or flesh-colored tinge. You can form no idea of their beauty from the dried specimens, except you have seen it growing in masses as I have found it this spring. Its botanical name is *Lisyrinchium Anceps;* the next is a little bulbous plant, familiarly called *star grass,* frequently abundantly intermixed with the above. It is about the same hight and blossoms with the *Lisyrinchium,* so that by blending the four colors, it would be pretty for borders. Its botanical name, *Hypoxis Erecta.* At the left is a plant far more elegant than many of our cultivated flowers; I infer it has never been cultivated as I have not found it in any of the catalogues. It could be easily grown in almost any soil. The specimen I send is small, the flowers not so many nor perfect as in larger plants. The leaves are all radical, two of which I inclose. Scape usually about a foot high. It is found in order, Primulaceae; name, Dodecatheon media. There are some three or four colors, but I should call them only varieties of D. media, seeds of which she would forward to any lover of flowers who would be willing to exchange rare sorts with her.

Mr. Wm. R. Prince.—one of these flowers, known as "Shooting Star," is the *Docatheon Meadi.* It is also called American cowslip — not the one that grows in marshes. It is very abundant in California, and is occasionally found wild in the Atlantic States. It is grown as a fine ornament to gardens, and sold by florists.

Mr A. S. Fuller.—I have it — two varieties, from Wisconsin. Another of the plants in the letter is very common at the west, where it is known as "blue-eyed grass." It is the *Cyserinchum.*

City Sewage.

Mr. Solon Robinson.—Alderman Mechi says: "I consider the sewage of London worth more than £2,000,000 sterling annually to British farmers delivered on their farms. Probably the ratepayers of London may ultimately fairly clear £250,000 of this amount, the rest to go to those companies which may undertake to convey it into the country. The whole matter is wonderfully simplified by our Metropolitan Board of Works. Their two great covered tanks, of 15 acres each, at Barking and at Plumstead will receive all the sewage of the metropolis. From those tanks it may be made to flow back to the fields from which it came. Ratepayers must take care that their representatives at the Metropolitan Board of Works do not part entirely with the control of so valuable a treasure. Although not at this moment sufficiently appreciated, the time will come when it will yield a large revenue to towns, as well as to the companies which convey it and the farmers who use it. But then, say others, how are you to get it on the farmers' lands? The engineering difficulties of so doing are insignificant in comparison with our railways. It is a simple question of pumping to a sufficient elevation. Mighty steam has settled that question. M'Lean's monthly register of the performance of the best Cornish engines shows that 112 lbs of coal (worth 1s.) will raise 100,000,-900 lbs. of water one foot high. Sir Joseph Paxton in his evidence before the Parliamentary committee, values the water alone of the sewage at 2d. per ton at certain seasons. The sands near Edinburgh, not worth 5s. per acre, have been raised in annual value to £27 per acre by the application of town sewage only."

Prof. Mapes.—There is a great difference between the two countries. Our sewage here is so much more diluted, and coal to produce power so much more expensive, that it is very doubtful whether the value of the sewage would pay the cost of its elevation to a hight sufficient to carry it out upon any cultivated lands in the vicinity. There would be another difficulty here, and that is to induce the farmers to use the sewage water after it is brought within their reach. It is notorious that American farmers are very negligent about using fertilizers.

Mr. Wm. S. Carpenter.—I think it of more importance for our farmers to attend to the sewerage of their own houses, as every house produces enough to fertilize acres of land. I have erected a suitable cistern in which all the slops of the house, water closets, &c., are conveyed; this material I apply to the growing crops on the top of the soil, and have experienced great results from its use.

Prof. Mapes.—I am glad Mr. Carpenter has introduced the subject of house-sewerage. I have for years used this material on my crops, but not until this substance has been in the cistern sixty days, during which time a great change takes place in its fertilizing qualities.

Grapes and Strawberries in Illinois.

Mr. E. D. Davenport, Waynesville, De Witt Co, Ill., says: "Let me tell fruit growers in Central Illinois that if they expect to grow strawberries without a good deal of labor, in the way of mulching and watering, they will fail: for by the sweat of thy brow thou shalt eat strawberries. I have planted this spring the following varieties of grapes and strawberries: 100 Delawares, 5 Ionas, 5 Herbemont, 5 Anna, 5 Diana, 5 Concord, 5 Union Village, and 2 Isabella; also, 100 Bartlett and 100 Triomphe de Gand strawberries. My grape vines are all growing without a single exception, and so far as I can judge, the leaves all look healthy; and as for my strawberries, I am more than pleased with them—I am rejoiced, they look so well." He asks which of an equal number of Delaware, Concord, Hartford Prolific, and Union Village, would probably produce the greatest returns in money. The answer to this question would be simply theory, and not worth the paper that it was written upon. What he wants is facts. If no one can give them from actual experiment, Mr. Davenport must wait until he can obtain them by his own experience. He says: "I have been for some time an attentive reader of Dr. Grant's works on grape and strawberry growing, but am not quite able to comprehend his meaning—[A good many others are in the same predicament.] Dr. Grant says, that in order to complete the planting of my vines I must layer or bed them next spring, a distance of about ten or twelve inches. I wish to know if I may not do it this fall, at the same time that I fill up the excavations they are set in, and thus save a good deal of labor."

Mr. Solon Robinson.—The answer to this question is in the affirmative. The vines can be layered in autumn as well as spring; indeed they are often covered for the purpose of winter protection.

Apple Trees—Varieties Adapted to the Climate of Iowa.

Mr. James H. Mason, Marion, Iowa, gives his experience since 1852: He says: "The winter of 1856-7 was the most severe in this State, the thermometer sinking to 32° F., below 0. The varieties that withstood that winter in this vicinity are the Yellow Bellflower, White Winter Pearmain, Benoni, Red and Sweet Romanite, Red and Sweet June, Famense, Fallawater, Fall Pippin, Winesap, Early Bough, Romanstem, Maiden's Blush, Tallman Sweeting, Milam Golden Seedling, Paradise Winter Sweet, Baily or Patterson's Sweet, Limber Twig, Early Pennock, Domine, Keswick Codlin. The Rawles Janette or Never Fail, of New England, in many localities was half killed. The Tulpehocking, about three-fourths destroyed; Red Rambo, three-fourths injured; the White Rambo, but little; the Michael Henry Pippin, totally destroyed. I own an orchard of about 200 trees, but no nursery, and living north of the parallel of 42°, I think I have had an opportunity of testing the varieties I named above. The last winter was very severe, the thermometer sinking to 30° F. I can discover no injury to my trees, except one of the Early Harvest varieties, which appears to be one-half killed. My oldest trees are 11 years old this spring, and my best bearer is the Romanite, and also the Romanstem, a native of New Jersey, and I suspose well known to some members of the Club. I addressed a line a few weeks ago to the Club, soliciting some information if well decomposed oak sawdust is a good application for fruit trees, and the answer was they have had no experience. I will ask the Club if they ever applied chip manure to apple trees, and what were the results. My system of treating trees is to train very low tops and cultivate the land."

Mr. Solon Robinson.—Several members of the Club have used chip manure with beneficial results.

Rosebugs and Grape Blosssoms.

A farmer's boy writes from Ridgefield, (Connecticut we suppose,) that he accidentally ascertained that a white cloth spread over a grapevine while in bloom keeps off the rosebugs. He says: "I have often seen the rosebug spoken of as food for poultry. Will your Club tell me, through the *Tribune*, what kind of a fowl (except a toad) will feed on Rosebugs, and what they can be had for by the thousand?"

Mr. Solon Robinson.—I will answer a part of this question. I know by observation that young turkeys will eat rosebugs. I cannot say that they will gather them of their own accord from the bushes, but when gathered in a cup, which is the plan we practice to keep them from destroying the blossoms of the vines, and fed to young turkeys in a coop, they eat them freely. I have not tried the experiment, but have no doubt that young ducks also would eat rosebugs. The inference from the above, that toads eat bugs, is worthy of consideration. Toads are truly friends of the farmer, and as such should be fostered. So are crows and skunks, for they consume an enormous quantity of beetles. As to keeping the rosebugs off the grapevines with a white cloth, I should like to know whether the cloth serves as a "scare-crow," or whether the vine must be entirely covered with the cloth to prevent the destructive depredations of the beetle familiarly called rosebug. The writer of the above letter says that he should write oftener, but he is afraid of criticism; that he makes no pretensions to scholarship—"I only go through the world with my eyes open." No, sir, you do not. If you did, you would see how incorrectly you spell many of your words. Open your eyes, sir, and you will resolve never to write another letter to an editor without referring to that Webster's Dictionary, that you speak of, to see that every word is spelled correctly. Grammar and style we never criticise. Ignorance of facts that glare every one in the face, so that they may be seen by opening the eyes, we do criticise. So we do dogmatical assertions, which are easily seen to be erroneous by any one who opens his eyes. We have no malice in our criticism. It is all for the general good.

A Phenomenon in Farming.

A Scotch farmer raised a crop of potatoes early last season on part of the field, sowing turnips broadcast without manure, and on the other part sowing, at the same time, drilled turnips, to which he applied $2\frac{1}{2}$ cwts. Peruvian guano and $2\frac{1}{2}$ cwts. dissolved bones. All was eaten off by sheep, and the whole field sown with wheat. Singular to say, the crop is decidedly superior on the land where there had been no manure. Can any of our readers explain the phenomenon?

Prof. Mapes.—Probably this matter, like many others, is overstated. It is like a great many statements of farmers' experiments in this country. It is no argument against the use of manure.

Mr. John G. Bergen.—The matter may and may not be overstated, but this is a fact in regard to all similar statements. The facts given are based upon the experiments of one year; they are not sufficient basis for an opinion. I have often seen similar results upon the market garden farms in this vicinity, where a field planted all to one crop this year, and all treated equally alike as to manure and cultivation, may show a marked difference in the growth of the crop up to a given row. On referring back I have found the field was treated last year exactly alike, so that the difference could not be traced to that or the preceding year, but upon looking still farther back one or two years, I havy invariably found the cause to proceed from the different manner of cultivating, manuring, or the kind of crop grown. This proves that the soil feels the influence of treatment for several years.

Amount of Flaxseed Per Acre.

Mr. C. D. Farnham writes to *The Rural New Yorker:* "I have had a good deal of experience in raising and dressing flax for the last twenty years, having raised yearly from twenty to fifty acres. I have sown different amounts of seed, but I think one bushel per acre enough for any land. I have sown more, but, as a general thing, heavy rains will knock it down, it will spoil, produce but little seed, and not near as much flax when dressed as that which has less seed sown; and it is more work to pull it. When I have sown two bushels to the acre on good land, it has fallen and remained as flat as if it had been rolled; and not one-tenth of it will straighten up until pulled. In such cases the crop is not worth half price. I generally sow on green sward, and seed with clover. In this way my land is improving. I think where land is seeded it does the grass as much good to pull the flax as it does corn to hoe it.

Pleuro-Pneumonia.

Mr. Solon Robinson.—The following interesting facts are taken from testimony elicited before a select committee in Scotland: "Mr. Gamgee repeated his statement that there was not proper supervision of the slaughter houses in Edinburgh—only a small proportion of the diseased cattle being condemned. With regard to the large towns, the ordinary practice was to milk the cows as long as they can be kept on, and they were usually sent away within the year. Diseased cows with pleuro-pneumonia would generally die in five months. He had known cases in Glasgow where diseased cows were purposely bred from, because a higher price was paid for those that had had the disease. It was almost impossible to buy cattle in the market at Glasgow without taking pleuro-pneumonia home. He would recommend inoculation in large dairies as the best remedy for the evil; and the objections which had been raised against the practice were entirely consequent upon the clumsy performance of the operation. He had practiced inoculation extensively himself in farms of 100 and 150 animals, and in dairies in Glasgow of an equal extent, with only one case of failure. In one of the large dairies of Edinburgh he had inoculated, and the cattle had been in an irreproachable condition ever since. His experience was that pleuro-pneumonia was only taken once, except in very rare cases, and inoculation was, in his opinion, the most effectual preventive."

Nitrate of Soda as a Manure.

Mr. Solon Robinson.—For the information of the members of the Club, I will read the following extract from the *Mark Lane Express:*

"The use of nitrate of soda, as a top dressing for barley, is gradually extending; and here, as in the case of other nitrogenous manures, it is found useful to combine it with an equal weight of common salt; and where a too rapid growth is still apprehended, the mixture has been successfully applied, at an interval of three or four weeks, as in the experiments made by Mr. W. Horn, of Sede, in Suffolk, in the season of 1860, on a light soil, where the manures were applied in two portions, viz., in the second week in April and May 1. This division was intended to prevent a too rapid growth at one time. The following are the manures and the results obtained per acre:

Soil simple produced .... 31 bushels.
1 cwt. guano, 1 cwt. of salt, do .... 41 bushels.
$\frac{3}{8}$ cwt. of nitrate of soda, 1 cwt. salt, do .... 42 bushels.
$\frac{3}{8}$ cwt. of sul. of ammonia, 1 cwt. salt, do .... 40 bushels.

"The small proportion of nitrate of soda, successfully employed as a top dressing for barley, is remarkable, for 42 pounds of cubic petre (nitrate of soda) are not more than will three times fill a man's hat; and certainly it is marvelous that three hatfuls of any substance should increase so much and so regularly the corn upon a whole acre of ground, as it did combined with 64 pounds of common salt, in one experiment, in which it is calculated that one horse cart load of nitrate of soda produced eight cart loads of grain. The purpose of the common salt is to restrain the invigorating power of the nitrate. One cart load of nitrate and two of salt produced an effect equal to 400 cart loads of farm yard manure.

Petroleum for Fruit Trees.

Mr. Theron P. Parker, Byron, Ogle county, Ill., gives the following as his experience in the use of gas tar upon fruit trees; and as one fact is worth a volume of theory, we publish his letter entire:

"I notice in a late report of the Farmers' Club that George Bush, of Crawford county, Pa., says that 'crude petroleum applied to fruit trees as a wash to the bark, destroys all kinds of vermin.' If the last two words of the sentence were omitted I think his statement entirely correct. And as information was solicited at a former meeting of the Club with regard to the use of gas tar as applied to young trees, and the tar and petroleum are so nearly related, I propose to give my experience in using it. Last year, after preparing my seed corn with gas tar and lime, I had some of the tar left, and I thought it would be a good use for it to put it on the bodies of some twenty thrifty young apple trees that had been put in the orchard to supply vacancies. I thought it would prevent rabbits from gnawing the bark, as I have been much annoyed by them. Well, it did do that effectually, for only one, and that a pretty large one, survived; and that looks as if it had had the ague.

"These applications for killing bark lice and other insects remind me of a pert reply of a doctor to an impatient mother, who inquired of the doctor if he could not give her something that would kill the worms in her child. 'Oh, yes, madam, there is no difficulty about that.' 'Oh, do then, doctor; I shall be so glad to save the life of my child.' 'Ah,' said the doctor, 'if you want to kill the worms and not the child with them, it is a pretty difficult matter.' Such, at least, has been my experience. Strong soap suds is by far the best application I have ever used for bark lice. But the tar on seed corn does well, for nothing will eat it, and it does not injure the seed when properly prepared."

Top Onions.

Mr. E. Wellington, Lowville, N. Y., inquires how "the onions commonly called Dutch Sets are raised? Whether they are from the black seed, or an entirely different kind? At what time they ought to be sown, how to preserve the seed?" &c.

Mr. Solon Robinson.—This is an entirely different variety from the black seed onions. The sets are immature onions, which planted in spring, grow to large onions. These mature earlier than onions from seed. That is their greatest value. If kept over till spring and set out, they produce, instead of black seed, a handful of little onions on the top of the stalk. These should be preserved over winter in a dry room, where they will not freeze. Plant them as early in spring as the ground will permit.

English Importation of Agricultural Products.

Mr. Solon Robinson.—The following statement from an English paper shows where we may find a market for many things that could be profitably grown in this country for exportation. The importation of the following articles is taken from the Custom House returns:

"Taking them in the groups in which they naturally arrange themselves, rather than in the alphabetical order in which they are placed, they are as follows: Pungent and aromatic seeds, carraway, coriander, cumin, and aniseed to the extent of 13,000 cwts., and of the value of £22,000. Dari, millet, and canary seeds, in all, 95,000 cwt., worth about £26,000. Trefoil, lucern, clover, grass, and other pasture seeds, 262,452 cwt., valued at £601,712. Unenumerated garden and field seeds, 26,847 cwt., valued at £31,817, beside carrot and onion seeds, worth £12,000 more. Tares, lentils, and kidney-beans, 61,159 quarters, value £130,643. This is exclusive of one million quarters of beans and peas imported and classed under 'corn' from having to pay the 1s. per qr. duty, while all the other seeds come in free.

"Lastly, we have the oil seeds, the most important as regards quantity and value, and which we may specifically enumerate from the official returns of 1861, as we have done the other seeds. We may here advert incidentally to the want of uniformity in the unit of entries, of which we have often complained, for we have all the confusion of lbs., cwts., tuns, bushels, and quarters, instead of that simplicity and uniformity so essential for calculations and in drawing conclusions and summaries. The oil seeds imported in 1861, were:

			Value.
Mustard	cwts..	23,299	£25,586
Rape	qrs..	249,635	711,141
Poppy	qrs..	5,451	15,717
Flax	qrs..	21,160	65,230
Lint	qrs..	1,156,110	3,042,825
Hemp	qrs..	10,571	25,084
Sesame	qrs..	2,112	6,862
Croton	qrs..	93	1,391
Cotton	tuns..	20,034	152,191
Unenumerated	qrs..	52,505	92,321
Quarters		1,460,117	£4,138,157

"To the seeds already enumerated, as coming within the same range, we may perhaps add flower roots, of which about £20,000 worth were imported, and plants, shrubs, and trees to the value of £24,000.

"But a very small portion of the imported seeds are intended for sowing. The pasture grasses, some of the flax seed, a little of the mustard and canary seed may possibly be so employed. The garden seeds are all for cultivation, and much of the cotton seed imported is intended for distribution abroad, in different new quarters where cotton cultivation has recently been entered on.

"About 17,000 cwt. of clover and 23,000 quarters of flax and rape seed went direct to the Scottish ports, 26,000 quarters of flax seed and 2,000 cwt. of clover to the Irish ports. Hull and Grimsby are the great ports of entry for the continental seeds, more than half a million quarters being received there — nearly equal to the amount which comes into London —

while Liverpool stands third, the imports there being about 250,000 quarters annually. Newcastle, Bristol, Gloucester, and a few others receive smaller amounts.

"Now, whence do we derive our supplies of these seeds? The aromatic seeds come from Europe and Africa; the grass seeds from Germany and France, except a little Timothy from North America; the garden seeds chiefly from Holland, Belgium, France, and Hamburg, and the oil seeds mostly from Russia and India, although Egypt, Italy, and Prussia now send us increasing quantities. The pulse, lentils, &c., are principally from Egypt and Portugal. The aromatic seeds and others are used for cooking, for confectionary and medical purposes. The great bulk of the oil seeds furnish beside painters', burning, and other oils — oil-cake for cattle food and manure, of which our imports are not so large as they formerly were, probably because it is found that we can make a better article at home. The wretchedly foul condition, however, in which much of the seed is received renders it extremely difficult to make a palatable cake for cattle, much of it being refused by beasts, owing to the quantity of earth and sand with which it is mixed."

What is a "Quarter" of Grain?

Mr. Solon Robinson.—The discussion on the change of duties in England elicits a distinct statement from those engaged in the grain trade, as to the meaning of the English term "quarter," as a measure of grain, when it is calculated on the *weight* instead of by actual measurement. One of the speakers at the meeting of the Corn Trade, at the London Corn Exchange, gives the following standard weights to the quarter of eight bushels of the different grains:

Wheat..................	496 lbs. to the Quarter—equal to	62 lbs. per Bushel.				
Barley..................	400	do	do	do 50	do	do
Oats....................	320	do	do	do 40	do	do

The Yield of Broom-Corn.

Mr. Solon Robinson.—It is estimated by broom-corn growers that an average of seven acres of good corn is required to produce two tuns of brush. An acre will average 35 bushels of seed, which is worth 40 cents a bushel, and is tolerable food for all kinds of stock and poultry. There are four varieties of broom-corn usually cultivated. First, the Sampson, which has long, heavy, coarse brush, fit only for coarse, heavy brooms, and is unprofitable to the manufacturer. Secondly, the Early broom corn. This ripens some three weeks earlier than the other varieties, and has a fine, tough brush, much liked by broom-corn makers. Thirdly, the South Carolina Dwarf, which has short, fine brush, suitable for wisps, and small, fine brooms. Fourthly, the common variety, which, for ordinary purposes, is profitable alike to grower and manufacturer. The crooked and short stalks should not be thrown away, as they answer well for the inside of brooms.

A White Wistaria.

Mr. A. S. Fuller presented some very handsome flowers of White Wistaria, a seedling of the *Wistaria fulgens*, produced by Ellwanger & Barry, at

Rochester, N. Y., which is far superior to the Chinese White Wistaria, and being equally hardy with the *Wistaria fragans*, is a valuable addition to our climbing plants.

Adjourned. John W. Chambers, *Secretary.*

June 21, 1864.

Mr. Nathan C. Ely in the chair.

Increased Growth of Plants in Moonlight.

Mr. J. B. Cressinger, Sullivan, Ashland county, Ohio, expresses his conviction that the growth of plants is considerably greater in moonlight nights than during the moon's dark period. This he proves by marking time and space at the ends of growing vines of various sorts.

Mr. Wm. R. Prince disputes the premises of this writer, but says he has never tried actual experiments.

Do Sap Suckers injure Trees.

Mr. Charles D. Tracy, Waverly, N. Y.—I see great complaints among some farmers that the woodpecker have picked holes in their apple trees. I have seen trees where the bark has been completely perforated with holes. I have a remedy for such trees, and for old trees, where, as I term it, they are hide bound. In the longest day of the year I take a knife and split the bark up and down the tree, then take my fingers and peal the bark off the tree from the ground up into the branches, taking good care not to bruise or scratch the gill which is under the bark, which, if the old bark was left on, would form into wood, but by taking off the old bark this substance forms into a new bark, and the tree takes new life and grows finely. I have tried it a number of times within fifteen years in different places, in this and other States, and never had one die.

To destroy the worms on currant bushes I dust over them plaster and sulphur. This I do several times in the season, and have been successful in keeping my bushes free from worms.

Dr. Trimble.—I have made repeated careful examinations and find that it is the sap and not worms which the birds obtain from the tree. Woodpeckers, on the contrary, perforate the rotten places in trees for the purpose of obtaining worms.

Emigration to Maryland.

Mr. Solon Robinson introduced to the Club Dr. J. E. Snodgrass, of this city, formerly of Maryland, who stated that he had prepared a letter of enquiry on this subject which he should be pleased to have the Club adopt as its own. Dr. S. proceeded to say that his knowledge of that State was acquired by fifteen years residence, and he is sure that no State in the Union offers greater inducements or will offer, if it becomes a free State, and he named several prominent individuals in the emancipation movement who would willingly communicate any information which the Club might desire about the price of land, kind and amount of crops that it will produce, state of society, and with what degree of respect emigrants from the eastern States would be received and treated.

The following letter, prepared by Mr. Snodgrass, was read by him at the close of his remarks:

"Observing that your name is prominent in the proceedings of the Constitutional Convention now sitting in Maryland, as an advocate of emancipation, we address you this letter of enquiry.

"As those interested personally and in behalf of many others engaged in agricultural pursuits, we desire some light on the following questions:

"1. What is the actual prospect of an early removal of slavery from your State?

"2. When will the change, if it takes place, be consummated?

"3. At what price can lands, in good cultivation, be purchased?

"4. At what price such as have been under slave culture, and are supposed to have been exhausted thereby?

"5 What are the advantages of the eastern shore of the Chesapeake Bay for agriculture proper? What for horticulture?

"6. What are the facilities for reaching a market?

"7. Has any considerable attention been given in any part of your State to *fruit culture* as a distinct branch of business? If so, has the experiment promised well?

"8. What degree of social toleration, to use a phrase which our pens almost refuse to write, not to say of welcome, would we 'Yankees' receive in neighborhoods heretofore given up to the almost exclusive control of slave culture and pro-slavery prejudices; such, for example, as those counties, as we learn from the U. S. census, there were before the war five slaves to one white man?

"We desire to be specially informed as to probabilities touching this last query, because we have read statements of the results of settlements in the border States, and particularly of the one much spoken of, some years ago, as that of 'the Yankees in Fairfax,' Va., which, while they appeared to be most successful pecuniarily or materially, seemed to encounter social barriers which were surmounted, when at all, with annoying difficulties.

"In answering the above questions, and others which your own mind will naturally anticipate as arising in ours, you will oblige thousands in this section of the country who only await the removal of that natural repellant of free labor, against which the majority of your people seem to be setting their faces, and reasonable assurances of some degree of welcome, to the end that they may seek new homes and better conditions in your more sunny clime.

Mr. Solon Robinson moved that this letter be signed by the chairman and secretary and forwarded to some prominent gentlemen in Maryland, asking for definite information that will be interesting to farmers in the northern States who may desire to emigrate to that State in case slavery emancipation should be carried into effect, and followed his motion with some remarks, showing the propriety of that course.

Dr. Trimble thought one of the inquiries should be in regard to the health of the country. He said that the eastern shore of Maryland, though much the finest agricultural portion of the State, is not so healthy as the upper counties. As a general thing he would prefer to emigrate to Maryland rather than any of the western States. Some sections of that State have been greatly improved by Quakers from Pennsylvania, who have gone in sufficient numbers to form neighborhoods and societies of their own. As this letter is to obtain information for the people, he hoped it would be so worded as to elicit it in the fullest manner.

Mr. Solon Robinson.—Where lime is used and improvements made, the country has become more healthy.

The motion of Mr. Robinson was unanimously adopted.

Flowers.

Mr. Wm. R. Prince presented to the Club a magnificent bouquet composed of the following flowers: Wistaria violacea; Lilium bulbiferum; Lilium undulatum fulgidum; Delphinium formosum; Transcentia alba; Transcentia rosea; Bignonia crucigera; Oenothera Missouriensis; Oenothera Fraseri; Hieraceum speciosum; Penstimon grandiflorum; Passaper crocea (yellow poppy); Rosa pallida (climbing prairie rose); York and Lancaster damask rose; pearly blush (Chester noisette) rose; Rosa nitida (native); Iris pseudacarus (yellow flowering Albion); Epilobium speciosum; Tarragon speciosum; Tarragon (spicy flavor, to mix with salads); Clematis erecta purple; Ranunculus bulbosus (double yellow); Male Vitus labruses; Mentha California; White Japan fragrant honeysuckle; Sedum Crux Andriee (St. Andrew's cross, five points or angles.)

Mr. Prince gave a little history and description separately of each of those plants, which was very interesting and instructive to those present, but which cannot be reported, on account of the frequent allusions to each of the flowers which he held in his hands and referred to during the discourse.

Strawberries—A New Pest.

Mr. J. P. Bixford, Bedford, Canada East, writes as follows about a new pest of the strawberry plant: "I am interested in the discussions of the American Institute Farmers' Club, and apply to them to help me out of trouble. Enclosed you will find several bugs which I have found on my strawberry plants. You will see that they have beaks. With these they make holes in the stems for the purpose of extracting the juice, which causes the buds to wither and drop off. Two-thirds of the buds have already fallen off from my plants, and the insect is still at work. I have tried tobacco juice upon them, but without perceptible effect. The plants are Triomphe de Gand. You will find some little green fellows, which I think are the young of the dark colored ones. I hope the Club will not overlook this subject because it comes from Canada—at present the land of skedaddlers."

Dr. Trimble examined these insects, and declared that they were new to this section of country. They will be a pest indeed if they ever become as abundant as the asparagus beetle has in this section.

The Chairman, Ald. Ely, observed that he had found a remedy for the asparagus beetle in placing his coops of hens and chickens near the beds.

Worms are not all Pests.

J. Vale, Pomfret, Vt., gives the following important information to farmers, which we present to our readers in his own original style:

"The article in the *Tribune* headed 'Interesting to Farmers,' sometimes puzzles me to find where the interest comes in. If this communication is of that class suppress it without fail. The last *Tribune* gives a learned and scientific piece on the importance to farmers of birds. We have long appreciated this here. They are not only defended by law, but by moral and religious teachings to the rising generation.

"But how is it about worms? I have been taught to consider them as enemies to the farmer, and waged war on them according. But lately I found that is not right, expedient nor proper to kill all kinds of worms. Now to illustrate: My farm is located on a southern declivity, and cut-worms have been the pest of my life, reaping the young corn close to the ground entirely out of season; of course I destroyed them without mercy when I was so lucky as to find them in hoeing. While engaged in this occupation of hoeing corn and killing cut-worms, occasionally a worm came to the surface that appeared different; he would throw himself on his beam ends and show fight, but the corn was missing where I found him—*prima facie* evidence—and he suffered the fate of the transgressors, the cut-worm. By and by the thought struck me, are not these the worms that the good God Almighty has made to follow on the track of those cursed cut-worms, and destroy them.

"Well, why not demonstrate this? I had a basin two-thirds full of dirt in which was a flourishing hill of corn; I caught Mr. cut-worm and put him in the basin. I caught Mr. nondescript and put him in; he made good time round the basin, not quite 2:40, but respectable time for a worm. Mr. cut-worm could not begin with him in speed. After making two or three rounds he came across the cut-worm; he seized him at once by the throat, then came the tug of war; but with all Mr. cut-worm's writhing and squirming, nondescript held his grip, and I could think of nothing more singular than a tiger fastened to his prey. He abstracted the inside of that cut-worm by suction, not to speak very philosophically, and left nothing but the skin. He gave the quietus in the same manner to two other worms forthwith, with this difference, they were not so completely exhausted. You may be sure I never killed any more of these *tiger worms*.

"Now, sir, if you think this worthy of your notice, present it to the savans; perhaps it is nothing new, and perhaps it is.

"This worm resembles the cut-worm very nearly—a little darker color, more activity, and a horny, spade-like head."

Dr. Trimble.—This tiger worm, as the writer calls it, is fully described by Dr. Fitch in his essay upon the cut-worm. He also describes several other destructors of that pest.

Worms on Grape Leaves.

Dr. Trimble.—My attention has lately been called to a small, bright colored bug, found in company with worms upon grape vines. A gentleman asked my opinion about destroying these bugs. On examining their movements with a magnifying glass, he found that a bug approached a worm and suddenly thrust him with a hitherto concealed dagger, upon which he held himself fast while he ate the juice of his body.

A Practical Test of Hot Water upon Peach Trees.

Mr. Frederic Kindley, New Holland, Wabash Co., Indiana, writes how he cured a sick peach tree. He says: "I had one some eight or ten inches through, hanging full of peaches, and it took the yellows, and the leaves began to fall off, and the peaches shriveled so that I could feel the stones in the fruit. One day when they were washing I said to my wife I would help that tree to die, so I took my mattock and dug around the roots of the tree, and took my brass kettle, put it over the fire, with some ten or twelve gallons of soapsuds in it, and when it came to the boil I took it and poured all the contents on the tree, in the forks thereof, which were a foot or so from the ground. The suds ran down and stood around the roots of the tree, and in a few days the leaves quit falling off, and the fruit filled up and came to perfection, and the tree grew vigorously for years, when one cold winter killed it and all the rest of my peach trees; and I believe the same process will cure the curls also. I think after I sudsed it it bore the greenest foliage of any of my peach trees."

Sulphur for Borers.

A farmer gives the following as the way he destroyed the apple tree borer: "Having seen in the doings of the Farmers' Club a great deal of the trouble caused by the borer, which is so destructive to apple trees, I will give my recipe, which I think will not fail to remove the trouble. Twelve years ago I had a choice tree that put forth leaves and then turned yellow. I dug the grass away from the roots and put sulphur around the roots and in the holes made by the borer. I did not dig the worms out, but the sulphur must have killed them, for the next spring the tree was as thrifty as ever, and has been full of apples every year since. I have used this remedy now for twelve years, and it does away with digging out the worms, and has never failed.

Fruit Culture in Southern Illinois.

Mr. S. S. Wallihan, Evansville, Wis., wants to know "what success attends fruit culture in central and southern Illinois. Each season we hear indefinite statements of dealers in early apples, peaches and blackberries, that they are from 'down in Illinois.' Now, as Illinois is principally one grand prairie, the question arises, has fruit culture on prairie lands as far north as the 40th or 41st parallel been made a success? Or is it only in particular localities and on land previously covered with timber? Some report from those who know, covering the above, will be very acceptable."

Minnesota Crab Apples.

Mr. W. C. Watt, Richfield, Hennepin county, Minn., wants to know something about the value of the native crab apple. He is apparently a new immigrant into that section, and finding some crab trees in blossom, wants to know if they will produce fruit worth preserving, and whether the trees will bear grafting with our cultivated varieties of apples.

Mr. Solon Robinson.—I have repeatedly answered these questions. I will do it once more. Some of the crab trees of the western prairies grow the largest and smoothest trees, and produce the largest and fairest fruit of any of the crab family within my knowledge. I have seen the apples a full average size of the lady apple, of a light, beautiful yellow, and when fully matured in winter they attain a slight degree of mellowness, but they are still sour as crabs. We have used them for pies and as stewed fruits but I should not like to incur the price of sugar at the present rates. In the lack of other fruit they make passable sweetmeats, requiring the same amount of sugar as other fruits, that is, pound for pound. I have always found it a losing business to set grafts upon crab trees.

When to Transplant Evergreens.

A new beginner in Allegany county, Pa., asks: "Which is the best season for transplanting evergreens? Would next month be too late? I have known some cases where they have done well in the fall."

Mr. Wm. R. Prince.—Evergreens should be planted from the 10th of April to the 10th of May.

The Chairman said that he had planted evergreens with success in June.

Beans for a Late Crop.

Mr. L. M. Stevens, Le Roysville, Bradford county, Pa., says: "For the benefit of the farmers please bring the following before the Club. I have, of late years, planted some beans late, say the 10th or 15th of June; then the late frost cannot hurt them, and the weeds are started, which you plow under before planting. Then, in the fall, when the bean has got its full size, or about half the pods are dry, pull them, and spread or set them up in small bunches until they are partially cured; then put them on an open scaffold in the barn or some other building, leaving them loose as they are pitched in; then, in the last of December, before the Christmas thaw, thresh them out, and you will have beans that are all cured, and the vines, if thrown out in the yard, will be eaten by cattle, especially by sheep, before hay. We had some cranberry pole beans in the garden last fall, and when the frost came they were as green as ever. On the evening before the frost we took the poles, with the beans, and set them in the wagon house until March, when I picked off the pods and gave the vines to the sheep. Any one, by looking at the beans, would think they were perfectly ripe before they were gathered, and when cooked they tasted like green beans. Farmers, try it."

Poison Ivy Cure.

Mr. E. D. Wright, Pierpont, Ohio, sends the following statement of an accidental discovery of the cure of poison by ivy. He says: "A few years ago my feet were badly poisoned with ivy. While they were at the worst, out of spite from what I suffered, I immersed them in soft soap half or three-quarters of an hour, and to my glad surprise, I found that it cured them. This spring, being again poisoned on my hands, as it had got quite bad, and growing worse every day, I held them in soap 20 or 30 minutes, and they were entirely cured the second day after. Some relief will be found, and perhaps a cure, by covering the poisoned part with soap, and letting it dry on. This, however, will have to be repeated several times.

I would recommend this as a cure, and, believing it ought to be generally known, I place it at your disposal."

Mr. Solon Robinson.—Another excellent remedy for the poison of ivy (*Rhus toxicodendron*), is a strong tea made of the leaves of the sweet fern (*Comptonia asplenifolia*), with which the part affected is washed as hot as it can be borne every hour until the poison is cured. Sometimes one application cures. If the poison affects the stomach of the person, drink freely of the tea.

Cause of Rust on Wheat.

Mr. James Laurie, Chalmers, White Co., Ind.—I think that the rust on wheat was caused by dew, or gentle rain or fog, remaining on the stalk or leaf of the plant, and the hot sun coming out immediately after and heating these minute drops and scalding the plant. I proposed a remedy, by disturbing (when there is no wind to do it for you) the growing wheat by a long line, with a man at each end, and dragging it over the top, bending each stalk over and causing the particles of water to collect and run down in drops.

Raising Calves by Hand.

The Hon. Wm. C. Dodge writes from Washington city upon the subject of raising calves by hand, as follows:

"The demand of the army, and the destruction of cattle to supply it, have rendered stock high and scarce, there being now less in the country than there was in 1860. Hence it is an object to raise every calf we can; but the high price of butter and cheese makes it more profitable to use the cow for those purposes than for rearing calves, especially in this region, where they know nothing of our process of raising them by hand, the only method in Maryland and hereabout being to let them run with the cow.

"Now, my idea is this: to make an artificial teat of rubber, mounted in a metal socket that can be readily attached to the top or edge of a pail, trough or other vessel, with a small flexible tube reaching down into the milk, so that the young calf or lamb can feed itself without the trouble and bother of teaching it to drink, which at best is an unpleasant and disagreeable job, coming in the spring, when the yards and pens are muddy, and when the farmer is in a hurry. They can be fed on skim milk porridge, &c., and the use of the cow thus secured for making butter and cheese, and the calves be raised at the same time. Oat meal porridge is said to be fully equal to milk for them, and I am informed that it is largely used in Canada and Great Britain for that purpose. Please let me know what you think of the idea. Is it of any utility? Will it be of benefit, and likely to be adopted if made?"

There is already one patented utensil for this purpose. It is a pail with an India rubber teat, the pail being suspended so that the calf reaches up to suck. We do not think that it has ever been extensively used. There is no reason that we can see why it it will not answer a good purpose.

Chess in Wheat.

Mr. A. Jones, Lafayette, Van Buren county, Mich., communicated the following fact to the Club, hoping to get correct answers to the two questions which close the communication. He says:

"A field of some eight or ten acres was alternately planted with corn and oats, and then seeded with timothy and clover. This lot was mowed for some three or four years, and finally used for pasture as many more years, when it was broken up or summer fallowed, and sowed to wheat. Great pains was taken to procure good, clean seed, free from cockle or chess. On one part of the lot (one-half or three quarters of an acre) was a slight depression, upon which, in the fall, the flood waters of a neighboring slough often settled (as it did in the present instance) and remained in a congealed state, and otherwise, during the winter and spring. Soon after the drying up of the waters a fine, luxuriant green presented itself upon the lately submerged depression. This was contrary to my expectations, supposing everything was killed or 'drowned out' thereon. When the wheat was well in head I visited this part of the lot again, when lo, and behold! instead of wheat a fine thrifty growth of chess presented itself to my astonished view, with here and there a wheat head interspersed. Where did this chess come from? Will wheat degenerate and become chess?

Mr. Wm. R. Prince.—I have for fifty years seen this discussion renewed from time to time, and have read statements many times where the question has been satisfactorily determined by special culture and critical investigation. Is the question never to be deemed settled? Will not the Club pronounce their fiat on this matter and settle the moon stories at the same time, once and forever, and refuse the propounding of either of these subjects as an evidence of an unsound mind? and further, the Institute has no time to waste on vagaries.

Triticum Sativum, common wheat, *Bromus Secalinus*, chess or cheat, has been distinctly described in a manner that they cannot be mistaken, by every botanic author from Wildenow down to the present time. *They are distinct genera*, and there has never occurred, since man existed on this globe, a single instance where one genus changes into another in the vegetable or animal kingdom. And no such variation can ever occur, and I beg all such inquirers to try and comprehend the fact that nature has one eternal law, which never vascillates any more in the minutest plant or the tiny insect than in the largest tree or mightiest animal. Were it not so, that there exists barriers impassable, all the races of animals and of trees would become one confused mass of hybrids, and the wise purposes for which each race was created could no longer be consummated, and God's great work would prove a failure.

Source of the Wool Supply.

Mr. Solon Robinson.—An estimate of the number of sheep in different countries, published in *The Rural New Yorker*, gives the following figures: "The number of sheep in Sweden in 1862 was 1,587,809; the number in Algeria in 1862 was 10,000,000—product, 150,000 quintals of wool; the number in Upper Canada the same year was 1,170,225—increase from preceding year, 120,000; the number in France in 1862 was 35,000,000. Three-fourths of these were Merinos or Merino grades. The number of goats and kids in France was 1,400,000. In Ireland there was a decrease in 1363, as compared with the preceding year, of 152,201 sheep, and a loss in valuation of £167,421. In South Australia, during the year ending March 31, 1863, there had been an increase over the preceding year of 12½ per cent., making a total of 3,431,000 sheep.

SALT AS MANURE—VALUABLE EXPERIMENTS WITH POTATOES.

Mr. Solon Robinson.—I present for the information of our farmers the following valuable experiment in the use of salt: "An application of farm yard dung, at the rate of twenty tons per statute acre, produced nine tons nine cwt. of potatoes, of which fourteen per cent. were diseased; while twenty tons of farm yard dung and two and a half cwt. of salt per acre produced thirteen tons sixteen cwt. of potatoes; and twenty tons of dung, with two and a half cwt. of salt and five cwt. of lime per acre produced sixteen tons of potatoes; the proportion of diseased potatoes in the two last named trials being in reality 'next to nothing,' or about one-fourth per cent."

STORING MANURE UNDER COVER—ITS VALUE.

In a Scotch experiment with manure, made from the same lot of cattle, part of it stored under sheds and part exposed to the weather, the following was the result: "Potatoes manured at the rate of twenty tons per acre, with the uncovered manure, yielded eight tons six cwt. per acre; with the covered manure, seven tons eight and a half cwt. The succeeding season wheat was grown on the field with no further application of manure, and the product of straw and grain accurately ascertained, showing an apparent difference also much in favor of the protected manure, but as the piece of wheat was winter killed unequally on the two parts of the field, this result has not so great weight as that of the previous season."

Where manure is exposed to the weather, a large admixture of litter, loam, peat or muck, answers instead of a roof. A well built compost heap will not absorb water from the rains sufficient to lessen the value of the manure.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

June 28, 1864.

Mr. Nathan C. Ely in the chair.

GAPES IN CHICKENS.

Mrs. James Adams, Weelaunee, Winnebago Co., Wis.—I think it the duty of every one to relieve suffering both to man and beast, and as I have seen several times in the reports of the Club accounts of the gapes in chickens, and believing that I have a remedy, I thought I would send it to the Club. It is simply to put salt into their meal, about as much as we would to make it for our own eating. It is not only a cure but a preventive, at least I never knew it to fail; give it daily.

Mr. Solon Robinson said salt might answer for chickens; he doubted it; he knows that salt is deadly poison to young turkeys.

Mr. N. Smith, Delphi, Carroll county, Ind., writes as follows upon this subject: "The discussions in the Farmers' Club upon the subject of gapes in chickens, make no allusion to a remedy which I have seen used successfully, and a perfect cure effected in two or three hours where the chicken was too far gone to eat any of the articles suggested as remedies. Take the chicken in your hand, open its mouth, and press down the point of the tongue, and the orifice or entrance to the trachea is at once seen; now take a horse hair eight or ten inches long, double it, and insert it into the windpipe as far as it will go; twist the hair between your thumb and finger, and from one to half a dozen small worms will adhere to it, which are easily drawn out. This operation may be repeated until every worm is removed, and the chicken will in a few hours be perfectly restored to health."

This remedy, although not referred to in the last discussion, has been spoken of in some of our meetings, and the Rev. Mr. Weaver said he had tried the horse hair remedy with success.

Mr. T. A. Goodwin, Indianapolis, gives a better plan than all that have been devised for curing the disease. He would prevent it. He writes as follows:

"In the reports of the Club I see you have discussed gapes in chickens. Not having seen a case of gapes for nearly ten years, I had supposed them about extinct. I have nothing to say against the learned disquisition as to the origin of the worm which causes the gaping. Whether it ever was a louse or not I cannot say, nor is it material. Ten years ago when Shanghaes were young, I tested an 'infallible cure.' Take a grain of black pepper, put it in the end of a goose quill, so cut as to receive about one-third the grain, hold the chicken's legs between your knees, open the mouth gently with the left hand, and thrust the quill, loaded with the grain aforesaid, about four inches down its throat; withdraw the quill, and the chicken never gapes but once more. It kills the worm nineteen times out of twenty, and the chicken about nine times out of ten; but I never discovered that it pays. In short, I long since concluded that in a yard infested with gapes, raising chickens is unprofitable. Some one said new yards are less affected with gapes than old ones, and thereby hangs the prevention. To cure gapes is impossible, to prevent them is easy. You want no sulphur, no grease, no chives, no onions. It consists simply in giving the chickens access to plowed ground. You never see gapes in the yard of a new settler, around the cabin in the corn field. Gapes are peculiar to a high state of civilization and refinement, which deprives the young one of its appropriate food. You want no coops with plank bottoms to keep their little feet dry. Put the hen in a movable coop in your garden, and while the young ones will destroy a thousand insects which would injure your garden, they will never have the gapes. I don't pretend to give the philosophy, I only state the fact, and I wish to state it *strong*—chickens having constant access to plowed ground never have gapes.

Poultry Raising.

Mr. N. H. Merwin, Rockport, Ohio, wants to know if there are any eccalobions in practical operation in this country.

So far as members of the Club present are informed, the answer is that all attempts to produce chickens in this country out of the natural order, have proved impracticable.

Mr. M. says: "The books mention that hens turn their eggs at times. Is it not to bring the outside eggs into the center of the nest to receive more warmth, and thereby equalize the amount of heat the eggs receive? or is motion necessary to the hatching of the eggs? If so, how often would it be necessary in artificial hatching? What degree of heat is necessary to hatch eggs? Some writers say 101 deg.; others, 104 deg., 106 deg. I find 90 deg. sufficient."

Will eggs hatch that are transported, say a dozen miles in spring wagons, the eggs packed in bran? If they will stand that distance, how much more?

Mr. John G. Bergen.—A few years ago there was a large chicken hatching establishment in Brooklyn. It was conducted a year or two, I should think, at considerable expense, and then closed. It proved an unprofitable investment. I have heard of several other attempts to make poultry raising a specialty. I have never heard of a single one that has succeeded. I have always heard it observed that transportation of eggs injured them for incubation. I have known them when carried only a few miles in a common wagon to be seriously injured. I should not expect more than one-half of such eggs to produce chickens. As to the question whether hens turn their eggs and what for, it needs proof by experiment.

Dr. Trimble.—It needs no experiment to prove that they do turn them. I have often seen them do it. If the eggs were not turned, I believe the chickens would not be perfect; they would come out mis-shapen and one-sided. When eggs are packed in barrels, it is necessary frequently to turn the barrels.

Dr. Snodgrass.—The hen does not turn the eggs to bring the outside ones into the center, nor to equalize the amount of heat, but to equalize the pressure of the albumen, which instinct teaches her is necessary during the process of incubation.

Sassafras Poles and Bark used in Heneries.

Mr. Philip W. Kohler, Hopewell, Warren Co., Maine.—To keep poultry free from lice have no other than sassafras poles for your roosts. Leave the bark on. I would not have any other if I had to import them hundreds of miles. My setting hens are not troubled with lice. Fine tobacco leaves or sassafras bark (the latter is the best) mingled with the straw is an effectual remedy. Procure sassafras roosts and you will have no use for the other. It is my opinion that lousy chickens are most subject to the gapes. Since I have adopted the use of sassafras roosts, my chickens are free from all disease and lice. They get all the corn they want, and water from a never-failing spring running through the yard. I would like to see the man that gets more eggs than I do from the same number of hens. *To keep bugs away from your cucumber and melon vines*, save your washing suds every week till they become a week old. By this time the smell becomes very offensive; apply this to your vines liberally twice or three times a week. It is a good fertilizer, and will make your plants grow rapidly. The same is good to apply to your cabbage plants, or anything liable to be attacked by bugs.

Mr. George Carpenter related a fact of which he was cognizant, where a sassafras stump which had been buried an unknown number of years was found when dug up to have the sassafras odor as strong as though it was from a tree cut but yesterday.

Flowers and Fruit from Nebraska.

Mr. R. O Thompson, Syracuse, Otoe county, Nebraska, sent the following letter with the article mentioned, which came in good order, and were much admired by the Club: "I enclose to you to-day a few specimens of Rocky Mountain plants, pressed; two pentstemons and a verbena. I have a large variety of western plants, and will send specimens as they flower; also seed. I inclose five gooseberries, small, but of good quality. In a few days I will send you some fruit of the Nebraska Prolific gooseberry, which is hardy, larger than the Houghton, never mildews, and as to quality you can judge when eaten. The verbena enclosed to you is from the Yellow Stone River country, and the plants from which these flowers were taken remained out unprotected when the cold went to thirty-two degrees below zero. I send them for you to present to or before the Farmers' Club, as I wish to disseminate these things among those who feel an interest floral and pomological.

How to Grow Good Radishes.

Mr. M. D. Williams, Waterloo city, Ind , wants to know "how we can raise radishes that are not wormy or pithy; we try it every year and fail every time." Some persons declare that it all depends upon the time in the moon that the seed is planted. We believe those are most successful who plant the seed in very rich fine s oil, and water the plants very freely.

Mr. John G. Bergen.—I do not grow for market but for family use, and sometimes fail. Changing ground is one of the best remedies I have used. I sow at all ages of the moon, and it makes no difference.

Mr. Adrian Bergen.—I have been very successful in raising this vegetable. My family put a quantity of house slops on the beds, and my radishes are never affected with worms. In dry weather the radish will grow hard and worthless unless often watered.

Mr. Reuben Ball.—I have always been successful in raising radishes. My soil is sandy, but I dig it well and apply composted manure.

The Present Season—Is it Early or Late.

Mr. John G. Bergen.—In a late conversation with a farmer, he complained of the backwardness of the present season. I told him I thought he was mis aken. In my opinion it was a week earlier than the average. Another farmer thought it perhaps about the average. Mr. Robinson now gives it as his opini n that, in the grape crop particularly, it is ten days earlier. As opinions are so various, let us look to statistics for facts. After the conversation alluded to, I immediately referred to my farm books. I find the first picking of various market garden crops since 1850 entered under the following dates. They were grown under similar conditions each year:

	Peas.	String beans.	Squashes.
1850		June 29	July 3
1851		June 26	June 30
1852		June 26	June 23
1853		June 20	June 23
1854		June 22	June 26
1855		June 25	July 2
1856	June 16	June 27	July 1
1857	None.	July 6	July 7
1858	June 14	June 30	July 6
1859	June 9	June 27	June 29
1860	June 11	June 27	July 2
1861	June 10	June 26	June 27
1862	June 12	June 25	June 30
1863	June 11	June 26	June 30
1864	June 6	June 22	June 22

I find from my own books and from conversation with my neighbors that the average time of making the first picking of field cucumbers is the 3d and 4th of July. This year on Bay Ridge, where cucumbers are extensively grown as a market crop, one farmer who has twenty acres, picked and sent to market yesterday, June 27, six thousand cucumbers, and some others, from one to two thousand. These statistics show pretty clearly that the season is a week earlier than the average upon Long Island.

A New Fertilizing Plant.

Mr. John Lowrey writes from Saratoga Springs as follows: "Inclosed is a sample of a plant that grows wild in the fields, on light sandy soil, in this section. I think it might be cultivated and used as green manure, if plowed under when in bloom. Will the Farmers' Club give their opinion of its value, and give it a name? Is it 'Blue Lupine,' or what is it? It comes up early in Spring, and flowers in May, in time to plow under for corn. It ripens early in harvest, and the pods burst open, and the seeds scatter upon the ground. The seed is somewhat like a small bean."

Mr. Solon Robinson—This is evidently one of the lupin family. The two most common in this country are known as white and blue lupin. This might undoubtedly be cultivated for the purpose of turning under as a green crop manure. But what would be the advantage over clover for the same purpose? That should be the question in all propositions to grow a substitute for clover. Has the substitute any advantages? In the Eastern-Shore counties of Virginia the soil is naturally sandy, being much of the same character as that around Saratoga. Under a very bad system of farming, it has maintained its fertility for a great length of time, owing almost entirely to the natural growth of one of the lupin family, similar to the sample sent with the above letter. It completely coats the ground of every corn-field as well as every other spot not occupied by crops. It is easier to allow this to grow than it is to cultivate clover. Whether farmers at Saratoga would derive any advantage from growing lupin as a manure crop, can be determined only by actual experiments. In some parts of Europe, Portugal in particular, white lupin has been extensively used as a fertilizing crop, and will grow on sandy land where no other plant can be successfully grown. It is of very rapid growth, produces a large amount of vegetable matter, much of which is drawn from the atmosphere, and a portion from a low depth in the subsoil, which its strong roots open and ameliorate. It is rarely injured by drouth or insects. It must not be sown in the Spring until the danger of frost is past. The seeds are used for cattle food, but it cannot be recommended for that use in this country.

Cherry Trees Infested with Aphides.

Mr. James Bedford, Sheffield, Mass., writes: "Our cherry trees for the last two years have been grievously afflicted with an insect that is new to me. It is first seen on the under side of the leaf, a mere mass of black specks. It causes the leaf to curl, grow sticky, and finally to fall from the tree. This season, this insect has taken possession of the fruit, and is in such masses that the bunches of half-grown cherries and the small twigs and limbs of the trees are a mass of black sticky matter, and alive at that. Under the microscope they present a disgusting appearance. I tried early in the season a sprinkling of unleached ashes on the foliage, but without effect. I send herewith a specimen of the 'varmint.'"

Dr. Trimble said that the lice which overwhelmed Egypt are said to have come out of the dust. That is not the way these come. By watching them with a magnifying glass the manner of reproduction can be seen, and the rapidity of increase is enormous. There is no kind of vegetation exempt from these pests, and nothing but an increase of their natural destructors can ever rid us of the nuisance. I have some spinach that is literally alive with swarms of these aphides. On the same plants I have lately observed a multitude of lady bugs. They have come to enjoy a feast of their natural food, and they increase so fast that I am at a loss to know how they are to live when the lice are gone. These bugs are our real friends.

Manure—its Effect on Fruit Trees.

Mr. J. Plocker, Fort Sully, D. T., reiterates the statement heretofore made, of the effect produced by a manure pile upon one side of an apple tree which greatly increased the growth of branches upon that side. He now says: "I should have mentioned that the tree previous to deriving any benefit from this manure pile, was growing together with others in a small strip of timothy meadow, and naturally from the continuation of this cause (being a tree of some eight or ten years of age) was in a languishing condition. It may very well be that some trees will send forth roots of the nature of the tap root, seeking those conditions most favorable to the growth of the roots, and the tree show no corresponding growth of branches on the side of the tree thus favored, or again the roots may be entirely cut away from one side of the tree, and the branches over these roots show but slightly the ill effects of such usage, because the space occupied by the decaying roots will soon be occupied again by other thrifty growing roots; but both these circumstances do not destroy the idea that the branches on one side of the tree may be accelerated in their growth by a particular management of the roots. For instance, the forest trees near a clearing will, under favorable circumstances, throw out the thriftiest branches on the side of the clearing, and the plowman finds to his cost that the roots follow suit. In connection with this subject, a writer in an agricultural paper remonstrates against allowing shade trees to grow near a roadside. But the objection is generally raised from a one-sided standpoint. Settlers in a timber region know very well how long they have to combat against miry roads. But in a forest, below a bed of leaves, lies generally a light, loose soil, and a narrow track, absence of wind and sun and recurring swamps give to trees in general a bad reputation as adjuncts to good roads. But there is a reverse to this picture. To look at the Missouri river at its lowest stage, passing by the arid plains of Dakota and Nebraska, it would seem as though the river would be lost before reaching the Mississippi, yet the snow mountains and far off timber regions of the Rocky Mountains periodically send forth their floods and allow steamboats to wind their way to the Upper Missouri. Look across the immense plains, and where can you point out a solitary tree. The "King of the plains" allows only of buffalo grass, that crisps like wire springs under your feet. In the numerous ravines you may find ponds bordered by wild fruit trees, but the forest trees must hide their diminished heads when reaching the level of the plains. If we wish the storm wind to dry up our rivulets and springs, and render the growth of forest trees more and more a matter of difficulty, we have only to grow prejudiced against trees, and allow the woodman's axe full swing; only keep on in this way, and the settled States may in due time boast of plains dry and barren as those of the buffalo regions, and perhaps settled by Arabs on a par with our Sioux and Buttes as to civilization.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

July 5, 1864.

Mr. Nathan C. Ely in the Chair.

HOW TO SUBDUE AND SEED WOODLAND.

The Chairman inquired how he should subdue the growth of weeds, ferns, small bushes, &c., in a piece of woodland of about five acres, which he wishes to get into grass, without injury to any of the large trees.

The old plan would be to cut the weeds and burn them on the ground. What if I mow when the growth is largest, and when very dry, say in August set it on fire? Then how shall I seed the land, and will the fire injure the trees?

Mr. Wm. S. Carpenter—I would advise that you mow it now, and again in August and September. He said that he had a piece to subdue, and that was the course that he should pursue. If he had cattle enough to crop the lot very close, that would be the easiest way of subduing it, as white clover naturally follows such pasturing.

A very slight fire running through a young orchard when the sap is in full flow will materially injure it, and may kill some trees. I had some trees injured in this way.

Mr. Solon Robinson—I do not think that it would injure large forest trees to burn the ground over as the Chairman suggests; and as he does not wish to preserve the smaller growth it would be the easiest way to prepare it for seed, except by close-penning cattle over the whole lot by means of a moveable fence. The Kentucky blue-grass pastures are prepared by cutting and grubbing, and harrowing and sowing the seed, and by a very careful nursing for a year or two.

Mr. John G. Bergen—Is the Kentucky blue-grass the same as a similar grass that we have here.

Mr. Solon Robinson—The same difference of opinion had existed for a long time among those who have written upon the subject. I will not undertake to settle the dispute, but I will say that I have never seen any grass growing naturally in the Eastern States that compared favorably with the growth of the blue-grass of Kentucky. It often forms such a heavy coat upon the gr und that it will bear up the heaviest fall of snow, and cattle push their noses through, and obtain an abundance of green, succulent food. The blue-grass is of more value to Kentucky than her boasted tol acco crop.

Clover and Clover Hay.

Mr. Solon Robinson—Botanists give the names of 59 sorts of clover (*trifolium*), yet only four or five are cultivated, and, as generally understood, only two—the white and red. A kind called yellow clover is a weed pest. Until lately, clover has not been highly esteemed by American farmers. It is now considered excellent for all stock by many who have tested its value thoroughly. It has been cultivated in America about a hundred years. As a renovator of worn-out soils, clover has no equal. As food for cows in a milk-dairy, clover stands ten per cent. ahead of timothy. We may judge something of its value from Prof. Way's comparative analysis, showing the following results:

	Water.	Fleshy Matter.	Fatty Matter.
Green Timothy	57.21	4.36	1.50
June Grass	67.14	3.41	.86
Orchard Grass	70.00	4.06	.94
Red Clover	81.01	4.27	.69
White Clover	79.71	3.80	.89
Dry Timothy		11.36	3.55
June Grass		10.35	2.63
Orchard Grass		13.53	3.11
Red Clover		22.55	3.67
White Clover		18.76	4.38

It will thus be seen that timothy is best when green and clover when dry.

One of the reasons why farmers have not grown clover for Winter forage to a greater extent, is that it is considered difficult to cure. Part of this difficulty is purely imaginary. "The modes," says a writer upon the subject, "of curing clover hay widely differ in the same neighborhood. Some let it go to seed before cutting, then dry and turn it till many of the leaves and blossoms are shaken off, and lastly cart the dry and bulky clover sticks. Others cut it when the blossoms begin to show, fork it the same day into small cocks, and then let it stand several days, either with or without hay caps, till dry enough to cart. Latterly it has been found safe to cart it the same day, or as soon as wilted, being careful only to avoid artificial moisture, and to fill up the bent or mow within three or four days, or before it begins to sweat. Hay is improved by sweating and changing color, like tobacco. When it begins to sweat it should not be disturbed till the sweat is over. The moisture and steam will go to the top, no matter what the height, and the top is the only part in danger. A foot of straw on top absorbs the moisture and saves the hay.

"One farmer cut 12 to 14 tons of mixed timothy and clover, and carted as fast as cut, without regard to weather. Straw was placed on the top to absorb moisture. The straw rotted, but the hay turned out good. Another cut four or five acres of clover, raked and cocked it all in one day. Threatening rain caused its hurried cartage the following day. It occupied a bent and a half in the barn. The full bent came out bright and good except about 18 inches of the top. The half bent was partially injured by adding other fodder, and thus keeping the steam in. Another knew of 30 to 40 tons of hay being cut and carted the same day. The mow smoked, sweat and generated toad stools, but only the top was spoiled. The balance was sweet and good, the blossoms were unchanged, and the cattle lapped it down like meal.

The Chairman.—I have lately conversed with a man who had just finished the cutting of 35 acres in Norwich, Conn., and sold the crop at $12 a ton, taken from the cock in the field. At that price would clover be a profitable crop? Several members said yes, if cured in the manner stated in the article just read.

Moving Trees from one Locality to Another.

The Chairman.—A gentleman has lately expressed himself very decidedly to me that it would be far more profitable for persons desiring to plant an orchard to procure their trees from their own neighborhood than from a distance. What is the experience of the Club? What would be the expense of moving trees, say from the old Colony Nursery, where they have always been exposed to strong sea winds, to the interior of the country?

Mr Carpenter.—My experience is that I have lost fewer trees from those imported from France than I have from those grown in my own nursery. It makes no difference to me where the trees have been grown, nor in what soil, so that the growth has not been forced by stimulating manures.

Mr. John G Bergen.—This is a difficult question to settle by individual experience. For instance, one might get his trees from abroad this year, and owing to the drouth loose half of them. He might attribute the loss to change of climate or soil. Of this he would be convinced next year by getting trees in his own neighborhood and not losing one. My experience has been during several years as follows: I obtained trees from a nursery one and a half miles distant, where the soil is sandy loam, exactly like that of my farm Also from Boston, where the soil and climate are both different, and from France, from soil with which I am not familiar, and from Mr. Reed's nursery, Elizabethtown, N. J., some ten or fifteen miles westward, where the soil is a stiff clay. Invariably Reed's trees have proved best, and those from Boston worse. The only reason I could give was, that Reed's trees seemed to be the best grown and in the best condition.

Varieties of Strawberries.

Mr. Carpenter said: As the season is approaching when people will begin to think of making new strawberry beds, would it not be well for us at this time to express some opinion as to the best varieties? I do not wish to dictate, but as I have had experience with more than a hundred sorts, and have fruited fifty or sixty sorts this year, I can express my preference, which those who have not had experience may take for what it is worth. Among all those that I have grown this year, of the varieties which can be obtained by the public, I must rank the Russell first. It has improved with me for three years, and is now more prolific even than the Wilson, and less acid, which is a very important matter when sugar is 22 cents per pound. The Wilson has qualities for the million and must not be discarded. The Brooklyn Scarlet, one of the *Tribune* prize strawberries, I take as a model of perfection of quality. It is beautiful in color and form, not as prolific as the Russell or Wilson, but has qualities which will always make it a favorite. The Monitor is of good quality, large size and prolific. These two are perfectly hardy. The Monitor may somewhat lack vigor in some localities. The Colonel Ellsworth, I fear, has a taint of foreign blood, which makes the plants tender and liable to fail in fruiting. It is but simple justice to the Tribune Association that we should say, and place it upon record among our transactions, that in sending out these plants more has been done to induce people to plant strawberries than in all that had heretofore been said and written In the Buffalo seedling I am disappointed. I shall not continue its cultivation. I may say the same of Robinson's seedling, a sort sent out by Dr. Grant. It is one of the most remarkable rank growing plants, with long leaf and fruit stalks, but a shy bearer, and the fruit not first rate. French's seedling is promising. The Austin continues to give good satisfaction, is prolific, and the fruit sells at a high price, and is largely grown by some as a market berry. I procured last year one of Mr. Boyden's new seedling, now called the Agriculturist. It is certainly a very remarkable sort. I have nothing to compare with it. Plants which grew from runners last summer, and were set in place in October, formed stools which produced this year 220, 240, 294 perfect berries upon each. Some of them were over six inches around. It is true that all new varieties should have more than one year's trial before they are recommended to the public. The fruit of this sort is good, though not the best. May we not hope that experiments will be continued in producing seedlings until we shall get a strawberry as sweet, high flavored and aromatic as the Brooklyn Scarlet, and as large, hardy and prolific as the Agriculturist. We could not then ask any further improvement.

Food of Birds.

The Chairman:—I have four cat-birds which make their nests near my garden I have lately observed these birds very busy among the cucumber vines. They apparently looked under every leaf for a worm. The leaves upon my cherry tree are curled, inclosing green worms. The martins are continually flying back and forth between their boxes and these trees, where they open the leaves, pick out the worms, and fly with them to their young.

Mr. Carpenter—I have taken notice frequently, in driving from the city to my farm, 25 miles distant, that insects of all kinds are much the most numerous nearest the city. This is owing to the continual warfare of city gunners upon the birds.

To prevent Cattle from Jumping Fences.

Mr. Solon Robinson—I lately learned a curious remedy to prevent steers from jumping fences, which is so easy of application and appears so effectual, that we give it to the public. It is simply to clip off the eyelashes of the upper lids with a pair of scissors, and the ability or disposition to jump is as effectually destroyed as Sampson's power was by the loss of his locks. The animal will not attempt a fence until the eyelashes are grown again. Of this we are informed by Samuel Thorne, the great breeder of Dutchess county, who assured us that he had tested it upon a pair of very breachy oxen. As it was of great value to him, he hopes it will be tried by others.

Mr. Carpenter—I have lately succeeded, after several trials, in making a yoke which prevents a colt from jumping, that could not before be restrained by any ordinary fence. I took a slim, straight hickory, twelve or fourteen feet long, which is split in two as though intended for the hoop of a cask, and shaved smooth, and so thin in the center that it is easily bent to fit the neck. It is held in place by a tough half-inch pin under the throat. The ends must be so long as constantly to drag upon the ground. It was a little awkward at first for the animal to eat in this yoke, but it soon learned to reach forward to get at the grass, but it has not yet learned to swing it over the fence.

Training Horses to Step High.

In Germany this is done by putting large magnifying spectacles upon the young horses, which magnify the size of pebbles, and gets the horse in the habit of lifting his feet high, and the habit, once fixed, continues, and this increases his value as a stately carriage horse for the London market.

Season of Cutting Timber.

A Michigan farmer writes: "I have a pair of bar-posts, quite sound, made from a white-oak tree cut in June, 1835, when the bark peeled freely. I have proved that basswood rails made in midsummer will last longer than will rails made in winter. Always cut trees when the bark will peel."

Cheap Farms in Maryland.

The Chairman—The letter that was forwarded to Mr. Stockbridge, of the Maryland Convention, he answered promptly, expressing great satisfaction to see that people in this section felt interested in the emancipation movement in Maryland, and said that he would give answers to all the questions as soon as his other duties enabled him to do so. Recent events have probably added to the delay, but in the meantime the following information has been given by other parties, which it is thought it may be interesting to make public.

Mr. James McCauley, of Elkton, Maryland, writes the following interesting letter, and kindly offers to answer individuals who may desire farther information about emigrating to Maryland :

"Gentlemen—I notice in the public papers your inquiries addressed to Mr. Stockbridge of the Maryland Convention, on the subject of agriculture in Maryland. I am a citizen of Cecil county, the northern one on the eastern shore—here I was born and raised, as have been my ancestors for the last century. My business, as land surveyor and agent for the sale of land, has given me a good opportunity for seeing the lands generally, in this county, and noticing their productions under different methods of culture. In the northern part of Cecil there has been very little of slavery for many years, though the lands have been, and still are, lower in price than in the adjoining States of Pennsylvania and Delaware.

The convention, now in session in this state, will abolish slavery—then the adoption of the constitution will be submitted to a vote of the people, by whom it will be approved without doubt. This will take place in the current year.

There is considerable land in the market, much of which you would not consider in good condition, of which the average price might be set down at $10 per acre. The eastern shore has great advantages as an agricultural district. There is scarcely a place in it, ten miles distant from tidewater, where lime, oyster shells, and all the manures in the market cannot be obtained. The soil is generally a sandy loam, though some stiff clay soils are found.

"Wheat and corn have been the staple crops, and the soil and climate seem well adapted to their growth. The land is level and easily cultivated, and well adapted to the growth of vegetables. Sweet potatoes and watermelons flourish here, and are of excellent quality. In the lower part of Cecil and in Kent counties peaches are grown with great success, and as a peach-growing district it is now second to none in the United States. Apples do well, but do not probably grow to such perfection as in the Northern States. The blight of slavery has been on the Eastern Shore; but when it shall have emerged from the plague it will be a splendid country. Connected with the great cities by water communication, and with a soil and climate so well adapted to the growth of grain fruit and vegetables, and to their perfection for the early markets, it will rapidly fill up with industrious and enterprising men, and be the very garden spot of the United States.

"In regard to social toleration there will be no difficulty. The slave aristocracy will go down with slavery, as a tottering building falls when the props are knocked away, there being nothing to keep it up, as there was in Fairfax, Va., where the institution was still flourishing.

"I will be pleased to answer any special inquiries respecting property and productions on the Eastern Shore of Maryland.

"Persons desiring particular locations and character of land will receive information by writing."

Messrs. R. W. Templeton & Co., No. 48 Lexington street, Baltimore, also offer to give information to any inquiries. They say that valuable farms are for sale in almost every county in the State, at what would be considered, in New England, remarkably low prices. They give the price of four farms in Cecil county, where the other correspondent writes from, as follows:

No. 1. Forty-six acres; price, $2,800—stone dwelling and good out-houses, barn and stone stabling, four miles north of Elkton, on Philadelphia & Baltimore Railroad.

No. 2. One hundred and twenty-five acres; price, $8,125—new dwelling and good out-houses, plenty of fruits, eight miles from Port Deposit.

No. 3. Fifty-eight acres; price, $3,800—good dwelling and out-houses, fine water, fruit, &c., seven miles from Elkton.

No. 4. One hundred and thirty acres; price, $10,000—brick dwelling, barn, &c., good land, at Elkton.

In Baltimore county, farms can be bought at from $13, without buildings, to $100 to $500 per acre, according to improvements, and in other parts of the State at rates proportionately lower, according to distance from market. We have no doubt that those who are desirous of buying land in that State can obtain valuable information from either of the above parties. And we have no doubt that land can be bought both in Delaware and Maryland, according to its actual value, cheaper than in Illinois or any other Western State. And we have no doubt that the first free labor settlers will get their land at less than one-half the price of those who come ten years later. There is no mistaking the signs of the times. Maryland is about to be redeemed from a most terrible curse upon her fertile soil and healthy, mild climate. Let all the friends of free labor help to set the tide of emigration toward her shores.

Statistics of Illinois Farming—Comstock's Spader.

The Secretary—Here is very interesting letter from M. L. Sullivant, one of the largest farmers in the United States, which gives the detailed cost of procuring corn on the Illinois prairie, by improved machinery. Probably when steam is applied, the cost will be still less. Mr. Sullivant says:

Homer, Ill., *July* 2, 1864.

"I have prepared and planted to corn this season 1,335 acres of land: 844 acres were plowed in our usual manner, say about four inches deep, at a cost of

445 days manual labor, at $1.50	$667 50
890 days horse labor, at 50c	445 00
Total	$1,112 50

"Or $1 31 per acre.

"There were spaded (eight inches deep) with Comstock's Rotary Spader, 491 acres, at a cost of

89¼ days manual labor, at $1.50	$133 87
208 days horse labor, at 50c	104 00
291 days ox labor, at 25c	72 75
Total	$310 62

"Or 63 cents per acre.

"I have had in operation two horse and three ox machines. One machine was worked 33 days, with the same team of four horses. At the end of the season their condition showed that the work had not been harder for them than ordinary plowing. The ox machines require a team of two or three pairs of oxen each. A portion of the season I worked two of the ox machines ganged with six pairs of oxen, one man managing the team and spaders readily. Four of the spaders are three feet in width each. For a few days in the latter part of the season I had at work one three feet eight inches wide, which is the usual width of our corn rows. It is proposed to construct the most of them hereafter this width, and attach a self-acting corn-planter. This will be capable of spading and planting one acre per hour, with a speed two and a quarter miles, at a cost not exceeding 44 cents per acre, allowing eight hours as a day's work. As a labor-saving implement, and a deep and thorough tiller of the soil, I am greatly pleased with it, and shall watch with a good deal of interest the product of the crop at maturity. At present there is no perceptible difference in the appearance of the corn on the plowed and spaded land, but I shall expect a yield of from 10 to 25 per cent in favor of the latter."

The Chairman—The Club will be very glad to have the result of the yield. If the drouth has been as severe there as it has here the yield of the deep tilth will be double that of the shallow, and more than ten fold pay the cost.

Adjournment of the Club for the Summer Months.

Agreeable to usage, on adjourning the Club for the day it was agreed to take a recess through July and August. The next meeting, therefore, will be held on Tuesday, Sept. 6.

The Chairman—I hope every member will feel it his duty during this recess to make a note of all such facts as he may think will add interest to our discussions or be of value to the large number of persons who read the reports of our proceedings. We hope our friends in the country who have sent Mr. Robinson and the Secretary so much valuable and interesting information will continue their good work. We hope at the next meeting they will have a budget of letters from the people which will furnish us ample matter for discussion without fixing upon any regular question for debate. Adjourned. John W. Chambers, *Secretary.*

September 6, 1864.

Mr. Nathan C. Ely in the chair.

Disease of the Leaves of the Grape Vine.

Mr. R. H. Williams—While at Philadelphia last week, I visited the garden of Mr. Jas. L. Lovering, at Oak Hill, and was shown by Mr. Tripel, his gardener and superintendent, through the various departments, and through his kindness I am able to present to the club the accompanying grape leaves of various varieties, exhibiting the fungus and its effects upon the leaves of the grape vines, which was brought to the notice of the club, at the last meeting, by Dr. Trimble.

Mr. Tripel told me that he first observed the disease last year pervading the different varieties cultivated under glass more or less— the white varieties evidencing the effect more readily and sensibly than the more hardy colored varieties generally. One vine of Black Barbarosa, a vigorous and rampant grower, appeared more injured than any other in the collection, and he concluded to try the experiment of cutting back and forcing new wood from near the root that he might test its effects on the new growth.

The result is as he showed me, the growth of vine was really strong and even rampant, reaching in length from 18 to 20 feet, it exhibited the ravages of the disease as much or more than any other vine in the grapery.

Mr. Triple's conclusion is, that it is a fungus, and during the present season, it has shown itself upon all the varieties grown on the grounds of Mr. Lovering, including the most hardy natives, and those both grown under glass and in the open air. The more delicate varieties exhibit greater sensibility and more fatal results, than the native or more hardy foreign varieties.

He thinks the disease is much extended from last year, and that it pervades the root as well as the vine, as evidenced from the experiment which I have described. Mr. Triple assured me that Mr. Lovering as well as himself are much interested in the investigation of the subject, and would be happy to add any further knowledge, that their experience may enable them to aid the efforts of the Association to ascertain its cause and remedy. My observation in the neighborhood of Philadelphia satisfies me that the disease is very general, and that the effects this year will result in a very short and inferior crop of fruit.

The query is, is it climatic or constitutional?

Mr. John G. Bergen—This is an important subject, and I hope the members will give us the results of their observations.

The dry season this year has been very favorable to the grape. I shall fruit more than fifty varieties of native grapes. I have not found any symptoms of rot in any of the varieties so far. I think it requires the experience of several years to make up an opinion as to the value of these varieties.

Mr. J. R. Lancaster, Quakertown, Berks Co., Pa., writes as follows: I acknowledge an indebtedness to the Farmers' Club for much valuable information. I take the liberty of asking whether the members know if Delaware and Diana grape can be made into raisins.

At a recent meeting, Mr. S. O. Cross suggests a theory on planting fruit trees to prevent sun or frozen sap blight. As the fall season is approaching, I take the liberty to suggest a mode of transplanting I have practised for the last fifteen years in a small way (although I prefer the spring to the fall for transplanting). I select my trees in the nursery, and mark the south side of them. I take care to preserve all the roots I can. I prepare the ground so as to receive them in their original position, the same as they stood in the nursery, for the reason that nature's laws are generally self-evident. Those who will take the trouble to satisfy themselves on the subject will be convinced of the fact that there is a difference in the texture of the wood of the body of the tree on the north and south sides. If we change the position, we change the natural growth of the tree. Hence the disposition to sun blight which I think to be the most prominent cause nine times out of ten. Ask the wood-chopper who has been an observer of nature, he will tell you the south side of a tree that is exposed to the sun, is tougher and harder to chip.

Mr. John G. Bergen—The result of my observation is, that it does not make any difference which way you plant the tree, whether it stands in the same position as it did in the nursery or not. The idea seems very natural, but the facts must be decided by experience.

Cattle on the Highways.

Mr. Adrian Bergen—I wish to call the attention of the club to a decision that has been made in Kings county on the subject. Some cattle had been taken into custody by me for trespassing on the highway; the person to whom they belonged paid me the fifty cents per head according to the statute, and then sued me before a justice of the peace of the town, on the ground that I was not the person to whom the fine should be paid. The justice of the peace gave the decision against me. I appealed to the county judge, who in his decision says:

"The statute don't say to whom application for redemption shall be made, whether to the justice or the person seizing the cattle. The natural, and I think the proper person to apply to is the person having the cattle in custody, and I see no objection to such person receiving the justice's fees and paying them over to him, which was done in this case. The defendant received no more than the statute required the plaintiff to pay for the redemption of his cattle, and so both parties seemed to have understood at the time. The payment was voluntarily made without objection or protest, and, as it would seem, without any demand by the defendant. There is no evidence to sustain the verdict of the jury, and the judgment of the justice must be reversed with costs."

JOHN DIKEMAN,
Kings County Judge.

Apple Trees.—Rot in Grapes.

Mr. John Q. A. Jones, Hanover, Howard Co., Maryland.—I am very much interested in the discussions of the Farmers' Club of the American Institute. Since purchasing my farm four years ago, I have been noticing fruit trees with more than usual interest. On my place are several young apple trees, sufficiently large and thrifty in appearance to produce a good quantity of apples. They generally blossom and set fruit, but before maturity the fruit falls. If any one of the Club can tell me what to do to obtain a crop of ripe apples, he will confer a favor upon me and many others. I would also ask whether dry weather causes grapes to rot.

Mr. Solon Robinson.—I wish we could tell Mr. Jones how to secure a good crop of apples. Perhaps the trees are not old enough to bear. To the question whether dry weather causes grapes to rot, I reply no.

Mr. G. A. Cooke, Wabasha county, Minn., says: "Can you or some one of your Club tell me what is the matter with my apple trees? They are all dying off, a limb at a time. They commence on this year's growth, then the limb turns black, and dies down to the trunk, and so continues till the whole tree is dead. It commenced three years ago among the Siberian crabs and killed them, and now the grafted trees are attacked. No insect can be discovered, though a kind of gum oozes out of the young growth. Unless I can find a remedy soon, I shall lose 100 fine trees just beginning to bear. Cold weather has not affected them, although 40 deg. below zero when small. I have peach trees that stood the same degree without protection."

Mr. Benjamin Summers, Vermillion, Erie Co., Ohio.—Some 25 years ago a tree in the southwest corner of my orchard became affected in a somewhat similar manner as were many trees in various sections of this country. We then called it fire blight, from the sudden withering of the limb or twig diseased. The disease on Mr. Cooke's trees may be different, but his short description very well describes the fire blight. It killed many trees—the one first affected in my orchard entirely; and it spread to the other trees so that some 20 or 30 were going the same way in that corner of the orchard. Learning or judging that it must be the work of an insect, though too small for my discovery, I undertook the seemingly Herculean task of cutting off and burning the limbs as fast as they died. It did not prove as great a task as I expected, and after following it up a few years two or three times in a season, I saved all but one tree, and they are now healthy and entirely free from the disease. I communicated these facts to an agricultural paper and they were published in the U. S. Patent Office reports some twenty years since. If it is the same disease, I am confident a thorough excision of the limb below where dead, and burning them, *persisted* in, will cure.

Mr. Solon Robinson.—I have pursued the same course but not always with success, because though the effects are the same, there is probably a variety of causes. Wm. S. Carpenter, John G. Bergen, A. S. Fuller and other experienced fruit growers, have repeatedly given their opinions upon this "fire blight" in the discussions of the Farmers' Club without coming to any definite determination as to cause or cure. All are agreed in one thing, however, and that is to cut away the affected limbs as soon as discovered. The present season, in the vicinity of New York, many limbs, in some cases entire trees, have put on the appearance of fire blights, in consequence of being infested with worms—a new order of caterpillars. It remains to be seen what may be the lasting effects. I wish we could tell Mr. Cooke how to save his apple trees. The same disease has killed many thousands in the New England States.

A Remedy for Apple Tree Borers.

Mr. W. Taylor, Berlin, N. Y., has accidentally discovered that blue clay is a perfect protection against the borers. He makes a mortar and plasters the trees up as high as the borers would work, making the application spring and autumn. The remedy has been worth so much to him that he wishes to make it universally known, by having it printed in the proceedings of the Farmers' Club.

Cure for Poison Ivy.

Mr. J. Booth, Medicineville, Wayne county, Iowa, wishes to corroborate the statement made in these reports some time since, that soft soap will cure the poison of ivy, ("poison vine.") He says:

"Fifty years ago my father said he had used it twenty years and never knew it fail to cure. I have never known it fail since that time.

"My method of using it is to put it on the part affected, wet it and rub it till it becomes a white lather, and let it dry on, and it seldom fails to cure by first application. It is also a preventive whenever a person is exposed to be poisoned. If he washes thoroughly with soft soap (it must be soft soap made of lye and grease) the part washed will never be poisoned.

"It will also prevent and cure the poison of poison sumac (which is distinguished from sumac by the shoots being red); it grows in New England; I have never seen it in the west; but it will not cure the poison from parsnip.

"All who are subject to be poisoned by either of these plants should remember this cheap, easy, convenient remedy."

Coal Oil for Insects.

Mr. George Bush, Little Cooly, Penn., reiterates his assertion that "coal oil," "rock oil," "petroleum" and "kerosene" are effectual destroyers of insects upon trees, and the application does not work any injury. He says that it is "coal tar" that kills trees, and not coal oil, because the tar dries and forms an impervious coating, excluding water and air, while the oil, whether used in a crude or refined state, is mainly washed off before it does any injury, except to the animals that it is desirable to kill. He earnestly advises those who have any doubts upon the subject to procure a single ounce of petroleum and try its effect upon a worthless tree. To apply the oil, he says: "I thoroughly saturate a rag with crude petroleum and rub the bark until wet, and then wipe off with a dry cloth. I stated before a simple fact, which I had tested upon my own trees, and therefore recommended it through your Club to others. Some of them, instead of trying it, go into a dissertation about the injury that coal tar has done. I did not recommend coal tar, nor would I recommend barn yard manure piled about a tree to exclude air."

Mr. Solon Robinson.—Mr. Bush, with his facts, has the best of the theorists. As a general rule one such fact is worth a bushel of theory, and so we give another:

Mr J. A. Donalson, St. Joseph, Mich., says: "A word about the effects of petroleum on fruit trees, when used to kill the borer. An acquaintance of mine tried the experiment on about a dozen fine peach trees, which a one hundred dollar legal tender would not have bought, and the trees died. I did not learn whether it killed the worms or not."

Now, is it possible that what killed in one case did no harm in the other? Or did the parties use different substances?

How to Kill Canada Thistles.

Mr. A. N. Kent, Amboy, Ashtabula county, Ohio, gives his experience with these pests of the farmer, for the benefit of the correspondent in Illinois, who stated that they were just beginning to make their appearance in his neighborhood. Mr. K. says:

"I will tell you how I did. I had a patch of several rods covered with them. I pulled them up two years, but they grew more plentiful. I was bound to get rid of them, and I did it thus: I took strong brine out of the bottom of a pork barrel, sharpened a stick and run it down six inches close to the root of each thistle, and filled up the orifice with the brine. It killed them completely."

We have known a small patch of thistles killed most expeditiously as follows: They were first mown, and then a man went over the stubble with an oil can filled with sulphuric acid, and poured a few drops from the spout into the hollow stalk of each plant. Except the labor, this is not an expensive application.

Mr. James Seely—I think seeding and mowing the only remedy for this pest. To cultivate the ground, except by thorough fallowing, is a sure means of encouraging their growth and spreading. And even the most perfect and expensive fallowing is liable to fail of its object if by chance a single stalk is allowed to seed in the neighborhood, because the seeds are scattered by the wind with great facility, and the better the tilth the more readily the seed germinates. By ordinary cultivation the roots are broken and distributed, and the seed is matured usually before the crop is ripe enough to harvest. Under such circumstances the spread is very rapid. And even in pastures they multiply rapidly, especially in loose soils. To rid land of thistles, seed it thickly with grass. A good strong growth of grass, besides reducing the amount of thistle at once, decreases its vitality, and thus retards the maturity until a later period than that at which the grass is ripe enough for haying. If, then, the crop is cut in season, the slender stumps of the thistles are exposed to the damaging effects of the weather, and no fear need be entertained of spreading by either root or seeding. If the cutting is delayed, there is little danger from seeding, as it is rare to find seeds having vitality when grown among grass. Time and patient determination are necessary to final success. How long a time will be required in every case to complete their destruction, I will not undertake to say; but I have never known an instance when enough thistles were found at the second cutting to injure the market value of the hay, or to materially lessen its amount. As a rule, I think the third mowing will prove effectual, except against what may yet spring from seed remaining in the soil."

The Clover Hay Worm.

Mr. Wm. K. Griffin—Equality, Gallatin Co. (Southern) Illinois, gives us the following description of a farmer's pest, that is new to us here, or at least has not been observed. It will be well for every one who discovers the "bad appearance" of clover hay, spoken of by Mr. G., to examine whether it is caused by the worm that he describes. He says:

"There is a worm here that feeds upon clover hay. It is of a reddish brown color, with a bright red head, and is about three-fourths of an inch long. It begins its ravages towards the latter part of the feeding season at the bottom of the mow, and works its way upwards, devouring the heads and leaves. It leaves in its pathway a filmy web which gives the impression to the careless observer, that the hay has become mouldy from having been stowed away too green. When the hay is thrown out, a substance resembling gunpowder in appearance is deposited which is probably the excrement of the insect. The worm is shy and active, avoiding the light, and is not apt to be observed unless sought for.

"The neighbors here had never heard of this worm till I mentioned it. This may be owing to there being but little clover hay made here, and that being generally fed out early; or perhaps the worm is a new comer.

Two years ago I noticed the bad appearance of the hay at the bottom of the mow, but did not discover the cause till a year later. By the last of February of last year, I found the worms had penetrated two or three feet from the bottom, and when I came to the bottom in April there was not a head or leaf of clover to be seen; nothing but the naked stems, with a little mixture of timothy, which was not disturbed. Last spring they made their appearance much later than before. I saw nothing of them till April, when within six or eight inches of the bottom of the mow. They had evidently just begun to work.

Pigeon Manure.

Mr. Solon Robinson—A correspondent wishes to know the best way to use pigeon manure. I reply that "I have used within two or three years past about 150 barrels of pigeon manure, obtained from city dove cotes. It has proved eminently successful until the present year, when, owing to the drought, it has in most cases been useless, and in some injurious. My mode of using it has been to mix it with five or six times its bulk of muck, mold or loam, making up the pile out of doors where it would be exposed to the rain which softens the lumps, and by frequent turning mixing the ingredients well together, so that the whole mass is extremely rich and well suited for any kind of manurial purposes. It will be good for strawberries in a rainy season, and good for nothing in a dry one. It is purely an ammoniacal manure, and like guano and other manures of that class, requires moisture to develop its value."

Shooting Catterpillars.

Mr. Thomas G. Redding, Royal Oak, Michigan, recommends by his own experience the plan of shooting catterpillars' nests from trees as the best way to get rid of them. "Load the gun with a small charge of powder without wad. Place the muzzle of the gun near the nest, and its explosion explodes all the worms." His theory about producing sweet and sour apples by joining the halves of buds from sweet and sour trees, has been so often and thoroughly exploded that it would be a waste of powder to fire at it again.

Do Toads Eat Bees?

A bee-keeper in Brooklyn begins a communication with the above question. He says:

"While transferring a swarm of bees, I observed a toad snap up one or two of them which were on the ground. The same animal domiciled near the swarm placed in the garden, and noticing his plump, portly appearance and fearing he was fattening on my bees, I determined to offer him a sacrifice to science. Well, I slaughtered and dissected him, or rather dis sected him first, as he refused to die, even when cut in pieces. His stomach was an interesting sight for a naturalist; but I will remark in his favor that not a single bee, or part of a bee, did I find. The contents were two long, hairy catterpillars, numerous heads and parts of beetles; but the bulk was made up of a sort of cabbage beetle, or flea, jet black, of small size, with a hard shell. I had noticed them very abundant on my cabbages and turnips. Finding so many noxious insects, I regretted his destruction, but to atone, I have collected a whole family of toads and am bringing them up with great care, giving them the best garden culture."

This proves what we have so often asserted, that the toad was one of the farmer's best friends, and as such we protected him and taught our children to do so; and we have tried many times to convince farmers of this fact, and that they should give the toads the "best kind of garden culture," and we should have still continued to urge them to do so, if our friend had found the evidence in the stomach of the one he dissected, that toads do eat bees. We have often heard that they do, but have always enjoyed a doubt. We have also heard that the King bird eats bees, but it did not make us an enemy to him, because it has been frequently proved that he only ate the drones. We dare say it is the same with the toad. And now, speaking of bees, we have a question to ask:

Do the bees gather their great store of honey from flowers?

We doubt it—we have always doubted it. We are sitting now as we write under the branches of a chestnut tree, among the leaves of which the bees are buzzing merrily. They are not after the flowers, for the flowering season has long since passed. It is mid August; the burs are an inch and a-half in diameter. What are the bees after? Not the chestnut burs, surely. We have just examined and solved the question. The leaves are covered with "honey dew," and we have observed in every good season for honey, that this substance was abundant. And so we have observed in seasons when there was no "honey-dew," that everybody said "what a poor season for honey!" Now we close with a repetition of the question, "Do the bees gather their great store of honey from flowers?

A New Caterpillar Pest.

Mr. A. J. Traver, Lisburn, Cumberland Co., Pa., gives the following description of a new kind of caterpillar: "It first made its appearance in our section about two years ago; it has now become a terrible pest; it is a small worm with long hair, green body, with bright yellow and black spots, and quite unlike the old variety that used to infest apple orchards, but have now disappeared. They appear upon all kinds of fruits and shrubs in myriads; they do not take time to build webs, but appear to be continually 'marching on,' and, in many respects, resemble the ravages of the army worm which I witnessed a few years ago in the West. They are entirely destroying my crop of grapes, by eating off the stems and letting them fall. I commenced cutting off branches and leaves as fast as possible, in order to defeat them, but their rëenforcements entirely outflanked me. I next applied air-slacked lime, but all to no purpose. Does the club know of any remedy?"

The club does not know of any remedy. The same pest has made its appearance in this vicinity this year in countless numbers.

A New Strawberry.

Mr. Traver also mentions a new strawberry called the Ida, originated by Mr. Cockling, of York county, Pa., which, after a test of several years, promises to be a valuable acquisition to the list. "It is a strong grower, wonderfully productive and very hardy. The berry is of medium size, beautiful scarlet color, round and smooth, uniform in size, good flavor, bears high up, and is hard enough for transportation. I wish some members of the club to test it, as I wish it to stand or fall upon its own merit. I will send a few plants to any person that the club may designate, free of charge, as soon as the season for transportation arrives."

We will suggest the name of Wm. S. Carpenter, as the proper recipient of the plants, as he has tested more varieties than any other amateur member of the club.

Aftermath.

"An old-style farmer" asks the "opinion of the club about aftermath?"

Mr. Solon Robinson—The opinion probably would be, of a majority, if fairly taken, that, as a general thing, aftermath is more valuable on the land for mulch and manure than it is for feed. Its greatest value as feed is for calves, or for lambs dropped in autumn or winter. It is also good for milch cows, but it must not be relied upon alone. It has not substance enough to keep up the supply of fat. In curing aftermath do not sun it too much. It is so succulent that if exposed long to a scorching sun, the best of it is burnt out. If you cut it to-day, while the dew is off, let it lie until to-morrow in the swath, then turn it over without shaking apart, when it is well heated in the sun. The next day put it up in large cocks, with hay caps. These are almost indispensable. Watch the cocks until cured to see that the inside does not sour and mold. Heating, if not carried to excess, will not hurt the hay. It may turn black and still be sweet. If carried to the barn when cured on a sunny day, that operation will dry off all the sweat, and it will keep very sweet. Some farmers salt aftermath. It is not a good way. Three or four days are necessary to cure aftermath in the swath or cock.

The New Pest of Currant-Growers.

Mr. Geo. W. Putnam, Peterboro, N. Y., sends the following description of the fly which is the parent of a worm which is devastating the currant bushes of all central New York. It is from the pen of Thomas Barlow, an eminent entomologist, Canastota, N. Y.: "It is about three-eighths of an inch in length, abdomen lemon-yellow; neck and mouth yellow; head and eyes black; upper and lower sides of the thorax black; the other sides of the thorax yellow; legs yellow, except the tarsal joints of the hind legs, which are black; antennæ about half the length of the body, or three-sixteenths of an inch; four wings, or hymenopterous, with a small black spot on the outer edge of the upper pair about one-third distant from posterior extremity. The worms passed into the pupa state the 26th of May, and on the 8th of June they appeared in the perfect fly. The whole insect has a shiny, glassy appearance, like a winged parasite. The wings are very transparent and ribbed considerably like the wings of an aphis. The abdominal form is much like that of the ant, and the wings lie along upon the body with but little spreading at the hind ends. Although I have specimens of last season presented me as stated in a former article, they were in too much of a shriveled condition for definite description." Mr. Putnam says:

"In that article Mr. Barlow described the worm, and speaks of the rapidity of its transformation, a few days only sufficing for it to become a perfect fly and to commence laying a multitude of eggs. These eggs are soon hatched, and thus the pest is indefinitely increased. In that former article, Mr. Barlow gave as his opinion that neither lime, ashes, soap-suds, nor any similar remedies were of any avail worth mentioning; that the only effectual way was to place sheets of paper under the bushes, knock the worms off by striking the bushes lightly with a stick, and then destroy the worms. In this conclusion Mr. B. is undoubtedly right. I have tried both ashes and lime, and though they cause the worm some trouble they do not stop its ravages. With the leaf well covered with ashes or lime the worm will continue its operations along the edge of the leaf with undiminished appetite. I have taken the worms, covered them with lime or ashes and then slacked the same by applying a drop or two of water; but neither the slacked lime nor the lye from the ashes trough, both powerful enough to affect the fingers, seemed to produce any effect upon the worm. In each case they only squirmed a little, and finally came out as good as new, with apparently an increased appetite. By proper management, however, the destruction of these pests becomes comparatively a trifling task. The bushes should be cultivated well apart and out on open ground, and without grass under them. By placing sheets of paper as above (pieces of oil cloth carpeting are better), then bending over the limbs and striking lightly with a rod, the worms will drop off by hundreds, and can be burned or drowned. A sprinkling of lime or ashes on the bushes will make them curl up and relax their hold more readily. The eggs already laid on the under side of the leaves will of course hatch out in a few days, and the same treatment must be administered to the new brood. Follow up this process for two or three weeks, and the fruit and foliage are mostly saved. It will readily be seen that the above remedy faithfully applied will well nigh exterminate this race of depredators, and if all the insect tribe which infest the garden and orchard could be as easily disposed of, the lovers of fruit might well rejoice, In the Hon. Gerrit Smith's garden the bushes stood on open ground, which was entirely free from grass and weeds. The worms had got a grand start before they were taken in hand. Men were then set at work to beat the bushes; the worms fell by thousands, and the men mashed them on the ground as they fell with the flat side of their spades, and thus a good portion of the foliage and most of the fruit was saved. An earlier application of this remedy would have been easier, of course, and more effectual. As the Hessian fly appeared with the coming of the Hessians, so the currant worm made its appearance with the great Rebellion. It might, therefore, with some propriety take the name of the 'Secession worm;' but I doubt if it would be morally right to libel any, even the most loathsome worm, by applying to them that hideous cognomen."

Protecting Plants from Frost.

Mr. E. Alesworth, Peterboro, N. Y., has accidently discovered how to protect plants in frosty nights. He was in the habit of using boxes, casks, pails, pans and cloths. One very cold night he covered one plant with a basket. "In the morning on examination, everything was killed or nearly so except the plant under the basket! Now it is a well known fact, that on the approach of a frosty night, if the *breeze keeps on blowing* there is no frost to do much injury; but if the breeze goes down with the sun, and is succeeded by a calm, then woe to the young flowers and garden plants. But any covering open on the sides or ends will create a draft in the stillest night, and this was the case with the basket. Ever since that time, Mr. A. has simply placed boxes, &c., at intervals, and laid boards on the top of them, leaving both sides wide open. It seems like no covering at all; but it is all that is needed, and he never loses a plant. The people are greatly troubled by frosts in that high region. In early June, and even in July, it is not an uncommon thing for them to put their flowers, &c., to bed, and tuck them up. Blanket, sheets, and cloth with boxes, pails, pans, &c., are all brought into requisition, and even with these the plants are often destroyed. But the gentleman above named always saves his plants by covering them in the method described."

Mr. J. E. Covington, *Churchill, Queen Ann's Co., Md.:*

Gentlemen—Having seen your letter to Mr. Stockbridge, I take the liberty of writing to you. To all the questions asked I can return a favorable answer so far as our section of country is concerned. I am a resident of the eastern shore of Maryland. I will try and give you a correct statement of our county. Slavery with us is nearly extinct, the slaves having all removed themselves but very few remain. I think in a short time there will be none to remove. Land varies from twenty to sixty dollars per acre, according to the quality and situation. Our advantages for agriculture and horticulture are good; land can be no better situated, for marketing of all kinds which has been carried on, so far as fruit is concerned, with success.

So far as your reception with us is concerned, that depends altogether on the man, if he conducts himself as a gentleman, I can assure you he need have no fear of an unwelcome reception. We have some fine farms for sale, and will be glad to have you with us. A friend of mine has a very good farm for sale, the land is thin, but there is no better natural soil; it is situated about a quarter of a mile from Chester river, within fifteen minutes ride of a steamboat wharf and grainery. It is in a fine, healthy neighborhood with good neighbors; there is a lime landing on the place, also a quantity of red cedar. Such a farm can be purchased at from thirty to thirty-five dollars per acre, it being finely situated for grain, fruit or marketing of any kind. There is a steamboat to and from Baltimore every day. Should any friends wish to make inquiries concerning this or any other place, I will gladly do all I can to aid them.

Geo. W. Russum, *Denton, Maryland:*

Gentlemen—My desire to contribute everything in my power to the growth and prosperity of my native State will, I hope, be a sufficient apology for the obtrusion of this letter as a response to the interrogatories propounded in your letter to Mr. Stockbridge, and by him published in the *Baltimore American* of a late date.

The first and second of that series can possibly be better answered by Mr. Stockbridge than myself, and they doubtless have been already. Whilst Mr. Stockbridge speaks of the convention and its purposes, it may not be amiss that I should state so far as the people of this district, comprising all the State east of the Chesapeake, are concerned, the prospect of an early removal of the curse of slavery from our State is as good as could be wished. They are ready for it whenever the convention shall fix the time for the operation of the new Constitution, which they hope will not be later than October 1st, 1864. The convention has already provided for the election of officers under the new Constitution in November, which indicates that the wishes of the people are to be faithfully executed by that body.

To the third and fourth interrogations, I would reply that land can be had in this section of the State at prices ranging from ten to sixty dollars per acre. This will indicate pretty well which are the exhausted lands and which are under good culture.

To the fifth, as to the advantages of the eastern shore for agriculture and horticulture, I reply that *all* the advantages, soil, climate and markets, are in favor of the eastern shore. Its soil is easier cultivated, being clear of stones, but few hills, and the season some week or ten days ahead of the *respectable* part of the western shore.

6th. The facilities for reaching markets are excellent, the bay vessels and steamers to Baltimore, to Philadelphia through the Chesapeake and Delaware canal, and by Delaware railroad to Philadelphia and New York.

7th. Considerable attention has been given to fruit culture, and the experiment has not only promised well, but proven exceedingly remunerating.

8th. You "Yankees," as you call yourselves, the bone and sinew of the great and christian North, would be heartily welcomed by all true Marylanders. There is but one section of the State where it is likely there would be an exception to that, viz., in the lower section of the western shore, known among loyal men as "South Carolina." I hope your Club will send a deputation to this eastern shore to view its advantages and report upon it. Though I am well nigh broken up at fighting this pro-slavery locofoco party, and am not in condition to extend to you many hospitalities, yet I have a few friends, and if you or any of your Club chance to come, as I hope you will, nothing would give me as much pleasure as to go around with you and by introducing you to the true men of the shore, make your visit both pleasant and profitable. The route to this place is by Delaware railroad from Philadelphia to Harrington, Del. Leave New York 6 P. M. to-day and reach here to-morrow at 4 P. M. If your Club cannot come down and see our country, I'll get our farmers (for I am a lawyer) to come and meet you and tell you what a great country we have. If there is any point on which you desire more information, please write me, for I am anxious to fill up the State by just such men as you represent.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

September 13, 1864.

Mr. Nathan C. Ely in the chair.

POULTRY, CAN THEY BE KEPT IN LARGE FLOCKS?

Mr. Martin A. Reeder, Winchester, Randolph Co., Indiana: "A large proportion of the farmers in this section are very much interested in all your discussions about poultry, for they derive a considerable profit from poultry which is sent alive to the New York market. Some persons have sent very large quantities, dead and alive, of turkeys, geese, ducks, fowls. I propound the following questions which interest a very large number: Will chickens, fowls, turkeys, &c., remain healthy in large quantities together? (1.) Would it be profitable to keep 5,000 hens together in an inclosure constructed similar to our country fair grounds? (2.) If so, how many acres, and whether in cleared or forest lands? (3.) Are there any such chickeries in operation within your knowledge? (4.) How have they succeeded? (5.)

Mr. Solon Robinson—I have proposed the following answers to the questions:

(1.) Not unless they have a very large range of ground, part of which should be woodland, and the other part frequently plowed and sowed with grass and small grain. Fowls require green food and fresh earth and running water to keep them healthy. They also require animal food, which they obtain in large quantities when running at large.

(2.) Not unless the inclosure is a very large one, at least 50 acres, and probably 100, and then the chances of profit are very doubtful.

(3.) This question is answered in the above.

(4.) I do not believe there is one in this country. The nearest approach to it is the establishment of the Messrs. Beatty, near Geneva, N. Y., who are not poultry raisers, but poultry feeders. They purchase the birds in autumn, and fatten them for market in an inclosure, just as some men purchase and fatten beeves and sheep. In this they are eminently successful.

(5.) Several attempts have been made in various parts of the country to raise poultry artificially and have all failed. In our opinion, that, like the production of silk, must always be carried on in a domestic way. We have never known either to succeed when undertaken upon a grand scale. A factory like that of the Messrs. Beatty, for the collection and preparation of poultry for market, would be profitable in every county in the country, and would induce farmers to produce poultry in much larger quantities, and at a very considerable profit.

Improvement Wanted in Carriages for Farmers.

Mr. G. W. Stebbins, Portland, N. Y., makes the following sensible suggestions upon a very much needed improvement :

"Will it be proper to suggest to the Farmers' Club an improvement in pleasure carriages, so that farmers and their wives, after the exhausting labors of the week, may be spared the acrobatic feat of climbing into a high buggy preliminary to the ride to church ; so that aged people may ride without the fuss of carrying out a chair, and without requiring a *boost* from the entire family? (1.) How we ever came to have such elevated vehicles I do not know, unless they were first used for their convenience in driving over stumps (2) when the country was new, and are to be retained until some great genius like that spoken of by Charles Lamb, who taught the people of China how pigs could be roasted without burning down the sty, shall arrive to show us we can ride just as well nearer the ground. If it should be thought advisable that the members of the club, including 'outside members,' should each have built a carriage after a plan of his own, and then at a grand carriage show a premium should be awarded to the best, I should like to be counted in (3). A broad sofa-like seat, that might be reached by an easy step, would be the main feature of the one I should offer (4). I sometimes dream of riding in such a one, in the 'good time coming,' when roadside fences shall disappear, and every road shall be like a gravel walk throughout the entire garden of America (5.)"

Mr. Solon Robinson—I answer the questions in this order :

(1.) Yes, very proper, and urge it upon all the wagon makers in America, and keep repeating it until somebody has gumption enough to make the improvement. Our present fashionable style is simply ridiculous—that is all. To this there is not a single exception. The Russian drosky comes the nearest to what is wanted for "old people," but the wheels of that are ridiculously small. There is no need of small wheels to bring the body of the carriage near the ground. That should be done by crooked axles. We have seen carts for moving heavy burdens, with six feet wheels, the body of which swung only six inches above the earth. Why not have go-to-meeting carriages upon the same plan?

(2.) If such was the origin, it will probably continue as long as a stump is to be seen. You might just as well expect a wagon wheel to make for itself a new track, to escape the old deep rut, as to expect a wagon-maker to vary the pattern of his respected grandfather. Besides, if you, Mr. Stebbins, had a new carriage built after a common-sense pattern, have you independence enough to use it?

(3.) And so should I. And I think that any agricultural society that will offer a prize large enough to bring out such a desirable improvement in farm carts and carriages will do more good than ever has been done by prizes for fast trotting, fat hogs, or big cabbage-heads.

(4.) I like your idea. Why not develop it?

(5.) Oh, may that good time soon come! It may be hastened, if we who have had the scales removed from our own eyes keep diligently trying to remove them from those of others who are still blind to their own interest.

Peach Trees and Tanzy.

Mr. D. M. Fisher, Arch Spring, Blair Co., Pa., disputes the position of Mr. Kohler, of Missouri, about tanzy being a preventive of borers and curl-leaf in peach trees. Mr. F. says:

"I would say that I have tried the remedy thoroughly, and in no case has it proved to be a preventive of either. I have peach trees standing among the tanzy dead and dry. I examine my trees annually, and sometimes oftener, and have always found the borers as plenty where the trees were surrounded by tanzy as anywhere else, and the curled leaf is just found the same as elsewhere."

This gives both sides of the question. Mr. K. thinks tanzy useful. Dr. Trimble thought the idea ridiculous, and Mr. Fisher says that he has fully satisfied himself by actual trial.

Do Birds Eat Strawberries?

Mr. Fisher also settles this question by the following statement. He also tells us how to cheaply protect the fruit from the birds. He says:

"You old strawberry growers may laugh at what I am about to write, but laughing in New York will not hurt in Pennsylvania. Having planted a bed of Triomphe de Gands, and being quite proud of their bright appearance, I was depending on them for a number of delicious messes, when lo, the robins and cherry-birds began to pick off all those that had the least appearance of coloring. After they were gone, they commenced on the green ones. Being determined to outdo the birds, I took newspapers, one for each hill, and with small stones and sticks I laid the edges of the paper tight to the ground and saved the crop. It improved the flavor of the berries very much by being shaded. In dry weather bits of paper will answer first-rate to keep the birds off the ground.

The New Destructive Caterpillars, and How to Kill Them.

Dr. W. P. Peck, English Neighborhood, N. J., says: "The caterpillar spoken of at the last meeting of the club, has this season done an immense amount of damage to young fruit trees in this vicinity.

"Perhaps the result of my experience may be of value to your readers I commenced to make war upon them early in the season, when they first made their appearance, by taking off the leaves upon which I found them and burning them in the kitchen stove. I have made it my first business in the morning to visit my trees and destroy the destroyer. The larger part have been destroyed while very small, and before they had done any damage, and before they were large enough to emigrate to my grape vines, which have consequently escaped the damage done to those of my neighbors. The young fruit trees of many in this vicinity appear to be totally ruined by this pest, while mine and those of others who have pursued the same course seem not to have suffered."

Mr. Solon Robinson.—We have pursued the same course, or rather the female members of our family have—a lame arm having prevented us from engaging in the sport. The success upon our grounds has been quite equal to that mentioned by Dr. Peck. Some limbs upon large apple trees, which we could not induce our Irish gentleman to risk his worthless neck to clear of the worms, look now as though the leaves had been scorched by fire. It is certainly the most destructive worm that has ever infested the trees in the vicinity of New York. It appears to possess a poisonous quality which turns brown every green leaf it touches, and it is in no way choice upon what kind of bush or tree the leaves grow. It has infested every kind of fruit in our garden, and nearly all kinds of flowering shrubs, and we have seen it on several kinds of forest trees and bushes. The period of its depredations is mostly confined to July.

Value of the Improved Black Raspberry.

Dr. Peck gives us the following testimony in favor of this fruit, derived from his own experience. He says: "I have now grown it for four years, and find it the most profitable crop I can cultivate. It costs less to cultivate an acre of them than an acre of corn or potatoes, while the product of an acre will sell for from $300 to $500. With special care in cultivation I am confident that $1,000 can be realized from an acre, at the price for which they have been sold in this market.

Grape and Wine Questions.

Mr. Jos. Harsh, Clyde, Iowa, asks about the Oporto grape: "Is it worthy of being classed among the fine varieties of wine grapes, such as Diana, Anna, Delaware, &c.? (1.) Is it hardy as either or all the above, and a good bearer? (2.) Has any work been published yet that is trustworthy upon the subject of wine making in America? If so, who is the author, and where can it be had? (3.)

Mr. Solon Robinson.—Judging from several samples of wine that we have seen from the Oporto grape, we must answer this question with a very decided negative. It is not, as its name indicates, the grape from which Oporto wine is made, and we do do not think it is a variety which will be successful in general cultivation. (2.) Of that we have no personal experience—those who have will answer. (3.) Col. Harazthy, of California, published a work some time since, which can be had of the Messrs. Harpers, in this city.

Seeding Land to Grass.

F. B Payne, Randolph, Vt., says:

"We have considerable difficulty, especially in a dry season like this, in getting our lands seeded down to grass (clover and timothy). We usually sow to oats and grass seed together in the spring, after having manured and raised a hoed crop the previous year, and especially upon upland of rather sandy soil, the grass seed often fails to come. Now, what course can we take to be sure of success in stocking down lands (1); how deep should the seed be covered (2); and whether harrowed, brushed or rolled in (3); and how can we best stock down after taking off the oats or other grains, and finding no grass starting up (4); is it a good way to sow a new supply of seed before the fall rains, and harrow in (5); or first plow again, then sow and harrow—or wouldn't it be as likely to success to wait till spring and sow on the last snow (6)?"

Mr. Solon Robinson.—(1.) The only sure way to success is by irrigation, and this is an important secret that American farmers will some day learn, that irrigation is one of the most valuable improvements that can be made, wherever it is practicable.

(2.) The proper depth to cover any seed is but very little more than the diameter of the seed. The imperfection of covering makes it necessary to cover some much deeper, while others are left entirely exposed. If we could be sure of a heavy shower immediately after sowing grass seed, that would cover it sufficiently.

(3.) We prefer to plow in oats lightly. The best implement for this is Share's cultivator. Then harrow smooth, and sow the grass seed, and brush lightly by a fine limbed bush drawn by one horse.

(4.) If the land is spotted with grass, it is best first to harrow and then sow the vacant spots as soon as the oats are cut.

(5.) Yes; but it is not necessary to wait for the fall rains before you sow, because, if the seed is on the ground, it will be ready to grow when the rains commence.

(6.) If the ground is all bare, we should recommend you to wait for the next spring crop.

The Rosin Weed of the Western Prairies.

Mr. J. Makinson, Monticello, Ill., sends a specimen of the rosin or wax, as he calls it, of a plant that grows very abundantly upon all the western prairies, commonly known as "rosin weed." It is also known to some as the "Polar plant," its leaves indicating north and south. Mr. M. says it may be obtained in large quantities from the juice of the pressed weeds.

Mr. Solon Robinson.—I believe it is one of the *helianthus* family of plants. I have frequently gathered the rosin from the broken stalks, but that is a very slow process. The specimen sent us, obtained in that way, is of a very light yellow color, quite transparent, so much so that a sheet of the thickness of common paper glass does not afford any obstruction to the reading of fine print. The gum is very pleasantly aromatic, and is slightly stimulating. Whether otherwise medicinal or not we cannot say. Unless it is so, it would hardly compete with other gums more easily obtained.

A Currant Bush Pest Described.

Mr. L. A. Willington, Glens Falls, Warren county, N. Y., gives the following lucid description of a worm which he thinks different from the one described by Mr. Barlow. He says:

"The worm makes its appearance here before the currant leaves are fully grown. It is at first a minute thread about three-eighths of an inch long, of a brilliant black and orange. It is very lively, has a voracious appetite and grows rapidly; is of the kind known as *measuring* worms, and when shaken from its hold drops down and hangs suspended by a thread, by which it ascends to the bush again. About the 16th of May I selected three full grown worms and put them in a lemonade glass, with about one inch of fine earth at the bottom of the glass. I fed them for several days, and they one by one disappeared. Turning up the earth with a stick, I found the worms in a torpid state. Going to my garden, I dug them out of the earth about the roots of my currant bushes in the same state. Two days later they were small, dark brown chrysalises. In a little over two weeks one of them made its appearance as a perfect insect—a small maize butterfly, with light gray marks upon its wings. In a week more they were very common in my garden, never going far from the currant bushes, nor could I discover when they laid their eggs. They fly mostly by night, and are very difficult to catch; but a candle set in a pan of water might attract them and destroy thousands before they had laid their eggs. The worm has been common to currant bushes for years, but it is seven years or more since it commenced to be troublesome here. One of my neighbors counted 900 worms shaken from a single bush at one time.

A Parasite Plant.

Professor Thurbur names the plant sent by John H. Mudget, Sr., Fonksville, Lake county, Ill. Its common name is "Dodder;" its botanical name is *Cuscuta Gronovii*. It is the pest of flax growers in England. It is a true parasite, like the mistletoe (*Viscum album*) and many others. It germinates its seeds in the earth, but as soon as the slender stem rises above ground it attaches itself to some other plant and the root dies, and then all the sustenance of the parasite is drawn from the supporting plant, which suffers in consequence. The one sent by Mr. Mudget is attached to the stalk of dwarf willow, which grows common on moist prairie soil, and may not be the same which plagues the flax growers of England. If it is, it will be likely to prove troublesome in future in Illinois. Mr. Mudget says he has most generally found this species of dodder attached to the large stiff stalks of the golden rod. It grows in long yellow threads, without leaves, which twine around the supporting stalk, where the dodder forms a little cluster of seed vessels. Dodder has no use, medicinal or otherwise, that has ever been discovered.

Adirondac Grape—Its Value ably Discussed.

Mr. Geo. W. Campbell, Delaware, Ohio, sends us a communication of which he says: "My object is to bring out the *facts*, if possible, about the Adirondac Grape, and while I seek no notoriety in the premises, I never allow myself to write any thing for publication to which I am unwilling to place my signature.

"I am fully satisfied that the Adirondac is not hardy enough to be of any value for *general* cultivation, and although I have the plants for sale, and means for increasing them to any desirable extent, I cannot with my present impressions recommend it; and I feel it to be due to the public that its true character and value should be ascertained."

The following are the reasons given by Mr. Campbell, why he does not indorse the Adirondac:

"This grape has now been offered to the public for two or three years, and somebody not specially interested in disposing of the plants at high prices, ought to be able to give a little more information in regard to it, than has yet been vouchsafed by its introducers.

Having invested over $200 dollars in the purchase of vines of this variety from Mr. Baily, and others, it has been my desire, as it certainly is to my interest, that the Adirondac should prove all that is claimed for it, but I am compelled to say, that in some important respects it has not met my expectations; and that my impressions as to its value, especially for general cultivation, are not favorable.

"I procured the first plants (grown under glass), of this variety, in the spring of 1862; cut them back to one eye, and planted them carefully. The few eyes which I took off I grafted upon some thrifty young vines of the Taylor, and placed them in 6-inch pots on a propagating bed, all of which grew promptly, and as soon as they were well started, I removed them to open ground, where they made growth nearly equal to the original plants. In the fall I cut them all back to about three inches, covered them with fallen leaves, and over these, mounds of earth from four to six inches thick. They were planted upon high sloping ground, where water never stands, and I regarded their protection as perfect. In the spring, upon uncovering them, I found all the buds killed down to the collar near the roots, on the original plants, and a part of those grafted killed outright, though the point where they were worked was an inch or two below the natural surface of the ground.

"Protected in the same way, Rebeccas were wholly uninjured; and those left unprotected, were not injured as badly as the Adirondacs which were carefully covered. This is to me conclusive evidence that it is *not hardy*, and in consequence not suited to general culture. The Adirondac is better covered with foliage than the Rebecca, and in open ground this season it has shown rather less tendency to mildew than the latter variety. From its foliage and general characteristics of growth, I judge the Adirondac to be an Isabella seedling; and though apparently much less hardy, may be an improvement in quality upon its parent; but I do not consider this well established. Most persons have doubtless observed that Isabella grapes grown in warm and sheltered localities, and otherwise well cared for, acquire a size and flavor greatly superior to those grown carelessly and in open exposure. I have seen them thus grown that I hardly recognized; and which, without explanation, might easily pass for a new and improved variety.

"As to the quality of the fruit of the Adirondac, I have no knowledge except that derived from reports of committees, and from others who have seen and tested it. So far as I know, it has not yet fruited, except in its original locality, on the banks of Lake Champlain, in Essex county, N. Y. The vine is near, or at the base of a semi-circular range of hills some 200 feet high, sloping south, and sheltering it perfectly,—the valley opening only southward. At New York, last fall, and at Cleveland, it is but reasonable to suppose the fruit shown was "got up" specially for exhibition. At

New York, I understand the report of the committee was favorable as to its quality, except that Mr. Chas. Downing dissented, giving his preference to the Iona.

At Cleveland it received a premium as the best grape, but the fact as stated by Mr Lyon, of Michigan, one of the committee, is that there was nothing placed in competition with it except the Catawba, and Mr. L. intimates that the award would probably have been in favor of the Catawba had the latter been ripe. Mr. A. S. Fuller, of Brooklyn, who visited the original vine in 1862, thus describes the fruit; "bunch large and compact, shouldered; berries large, round; skin thin, dark, nearly black, covered with a delicate bloom; flesh tender, with scarcely any pulp, melting sweet, but not rich." He adds: "*If* this variety proves to be as good in other locations as there, I shall consider it a great acquisition."

"I have written the above for the purpose of eliciting information. If the experience of others has been more favorable than mine, I should be glad to know it, for I feel an interest in having the matter fairly tested; and if the pub ic are to invest the two, three, or five dollars per vine, now asked for the Adirondac, I think they should do so in possession of all the facts that can be obtained as to its true character.

Tea and Coffee—Economy needed in their Use—Substitutes.

Mr. Wm. A. Drew, Augusta, Maine, gives us the following argument upon the above question, which we commend to all the readers of these reports. He says:

"The object of my present letter is to ascertain from you, or the Farmers' Club through you, what, if any, wholesome substitute for the Asiatic tea may be found in our pastures, fields or gardens? In these times of high prices it becomes the duty of every prudent housekeeper to study economy in the use of the necessaries as well as the luxuries of life. True, in this war, our ladies *can* do without tea as did the women of the Revolution; but for the reason that what were *women* then are *ladies* now, I fear that, so much are they under the potent influence of luxurious fashion, the wives and daughters of the present day are hardly so personally patriotic in matters of self-denial as were the mothers and girls of '76. Of course, then, we must have tea upon all our tables with every declining sun. But when, as now with us, providers have to pay a dollar and fifty cents per pound for Oolong, we fathers and husbands are tempted to provoke the question, can anything be gathered or raised from our own soils that will, partially at least, if not altogether, take the place of the Chinese herb as an acceptable and healthsome beverage to wash down our bread and butter, our pies and cakes, at the third meal of the day?

With regard to the morning repast, various substitutes have been prepared for coffee, some of which are well approved and in general use. These have largely taken the place of the Javas and the Rios. Indeed, I hardly know of a family now that uses the pure unadulterated coffee for breakfast. My own experience in this matter is as follows: I knew, before this war, that chicory was an article of commerce, and even in cheap times entered into the preparations of ground coffee as furnished to the army and navy, and as retailed in our groceries. But I had never tested its virtues upon my own table. The fact of its approved use, however, suggested to me the idea of sending, as I did send a year ago last spring, to Thorburn, New York, for a quantity of chicory seed, a few rows of which, on its reception, I sowed as an experiment in my garden. The ground was rich and mellow, and I thinned the plants early to about six inches apart in the rows. They grew luxuriantly, and from three rows of four and a half rods each in length, I harvested in autumn nearly six bushels of large, fair, handsome roots of chicory—resembling the largest and most comely parsnips. These I put in the cellar, with a little loose earth over them, for a winter's supply, and commenced the use of them as follows: After washing a few roots, we cut them crosswise in slices about the thickness of a half dollar, and spread them on pans in the brick oven after baking or in the stove after cooking, and there let them shrivel and dry till proceeding to burn them as we would coffee over a hotter fire. Thus prepared, a few blows from the pestle in a mortar broke them up fine enough to pass through the coffee mill. Before the rebellion I was satisfied to buy Java coffee by the pocket or bag at a Yankee shilling per pound. Since the war has driven me to chicory, our practice has been to mix one part of pure Java coffee with three parts of chicory, and this, ever since last autumn, has been our morning beverage—and strange to tell, no person in the family or friend visiting it, has ever complained, but all have been pleased with the composition? Indeed, we think the chicory is a positive *improvement* on the coffee; it has the Java flavor still, and is certainly more wholesome than entire coffee, for everybody knows that there is something in every variety of the dandelion species that is highly congenial to the biliary system of the human stomach. So now, when old Government Java is sixty cents per pound, it really costs me but fifteen cents—cheaper than of yore. Were it to return to the old price of a shilling, we should continue the mixture of our chicory with it; as now, preferring it thus prepared as a beverage, and believing it to be more healthy.

"But in the matter of tea, I need information from the club, whether anything hereabouts can take its place or be mixed with it to advantage. It seems to me to be important that this question should receive a public answer, for the economical advantage of the people.

"I remember that in the last war with England, in 1812–15, my father owned a West India coaster, that used to visit North Carolina for naval stores. On those voyages the captain and crew made it a point to gather or purchase a native *tea* which was in use there, and which they brought home in quantities and sold to our grocers in Massachusetts (my native State), who supplied many families with the article. I have forgotten the name of the plant, and would give almost anything to recall it. Can you tell what it was? Can any of the club tell what it was? Does any one know anything about it now? I only remember that it was a popular beverage, and sold readily in market as a substitute for the Chinese tea. It was *called* 'tea,' but the Indian prefix I have forgotten. If you, or any of your respected associates, can tell us its name and describe its quality, I shall be well rewarded for the writing of this letter. Remember it is a

North Carolina plant, and I think may be found growing wild on Roanoke Island.

"Meanwhile, all the experience I can give you in my own case is this, it may not be of any service to you or the club. In my garden I raise a great many black-cap raspberries, or thimbleberries, as they are otherwise called. Now, when the new canes are growing, young and tender, we strip the leaves from a foot or two of the ends of them, spread them where they will dry in the shade, and to one part of Oolong tea and two parts of these tender black-cap leaves, and steep them together in the common tea-pot. The beverage is certainly innocent, pleasant, and few connoisseurs at our table can tell the difference between it and the unadulterated article. At this rate the Oolong, which now sells at retail for one dollar and fifty cents per pound, costs us, in reality, but forty-seven cents. If you know of a better substitute, please give us the benefit of your knowledge. Common raspberries, I suppose, will do as well as the black-caps. Some use the hardhack of our pastures, and this is not a bad arrangement. Sage makes an excellent tea, but it is an *herb*, more adapted to the exigencies of sick people than to the tastes of well ones.

"We must economize in all these matters, and he who will show his neighbors how to do it effectually and practically, is a public benefactor."

Mr. Solon Robinson.—Upon this I have to remark that we commenced the growth and use of chicory and commended it to others before the advance in the price of coffee made it as great an object to do so as it is at present. Our mixture is somewhat more economical than that of Mr. Drew. It is as follows: one-sixth coffee, two-sixths chicory, three-sixths rye. This mixture has given old coffee drinkers great satisfaction. The odor of the rye is neutralized by the coffee, which is well known is one of the best deodorizers that we have in common use. The addition of chicory to coffee, whether mixed with rye or not, is a positive improvement. In regard to its preparation, we cut and dry the roots in autumn. They are afterwards roasted for use as wanted, but not ground. Using them in small broken pieces, requires rather more weight of chicory than if ground, but used in this way, it is an advantage in causing the coffee to "settle" without using any other substance for the purpose. The roots will require examining during the spring after drying, as like apples and other substances they are apt to become wormy. To remedy this, put them in the oven and give them a slight baking.

The name of the North Carolina tea is Yupon. It resembles in size, growth and full age, the common garden plant called "Strawberry tree," (*Euonymus Europáeus.*) The leaves are gathered at any time after fully grown, and dried in the shade, and packed away in bags or boxes for future use. The plant is common upon all the coast range of North Carolina, and very little tea of any other kind is used by the natives. When they are sick and need an emetic, they drink the Yupon tea very strong. It answers the desired purpose and saves doctor's bills. As a beverage, we cannot say that we took to it kindly, though we have frequently drunk it while traveling in that country, and were told that by continued use we should become fond of it. To our taste, we should greatly prefer the "Jersey tea," (*Cleanothus Americanus.*) We highly approve the suggestions of Mr. Drew to seek for some substitute for the costly Chinese tea. We have no doubt that there are several more healthful, and which, perhaps, as in the case of Yupon, would give equal satisfaction to those who become accustomed to their taste. This is an important question, which must receive *immediate* attention from all who are disposed to make experiments, as leaves must be gathered before they fully mature.

Ailanthus Silk.

Sarah M. Ross, Ai., Fulton county, Ohio, manifests her zeal in behalf of non-importation, in a practical way. She says:

"I take the liberty that the lady from Vermont has, that is, to get you to procure me some ailanthus seeds; I have long wanted to commence the silk-work business, and if I can get the eggs and food for the worms I intend to have a dress of my own manufacture (I have been a reader of the Tribune for four years, and read the debates of your club with pleasure), and if can get some ailanthus seed and silk-worms eggs, I hope with profit.'

There will be no difficulty in getting ailanthus seed from any large city seed stores in autumn. Perhaps this Club will have a lot for free distribution. The eggs of the worms that feed upon and make silk from ailanthus leaves are in use in France. We do not know of any in this country. Silk-worms that feed upon mulberry leaves have been common many years.

Wild Flowers from Wisconsin.

Mr. J. Weston, Briggsville, Marquette county, Wis., says: "I send you inclosed two specimens of our beautiful wild flowers. They both grow on most sandy land, and by the roadside. They are exceedingly beautiful and fragrant, and they continue in blossom a long time. If any one should wish for any seed, I will send them some. If any of your Club know the botanical name, please give it in the Tribune."

Prof. Thurber gives the name of the one with the spike of purplish flowers as *Amorpha canescens*, and the other *Tephrosia Virginiana*. The first is known as the Lead plant, and is supposed to indicate the existence of galena in the vicinity where it is found in abundance. The common name of the other is Goat's Rue. Both are pretty flowers, and so are many other wild ones in the West.

Prairie Tea—Jersey Tea—American Tea.

Mr. Charles Boynton writes from Lyons, Iowa, as follows: "Inclosed with this I send a few of the tip-ends of the sprouts or branches of a shrub that grows plentifully throughout this region, on the higher portions of the prairies, and which has been called by some Prairie Tea, but is generally known as Red Root. It grows about two feet high, in clusters of shoots springing from the root, or from the shoots of last year's growth; I think both. The root is large compared with the top, is very tough, and runs out in horizontal branches to a great distance. It is much dreaded by prairie-breakers, and a higher price is paid for breaking up land in which it abounds. It is of a red color, and is very astringent. The leaves of this plant have, no doubt, in decoction, somewhat of the flavor of tea, and they resemble it in shape and other characteristics. I am led to suppose that it may contain *Thein*, and I have, or can gather sufficient of it for an analytical test, if such can be had. I think it likely that the same thing has been presented to you before, and that you are acquainted with it better than myself."

Mr. Solon Robinson.—It is the identical article that was extensively used after "the great Boston tea party," and during the Revolution was called "Jersey tea," and of late has been called "American tea," and as such has been gathered and cured to sufficient extent to fill a great many empty tea-chests, and from these the tea has been retailed in this city to considerable extent; a good deal of it has doubtless been sent to the country and sold at a dollar a pound to the very persons who have had to pay an extra price for breaking prairie that was covered with the identical shrub bearing the leaves which furnish their tea-party beverage. The leaves of this shrub do not contain Thein, nor do they contain anything deleterious, and they do make a rather pleasant beverage, which is a very good substitute for the real Chinese article. The leaves should be gathered when fresh and green and dried in the shade, or else like tea-leaves, by fire heat in shallow pans, stiring constantly. We recommend our western friends to try a little of the abundant "prairie tea."

A New Wheat.

Mr. Isaac Diehl, Jarvis, De Kalb County, Ind., says: "Eight years ago I selected from my field five heads from one stool, sowed the seed, saving and repeating until I got 83 bushels before selling any. Since then some of my neighbors have grown 48 bushels per acre. This year not quite so good. It is now much sown in this section, as it is the earliest variety known, and in this bad year is the best of any variety here. The straw is short and heavy, and does not lodge upon rich ground."

Mr. Solon Robinson.—If all this is true wheat growers will do well to procure some of the seed and try it. The sample sent is a fine, plump, white berry of small size.

Opium from Common Poppies.

A correspondent writes as follows:

"If all the opium in the poppies in our gardens were to be saved, I believe it would amount to one half the consumption in the States. Last week I experimented a little, and estimated that, with enough plants, an active person could gather four ounces in a day, which, at the present wholesale price would be worth four dollars. Many people think that the common garden poppy does not give pure opium. To satisfy myself on this I tested some, and found the yield of morphia equal to the best imported.

"Directions.—After the flowers have fallen off, with a sharp-pointed knife make a slight incision entirely around the capsule, about half way down from the top, being careful not to cut through it. The milky juice will instantly exude, and in two or three hours be dry enough to scrape off with a dull knife. It must not be done in wet weather."

Canada Thistles.

Mr. E. W. Mann writes from Wisconsin about this pest, that appears to be spreading rapidly over the prairies. He says:

"I have two small patches, and they keep spreading from year to year in spite of my efforts to subdue them. How much salt will it take per acre to kill Canada thistles, and, if sown broadcast, the effect it will have on the land, and how long it will destroy the crop."

We have never tried the experiment as to quantity, but we know that 20 bushels per acre does not destroy crops; we suppose that it may take 100 to kill thistles. We think that the land would recover in one year, and be better than ever. It certainly would by adding as much lime as you used salt.

Mr. B. C. Arnold gives his experience in killing Canada thistles as follows:

When the plant is so far advanced in blossoming, that seed is rapidly forming there is a heavy draft on the accumulated supplies, and all the resources of the plant. This occurring at a season of the year usually hot and dry, I reasoned that to mow it at this time, leaving the stumps exposed to the hot sunshine, would destroy it. I mowed them, and but few plants made their appearance the following season, and those were of the smaller ones of the year before which had not seeded so freely, and consequently were less exhausted. It is therefore essential that the cutting should be delayed as long as can be without incurring the risk of seeding with a new crop of them.

Hops.

Mr. James Manning, Will county, Illinois, writes for information on this subject, and inquires if hops can be grown in Wisconsin as well as farmers grow them in Central New York.

Mr. Solon Robinson—I spent some time during the summer among the hop growers of New York. There is no reason why you cannot grow hops in Illinois and Wisconsin, but you will find one trouble. The soil is so fertile that the vines will grow too large, overrunning and breaking down the poles and not producing fruit in proportion to the growth of the vines. At least that has been the experience of those who have tried to grow hops upon very rich, mucky soil. There is a great difference in soil, as to the quality of the hops, so that half the quantity grown upon one soil is worth to the brewer more than the larger quantity from another district. This value can only be proved by years of experiment. Of that you must take the chances. Of the preparation of the ground, whatever prepares it well for corn does for hops. In this word well, I include the draining and subsoil plowing, as first, and such other cheaper preparations as are usually given as second and third. The tending of the crop is exactly what a good corn-grower would give; that is to keep the ground absolutely clean and mellow with the plow and horse hoe, and a little work with the hand hoe. I found in the clay-slate lands of Cortland, Cayuga and Onondaga counties, that the hills were about eight feet apart each way, with four to six vines on each hill, trained upon two poles, ten to fifteen feet high. In some places I have seen them 29 to 30 feet high. I believe that long poles are unnecessary. Like grapes and other vines, they always produce the fruit on the top, and if that top is trained low, the yield is just as good as when high. I know that Lima beans do better on low poles than high ones, if the ends of the vines as they fall over the tops of the poles are pinched off, and I have noticed the same result with hops. But as I am not a hop-grower, I cannot give information derived from experience. Perhaps others will. One of the difficulties about hop-growing is, that it cannot be taken up this year and laid down next. When once prepared for, the business must be continued. The roots planted this year, will produce a good crop next, and succeeding years. The poles are at first expensive, but last many years, if made of durable timber, such as cedar, tamerack, chestnut. To grow hops upon a large scale, you must have a good drying kiln. The first preparation of the ground, the roots, the planting, the poles, the kiln, and proper appliances for bagging, all involve considerable outlay, and deter ordinary farmers from the business of hop-growing, except in a neighborhood where the small farmer can sell his crop to the large farmer, who has the proper appliances for preparing them for market. You ask "what are the dangers of failure?" They are as numerous as with any other crop. For instance, I find among the hop-growers whom I visited this season, that some fields are almost a total failure in consequence of being infested with an aphis, similar to that which has destroyed oats and other crops. Then the drouth has very materially affected the product. In some seasons there is a failure to produce the essential principle of hops, called *lupulin*, that yellow powder which you see in the blossom. When that is the case, the hops, however large the yield may be, are unsalable, or rather salable at a reduced price. There is no crop which the farmer grows, so variable in price. It sometimes ranges within a single year from six to sixty cents a pound. It is considered a good crop at an average of twenty-five cents. It is unlike corn or wheat—it cannot be kept over. Hops must be sold while new, or else they may prove a total loss. There is a hope that a recent discovery may obviate this. Dr. Samuel R. Percy, a chemist of New York, has discovered that by infusing hops in water he can extract all the value, and then evaporate the water, by steam boiling *in vacuo*, combining the extract with molasses, so that he can put all the value of a bale of hops in a five-gallon keg. In this form it can be kept any desired length of time without deterioration. This discovery, if successfully carried out, may give an impetus to the hop-growing of the West.

Packing Eggs for Winter.

Mr. G. M. Teachout, Prescott, Pierce Co., Wis., recommends those who desire to pack eggs for winter, not to let cocks run with the hens. He thinks the hens lay better, and if they happen to sit a few days upon the eggs, they are not as readily spoiled.

How to Seal Fruit Cans.

Mr. C. W. Carpenter, Mt. Gilead, Ohio, says: "I wish to add a couple of items to your discussions about canning fruit. First:

"That putty is generally used hereabouts for sealing up cans of fruit.

It has been tested for several years, and is considered by all who use it as much superior to wax, as it is a hard matter to seal a can or jar with wax, without getting the wax in the fruit, which spoils the taste, and certainly the putty is much the cheapest."

"I think it is not generally known that peaches can be peeled for canning or drying by scalding the same as tomatoes. They must be ripe, not too ripe; take a small wire or splint basket filled with peaches, dip them into a kettle of boiling water a few minutes; a little practice will enable one to get the right scald every time. They can be peeled in this way with about one-third the labor and much more saving, as it takes none of the flesh off the peach. Tin cans should be emptied immediately after opening, as the fruit will eat the can more in a few minutes exposed to the air than it would in twelve months sealed.

"When eggs are not expensive, a very neat, good sealing can be made by dipping white paper in the white of eggs made more fluid by beating slightly with alcohol. Tumblers can be covered in this way entirely air tight." Adjourned. JOHN W. CHAMBERS, *Secretary.*

September 20, 1864.

Mr. Nathan C. Ely in the chair.

AMERICAN POMOLOGICAL SOCIETY AT ROCHESTER.

The Chairman.—I understand that some of the delegates appointed by the American Institute to the American Pomological Society are present, and I hope they will give us some account of the proceedings of that Society.

Mr. John G. Bergen.—I was one of the delegates to the Pomological Society. Mr. B. C. Townsend, chairman of the delegation, will make a written report. In his absence I will say that the delegation of the Institute was cordially received and participated in the discussions. The object of the Society is not so much to have an exhibition of fruit as to discuss the relative character of the various varieties of fruit, and their suitability to locations and soils.

Mr. William S. Carpenter.—I took the opportunity of examining the great nurseries in the vicinity of Rochester. I understand that there is from six to seven thousand acres of land devoted to this purpose. One firm had over a quarter of a million of grape vines fit to be set out the coming season. These nurseries are purposed to send out every variety of fruit.

Dr. Trimble.—We talk much about setting out trees, but we neglect to destroy the little insect that is driving out the plum from cultivation. There was only one exhibition of plums at the meeting free from the effects of this insect. There was hardly a pear or an apple shown that was entirely free from injury. In my opinion we have trees enough. Do not let us act so cruelly as to let these small insects get the better of us and destroy our fruit.

Mr. John G. Bergen.—I differ from the entomologist of New Jersey that we have trees enough. If we plant trees we shall get an abundant supply. I have raised six varieties of plums this year, and two years ago I had a very fine crop. These insects will regulate themselves.

Dr. Trimble.—Circumstances favor us some seasons, and we get a partial crop. While in Rochester a gentleman from Michigan told me a singular circumstance in relation to the ravages of the army worm. They came in such quantities that he was afraid they would consume his whole crops. He fought with them night and day, and got his neighbors to help him. They would eat off a field of clover as clean as this floor.

Mr. William S. Carpenter.—I am surprised to hear any gentleman say that we have trees enough, in this day of enlightenment and progress. I never think of the curculio except I meet Dr. Trimble. I shall endeavor to plant all the varieties I know worth cultivating. A neighbor lately told me that unless the curculio had thinned his crop of plums, his trees would have broken down with their immense load. I want the country to be supplied with a bountiful crop of fruit, so that all may eat. We have received in this city over a hundred barrels of plums per day for the past two months.

Dr. Trimble.—I believe we are on the same track. Our object is the same; we are trying to supply our people with fruit—Mr. Carpenter by increasing the number of trees, I by preserving those we already have.

Mr. John G. Bergen.—Some years ago the lady bug was very destructive to the squash, but they have passed away. I have seen but two or three during the past season. At one period the St. John wort was so thick in our fields that more than half the crop was St. John wort, but now this plant is hardly found. Why may not the curculio disappear as suddenly?

Dr. Trimble.—We must judge of the future by the past. I say these insects are increasing. The apple moth is more destructive to the apple than the curculio.

Mr. R. H. Williams.—I am pleased to hear that our friends have been through a part of Western New York. I am happy to hear that these gentlemen have found that there are other places to grow fine fruit outside the environs of New York. I am pleased with the remarks of Dr. Trimble. From my observation I am positive that these insects are on the increase. With the consent of the club I will make a few remarks on

Western New York as a Fruit Growing Region.

This somewhat celebrated and productive portion of the State, owes perhaps more to its peculiar formation, both as regards its geological and physical organization, than to its latitudinal position, for its fertility and productive powers, and at an early date of its explorations and settlement was denominated the "*Genesee Country*" by some, and by others the "*Lake Country*," as distinguishable from other and surrounding localities. It may be generally described as that section bounded on its north eastern, south-eastern and south-western borders by a series of lakes and their land slopes, whose waters and drainage flow into Lake Ontario, and on the west by the Genesee River and its west side slopes, which find the same general reservoir—and embraces within its general sweep the counties of Onondaga, Cayuga, Seneca, Wayne, Ontario, Yates, Livingston, Monroe, and the eastern portion of Genesee and north-eastern Orleans.

The drainage of this region, it will be seen, is towards the north, and its whole physical organization corresponds with this fact.

The lakes upon its outer rim, forming extensive reservoirs of the purest and most beautiful water, are elevated above lake Ontario from one hundred and fifty to five hundred feet, according to their distance and direction therefrom, as the elevation is greater and generally more rapid in a southerly and southwesterly direction ; and the slopes whose drainage supply these reservoirs attain their greatest altitude and reach their summit level between the water flowing to the north and finding their ultimate outlet to the ocean through the St. Lawrence, and those flowing south and their final source to the Atlantic through the Susquehanna, at elevations varying from eight to twelve hundred feet above lake Ontario, which is two hundred and thirty-one feet above tide-water.

It is therefore most favorably diversified with valley, plain, hillside and ridge, varying between the most productive depressions to that of the most desirable thermal elevations, securing both sunlight and heat by day and resisting nocturnal frosts, the fruit growers' dread and scourge, by the dry atmosphere of the altitude in late spring and early autumn.

On its northern and somewhat converging front are the tempered waters of lake Ontario, while upon its outward semicircular rear lie the glittering basins of the Oneida, Onondaga, Skaneateles, Owasco, Cayuga, Seneca, Crooked, Canandaigua, Honeoye, Canadice, Hemlock and Conesus lakes, ranging from sixty to forty miles in extent, north and south, and from a mile to four miles in width, exerting a most beneficial influence upon the temperature and salubrity of the climate, both by summer evaporations and winter modifications.

The geological structure is also equally favorable. It lies wholly upon the secondary formation, and from Syracuse west to the Genesee, within the area of the semicircle, there is not a decomposing rock or a drift formation unfavorable to vegetable growth and perfection, adapted to the latitude.

From the saliferous rock containing or overlaying the salt deposits at Syracuse, along and contiguous to the Erie canal westward, are found in beds all the various mineral combinations which lime assumes from that of shell marl beds, carbonate of lime, or common limestone, in all of its varieties, including the cement or water lime and plaster of paris (sulphate of lime), and all in great abundance, associated with their legitimate geological rock strata and appearing at the surface in many localities to the Genesee river, and also southerly and interiorly on the borders of the Cayuga and along the outlets of the Seneca and Canandaigua and other and various localities, in a manner to facilitate every demand of agriculture or art that may arise for their use.

In addition to the salt springs open and elaborately worked at Salina, Montezuma and surroundings, there are many other indications of similar minerals throughout the canal route westward. We find the white sulphur springs at Clifton, Ontario county, and the magnesian springs at Avon, Livingston county, flowing from immense and exhaustless sources; while others of less note and importance are to be found in almost every locality.

Add to these natural compounds for forming and sustaining a superior and enduring soil, the more than probability that the whole is underlayed by the coal and oil bearing geological formation, which, in view of recent investigations and discoveries, may be supposed to bear within its bosom unmeasured reservoirs of rock oil, that some adventurous auger may soon penetrate and develop to art and commerce, on the south side of lake Ontario, as has already been accomplished on the north or Canadian side, and which by its carbonaceous and oleaginous permeation of the earth has ever been exerting, and must continue to exert, a powerful influence in supplying to the soil valuable elements of vegetable production.

This idea of the permeation of the soil by continual exhalation and capillary attraction towards the surface, is strongly sustained from recent explorations by scientific minds among the oil regions of Pennsylvania and West Virginia. That this region is underlaid in many localities with coal or oil is indicated by the emission of carburetted hydrogen gas from innumerable sources, scattered throughout its whole area, as well as by the long established fact that similar geological strata are found cropping out along its northern and northeastern border and probably forms the basin of lake Ontario, and holds the deposits so successfully tapped in Canada; while on the southern border and within twenty or thirty miles south of the dividing ridge the Blossburgh bituminous coal mines are furnishing annually their thousands of tons for the consumption of the country.

To this peculiar region then, as a favorable fruit-growing section, we may sum up the following advantages: Its superstructure is of the best geological character known for agricultural purposes, being rich in mineral deposits, and in their diffusion generally free from a porous substratum that continually swallows up all added stimulants like much of the primitive formations.

It is surrounded by a water border upon its outer rim at both its lowest and greatest elevations, calculated at once by the extent of surface to temper its climate and furnish moisture from evaporation to protect against the severity of droughts experienced in many other localities.

By its elevations and depressions it furnishes every variety of soil and altitude desirable, while its physical structure (the drainage being from south to north), secures sheltered hillsides and valley adapted to every production applicable to the latitude within which it is found, viz., between forty-two and forty-three and a half degrees north.

That it is peculiarly adapted to the most successful growing of the apple, pear, plum, cherry, and all of the commoner small fruits, with the peach in the most favored localities, has long been established by the extensive orchards throughout its area, and the thousands of acres appropriated to nursery purposes, stretching from Syracuse to Rochester, sufficiently attest, and that it is destined to be the great grape-growing and wine-producing region. When its extensive natural advantages are duly appreciated within the State or the limits of its latitude, the successes attending recent trials at the head of the Canandaigua, at Naples, where an hundred acres or more are already set and much of it in bearing; at the head of the Crooked, at Hammondsport, where several hundred acres are in bearing (and they have extensive wine presses and cellars), and other hundreds set and being set annually; and also along the western border of the Seneca, and at many other localities, give assurances calculated to stimulate increased effort from year to year in that direction.

The localities which give greatest promise for grape culture are those slopes forming the western margin of the lakes and their outlets, and the elevated hillsides elsewhere along the valleys on a soil formed from the decomposition of the calciferous, or Genesee slate as it is sometimes designated, overlaying a marly or limy clay subsoil, which is usually found upon all the lake borders and ridges, and affords a pliable yet firm and enduring soil, happily influenced by most of the mineral and all vegetable and animal manures, and resisting the destructive effects of both excessive drought or wet in an eminent degree.

Originally this section of the State was a vast wilderness of heavy timber, unbroken except the spaces occupied by the lakes and streams, from its eastern to its western border, and embracing nearly every indigenous variety of trees.

The shagbark, maple, basswood, white elm, predominating on the flats, and alluvial deposits, while upon the hilltop and sides were found the oak, chestnut, hickory, beach, poplar, and in many localities the white pine flourished in seldom surpassed luxuriance, and thus, for ages had been furnishing the material for the vast accumulations of vegetable material found overspreading the surface everywhere, and accumulated in every ravine and valley in such quantities as to supply, by prudent application, the demands of agriculture and pomology for a long time to come, in addition to the annual product of manure from its other various and extensive sources, for it is unsurpassed if equalled for the production of all the cereals and the grasses of the Northern States.

It is, therefore, perhaps not unreasonable to anticipate, that with the intelligent effort now being directed to the culture and production of the more valuable fruits, and particularly the grape, this section will be found leading the enterprise, and directing the investigation of both soil and climatic influence, bearing upon the subject, and what may be most successfully applied in amelioration of the one and the improvement of the other.

Indeed I even look forward to a day when the planting of the sugar maple, oak, elm, pine, hemlock and other forest trees along the highways and exposed farm margins, with hedges bordering and sheltering the northern and western exposures of the orchard and vineyard, shall produce a most decided climatic improvement, and add both beauty and profit otherwise to the rural districts. And when a more perfect knowledge of the thermal line, or that point shielded from late and early frosts by atmospheric influences in the ascent of hillsides by diurnal evaporations, shall be better understood and observed in the selection of locations, I anticipate a vast accession of territory heretofore overlooked, and perhaps the rejection of much that has long been occupied with unsatisfactory results in fruit culture.

It is, therefore, to these two influences of position, viz: water fronts on lakes and elevations affecting the dew-point of the thermometer, in comparison with those sections watered by rivers and creeks, emanating from springs and following narrow channels, and flowing in currents more or less rapid, in the same or even much higher latitudes and on soil similar, that I desire to invite the attention of both scientific and practical observers; and I will close by citing a few instances in evidence of their importance.

At Hammondsport, at the head of Crooked lake, which is four hundred and eighty-seven feet above Lake Ontario, and seven hundred and eighteen feet above tide water, the most extensive and probably successful vineyards within the State are found, and they extend from the lake shore to elevations approaching to near four hundred feet along the slopes. Here, also, every other variety of fruit succeeds in great perfection.

Bath is only eight miles south, but on the southern declivity of the dividing ridge, and on the Cohocton river (a tributary of the Susquehannah), at an elevation of only three hundred and seventy-two feet above that of the waters of Crooked lake at Hammondsport. Yet no known variety of the grape has been found to ripen and perfect without the aid of glass or other artificial means, while other and more hardy fruits succeed but partially.

At Naples, at the head of the Canandaigua, four hundred and seventy feet above Lake Ontario, the same success is attained as at Hammondsport, while six miles south, on the southern water slope the difference is even greater than at Bath.

Such decided and dissimilar characteristics, I think will be found on all of the slopes south of the dividing ridge encircling this country of lakes, and on the growth of grain, as well as fruit, these remarkable influences are exerted apparently without material modifications from differences in latitude or soil.

Carpenter's Seedling Grape.

Mr. Wm. S. Carpenter exhibited a new seedling grape he found growing on his farm; the vine bore fruit last year for the first time; this season it has some thirty bunches; they are of good size; color dark purple; the bunches have shoulders which shows the adaptedness of the vine to make large bunches. I suppose the vine to be an Isabella seedling.

Mr. John G. Bergen remarked that the bunches were much more compact than the Isabella, and larger both in fruit and bunch than average Isabellas at this season of the year. They have every appearance of being a good market grape, and even an improvement on the parent stock.

Mr. R. H. Williams suggested to the Club the appointment of a committee to visit the exhibition of fruit at the Pleasant Valley's Fruit Growers' Association, to be held at Hammondsport, N. Y., on the 6th of October. This place is located at the head of Crooked lake; the influence of the large bodies of water keeps off the early and late frosts; it is eminently suited for the cultivation of the vine. The Catawba grows as fine here as in Cincinnati.

Mr. John Bergen.—The influence of water to the culture of the grape is shown by the fine crop of grapes raised at Kelly's Island. A large number of vineyards are being laid out on the borders of Lake Erie.

On motion, Mr. R. H. Williams was appointed a committee to visit the exhibition of the Pleasant Valley Fruit Growers' Association.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

October 4, 1864.

Mr. Nathan C. Ely in the chair.

FARMS IN MISSOURI.

Mr. J. S. Newmeyer, Le Platte county, Missouri, says:

"Farms are selling there at six to twelve dollars an acre. The soil is good for wheat, rye, oats, corn, clover, timothy and fruit. Winter grain is sometimes subject to winter kill. Slavery is considered dead. There never were many slaves here, and they have nearly all left. As regards good Union people being safe, there are places they would be perfectly safe, and others that they would not be safe at all. The most of this county would be safe at present, between here and the Mississippi river. I would advise the man who inquired, by all means to take a little time and come out and see the country. I have lived here eight years; was born and raised in Fayette county, Pennsylvania."

Mr. Hawkins, mayor of Oregon city, and Mr. Kaucher, sheriff of Holt county, also write in the same tenor. They say that county is one of the most peaceable in that State. The soil is good, cheap and inviting to good Union men. Slavery is past resurrection.

YIELD OF GRAPES TO THE ACRE.

Mr. Solon Robinson.—I regret that Mr. Wm. S. Carpenter is not present, as I have a letter criticising very sharply his statement that it is possible to raise ten tons of grapes to the acre. Mr. Carpenter said that ten tons, 20,000 pounds of grapes, might be raised on an acre of land, and this quantity, at 15 cents per pound, would amount to $3,000. This correspondent asks if that is not drawing a long bow. Mr. Robinson then made the following calculation: There are 43,560 superficial feet in an acre. A vine trained to a single stake can be grown upon four feet of ground. Say 10,000 vines per acre. At only two pounds per vine the yield would be 10 tons. Or if the vines are planted at twice the above distance apart, or four feet each way, which is much more than is necessary, there would be 2,722 per acre. At 7½ pounds per vine, we should have 20,415 pounds. Grape vines trained to single stakes will grow as closely as hills of Indian corn. Say three feet apart each way, and we have 4,840 vines. It is not "shooting with a very long bow" to estimate an average yield of five pounds per vine, after the vineyard has attained its maturity, if it is well cared for. The members of this Club know vines standing thus near together which averaged more than this the present year. But suppose upon such close planting as three feet apart we only estimate a yield of two pounds per vine, we shall have 9,680 pounds upon an acre, and that at only 10 cents per pound, would give a better result than can be obtained from a crop of any kind of grain, deducting the expenses of each. Is the gentleman satisfied that Mr. Carpenter did not over estimate the quantity of grapes possible to be produced upon an acre?

Dr. Trimble.—I think, Mr. Chairman, that these large statements are calculated to mislead. It must be remembered that for one perfect crop that we get there are several imperfect.

The way to Raise Pears.

Dr. I. M. Ward.—If Dr. Trimble means this remark to apply to the pear tree, I shall dispute its correctness. My pear trees have borne for fifteen years a good crop every year.

Dr. Trimble.—Dr. Ward has had a great deal of experience, and with the thorough care that he takes of his trees he may always have a good crop. But it is very different with the culture that farmers ordinarily give to their trees. I would ask Dr. Ward how often he has changed his trees.

Dr. Ward.—I have some fancy varieties that have been replaced, but the Duchesse d'Angouleme, the Bartlett, and others that I rely on for my crop, are the same trees that I set out fifteen years since.

Dr. Trimble.—How often do you plow the ground?

Dr. Ward.—Every spring I go through with a light shear plow that stirs the ground about two inches deep, and then I put on the mulch.

Mr. R. H. Williams.—What do you use as a mulch?

Dr. Ward.—Salt hay or straw. I spread it on two inches deep, so that a man can lie down anywhere in the orchard without soiling his clothes.

Mr. Solon Robinson.—How often do you manure the ground?

Dr. Ward.—Every year; and I think it very important to spread the manure on the surface. I find that if I omit the manuring one year, though the crop is about the same, the fruit is smaller in size.

Mr. George Bartlett.—I believe the same care practiced upon a vineyard which Dr. Ward gives to his pear orchard, would insure a certain crop every year, and almost as certain as a crop of hay or corn. One farmer made a valuable crop of hay this year simply by manuring, while his neighbors, who did not manure, failed. It is well understood by most farmers that highly manured land withstands the drouth much better than land which is not so treated.

Planting Vines—Is Trenching Necessary?

The above writer says: "Dr. Grant and most others who claim to speak with authority on the propagation of the vine, advise us to delve down into the bowels of the earth two or three feet or more in preparing to plant vines; and the Doctor tells us shallow planting and surface manuring will do for a few years, but the vine will soon fail thus treated. I am not an advocate of shallow planting, but could point the advocates of deep trenching to hundreds of large and thrifty vines, from 50 to 100 years old, which were originally planted very shallow, and have been surface manured ever since with the decayed leaves of the surrounding forests. Is it not about time they should begin to fail? The highest ridges and the poorest, thinest soil in Ohio is where such vines most abound; the subsoil a yellow, gravelly clay, so hard that nothing but a pick can penetrate it. Nature furnishes us facts and nurserymen give us theories. The two should harmonize. I believe no fruit bearing plant, shrub or tree, will bear so much mangling, pruning and dwarfing, of both root and branch, as the grape vine and live. It seems to me almost a miracle in nature that vines can be planted two or three feet apart, and kept dwarfed to the dimensions vineyardists advise, without killing them entirely. May not the diseases the vine, which have been developed of late years, be traced to the practice of close planting and dwarfing? I have planted one hundred vines, and expect to plant that number each year. I plant in rows ten feet apart, and eight feet apart in the row, but do not expect to get ten tons to the acre, should be more than satisfied with less than half that amount."

At this distance apart the gentlemen will have only 846 vines to the acre. Will he be satisfied with less than 20 pounds per vine, spread upon trellis with arms four feet long, and at that distance apart growing very high and strong At that he would have 10,920 pounds per acre; at 25 pounds per vine, 13,650 pounds; at 35 pounds per vine, 19,110 pounds; at 37 pounds per vine, 20,202 pounds. We don't know that an acre can be made to average that, but single vines, of the same size, have yielded 50 pounds, which for an acre would make 27,300 pounds.

Some of the members of the Club thought that this statement was too "rose colored," though none disputed the calculation as a possible result. Others thought that farmers need just such statistics constantly presented to induce them to undertake any new branch of culture. It is, said one, the neglect of all the cardinal principles of fruit growing that causes so many to fail.

How to Keep Winter Apples.

Mr. S. D. Comfort, Fredericktown, Knox county, Ohio, says:

"A neighbor of mine, one year ago, packed eight barrels of winter apples with dry sawdust, and left them headed up, exposed to all the rigors of our last unusually cold winter. The result was, they were taken out in the spring sound, and had retained their flavor better than if buried in the ground or kept in cellar. Query—Could not grapes be kept in the same way? The same enterprising neighbor (a Maine Yankee), preserves his cabbages through the winter by packing among refuse or leaves, head downward, in boxes, each layer of heads with the stems cut off near the head and covered with loose leaves of cabbage. Freezing will not injure them when thus covered."

Native Iowa Plants.

Mrs. Mary Treat, Blaistown, Iowa, sends the following communication:

Mr. Secretary.—Inclosed find specimens of Jersey Tea (*Ceanothus Americanus*), and two species of Liatris and Cassia. This last is one of our most beautiful native plants. It grows in close masses from one to four feet in height, according to soil, situation, &c. It is quite sensitive, the leaves closing upon being handled, and at night and before rain. It flowers all summer, is still in bloom Sept. 19th. I send with it the matured Legumes. The Jersey Tea recommended by you as a substitute for tea, is a beautiful flowering shrub with a profusion of white blossoms. The Liatris adorn our prairies most through the month of August, though still in bloom; they are very brilliant, showy plants.

Seeds of all the above flowers can be had by sending to me, with inclosed stamps, to pay return postage. I have received a great many letters asking for seeds, but nearly all neglect stamps.

One of your correspondents asks the cause of the falling of the Sorghum. The farmers here attribute it to the chinch bug. I have examined the cane but could find none of any account about the fallen, but about the green and more thrifty looking hills, I found myriads working at the roots, so of course they must leave after sapping the plants to their satisfaction, in pursuit of better.

Sowed Corn—How to Cure.

Mr. E. W. Allen writes from Broken Straw, P. O., Chautauqua county, N. Y., that owing to the drouth winter fodder is very scarce, and he wants to know the best way to cure sowed corn, as well as corn-stalks when cut up by the roots.

Mr. Solon Robinson.—I once cured a very heavy crop of sowed corn in the following manner: I commenced cutting one side of the field and setting the stalks against the fence. Then I set a row of forks and poles in the space cut off, and set up stalks upon both sides of the pole, leaning together, and so continued till all was cut. This is only practicable near the forest. Where not convenient to set the stalks up in this way, I would carry a bunch of straw along and tie the stalks in small bundles as fast as cut, and set them up in loose stooks until partially cured, and then put them together in form to withstand the weather. The same plan may be pursued in curing corn cut up with the ears on, or after they have been plucked. There is no better way to preserve stalks in winter than to set them up like a roof across a straight fence, stone wall, or pole on forks, so as to leave an open space through the center. When straw is of no value, cover the peak of the roof with enough to shed the rain.

Mr. R. H. Williams.—I would not bind the stooks, but set them up as loosely as possible, so that the air can circulate freely, binding the stook together at the top with a straw band.

Mr. Solon Robinson.—There is a very simple little machine for this purpose which I have used with great satisfaction. It is a wooden spindle about three feet long, sharp at one end, with a crank and handle at the other. The spindle should be made of ash, about an inch and a half in diameter. The crank may be ten inches long and pretty strong. A stout cord is attached to the spindle near the handle, with a hook on the other end of the cord. To operate it the spindle is thrust through the stook of the cornstalks near where the band is to pass around. The cord is then passed around, and the loose end hooked into a staple in the crank. A few turns of the crank draw the cord tight and press the stalks more firmly than it is possible to do by hand. The band is then applied and the cord loosened. A man can put up twice as many stooks in a day with this implement, and do it more than twice as well as he could without.

Kentucky Blue Grass.

Mr. T. G. Donaldrary, Scroggsfield, Ohio, wants to know when to sow and in what soil to sow Kentucky blue grass. He also wants to know how much seed it will yield per acre and whether it will pay to grow blue grass for hay or pasture.

Mr. Solon Robinson.—Sow in February or March upon land well prepared in autumn, upon limestone clay soil. As to the quantity of seed, no one here can answer. Whether it will pay, is answered in every drove of fat bullocks that leaves Kentucky for an Eastern market.

How to Spoil Meadows.

Mr. Allen asks the following question: "Will meadows keep up where the hay is taken off and no manure returned, if not fed off spring nor fall? If not, what is the cheapest and best mode of manuring, if too far off to draw barnyard manure?

"Will Peruvian guano, so far off, pay, the expenses are so much for transporting by railroad?"

Mr. Solon Robinson.—The answer to this is most decided, that there is no better way to spoil a meadow; and the best and cheapest mode of manuring it is to keep the cattle off. On some land plaster will pay, and where hay is as valuable as it is near New York, it does pay to use Peruvian guano. In Chautauqua county, we think it would pay to buy wood ashes. If you have a muck bed, it will pay to dig and pile that until it is decayed, and use that for a top dressing. So much depends upon locality and other circumstances, that it is impossible to give specific directions to suit such a case as this.

Dr. Trimble.—I never saw but one place out of Kentucky where blue grass did equally well, and that is upon the Brandywine Hills, Chester county, Penn.

Mr. Solon Robinson.—It does equally well in several places in Ohio. It will do well in any place where there is limestone clay.

Mr. R. H. Williams.—It does well in Putnam county, N. Y., upon land which is so hilly and rocky that it cannot be plowed. I think it would do well in nearly all of Western New York, if farmers would allow it to get well rooted. The trouble is, where all the land is arable they are disposed to turn over the sod by the time it gets well set.

Location of Vineyards.

The Secretary read an invitation from Mr. Younglove for the Club to visit the Pleasant Valley Wine Company's vineyards, in Steuben county, New York.

Mr. R. H. Williams observed that he believed this company had the best location in the State for vineyards; that they are eminently successful in growing the Catawba grape.

Mr. Solon Robinson disputed this point as to the best location, because he believes locations equally good may be found upon the borders of all of the interior lakes of the State, as well as the one upon which Pleasant Valley is situated. Mr. R. H. Williams and several others concurred in this opinion.

Careful Packing of Grapevines.

Dr. Trimble related an anecdote which he thought ought to be published to the credit of Dr. Grant. Some vines sent to a person in Huntington county, N. J., which should not have been over twenty-four hours on the passage, got astray on the railroad, and did not arrive till the next spring, six months after they were packed, having been exposed all that time to the vicissitudes of rail cars and freight houses. The gentleman expected, of course, to find the vines worthless, but the doctor had lately seen the growth that they had made this summer, and never saw a more vigorous one.

Dr. Trimble read a part of a letter from Mr. Kilpatrick, of Iowa, about the success of vines in that State, which he attributes in a considerable degree to the careful manner in which they are packed at the nursery. He cautions the doctor not to show the letter to the reporter, for fear he might get his name in the paper.

A New Cotton Pest.

Mr. Bryce Crawford, Sparta, Randolph county, Ill., sends a sample of cotton grown there, inclosing the chrysalis of a worm which has destroyed the crop, which is unlike the common army worm, and old cotton-growers say they never saw anything like this before. This worm, Mr. Crawford says, has entirely blasted the hopes of the cotton-growers in that section. In some fields the worm has destroyed every leaf, blossom and young boll. "We got our seed from Dixie, and if we have imported a new pest, it will be one more evil arising from our slaveholder's rebellion. I send you the worms in their present stage, expecting that they will get their next dress by the time your Club meets, and some of your professors can tell us all about them." The worms were utterly crushed, so that we could not make out anything about them. Insects or worms sent to the Club should be placed in small paper boxes.

Substitute for Tea.

Mr. H. S. Alexander sends specimens of a plant which his family use as a substitute for tea, and which he thinks can be cultivated to advantage. The stalks grow very closely together, and from eight to twelve inches high.

The Chairman remarked that he had never seen anything that had so much of the odor of Young Hyson tea as these leaves. He took them home for trial, and will report their quality.

The Flax Pest.

The plant sent by Mr. E. D. Wright, Pierpont, Ohio, is the Dodder, fully described in our proceedings some weeks since. It comes from seed as much as any other plant, and has its root in the ground, though soon after it starts it strikes a new root into the stalk of the flax or some other plant, and then the original root dies, so that it appears to be a parasite.

Name of a Grapevine Insect.

Dr. Trimble.—The name of the insect sent by Robert Cushman, Pawtucket, R. I., is called Thrips. I cannot name any remedy. They are all of the same character in a different state of development. As he says, some are white, some brown, some red-striped, and appear to be a sort of flying or skipping louse. Although so small, they injure the vines much.

"Paradise Stocks—What are They?"

Mr. Solon Robinson.—They belong to the crab-apple family, and are spoken of as English and French Paradise, in the same connection with wild crab stocks. We don't know the difference, except that cultivated apple scions take more readily upon Paradise than upon wild crab stocks. Large nurseries keep the Paradise stocks for sale.

White Willow.

Mr. A. Pittenger, Hancock, West Virginia, wants to know:

"If the white willow, about which so much has been said, is suitable for hedging?" The answer all rests upon what you may understand about the word "suitable." It appears to suit some people. It undoubtedly suits Mr. Pike, the man who started it, and who paid the expenses of the enormous puffs given it by some of the papers, as he has realized more than a hundred thousand dollars by the operation. The losses of those who have tried to make a fence of the willow and failed would probably sum up a million of dollars. If Mr. Pittenger would like to join the happy family, let him at once procure willow cuttings, and go in to win or lose.

Training Grape Vines.

The above correspondent says: "I have lately seen a small vineyard, which has been pruned in a different way from any I have ever seen recommended. The vines are trained to stakes, and the same cane allowed to bear fruit but once, and a young shoot kept coming up every year to bear fruit the next. Is this a new way?

Mr. Solon Robinson—It is the good old way which has been practiced for centuries.

Strawberries.

Mr. C. K. Adams, Ann Arbor, Mich., wants the club to name three or four varieties of strawberries for family use, that will give fruit the longest time, and of the best quality. This has been done repeatedly, but it may not answer at the place named. We would, however, risk our chance upon the following: Wilson, Hooker, Russel, Austin, Bartlet, Triomphe de Gand, Brooklyn Scarlet, and some of the members were disposed to add the "Agriculturist;" but that was objected to, because not yet sufficiently introduced to the public.

How to Preserve Scions.

Mr. C. C. Hatch, Ischua, N. Y., who has followed grafting over forty years, says:

"I cut my scions in February. I then take resin with a little oil or tallow to reduce it, as clear resin is apt to crumble off. Melt it, and when boiling hot dip the end cut from the tree of each scion. This seals the pores of the wood, and then stand the buts of the scions on the damp ground on the bottom of my cellar, and turn an empty cask over them. In this way they keep fresh the year round. I have scions of apples and pears in my cellar to-day that are as fresh as when cut last February; and one year, for an experiment, I kept some over the next winter, and set them in April after being cut 14 months, and they grew. And grape cuttings prepared in this way, and then rolled up in oiled cloth or oiled paper, might be brought from Chili to New York in safety."

Wheat Weevil.—Where it Breeds.

Mr. Geo. W. Putnam copies the following article from *The Detroit Advertiser* of Sept. 22, and forwards it for the consideration of the Club. It is furnished by Dr. Isaac Smith, Grosse Point, Michigan. He commences with the question, "Does the weevil breed in the mullen?" and then says:

"I have not seen it stated any where that the weevil is in the mullen. It was by accident that I discovered this to be the fact. I believe that if the mullen was exterminated the weevil would go with it. It is a fact that no domestic animal will eat this plant, and that this is a safe retreat through the winter for the weevil. This insect works more on the edge of a wheat field than in the middle. When the ground is summer-fallowed there are often very many mullens left around by the fences. At the proper time the weevil leaves the mullen and attacks the wheat, and then returns to the mullen in the fall. I cannot find it in any other plant. They are located in the mullen about the seed pods, and are thickest near where the wheat stubble is. This matter ought to be investigated by those who have a better opportunity than I have."

So we think; and therefore bring it before the club and through this report, before a great many thousand farmers, who have the means of investigating the subject. But, and here is the trouble; does Dr. Smith mean the weevil, or the wheat midge? It is the latter that destroys the wheat when the kernels are in milk. It is the former that destroys it after it is stacked or housed, and often after it is threshed and stored for winter. This is the *Calandra granaria*. The other pest is the *Cecidomyia Tritici*, sometimes called midge, and sometimes red weevil. It is a fly and not a beetle, and therefore not properly called weevil, but we suppose it is the insect spoken of in this communication.

Diggers versus Plows.

A California correspondent, having read the letter of M. L. Sullivant, of Illinois, about Comstock's rotary digger, writes to say how much pleased he is with the information. He thinks that diggers will supersede plows upon the plains of California, as it would produce a great saving of expensive manual labor.

Squash Borers—Remedy.

T. A. Lynn gives the following remedy for squash-vine borers.

"After the squashes were half grown, noticing a wilted look in the leaves I supposed the borer was at work, so I took a shovel and placed a shovel-full of soil over the joints about two yards from the hill, and the vines rooted anew where they were covered, and I now have some fine squashes to pay for five minutes' work with the shovel. I would recommend, as soon as the squashes are gathered, to cut the vines close to the hill, leaving the stumps in the ground, and then to pour upon the stumps, from a tea-kettle, *boiling* water, which will disagree with the borer, and if her eggs are laid, will cook them, so that they will not hatch next Spring. It is advisable to cover the joints of squash, melon, and similar vines, where there are no borers, as new roots will form, new vigor will be added, and a larger crop secured."

Another person practices slitting the vines as soon as borers are suspected, and taking them out, and thus preserving the life of the vines.

Adjourned. John W. Chambers, *Secretary.*

October 11, 1864

Mr. Nathan C. Ely in the chair.

Apples for a Name.

Mr. Leroy Whitford, Harmony, Chautauqua county, N. Y., sends to the club a seedling apple which originated in David Arnold's garden on the east side of Chautauqua Lake. They are highly esteemed here, both as a cooking apple and a dessert apple. It ripens gradually from the middle of August until November.

Mr. W. S. Carpenter.—The apple has a fine red color, but it is too soft for a market apple. The flavor is only of a medium quality. There are so many apples so far superior to this, that I do not think it would be an addition to our already extended list.

Mr. P. T. Quinn.—The apple is certainly not a superior eating apple, as the flesh is very tender. No doubt it is a good cooking apple.

Mr. Robinson.—As a local apple it may be valuable. The flesh resembles "Sops of wine." I hope the apple will be placed on exhibition in the rooms of the Institute.

Questions for Discussion.

Mr. S. Crosby, Lagrange, Indiana, asks a series of questions in relation to the sap in trees.

On motion the subject was referred to Dr. Ward and Mr. George Bartlett, to answer and report at the next meeting.

Curculio—A Remedy Suggested.

The question of what can be done to prevent destruction of fruit by curculio, having been called up by a letter read by Solon Robinson, it was suggested by Dr. Ward that mulching may be found to be a remedy. His pear ochards have been almost free of damage from this troublesome insect for several years; he has this year come to the conclusion that it is owing to mulching. He particularly examined two neighboring pear orchards this year, which are well cared for, except mulching, and found the fruit in a sad condition—particularly that of Mr. Goldsmith, who several gentlemen here know as a good cultivator. His fruit was not marketable, while not one in a hundred of Dr. Ward's was injured. "Now," said the Doctor, "I do not affirm that mulching is a remedy, but it looks like it, and if it is, I want it should be known. At least let others try the experiment. I use salt hay, perhaps three tons per acre, spread on after plowing in spring, and my men are at work to-day raking off and stacking the hay for use again next year. Manure will now be applied."

Mr. Solon Robinson.—As you use salt hay, may we not attribute a part of the virtue of mulching to salt as well as to the shade?

Dr. Ward—Perhaps. That experiment must be tried. At any rate the mulch is of the greatest benefit; it keeps the ground so loose that it is now very mellow, and it prevents all growth of weeds, which exhausts the soil as much as a crop of grain; and besides, the mulch saves the fruit that drops, from bruises.

Mr. P. Quinn.—If there was no other benefit in mulching, I would use it for that alone. It saves its cost in the protection to falling fruit. For a crop in a young orchard, I prefer potatoes. Beans will do, and so will carrots if the land is rich and mellow enough.

Plowing Under Weeds.

Mr. George Bartlett.—I once had a piece of timothy killed by the army worm in Illinois. I turned in the hogs to kill the worms, and they rooted up the sod and then there grew the largest crop of bitter weeds, known by some as rag weed, hog weed, and stubble weed. I rigged a plow with an extraordinary high beam, and with three horses abreast turned under a growth that was higher than the horses.

Osage Orange Hedges.

Mr. P. T. Quinn.—I must speak of the value of the osage orange as a hedge plant. I had occasion to visit a farm in Monmouth county, N. J., belonging to Mr. Thomas Bell. I there found the farm fenced entirely with the osage orange. The fields contained about twenty acres each, with a line of gates in the centre. In each of these fields were cattle, horses, sheep, and swine. The fences were perfect to keep the stock separate. I think any person who requires a fence should see that of Mr. Bell's. I am sure they would use the osage orange.

Dr. Isaac M. Ward.—About 1850 I planted a line of buckthorn hedge and another of osage orange. The first is a complete failure; the second is a complete fence against man or beast. It is not affected by cold. From some recent experiments I am satisfied that I can make a good fence of Norway spruce. For all purposes it is better than arbor vitæ. It bears shearing, and the limbs grow so strong that they resist all efforts of cattle to get through, and a fence can be made of this spruce as soon as with osage orange. I would set the plants one foot apart.

Mr. W. S. Carpenter.—I prefer the Honey locust to any plant I have seen for hedges.

Mr. Solon Robinson observed that the great difficulty with the osage orange, as a hedge plant, was the danger of the thermometer falling 20 degrees below zero, when they would be destroyed.

Mr. James B. Olcott, East Greenwich, R. I., contributes the following pleasant letter to the Club:

Of Poison Ivy and Sumac,

my experience may be interesting. I have been poisoned by them a hundred times, I dare say—once so badly that inflammation closed my eyes, and often so that a week's misery ensued. My father had a swamp lot—as good as the itch to me—which, despite my last year's smart, I would annually assist in mowing. I tried remedies and preventives, drinks and washes, all of no avail. Woolen pantaloons and buckskin mittens would not keep me clear of poison. At last I hit upon the idea of washing myself in simple water as soon as possible after exposure, within two hours is best, though a thorough washing and rubbing at the end of each half day's work will do. In this way I can work among poison plants with impunity, or at most, feeling but a slight burning of the skin, which, but for the washing, would result in blisters. In clearing a swamp, with plenty of poison sumac in bunches, I left the sumac until I had two or three hour's work, then cut, piled and burned it, never forgetting to wash myself immediately afterward. My theory is that the trouble arises from the fresh juice of the plant, or its exhalations near the person. The smoke of it will not poison me; that is the juice scalded, I suppose. I do not believe people are poisoned simply by walking near these plants. If it were so I know a much traveled road that would keep half the inhabitants of a country scratching themselves. Some persons can handle these plants without harm, and among my acquaintance the exempts have mostly fair complexion. I kill these plants remorselessly whenever they come in my way, unless it be when the ivy handsomely covers a wall or tree.

Furze-top Grass.

In Rhode Island farmers buy and sow grass seed under the name of "furze-top," or Rhode Island bent. I have been trying to get a knowledge of that grass these four summers past. I am no botanist, but study Flint's work on grasses, and ask questions of all my neighbors. The grass which my neighbors call "furze-top" blooms about the last week in June, red-top fashion, but lighter colored, and blooms but once a year, throwing up a thick aftermath of narrow, yellowish-green leaves. It constitutes the greater portion of the sod in the hollows of old meadows, pastures, and by the roadside, where sand and gravel prevail, perhaps throughout New England. This grass very nearly answers the description of Flint's "green meadow grass, June grass, common spear grass, Kentucky blue grass," &c. It may be the grass which Mr. Flint calls "fine-top," and which he says dealers sell out of the same bog from which they sell red-top. I judge so from the similarity of the names fine-top and furze-top. The grass I am speaking of makes the handsomest and best turf for lawns. Is it identical with Kentucky blue grass? If I cannot find out without less trouble I would send a sod of it to Kentucky. Furze-top or Rhode Island bent seed, I am told by dealers, is usually gathered from old meadows and pastures, and sells for twice the price of red-top, if of good quality. I have an acre of it in lawn, sown a year ago, which appears, except for its want of age, like the best sandy roadside turf wherever I travel in New England.

Sweet Corn.

We are eating a kind of sweet corn so very excellent that I feel ashamed of myself that I don't save it all for seed and send it to the Farmer's Club for distribution. It may be more common than I think, and may be readily recognized from the reddish purple of the entire plant with the exception of the cob and kernel, which are of the whitest. It has small, eight-rowed ears, often three upon a stalk, needs especially generous culture, for which reason it will not find favor with market gardeners, er with consumers, who must have a bulky dozen for their money. As plain boiled corn it is delicious.

How to Make a Strawberry Bed.

I dislike very much the weeding of strawberries, so I clean my ground before planting, if possible, and have a patch now in hand for fruiting in 1866. It was a solid meadow sod, plowed July 4th, since which it has been harrowed with Share's coulter harrow nine times, to the 12th of September. The ground was infested with Canada thistle, dog-grass, and another grass about as hard to kill as either, which appears equally at home upon the dryest and wettest land if it be but rich enough. These weeds are not dead yet, but they are all weaker. I keep that harrow on the ground, and whenever the team has a spare hour the land gets a thorough cultivation. I expect to plant next spring upon clean ground. I have enjoyed reading in the Tribune the accounts of the mischief in all parts of the country done by insects—though those that come from the West are almost too tragical—for the fact is that next to drouth, worms and bugs are my chief misery. My farming grows more wormy and buggy every year. I shouldn't like to confess as much to my neighbors (among whom I get the *sobriquet* of "old compost,") but I don't mind telling you that my secret and growing belief is that thoroughly prepared farm composts are perfect breeding places of the insects which destroy vegetables. And to make matters worse, I give so clean cultivation that there is nothing but the young plants for insects to live upon!

It is the unanimous desire of the Club that Mr. Olcott will send some of his corn for distribution next Spring. Direct to J. W. Chambers, Secretary American Institute Farmer's Club. Such practical letters as this are very interesting, not only when read to the members, but will be perused with pleasure by all who read the reports.

Grapes in Iowa.

Mr. Jacob Hare, Canaan, Iowa, says:—"That notwithstanding I live on the prairie, where there is not an acre of natural timber in the township, I succeed in growing grapes of the following varieties: Catawba, Isabella, Concord, Hartford Prolific, Diana, Delaware and Clinton. But the fact I wish to bring to your notice is, that the Clinton is preferred in my family above all others. If so, why not place it in the foremost ranks as a good grape for hardiness and prolificness? But it should hang upon the vine till frost, in order to mature its good qualities. We have also succeeded in cultivating most of the small fruits as well as apples, but peaches are uncertain."

Mr. Solon Robinson.—I would recommend Mr. H. to try Norton's Virginia, as that succeeds admirably in Missouri, and is preferable to Clinton, particularly as a wine grape.

The Chess Question.

Mr. Egbert Cowles, Farmington, Connecticut, relates his experience at some length upon the chess question. He says that sixty years ago he assisted to clear off the forest and sow a field of wheat, in which were two hollows where the water stood during winter. "In the spring the plants in these hollows in this stage of growth could not be distinguished from wheat, yet to my surprise, when we came to gather the crop in one of the spots indicated, so far as the water had stood the crop was entirely chess, without intermixture of wheat, while the surrounding crop was clean wheat, and the line between the wheat and chess was as distinctly marked as the boundaries of our field, and all over the remainder of this field of some ten acres there was not one head of chess to be found. Now the answer to the question, 'how chess originates," is of no practical importance, because it is rarely troublesome or injurious, yet it is interesting as a question of science, and we ought to be able to answer it; and I confess I can come to no other result in my case, from the facts I have given, but that the water standing upon my wheat plants so far changed their nature as to produce a bastard seed called chess. If any of your experienced correspondents can give any facts that will enlighten us, or that will explain the facts I have given so as to show a different conclusion from mine, I shall feel thankful for the information."

Mr. Solon Robinson.—And so would a good many other persons who have had the same experience. No member of this club will offer to indorse the heresy that wheat turns to chess, but some of them have seen chess grow where nothing but wheat was sown.

What Ails the Bees?

Mr. William G. Tritt, Meadville, Pennsylvania, answers T. B. Whipple's inquiry why bees leave the hive, that it is the want of ventilation. Mr. Tritt asks the following question: What is honey-dew, or from whence does it result? He is respectfully referred to Webster's dictionary.

Substitute for Coffee.

Mr. Egbert Cowles, Farmington, Connecticut, says that he has tried nearly all the articles recommended as substitutes for coffee, and finds nothing that equals beets, prepared in the same way as directed for chicory, that is by drying and roasting and afterward mixing with coffee in such proportion as may be desired, or as experiment indicates may be palatable.

Potatoes—How to Grow Them in a Drouth.

Mr. William Tucker, Madison county, Illinois, says that from the 9th of May to the last of September, there were only two small showers, which were not sufficient to wet the ground three inches deep. The result is no potatoes have been raised except by one man, who laid his potatoes on the ground in February, as though planting, and then covered them with sixteen inches of straw. His crop is a very fine one.

Flowers and Flower Seeds.

Miss Ada L. Morrison, Alton, New Hampshire, wishes that this club would give more of their discussions to the subject of flowers. She says it would greatly oblige those who live in the country who love flowers, yet see but few of the finest cultivated sorts, and she would be greatly delighted at being the recipient of some of the seeds which good folks sometimes distribute. She says: "Something seems to tell me that if I write in season, before the frost destroys the flowers in the garden (and the frost has not injured mine yet), I can get more of a variety than if I wait till spring. These that I have that I prize the most, are dahlias, petunias, balsams, gillyflowers, and a few more of the same sort—very pretty for the kind, but not enough. I should be very grateful for a few pansy seeds. I take great delight in the garden, and spend many hours through spring and summer there at work. For a number of years we have been deprived of grapes, though the vines always seemed to bloom well. Last year I was told the cause after it was too late. This year I began in earnest, and by great industry on my part, hundreds if not thousands of rose-bugs lost their lives. The result is our vine hangs full with the tempting, luscious fruit, and we feel that our labor is not in vain. Is this the only safeguard to the vine, to kill the bug? There is another question to be settled for me: Will squash seeds when planted ever turn to pumpkins if not planted near each other? I for one think they do, for this season we have met with a complete failure."

Mr. Solon Robinson.—In answer I would say that squashes and pump. kins do not hybridize so as to affect the fruit of the present year. The difficulty is with the seeds planted. If they were from fruit of either sort grown in proximity to the other, the result will be entirely uncertain. In regard to the grapes, nothing but "eternal vigilance" will secure a crop where rose-bugs abound.

Mr. Wm. S. Carpenter.—I will relate a little anecdote, to show how attractive flowers are. A few days ago, a carriage stopped in front of my place, and a lady got out and asked the privilege of examining some flowers that she saw from the road, which were new to her. She observed that she had lived many years in the West, where her opportunity to observe cultivated flowers was limited, and one of the greatest delights of her visit at the East, was the study of these beautiful ornamentations of home. To her a home without flowers was lacking in the main feature of attractiveness.

Mr. Jireh Bull suggested that the Horticultural Society should take up the subject of flowers, and give practical instructions about kinds and culture.

Adjourned. John W. Chambers, *Secretary.*

October 18, 1864.

Mr. Nathan C. Ely, in the chair.

Thayer's Steam Cultivator.

Mr. A. P. Thayer, Syracuse, N. Y., exhibited a model of a steam cultivator, and gave a description of his machine and what he hoped it would accomplish. It is not a plow, but an earth cutting machine, and its operation is not unlike a straw cutting machine, which has knives set around a cylinder in a spiral form. These knives, four in number, are five feet long, twenty inches wide, one-fourth inch thick, of plate steel, and so arranged that some part of them are continuous and equally cutting slices of earth, three inches thick, and to any desired depth, being easily regulated by gearing, which hoists the knives quite above the earth when necessary. These slices are cut into five pieces, by cross knives, and carried to the rear and deposited bottom upwards. The cutting cylinders runs with a speed ten times greater than the driving wheels, so that something is gained by momentum, and the operation is all the time drawing the machine forward, instead of holding it back, like a dragging anchor, as is the case with locomotives that drag a set of turning plows behind. This cutting cylinder is in the rear, between the two main wheels that support the platform which carries all the necessary machinery. The boiler and chimney resting upon another pair of wheels project forward, and are so arranged as to steer the whole as easily as an ordinary wagon is steered by turning the forward wheels. There would be no difficulty in plowing a square lot about going within twenty feet of the corner. The inventor calculates that a full-sized machine would weigh 3,000 pounds, without fuel and water, and that it would require an engine of from eight to ten horse power.

Mr. Wm. S. Carpenter asked the inventor if he thought the earth would be freed from the knives in the rapid motion he intended to give the cylinder?

Mr. Thayer, in reply, said he thought the earth would fall out of the knives as they revolved.

Mr. Solon Robinson asked what would be the effect of the machine, should it hit a hidden boulder?

Mr. Thayer.—The machine is not intended to work in stony ground. If the knives should strike a firmly bedded stone, the effect would be the same as when a plow struck it, the plow would stop.

Dr. J. P. Trimble.—I am pleased to see that efforts are making to use the power of steam in the cultivation of the soil. I hope to see in my day that all our plowing will be done by steam power.

The chairman expressed the opinion that the efforts of the inventor was very satisfactory. Of course nothing definite can be said about this plan of working the earth until a full sized machine is tried, yet as far as he could judge, the plan looks feasible.

Fruits on the Table.

A splendid exhibition of seedling grapes was made by Mr. David Thompson, of Green Island, opposite Troy, New York, some of the bunches of which grew so compactly as to appear at a little distance to be perfectly solid.

Mr. E. Williams, New Jersey, exhibited seedling apples, much resembling Rhode Island greenings, though with a sharper acid, reported as only second-rate for eating, but excellent for cooking. The tree is a very free bearer. Some pears exhibited by the chairman, from trees which he bought for Easter Beurré, were decided by Mr. Carpenter and Mr. Bergen to be Beurré d'Anjou. Some Duchesse pears from a tree allowed to bear all the fruit that set, showed the bad policy of that practice, the fruit being only about half the usual size.

Mr. Carpenter made a statement that in Mr. Knox's vineyard at Pittsburgh, Pennsylvania, vines planted six feet apart—1,295 per acre—yielded fifteen pounds per vine; which would give a result of 19,425 pounds per acre.

Dr. Trimble thought it wrong for the club to tell of such large yields. Mr. Solon Robinson thought it best always to tell the truth. Mr. George Bartlett thought the club might positively assert that ten tons per acre could easily be produced.

The One Hundred Dollar Prize for Apples.

Mr. Carpenter announced that the Greeley prize of $100 for the best bushel of apples was open to all the world, that some had already been received, that others would be, and that all received would be examined by the committee on the first day of each of the months of November, December, January and February, and afterwards exhibited to the public at the rooms of the institute.

A Glass Fruit Jar.

Mr. Williams exhibited a glas fruit jar invented by Griffin & Titus, New York, which was examined and approved by the club. The cover is of glass, ground into the jar, and made perfectly tight by a gasket of India rubber. The top is held on by a curiously formed piece of malleable iron which operates as a screw upon the neck of the jar. It is a fact worth knowing, that after jars become perfectly cool, there is no need of outside pressure, and the screw clamps may be removed and applied to others. This appears to be the most convenient form of jars yet exhibited.

How to Send Insects by Mail.

Dr. Trimble desires to call particular attention to the proper mode of sending insects by mail. One lately sent to Mr. Robinson in a bottle was nothing but a mass of mold. Others sent in loose paper in letters were crushed out of all shape. They should be put up in pasteboard boxes.

The Circulation of Sap.

Mr. S. Crosby, La Grange, Indiana, at the last meeting presented the following questions to the club, in hopes to get an answer upon scientific and rational principles:

"Does the sap in trees remain stationary or dormant when the timber is not frozen, until by accident or design some portion of the grains of the wood is severed, when as is known, the sap flows?"

"If it does not remain stationary, does it have a continuous flow up and down the trunk of the tree?"

"If so, then by what power, and where does it go up, and where down the tree?"

"In that species of wood known as the 'sugar maple' is what is called the 'sugar water' really the sap of the tree? and is it, or is it not essential to the life and growth of the tree?"

"What produces the saccharine quality of the 'sugar water?"

"It is well known that for good sugar weather it needs freezing nights and thawing days. Now is it the freezing that makes the 'sugar water?' And is the moisture which is required for its production taken into the tree through the foliage and branches, or through the roots?"

Mr. Geo. Bartlett, from the committee appointed at the last meeting, made the following very satisfactory report:

The several queries in that communication constitute a request for a general account of the circulation of sap in trees, and the formation of maple sugar. We proceed to give such an account in the briefest and clearest manner at our command.

Trees are made up of fine tubes which extend from the root to the leaf, and it is through these tubes that the circulation of the sap is carried on. If a growing tree is pulled up by the roots, and the roots are placed in a vessel of water containing some colored solution which they will absorb, we can trace the course of this solution through the tree by cutting notches into it at successive periods. The coloring matter is always found first in the body of the wood near the root, then in the wood higher up, and so on till it reaches the leaf; then it begins to appear in the inner bark near the leaf, and it passes down through the bark again to the root. This observation shows that the circulation of the sap is up through the wood, and down through the bark.

We are not able to answer the question of your correspondent, what is the force that causes the sap of plants to circulate. There has been much speculation in relation to it, but it has never been settled by observation and experiment. It is pretty well established that sap circulates in the winter, though less rapidly than in the summer, and less rapidly at that time in deciduous than in evergreen trees.

The Formation of Sugar in the Maple.

The solid portions of thoroughly dried wood, and other parts of plants, are composed mainly of water and charcoal. When charcoal is burned, a small portion of ash is left. This ash is the mineral or inorganic portion of the substance of the tree, and consists principally of potash, lime and flint of silex. That portion which burns in carbon. In burning, the carbon unites with oxygen to form carbonic acid, an invisible gas that floats away in the atmosphere.

The water and the inorganic matters enter the tree through the roots; the carbon enters mostly through the leaves. Carbon forms about one-half of the solid substance of the tree, and water the other half.

Water is composed of two elements, oxygen and hydrogen, in the proportion of eight pounds of oxygen to one of hydrogen. These in entering into a chemical combination with carbon, lose the liquid state of water, and form the various solid substances which make up the body of the tree.

In its course the sap undergoes important transformations. The trunks and leaves of trees are scenes of constant chemical operations, many of them more mysterious than any of the operations of the laboratory. One of these is the decomposition of carbonic acid in the leaf. The affinity of carbon and oxygen is very strong indeed, and there are few forces in nature that can rend these two elements asunder; but the combined action of light and vegetable life is separating them throughout every day in the leaves of all growing plants. Carbonic acid is absorbed from the atmosphere by the leaf, its two elements are torn apart, the oxygen is returned to the air, and the carbon combining chemically with other elements in the sap is carried to the places where new wood is being formed, and is there deposited in its proper place to help build up the structure of the tree. The symmetrical order in which the carbon is deposited in a tree may be seen by looking at a piece of charcoal.

If wood is examined under a powerful microscope, it is found that the tubes through which the sap circulates are formed of minute sacs or cells. The substance of which the walls of these cells are formed is called cellulose. It has been the subject of a great deal of chemical research, and is found to consist of carbon and water, or more strictly, of carbon and the elements of water, oxygen and hydrogen. Cotton and linen are almost pure cellulose. Each atom of cellulose contains twelve atoms of carbon, ten atoms of hydrogen and ten of oxygen. Starch, gum and sugar all have the same composition. This is one of the wonders of chemistry, that substances composed of the same elements, combined in the same proportion, should have properties so different as gum, starch, sugar, and cotton or linen fibre. Their different properties must of course result from the different modes in which the atoms are arranged.

Besides these four substances there is one other constituting a considerable portion of the body of trees, which is also formed of the same elements as the others but in slightly different proportions. This is lignin. It is an incrustation on the inner surfaces of the cell walls, and its office appears to be to strengthen and stiffen these walls. Its constitution is twelve atoms of carbon, eight atoms of hydrogen and eight of oxygen. In this case, as in the others, there are just as many atoms of hydrogen as of oxygen; these two elements enter into the compound in the same proportion to each other as that in which they unite to form water. If a tree or other plant is thoroughly dried so as to expel all of its uncombined water, nine-tenths of the remaining substance consists of the five compounds, cellulose, lignin, starch, gum and sugar, and all of these are composed of hydrogen and oxygen in the same relative proportion as that in which they exist in water, chemically combined with carbon.

Why it is that the atoms of these substances are so arranged in one part of the plant to form cellulose, and in another to form starch; why it is that they are so arranged in one tree as to form gum, and in another to form sugar, are mysteries which lie beyond the present boundaries of human knowledge.

There is one other organic element, and several inorganic, besides those mentioned, which enter, though in small quantities, into the constitution of plants, but a full discussion of the part which they perform in vegetable economy would demand an exhaustive treatise on agricultural and vegetable physiology. The presentation of this general view of the growth of plants is deemed the most proper discharge of the duties of your committee.

On motion of Mr. Robinson it was resolved that the Secretary enter the report at length on his minutes.

How Can Cider Be Kept Sweet?

Mr. W. S. Clement, Winterport, Me., wants to know how cider can be kept sweet without using sulphite of lime, because that if used in sufficient quantity to preserve the cider sweet materially injures its quality. Mr. C. says: "I have lately heard from a person who has tried the experiment that from six to eight pounds of fresh beef cut up and put into forty gallons of cider, with one pint of rock salt added, will preserve the same better than any other preparation which he has used."

Mr. Solon Robinson.—This will answer no better purpose than the sulphite of lime. It imparts an unpleasant taste, and sometimes the odor is intolerable. I have seen tallow used with a better effect, and I have been assured there is nothing equal to oil, a pint of which, poured gently into the bung after fermentation, has proceeded just far enough to make a pleasant beverage, excludes the air, and prevents any further fermentation.

Mr. W. S. Carpenter said all that is necessary to prevent the fermentation of cider is to entirely remove the sediment. This can be done by isinglass, about an ounce to each gallon in the cask. It should be dissolved in hot water or heated cider, and poured into the cask and thoroughly shaken. It is then bunged up, and in a week or two all the sediment has settled to the bottom. The clear cider may then be drawn off into a clean cask. A new cask or one that has had some kind of alcoholic spirits is preferable. The chairman said that he had used large quantities of isinglass to fine wine. When it is first put in it gives the liquor a milky appearance, but the muddiest looking wine will, by this process, become very clear. He has also known mustard seed used to prevent fermentation of cider.

Mr. Solon Robinson said that was simply because the mustard seed is composed largely of sulphur. It will be well to define what is meant by isinglass, as in many parts of the country mica is known by that name. The article recommended is an animal substance. It is largely manufactured by Peter Cooper of this city, and sold in small sheets of white gelatin for culinary purposes.

Mr. Norman Francis said that he recollected an instance where his father put a handful of alum into a barrel of cider when slightly fermented, which he bunged up tight, and it kept perfectly in that condition till more than a year old.

To Prevent Worms on Trees.

Mr. Charles Thompson, St. Albans, Vt., earnestly recommends everybody to make a strong effort from December to May to destroy all the eggs which will hatch into caterpillars next Spring that can be found by the most diligent search upon the trees. He thinks this is a far easier process than killing the worms. "To save our orchards, destroying the worms in some manner, is the only remedy. The chrysalis is not always to be found, the millers cannot all be captured, and one escaping will deposit many eggs. If the worms can be shaken from the trees they infest, shake them off and crush them upon the ground. If, like the apple tree worms, they are found in clusters, crush them in their nests. If hang-worms, shake the foliage, and they will run down on a silken thread, from a foot to a foot and a half in length, and while thus suspended may be crushed between two pieces of board or shingle."

A New Wheat Pest—Destruction of Whole Fields of Newly Sown Wheat.

Mr. Truman Beeman writes, Oct. 10, from Washington county, Ind., the following letter, which gives gloomy, though important information. The description which he gives corresponds with the destructive cut-worm. He says: "We have a new wheat pest among us this Fall, at least it is new for this section of country, as it has never been seen here before. It is a cut-worm, from half an inch to one and a half inches in length, and the largest about one-quarter of an inch in diameter. It has a longitudinal brown stripe the length of its back, sometimes checked with light and dark checks, with darker brown stripes on each side, while its under side is of a dingy white. It has two rows of legs about one-eighth of an inch long, and walks fast. It has destroyed two-thirds of one field of my wheat, taking clean as it goes, hardly leaving a spear. It cuts off the stalks above ground, and then eats down to the roots, sometimes leaving a part of the cuticle, but generally taking the whole plant, roots and top, so that I can see no signs of wheat where they have been, even by digging down into the ground. When they have cleaned out a spot, they move on like an army, leaving no stragglers behind, but taking every laborer along to other parts of the field. Now, if you or any member of the Farmer's Club can tell me where these worms have come from so suddenly, and in such numbers, for they are countless, and tell me how to get rid of them, or whether they will leave, or die out and leave no progeny, or can give any important information concerning their nature or habits, you will confer a great favor. There are many other fields about here which are injured as bad as mine. My wheat was sown on the 14th of September, on oat stubble, with a heavy growth of green oats plowed under, wheat sowed on the furrows, and harrowed in. All the wheat which I have heard from as being damaged by this worm, was also sowed on oat stubble."

Coal Ashes For Vines

Mr. G. H. Lincoln says: "I have been trying coal ashes on vines for the striped bug, with complete success, by sprinkling the vines in the morning, when the dew was on; I would like to know if it is the sulphur that does the business?" No sir, it is the dust. If taken from the road it would do just as well as from the ash barrel.

Deterioration of Sorghum.

He also asks: "Will sorghum seed deteriorate by long continued planting without changing the seed?" That portion of the sorghum family known as Chinese sugar cane, or sorgo, will deteriorate if grown anywhere near broom corn or other members of the family by hybridization, so that the stalks will be as innocent of sweet sap as a mullein stalk. It requires the greatest care to keep the sugar cane seed pure. The true sugar cane, *arundo saccharifera*, never seeds in the United States, and therefore does not hybridize and deteriorate. The Chinese and African sugar cane that we grow at the north, is very subject to deterioration and great disappointment in the product. The growing of broom corn near it must be rigidly prohibited.

Cause of Rust and Mildew.

Mr. William Tucker, Madison county, Illinois, thinks the whole secret of rust and mildew is excessive moisture. He says: "All rust in wheat, all rot in grapes, all splitting of fruit on the tree, all mildew upon living vegetables, results from a superabundance of moisture, received from the earth through their roots, and the leaves, and the stems, and the fruit, all of which absorb moisture from the atmosphere." Perhaps this theory may be doubted by some people who have seen serious cases of mildew in a very dry season. Mr. Tucker thinks that high culture has rendered fruits delicate and liable to disease. In regard to the disease of grape vines, he states something that needs further confirmation. He says: "It is known that grapes grown upon vines lying upon the earth are not so subject to rot or mildew as grapes grown upon vines supported in the air. Why is this? Simply because the fruit lying on or near the earth draws moisture from the ground, and being protected by weeds and the foliage of the vine, moisture is not rapidly exhaled or evaporated from the fruit. The fruit thus kept fully expanded absorbs but little additional moisture in damp weather, and as there are no rapid contractions or expansions, the consequent strain upon it is not sufficient to rupture it."

Name of an Insect.

Mr. R. H. Arnold, Honeoye, New York, asks the club "to give the name of the little insect that sings at eve upon the trees. It is a green insect, about one inch and one-quarter long, and at the extremity of the wings about three-eighths of an inch wide; has grasshopper legs; wings are semi-transparent, with crosslines; sings on warm evenings with a loud, sharp voice, all singing in one tone, but on cool, frosty nights, its voice is mellowed down and becomes very soft and sweet, and different ones take different tones. Its song is produced by the wings." The specific name of the insect in question we cannot give, but it is of the order of *orthoptera*, of the same family as the katydid, and not injurious to farmers unless the noise is annoying.

Squash Vine Borers.

Mr. R. S. Williams, Gastoron, Fremont county, says that he effectually cures the ravages of the borer of squash vines by examining them carefully two or three times in the early part of the season, and finding where the borer is by the enlargement of the vine. He cuts it out with a sharp knife, and covers the vine with earth, pressing it down hard. In this way he has grown this season half an acre of Hubbard and other winter squashes.

Mr. Charles Thompson, St. Albans, Vermont.—"To prevent the ravage of the melon bug, it is only necessary to place a box, without top or bottom, around each hill of plants. The bug will fly against the box and fall down on the outside of it, and if it be well bedded in the earth, so that no entrance can be found beneath it, the plants will be secure. It is the practice of some to cover the top of the box with muslin, but this is altogether needless."

Wheat without Plowing.

Mr. Norman Matteson, Berwick, Warren county, Illinois, says: "I see in several agricultural papers, that 'subsoiling, fall and spring, and deep plowing,' is highly recommended for wheat. This would not do so well here in our rich soil. We succeed best not to plow at all, to sow very early in the spring, on level land, among corn stalks, harrow with the team astride each row both ways, and then roll. Such treatment prevents the chintz bugs from doing their ravages; the ground being solid, the bugs cannot breed among the old corn-stalks under ground. I sowed ten acres after the above rule, the first week of last March; it yielded 255 bushels of the first quality of wheat. It was a very heavy growth, wherefore it all lodged flat to the ground. I cut it one way with a McCormick reaper. My neighbor, right across the line, possessing just such land as mine, plowed his ground and sowed one month later; but the bugs nearly destroyed his wheat, so that he cut only part of it. Another neighbor I persuaded to sow three acres of wheat according to my rule, and the crop weighed 93 bushels."

Buckwheat as a Manure Crop.

A correspondent, Mr. Allen, asks the following question: "I would wish to inquire of the club their opinion as to the benefit of replenishing land by plowing in buckwheat while it is green. Would it be a good manure for winter wheat if plowed in just before sowing the wheat."

Mr. Solon Robinson.—To this it may be answered that buckwheat is rather better than no crop to turn under for manure, but it is not half as good as clover, and is less valuable than several other things which are just as easily grown. A crop of sowed corn would be far better than buckwheat. The common flat turnip has been highly recommended for this purpose. But of all things to turn under to improve land, there is probably nothing so valuable or economical as red clover. There certainly is no way that land can be manured so easily as growing the manure upon the soil to be improved, and 160 loads of well decomposed sods would be counted a good dressing for an acre. Then why not grow them where they are needed?

Apple Trees for the West.

Mr. L. L. Fairchild, Dodge county, Wis., wants a list of "*very early* bearing apple trees adapted to the West. And tell us about how long after three or four year grown nursery trees are planted out before they may be expected to bear?" We hope some Western correspondent will answer this question for the benefit of Mr. F. and many others.

Tomato Worms.

Mrs. C. A. Cassilt writes as follows from New-Castle, Penn.: "Excuse me for troubling you, but I will stand in some little corner and wait very patiently indeed, if you will only tell me in your own time, if the tomato worm bites, if it is poisonous, what is its origin, &c.? Now don't please laugh or scold. I have such a horror of the *ugly* thing that I fear that the tomatoes would not be gathered, if it depended upon me to gather them. We have had an unusual large number of worms on our vines this Summer, and I have been tempted to wish tomatoes were called '*Jerusalem apples*' still, and naughty chilpren whipped for eating them. Notwithstanding, I have made seven gallons of superior catsup, and put up I don't know how many cans 'air tight.'" We have often handled these worms, and never heard that they would bite, or were poisonous. Its origin is like that of all similar worms—from the eggs of a large moth.

Southern Illinois Described—State of Agriculture, by a Resident.

"In writing to you some weeks ago about the clover hay worm, I intimated that I would furnish the Club with some items pertaining to the state of agriculture here, and to my own experience in that branch of industry. In order that you may better appreciate what I have to say, I shall venture to introduce myself with rather more egotism than is consistent with the rules laid down by Chesterfield.

"Equality, from which I date, is a village of some 500 inhabitants. Its principal attraction consists in its coal mines and salt works. I live six miles to the northward of that place, at which is my nearest post-office. I came here seven years ago and settled in the woods. Upon my little tract of one hundred acres there was not then a tree missing, except here and there one that had been fallen by the hunters of bees or coons. I have now an improvement of about forty acres, chiefly the work of my own hands. This is still enclosed on three sides and half of the fourth by a dense forest. Within the last three years I have constructed nearly a thousand yards of under drains, which is, by the way, a thing entirely new to this region. These introductory statements will enable you to understand that I am less familiar with the pen than with the axe or spade.

"Southern Illinois is probably less frequented by Northern and Eastern people than any other portion of the free States. I have never seen more than two or three persons here that were originally from New England or New York, snd not one that was engaged in farming. English and Germans are also rarely met with. There are a few Irish, but the farming population is made up almost exclusively of emigrants from the slave

States and their descendants, of which Middle Tennessee has furnished the largest share. These people have been sufficiently set off by occasional correspondents of the Tribune, who have traveled or sojourned among them. I will therefore let them pass for the present, though I may have occasion hereafter to allude to some of their characteristics.

"My personal knowledge of this region is confined chiefly to this county (Gallatia), and the county adjoining on the West. They are situated in the south-eastern corner of the State. The face of the country is in some places broken by hills of considerable magnitude, but much the larger portion is simply rolling. The more depressed portions are usually wet during the latter part of Winter and early Spring. The bottom lands along the streams are subject to overflow. This is especially the case with the bottoms of the Wabash, which are very extensive. The beds of the small streams are muddy; the waters are turbid and have a sluggish current when low. The back waters of the Ohio not unfrequently reach a point fifteen miles or more in a direct line from that stream, through the Saline river and its branches.

"The timber upon the upland is usually post oak, black oak and hickory, with a scattering undergrowth of dog-wood, hazel, and various other saplings and shrubs. There is a cypress swamp some six miles from the Ohio, and running nearly parallel with it, and extending from the Wabash eighteen or twenty miles. At the point where it is intersected by the road running north from Shawneetown, it is passed by means of a log causeway a mile in length. This swamp furnishes great quantities of valuable lumber, which much resembles pine, and is perhaps quite equal to it for building purposes. What is called low or wet land here, is hardly entitled to the name of swamp, inasmuch as the surface is solid even when covered with water, and is generally sufficiently dry to admit of being planted in corn during the month of May; though there are few Springs so dry that these lands would not be greatly benefitted by a system of under drainage.

"Of the bottom or low lands there is considerable variety both of timber and soil; the former being a very good index to the latter. That is, a good judge of land can determine with nearly as much certainty of the quality of the soil when the ground is covered with snow as when bare, simply by observing the growth of timber. The richest, the most desirable, and probably the largest proportion of this class of lands, is what is called black land, from its color. The timber most characteristic of this is hackberry, black mulberry, and slippery elm. There is also often interspersed white ash, honey locust, sweet gum, and the large variety of elm. And here let me remark that upon all the lands, whether high or low, there is usually a sufficiency of oak of one kind or other to answer all the ordinary demands of fencing. We sometimes meet with a small area of low land where the soft maple, and a variety of red oak called water oak, prevail. Here the soil is of a lighter complexion and less fertile. We have a kind of oak called overcup, probably from some peculiarity of the cup which encloses the acorn. It is found abundant in some places upon the medium quality of low land. The bark resembles in color that of the white oak, and the wood is as durable as that of any kind of oak. Its peculiar value consists in its growing very straight and free from large limbs; and of its being found, oftener than otherwire, of a size suitable for log buildings.

"The whole surface of the country that I have seen is free from stone, and it is not often met with in digging wells; though quarries of stone are found here and there on the banks of our large streams, some of which make excellent grindstones. Beds of nearly pure sand are occasionally met with, but it does not predominate in the soil. The upland, though not remarkable for fertility, has a light, warm, mellow soil, which is easily tilled and gives very satisfactory results for several of the first years it is under the plow.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

October 25, 1864.

Mr. Nathan C. Ely in the chair.

FOOD OF CEDAR-BIRDS.

Mr. S. R. Dunn, Woburn, Mass., thinks that cedar-birds have kept his fruit trees nearly clear of worms for several years. They come in flocks as soon as the worms appear.

Dr. Trimble, the entomologist of New Jersey.—I consider the cedar-bird one of the most valuable laborers upon the farm, orchard or garden. I have paid great attention to the subject during the past summer. I have shot and dissected several of these birds at different periods, and found their stomachs filled with worms. In one I counted the remains of thirty-six of the destructive kind known as canker worms. I have watched the parks in this city and found that upon days when but few persons were there, cedar-birds came in flocks to feed upon the span worms, which are such a nuisance every year, and am of opinion that if the parks were closed for some weeks, at the proper season, that the birds would soon abate the nuisance. When the worms first appear, would be the proper time, for then it takes a much larger number to satisfy a bird. They feed upon them, however, in all stages of their existence, even after they are wrapped up in their cocoons. These birds never have their young until worms are abundant. It is true that later in the season they eat a few cherries, for which they are shot, and in autumn we see long strings of them exposed for sale in the city markets. This should be utterly prohibited. They should be protected in every possible way, and so should all the class of insectivorous birds, particularly the three warblers of Wilson and the bobolink.

Rev. Mr. Weaver asked the doctor to describe the cedar-bird, as we now have many in the city which resemble the canary birds, only larger. Some call them English sparrows. Are they cedar-birds or sparrows?

Dr. Trimble said that they were neither. The cedar-bird had a high tuft on its head, and the ends of the wing and tail-feathers appear as though tipped with wax. They are very beautiful as well as valuable.

The chairman said that a flock of these yellow brown birds spoken of, had been busily searching the trees in his yard for two weeks, and he had taken great care not to frighten them away. What are they?

Dr. Trimble.—These are the yellow rumped warblers of Wilson. These should not only be carefully protected by law, but the people should be so instructed that no law would be needed for the protection. Every man who owned land would learn to consider the birds as part of his property. Another most valuable bird to the farmer is the Baltimore oriole, that beautiful little creature which builds such artistic habitations for its young, hanging from the limbs of trees. Both birds and nests are ornamental besides being useful. Whenever you find one of these nests you will find but few worms on the trees. The oriole is the only bird that I know that eats the curculio.

Squash Vine Bugs—Remedy.

Mr. Anson Hammond, West Liberty, Iowa, says that by planting a few seeds of hemp in each hill of squash or cucumber vines, the striped bug will be effectually kept away. Let the hemp plant grow until the vines are out of the way of the bugs, then pull them up like other weeds. This information will be worth remembering until next season.

The Wheat Midge.

Mr. D. Steck, Hughesville, Lycoming county, Penn., gives the following full description of the wheat midge and its habits. He says:

" The perfect insect is a small gnat or fly, as its name (midge) indicates; it is of an orange color, in general form it somewhat resembles a mosquito, but is a little smaller, being only about one-tenth of an inch in length. It has long, slender legs, and two transparent wings. Its antennæ are of a blackish color; those of the male are nearly twice as long as those of the female. The eyes are black and prominent. It makes its appearance from the first of June to the end of July, according to latitude, later as we proceed north.

" The female deposits her eggs upon the kernels of the wheat, by means of her egg tube, which she inserts in the opening between the valves of the corolla or chaff which inclose the developing kernel. As many as ten or fifteen are often found on one kernel. In a day or two the larva or maggot is hatched from the egg, and commences operation upon the immature grain, from which it sucks the juice, of course preventing its full development, and when several are present, rendering it entirely worthless. In about two weeks the larvæ attain their full size, and are prepared to undergo the next change in their existence. They cease feeding, the body of the worm contracts within the skin, and it remains torpid in this state for a few days. It then bursts this envelop and emerges from one end leaving its shell behind. Its appearance is slightly altered. Soon after moulting the insect falls to the ground, where they burrow five or six inches below the surface. Here they lie ensconced until the following spring, when they undergo their next change, that is, from larvæ to pupæ. This change is completed without casting the skin; the wings and limbs of the yet imperfect insect being unconfined, instead of closely enveloped, as is the usual condition of most insects in the pupæ state. It now works its way to the surface, and emerges in the final, complete state, ready again to multiply its species for further destruction.

"I will here mention an instance that occurred in the spring of 1856. Early in April I plowed a piece of land on which the midge had destroyed a crop of wheat the previous season. Soon after the plowing was finished, there was a heavy fall of rain; the next day I chanced to pass over the field, and to my great astonishment I saw millions upon millions of the midge in the low places where the water had carried them. They were then apparently in the same condition as when they first issued from the wheat to enter the earth. As the water subsided, they gradually disappeared by burrowing in the earth again.

"According to the statements in the article referred to in the beginning of my letter, the midge would necessarily become a perfect insect in the fall, when they take refuge in the mullen. What nonsense."

What makes Color in Grapes?

Mr. S. R. Dunn, Woburn, Mass., wants to know "the difference between the white and purple or colored grapes chemically? What is the coloring matter, whether iron or not, and the effect on the system in their consumption?"

Mr. Geo. Bartlett.—This question is wholly unanswerable, as to what makes the color. It has no effect on those who eat colored grapes.

Dodder, the Flax Parasite,

is said to be medicinal by Mr. John Graves, Poughkeepsie, N.Y. "It was considered, in England, an efficient remedy for hypochondriasis and bilious complaints; and the medical faculty of that period used to import from Italy and Turkey, as being still more efficacious, the *Cuscata minor*, (the Dodder being *Cuscata major*,) which attaches itself only to the *Thymum durius*, (our common garden thyme,) that herb growing wild in those countries. Perhaps even now, in some cases, it might beneficially supercede the mineral medicaments so frequently used for the cure of such diseases."

Apple Trees that Bear Inundation.

Mr. S. W. Gavitt, writes from Kern River, California, that in several inundations that he has witnessed in that State, he has found the Northern Spy apple trees have lived, when all other sorts have perished, and therefore reccmmends it for all situations subject to overflow.

Economy in Wheat Growing.

Mr. P. D. Beckwith, Dowagiac, Cass county, Mich., wants the Club to discuss the subject of grain raising in all its various relations. I think we, as a people who raise grain, and particularly wheat, do not sufficiently understand the subject in scarcely any one particular. He says: "It is admitted by all farmers who have used grain drills, that they cannot afford to sow their grain broadcast, but should use a drill by all means," and he thinks Gage's roller drill superior to all others. The advantages of drilling wheat are: Saving of labor and seed, increase in yield, and protection from winter-killing and drouth. All the seeds is buried out of the way of the birds, and seeding can be done in windy weather.

Poultry—How to Keep it Healthy.

Mr. Jonathan Kepler, Pleasant Mound, Ill., says that forty years ago his mother was told that if she wanted to keep her fowls healthy she must kill all the old cocks, keeping none over but one winter. Pursuing that course, he has not known one case of the gapes in that time. He also recommends never to allow old hens to accumulate in the flock, and to obtain eggs from neighbors every year to produce a cross in his stock.

Mrs. James Adams, Wee-law-lee, Wisconsin, says that gapes are entirely prevented among poultry by salting their food in the same proportion as food for ourselves.

Tripe—How to Clean It.

Mr. Robert Terrett, Newton, Licking Co., Ohio, says, in these times of scarcity and high prices of meat, he thinks the club would confer a great favor upon all who read its discussions if it would give some directions how to save and clean beef's tripe, which makes a most excellent article of food, but which few people in the country know how to prepare.

Mr. Solon Robinson.—The answer to this is, cut as small an opening into the paunch as possible through which to empty the contents. Do this with care, so as not to smear the outside, and carefully wash off any substance that may adhere. Then let one man thrust his arm into the opening and seize the bottom firmly, while another turns the sac inside out. Now sew up the slit that was cut firmly with strong twine. The sac is now to be thoroughly washed in cold water, and then either covered with whitewash just as you would cover a sheepskin to loosen the wool, or else placed in a tub of strong alkali made of lime or wood ashes or potash, and kept there until the wooly coating is loosened so that it can easily be scraped off with a knife. As soon as this is the case, give the sac another thorough washing to cleanse it of the lime, and then it is ready to be cut up for scraping. Cut it in long strips, about five or six inches wide ; lay one of these upon a table or board before you, fastened at one end with a couple of tacks, and scrape with a dull knife until quite free of the adhering coat. Then wash, and put the tripe to soak in weak brine for twenty-four hours or longer. Then wash again and it is ready for boiling. It should be boiled until it is quite tender, when it may be pickled or put away to be eaten fresh, after recooking, by stewing, frying or broiling ; and there certainly is no part of a beef that affords richer or more palatable food, and it is through the sin of ignorance that it is so often wasted.

Sowed Corn for Fodder.

A farmer in Chautauqua county wants the club to keep agitating the question of sowed corn and how to cure it. He says that some of his meadows have been in grass twelve or fourteen years, and must be broken up this fall or next spring. The consequence will be that he will be unable to winter his stock unless he can do it upon corn-stalks or some other substitute for hay. A great many other persons have old meadows which they hesitate to break up for the same reason—they do not know what to substitute for the grass during the transition stage. Many who have tried sowed corn have found the difficulties of curing it for winter feed so great that they have abandoned the attempt. This writer says he has tried binding in small bundles, putting the bands as near the tops as possible, and also the plan of setting it round a pole on forks, and the result is about the same. The earliest sowed corn cures the easiest. The difficulty is in keeping it sweet after it is packed away for winter. Although supposed to be well cured, it often retains moisture enough to cause it to mold. He finds the best way to keep it is to pack it with straw layer by layer. He wants to know if any one has had experience in the use of salt in curing corn-stalks. Some suppose it injurious instead of beneficial, as it tends to keep them damp, and does not help to cure it except in such large quantities as to be injurious to cattle.

Mr. Solon Robinson.—I approve of the method of packing cornstalks with straw, but disapprove of the use of salt.

Ashes as a Manure.

The same writer asks, what in the opinion of the club, ashes are worth as a top-dressing for meadow, where hay sells for $20 per ton.

Mr. Solon Robinson.—Many of the club who have had experience in the use of ashes, consider them worth twenty-five cents a bushel upon any land in the vicinity of this city. They may be profitably applied to grass land at the rate of twenty bushels per acre.

Mr. George Bartlett said that he had seen the effect of ashes upon land twenty years after the application.

Mr. Wm. S. Carpenter said that there was a great difference in the quality. Those from hickory wood are worth fifty cents a bushel for many purposes on the farm. For potatoes, ashes are almost invaluable.

The chairman asked the opinion of the club as to the value of leached ashes. He used 200 bushels year before last upon potatoes, without any perceptible advantage.

Mr. George Bartlett replied that he might have used the ashes upon soil already sufficiently supplied with potash. They are apt to be of the least advantage upon clay soil.

Mr. Solon Robinson said it is certain that they are advantageous upon the sandy soil of Long Island, as farmers there are willing to pay the cost of ashes in Canada West and transportation all that distance.

Mr. Martin E. Thompson mentioned the advantage of leached ashes upon Long Island and a crop of potatoes this year, 375 bushels per acre.

Grape Vine Worms.

Mr. A. Gilbert, Tipton, Indiana, says: "I found on my vines several of the worms with the parasite cocoons stuck all over them. I put one under a tumbler, and a few days after there was a large number of small black flies in the tumbler; they were three-sixteenths of an inch long, large head for the size of the body, body slim and two hairs from the tail. To be sure that they came from the cocoon, I took out the worm and cut off the top of one of the unopened cocoons, and out crept a fly like the others."

A Plant for a Name.

Mr. G. also says: "I send a specimen of a small, pretty vine, that came in a box of plants from New Jersey. It has a yellow flower. I would like to know the name."

Professor Thurber.—This plant is known among country people as pennywort. Its botanical name is *lysimachia nummularia*. It grows very prettily from hanging baskets, that is, baskets filled with damp moss in which the roots of the vine are planted, and from its small, shining round leaves grow and hang over so as to drape the sides of the basket and form a very pretty winter ornament for rooms.

Sorghum in Southern Illinois—It Deteriorates.

Our seasons here are several weeks earlier than necessary for the maturity of sorghum. It was not injured by frost last year, though it came five weeks earlier than usual. The seed is planted in May; it might be in autumn. Scattered seed often grows to become a nuisance in the cultivation of the next crop. Cane need not be fully ripe to make good molasses. I have made it of excellent quality from canes where the seed had not half turned. A neighbor made some from unripe cane, which much resembled maple molasses. The opinion generally prevails that the seed should be fully ripe. That opinion is erroneous. For family use a plain wooden mill will answer where an iron mill is inaccessible. The juice should be skimmed thoroughly just before and just after it begins to boil, and it should be boiled immediately after it is pressed, and boiled as rapidly as possible, and removed from the kettle as soon as done, because the affinity of the molasses for the iron injures its quality. Clean the kettle thoroughly before using again. That sorghum sometimes degenerates, is an established fact; but I am not aware that the cause of such degeneracy has been fully brought to light. I will therefore give the club the benefit of my experience in full, bearing upon that point. Three years ago last spring I planted one-fourth of an acre in the corner of a cornfield, and the yield of molasses was very satisfactory. I saved a portion of the seed, and the next spring planted three-fourths of an acre in the same corner. I was not at home when the crop was worked up, but found that the yield was but little more than that of the preceding year from one-third of the land. At that time I attributed the deficiency to some defect in the old wooden mill, or to the incapacity of those left in charge. A portion of the seed had been saved, with which I planted one-fourth of an acre the following spring in another corner of the same field; corn still growing upon two sides of the patch, as in the two former years. Upon commencing to grind out this crop, I soon discovered there was some serious defect in the cane; the juice was not there. So I abandoned the job, and hauled what was left to an iron mill, the owner of which told me my cane was running into broom corn. He also informed me that he had found a good deal of difference in the proportional quantity of juice afforded by different crops; and pointed out one pile which he said was not worth working up. This, upon inquiry, I found to belong to a man to whom I had given the seed. Upon a more critical examination of my cane, it was found that a few of the stalks were heavy and full of juice, while much the larger portion were nearly as dry as corn-stalks. From the whole quarter of an acre but five and a half gallons of molasses were made—less than one-fourth of what was obtained from the same area two years before. There was no broom corn grown near either of the crops referred to. If I were to plant sorghum again I should select the seed from that crop which should be found to yield the largest quantity of molasses from the smallest bulk of cane, and should plant as far as possible from corn. Four years ago an occasional farmer here and there raised a small patch of sorgo, and ground it upon his home-made wooden mill, and boiled the juice in such kettles as he happened to possess or could borrow. Now iron mills are coming in all around, and there is not one farmer in five within the circle of my acquaintance whose table during the coming year will not be abundantly supplied with this new-born luxury; while at the same time there will be a surplus sufficient to supply the home demand. The owners of iron mills manufacture molasses for fifteen cents per gallon; the cane being delivered at the mill. The farmer, or any one else who can command half an acre of good land, must be poor and lazy indeed who cannot now keep his table supplied with this nutritious and wholesome delicacy."

The writer wishes to know how far north sorghum can be profitably grown. He thinks as far north as Central New York. Perhaps that may be the case in some localities.

Mr. Solon Robinson.—Sorghum has but little cultivation in this or other North-Eastern States, though it has been grown to some extent in gardens. My opinion is that it has never succeeded north of latitude 43 degrees, and only partially as far north as latitude 42 degrees 30 minutes. The fact mentioned by the writer about the degeneracy of sorghum grown in the vicinity of Indian corn, is a very important one. If such is the case that it does hybridize with corn so as to injure its saccharine quality, the fact should be definitely known, and no seed should be used of cane grown in such a situation. We know that it will hybridize with broom corn, Guinea corn, Doura corn, and other varieties of the sorghum family, but did not know it would with Indian corn. We have heard much the present year about sorghum that yielded no juice, or the juice of which was not saccharine, and we hope that this statement will lead to the cause and a remedy. Sorghum is altogether too important a crop, particularly for the West, to leave anything unconsidered that will tend to its improvement. It is of the utmost importance to keep the seed pure. Its degeneracy in other situations can only be accounted for upon the hypothesis of this case mentioned in Southern Illinois, that it has been affected by growing too near Indian corn. Let us have more facts.

Mr. Wm. S. Carpenter said that sorghum was largely grown the present year at New Milford, Conn. This is a little above 41½ degrees. A gentleman there estimated there were about 250 acres, and that it would yield 200 gallons of syrup per acre. There is a factory that grinds the cane and manufactures the syrup for toll. If such factories were established in other neighborhoods, sorghum would be extensively grown in this region as well as the West.

Mr. J. Irish said that sorghum had been successfully grown in Onondaga county for several years. Many farmers produce more than they require for use, and consider it easier to make molasses from sorghum than from maple trees. There are neighborhood mills established there, which grind the cane and make the syrup for twenty cents a gallon. The seed ripens perfectly in that county, between $42\frac{1}{2}$ and 43 degrees.

Mr. Weaver said he had lately heard of molasses made of Indian corn, at the rate of three gallons to the bushel.

Mr. Bartlett said it must be done by previously malting the grain.

Mr. Irish said he had heard of molasses made of cornstalks.

Mr. Solon Robinson.—That was done extensively at Wilmington, Delaware, more than twenty years ago by a Mr. Webb. He found no difficulty in making molasses, and but little in making handsomely granulated sugar. The only secret about the matter in making molasses from Indian cornstalks is to carefully strip off all incipient ears, and then allow the stalks to grow to maturity. Mr. Webb gave up the manufacture of molasses because we were then under the southern rule of no tariff, and foreign molasses was introduced so cheaply that it would not pay to make it at home. There is no necessity now to make it from cornstalks, because sorghum is preferable. The only thing we want to know is how to keep the seed pure.

Strawberry Plants—How to Preserve Them.

Mr. Wm. S. Carpenter.—Strawberry plants sent by mail or otherwise are often received in a very dry condition. If set in the earth in that state, and watered, they will surely die. If laid upon the surface and covered with damp moss, and that pressed upon them with a board for one or two days, they may revive. I lately received some from Wisconsin which were all apparently dead. I treated them in this way before setting them in the ground, and now they are growing vigorously. If you have no moss at hand, you may cover the whole plant in soil, or with almost any other substance, rather than to plant them in the ordinary way.

Adjourned. John W. Chambers, *Secretary.*

November 1, 1864.

Mr. Nathan C. Ely in the chair.

Emigration to Maryland.

A letter was read from Prof. W. Baer, Sykesville, Md., who offers to come here and deliver an address before the Club, giving important information to those who may desire to emigrate to that State.

Mr. P. T. Quinn.—I think there is no better State to emigrate to than some of the counties of Maryland. Land can be purchased there at a moderate rate in Kent, Carroll, and Baltimore counties, where I have been in the habit of visiting for the past five years. A friend of mine purchased a farm on which twenty acres of wheat had been planted, which yielded twenty-two bushels per acre. The facilities of getting to a market are easy. The quality of land is equal to any in this State.

Mr. Wm. S. Carpenter said that he knew several persons who had gone from this part of the country to Maryland, and had become very much dissatisfied.

Dr. Ward thought the only way to get at the truth was to have the subject thoroughly discussed. We know that some parts of the State of Maryland is very productive, and now that slavery is abolished it will be a very desirable State for emigrants; and moved that the Secretary notify Mr. Baer that we will give public notice that he will be at a meeting of the Club ready to answer any questions in relation to Maryland.

Sugar and Syrup from Indian Corn.

The Chairman stated that he had just seen and carefully tested the quality of syrup made from Indian corn after the process discovered by a German chemist of Buffalo, who is certain that he can obtain as much molasses from a bushel of corn as a distiller can whisky; that is, three to four gallons, and the quality of that which he saw is equal to the best sugar refiner's syrup, which now sells for $1,50 a gallon, and the cost of making is declared to be quite small. Two sugar refiners who have examined the process are so taken with it that they have each agreed to put in $50,000 to establish a manufactory of syrup, and probably sugar, from corn. At present sugar has not been made, but some of the syrup left standing in a bottle solidified, so that the bottle had to be broken to get it out, and it proved to be a fine grained, plastic sugar. Upon some surprise being expressed that sugar or syrup could be obtained from Indian corn, Mr. Ely observed that the whole success of the distiller of grain depended upon the amount of saccharine that the grain contains, and therefore it does not surprise him to hear that this saccharine can be extracted before as well as after it has undergone fermentation. The only thing is to hold the fermentation at the right point, and make sweet syrup instead of alcohol. Some of those who have examined this new process, and they are men of sound judgment in such matters, are satisfied that the whole country can be supplied with sugar and molasses from Indian corn. At any rate the problem will soon be solved, for some of the wealthiest men in New York are engaged to fully test the process.

Mr. Solon Robinson said that the question that corn contains saccharine is not disputed. The only thing to be settled is the cost of extracting it.

Prof. Tillman thought that there was a still more important question, and that is, whether it will prove to be true cane sugar, or more like grape sugar, which is less in value, because less sweet. Now is it settled that this new product is sweet, not only in taste but in fact? that is, does it contain $C^{12} H^{11} O^{11}$?

Mr. Geo. Bartlett.—I understand that this syrup is made of starch, which is nothing new among chemists. In France it is an established industry.

Osage Orange—Is it Hardy?

Mr. E. H. Rood, Bloomington, Ill., says: "I notice in the last report of the Club that the Osage orange would be killed with twenty to thirty degrees below zero of cold. I have lived in Illinois nineteen years; last winter, with one exception, was the coldest during that period—thermometer twenty-five degrees below-zero. Peach trees killed very generally, but I have yet to see the first hedge killed by last winter's cold. The cold winters of 1854 and 1855, however, did kill many Osage orange hedges, but that is the only winter in which they have been killed since their introduction as fencing material."

Mr. Solon Robinson.—That is just the whole that I have stated in regard to this kind of fence; that it could not be relied upon further north than the cotton growing region. Any plant to answer for a fence in this latitude must be proof against any degree of cold ever known. If it is not, and a farmer has used it to fence his farm, he is never certain of the next crop. One hard winter may leave him fenceless. I grant all that is ever claimed for the beauty and goodness of Osage orange hedge, but still it is not sufficiently hardy.

Mr. Geo. Bartlet thought that it would be safe to plant Osage orange wherever peach trees flourish. At any rate he thought the isothermal line of the cotton plant quite too low.

Mr. P. T. Quinn said that he had known a hedge of this plant to endure the winter in Jersey twelve years, and he thought a man could afford to lose his fence once in ten years rather than fence with rails. Besides, the less fence we have the better.

Mr. R. G. Pardee.—The greatest difficulty about a hedge of any kind is not its liability to be killed by cold, but to be neglected and suffered to grow out of shape, unsightly and worthless. The generality of farmers would never pay proper attention to a hedge to make it answer for a fence.

Mr. Wm. S. Carpenter.—I believe the wild pear tree would afford a good material for hedges. It would be very hardy, strong, and not liable to any disease. It would, in my opinion, make a good hedge.

Mr. Solon Robinson —And so would apple trees. Witness those in old pastures that have been brouse d by stock; see how rugged they grow. No animal could get through such a hedge.

The Chairman.—I notice in an account of the discovery of a new pass over the Andes, that a forest of apple trees was found upon one side of the mountain.

Poison Ivy Remedies.

Mr. E. H. Rood, Bloomington, Ill., says: "I notice in the reports of discussions at your Club that you have mentioned several remedies for the poison ivy. After the poison has taken effect, and sores are a consequence, bran poultice is a specific. This I know from actual experience, having been many times poisoned—bran of wheat or rye equally good." "Yes," says a lady, who has been often poisoned, "equally good; but no better for me than hot water without the bran. A very hot poultice of anything is good, and often renewed will effect a cure; but all the remedies that I have tried are not equal to the sweet fern tea. Perhaps bran is a specific for some persons; it is not for me."

Mr. Pardee said that he knew of a child that was troubled years with poison sores cured by tea of Honduras sarsaparilla. He would oppose all remedies that tend to drive the poison inward."

Grapes—How many can be Produced upon an Acre?

Mr. Solon Robinson.—This question has been considerably agitated of late. Here is an item of evidence that members of the Club have not overestimated the possible production. Suel Foster, Muscatine, Iowa, in a letter to *The Country Gentleman* says, in speaking of an exhibition of grapes at the Iowa State Fair, that Mr. Jobe, of Clay, Washington county, Iowa, raised this year on half an acre, containing eight hundred vines five years old, 8,665 pounds. He had the proof of this crop with him, and expected to get a special premium from our "Discretionary Committee" for this most extraordinary crop of Concord grapes. He had about four acres, set mostly with Concord. His yield of wine, with some select lots, was a gallon to a little over eleven pounds, but the average was about a gallon to fourteen pounds. A portion of his grapes were sent to Chicago, and sold at fifteen cents, netting him at home twelve and a half cents per pound. At the same rate his vines will yield 17,330 pounds per acre. Does any one doubt if they will do that at five years, that they will yield 20,000 pounds at ten years of age?

Mr. Wm. S. Carpenter said that he lately read a statement in the *Genesee Farmer* that Mrs. Munn's grapes were splendid. She has five hundred and forty-six bearing vines, seven years from planting. They are trained on post and slat trellises, seven feet high. The vines are fourteen feet apart each way. The whole vineyard occupies two acres and five-eighths. In 1862 it produced seven tons of grapes; last year eleven tons, and this year the crop is estimated at fifteen tons. They are all Isabellas. Mr. Adams has charge of the vineyard, and has certainly been very successful.

Heavy Seeding of Grass Land.

Mr. Solon Robinson.—The following mixture of grass seed for an acre of land is used by Mr. Collins, a dairyman at Collinsville, Conn.: nine lbs. timothy, nine lbs. orchard grass, three lbs. red clover, three lbs. red top, seven lbs. Italian rye grass, three lbs. perennial rye grass, two lbs. tall meadow oat grass, and four lbs. white clover. In England two bushels of large and twelve lbs. of small seed is given as the seed for an acre, and the cost is stated at "twenty-five to thirty shillings" an acre.

Iowa as a Wool Producing State.

Mr. Solon Robinson.—It was estimated that between 400,000 and 500,000 sheep were driven into Iowa in 1863, and that the influx this year will be equal to the last. This, with the increase of lambs, which is very large, as the sheep are remarkably healthy, will soon give that State a high rank in the production of wool, particularly as marked attention is given to fine wool sheep. There were fifty Vermont bucks in one lot at the Iowa State Fair.

Profitable Stock.

Mr. E G. Holcomb, Brashier Iron Works, St. Lawrence county, N. Y., says: "From seventeen stocks of bees I had eight hundred lbs. honey and twelve swarms; one hive made eighty-one lbs., but did not swarm. This crop was mostly obtained from the last of June to the middle of August, at the time that white clover was most in blossom. As for honey dew I have never seen it in this section. In some seasons we obtain a good yield from basswood, but none this year. The quantity of buckwheat honey was very light—about two lbs. to five of clover; therefore I consider white clover the main source of supply, and in this section there is plenty of it. I wish to ask the Club, or any of the outside members, if there is any feasible mode of stifling the worms or moth eggs in boxes, after being removed from the hive, without the use of sulphur, which is apt to give the combs a green color." Would the fumes of charcoal answer?

Mr. Bartlet, who is a practical chemist, replies no; nothing of the kind will destroy the vitality of eggs.

Evans' Rotary Cultivator.

Solon Robinson.—I am glad to announce to the Club that "Evans' Rotary Cultivator" has been so much improved by Mr. Hepburn, its present proprietor, that it is almost a new machine, and much more promising of success in practical use than it was when exhibited two years ago at Rochester, at which time it was highly commended by a committee at the State Fair. I am informed that a company has been formed for the purpose of introducing it to the public. The machine is now ready for exhibition, and it is intended to have a public trial of it at Flatbush, L. I., on Thursday next, and the proprietors would be glad to have a committee of this Club present."

On motion of Mr. Robinson a committee of five were appointed to examine the working of the machine: Messrs. Solon Robinson, John G. Bergen, Wm. S. Carpenter, P. T. Quinn, Isaac M. Ward were appointed said committee.

Consumption of Meat in Cities—London and New York Compared.

Mr. Solon Robinson.—I find the following statistics in *The Mark Lane Express* of the consumption of meat in London, which I think worthy of transferring to the reports of this Club, to compare them with those of New York. The figures are from a paper read by R. Herbert before the British Association for the Advancement of Science. The writer appears to mourn the inability of England to furnish meat for its own people. He says:

"If we closely examine the returns of the great metropolitan market, which has to furnish a supply for nearly 3,000,000 people, we shall find a state of things which would appear to shake confidence as regards our powers of production. In 1853 and 1863 the total supplies of stock disposed of in the above market were:

	1853.	1863.
Beef cattle	252,624	288,177
Sheep and lambs	1,325,474	1,389,142
Calves	20,395	23,291
Pigs	34,677	53,985

From the above figures, we must deduct the numbers of foreign stock offered, in order to see how far production has increased in the United Kingdom. These numbers were:

	1853.	1863.
Beeves	52,344	72,907
Sheep and lambs	220,429	285,296
Calves	22,619	26,630
Pigs	8,508	17,562

It follows, therefore, that the increase in home-fed beasts in the ten years was trifling in the extreme, and that there was a falling off in the supplies of English sheep in 1863, compared with 1853. Here, it will be perceived, the question assumes more than ordinary importance, because the progressive nature of our home and foreign trade, and the increased power of purchase and consumption must, at no distant date, tell seriously against the consumers. Let us now see how prices have ranged in the ten years. In 1853 and 1863 they were as under, per stone of 8 lbs. net:

	1853.	1863.
Beef, from	2s. 6d. to 5s. 0d.	3s. 4d. to 5s 2d.
Mutton...	2s. 6d. to 5s. 4d.	3s. 6d. to 6s. 2d.

In the period here alluded to, then, inferior beef has advanced 10d., and all kinds of mutton 1s. to 1s. 2d. per 8 lbs.; although, as I have shown, the arrivals from abroad have continued to increase. If we refer to 1842, and to the ten years prior to that period, we shall find even a greater difference in value. The best Scots were seldom worth more than 4s. to 4s. 2d., and the best Downs 4s. 6d. to 4s. 8d. per 8 lbs. There is, therefore, a much larger profit to the grazier without a correspondng increase in the supplies."

I will now give the number of butcher's animals reported at the market places in this city, which does not include some thousands of calves and sheep, many cows, and a few beeves sold at the Hudson River market boats and other places. Cows are included as butcher's animals because they are nearly all fed for that purpose upon distillery swill. I have not the figures for 1853, but here are the current returns of

	1854.	1863.
Beeves	169,864	270,561
Calves	68,584	35,709
Sheep and lambs	555,479	519,316
Swine	252,328	1,101,617
Total	1,046,255	1,927,203

The enormous excess of swine here do not enter into the city consumption as fresh meat, but is packed, and much of it goes to feed the English, who are unable to produce enough for themselves. Beside the live stock received in both cities there is an enormous quantity of dead meat brought in. We have no statistics of New York, but the article from which we have taken our figures in regard to London, says:

"In the two years ending with 1853, about 20,000 carcasses of beef, and 200,000 carcasses of mutton, received from Scotland, were annually disposed of in Newgate and Leadenhall. In the two years ending with 1863, the average number of the former received by railway and steamboats was 27,000; of the latter 300,000. It follows, therefore, that the production of food in Lincolnshire, Leicestershire, Northamptonshire, Norfolk, Suffolk, Essex, and Scotland, has steadily increased during the last ten years, and were it not that the dead markets were from time to time heavily supplied with meat from Scotland, Yorkshire, &c., prices would have been unusually high, since it is evident that the quantities of stock exhibited in the cattle market are wholly inadequate to meet consumption. Again, we may remark that at various periods of the year, large numbers of prime beasts and sheep are purchased in London for transmission to the various outports and watering-places. It would be difficult to ascertain the quantity of meat annually consumed in the metropolis, but we may consider it about as follows: 250,000 beasts, 1,500,000 sheep and lambs, 20,000 calves, and 400,000 pigs. The enormous supplies required year by year prove that great efforts will be necessary on the part of our graziers to meet the still increasing volume of trade."

The same state of things exists in this country, and if it were not for the bountiful supply of meat given us by the Great West, New York city would be as much under the necessity of importing meat from foreign countries as London. Of the future of England, the writer says: "At present, the prospect is, even with an increased importation of stock from abroad, that all kinds of meat will be very high in price for a long period. We must bear in mind that France, like ourselves, is suffering from a scarcity of stock, compared with the consuming powers of the country. Last year the imports in France, chiefly from Holland, Germany, Belgium and Spain, amounted to nearly 600,000 head; and yet prices ruled high. From that country, therefore, we can expect no aid, because she is now competing with us for a supply of food." Does this not look fair for American farmers, that the demand for salt beef and pork will continue to be so good that we can afford to send this food to England without cutting short our own supplies.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

November 15, 1864.

Mr. Nathan C. Ely in the chair.

WHEAT TURNING TO CHESS.

Mr. L. H. Patchen, Depewville, Jefferson county, N. Y.—I observe that Mr. Egbert Cowles, of Conn., relates his experience upon the chess question; there seemed to be a doubt in the mind of the Club with regard to wheat turning to chess. I would state what I have observed on the subject: I have seen wheat and chess grown in the same head together; it was not thought an incredible thing by farmers that wheat would turn into chess: when we were clearing up our lands in the northern part of Jefferson county, or at least by many some forty or forty-five years ago. I have noticed, as Mr. Cowles says, that in the low places where the water stands, and dries away in the spring, it will produce chess. I have examined the roots that produce chess, and, as near as my judgment would allow me to decide, the main stalk of the wheat was killed and the sprouts from the roots produce chess. I should like to know the views of the Club upon this peculiar head.

Mr. Wm. R. Prince.—I consider it a waste of time to discuss this question, which seems never likely to be settled. Wheat and chess are two distinct genera, and one genus will not change into another.

Dr. Trimble.—I will read the following extract from Dr. Darlington's work on weeds and plants:

"This foreigner is a well known pest among our crops of wheat and rye, and occasionally appears in the same fields for a year or two after the grain crop; but being an annual, it is soon choked out by the perennial grasses, and fallen seeds remain, like myriads of others, until the ground is again broken up, or put in a favorable state for their development. The best preventive of this and all similar evils, in the grain field, is to sow none but good clean seed.

"Among the curious vulgar errors which yet infest the minds of credulous and careless observers of natural phenomena, may be mentioned the firm belief of many of our farmers (some of them, too, good practical farmers), that this troublesome grass is nothing more than an accidental variety or casual form of degenerate wheat, produced by some untoward condition of the soil or unpropitious season, or some organic injury, though it must be admitted, I think, by the most inveterate defender of that faith, that in undergoing the metamorphosis the plant is surprisingly uniform in its vagaries, in always assuming the exact structure and character of bromus.

"A similar hallucination has long prevailed among the peasantry of Europe in relation to the supposed change of character in the grasses. But in the Old World they were even more extravagant than with us, for they believed that wheat underwent sundry transmutations, first changing to rye, then to barley, then to bromus, and finally from bromus to oats. I believe the most credulous of our countrymen have not been able as yet to come up with their transatlantic brethren in this matter. This grass has been cultivated within a few years as Willard's bromus, and the seed sold at a high price. The farmers found that they not only did not get a valuable grass, but were really propagating a worthless and pernicious weed, being thus doubly cheated."

Mr. R. H. Williams declares, though in opposition to the theory of Dr. Darlington, Mr. Prince and other eminent botanists, that chess is indigenous to this country; that he has often seen it growing wild upon both timber and prairie land. In that condition it is so minute that it is seldom observed; but cultivation develops it to the size it is found in wheat fields.

Mr. Wm. S. Carpenter thinks all the chess theorists honestly mistaken, and until something can be proved that the question shall be, so far as discussing it in this club is concerned, considered as settled in favor of botanical science.

Flower Seed for Distribution.

Mr. Wm. R. Prince sends in some flower seeds for distribution, and says that he intends to send others, in order that the gardens of the interior may be filled with plants of permanent and enduring beauty. Those sent in to-day are of the Japan, blue striped, *hermerocallis*, which he says should be kept in a cool, dry place, free from frost, until the middle of April, before being planted. Also the golden trumpet flower, *bignonia flava*, a hardy climbing shrub. Ladies in want of these or others that may be named hereafter, must send stamped envelopes to the secretary, J. W. Chambers, and he will gladly distribute these and any other seeds that may be put into his hands for that purpose; and it is to be hoped that those who have such things to spare will take this method of putting them into the hands of those who will receive them with thankfulness.

Evans' Rotary Cultivator.

Three of the committee appointed November 1, to examine the working of Evans' Rotary Cultivator, at Flatlands, Long Island, attended to that duty, to wit: John G. Bergen, Wm. S. Carpenter and Solon Robinson, all practical farmers, who have had repeated opportunities of witnessing the operation of this machine, in previous years, as well as others designed to dig up the soil as a substitute for the plow, or other contrivances for rendering the surface pulverous and in fine condition for seeding with any crop.

The spot where the trial was made was upon the farm of David W. Wetmore, near the mill-pond, in Flatlands, where the soil is of that character of loam that makes it pack together very firmly after it has been lying some time exposed to the action of the sun and rains. The land had been well prepared by plowing and harrowing in July for a turnip crop, which had entirely failed in consequence of drouth and grasshoppers. Consequently it was very compact and level, and required the strength of four horses to work the machine to its full capacity, which is eight inches deep and thirty inches wide.

The machine is made with steel teeth about an inch wide, like those of an ordinary spading fork, which are set, two by two, on a flexible chain band, working over rollers; and a machine may be made with two or more of these chains; two cutting twenty inches wide, and three thirty inches, and so on. The one that we saw at work had three chains and six rows of teeth, and these, with the rollers, levers, etc., for regulating the work, are mounted upon a pair of wheels, are about two feet high, and the whole, with a seat for the driver, occupies just about as much room, and is of about the same weight as a Buckeye mowing machine, minus the cutter-bar.

Upon hard ground, like that at Flatlands, it is necessary for the driver to ride, or carry weight, to keep the teeth in and steady.

In moving from place to place, the teeth are lifted from the ground, and the whole weight then rests upon the wheels. When let down to full work, the wheels are lifted, and the whole weight of the machine and driver, say eight or ten hundred pounds, rests upon the teeth to force them into the ground; and the rollers are so arranged that the teeth strike as they revolve upon the points and are forced almost perpendicularly into the earth, to whatever depth they are set for, from one to eight inches. If the motion of the team is rapid, the action of the teeth upon the earth, as they come around the hind roller, by a short, sharp leverage, is to throw it up in a spray, like the hay behind a tedding machine. In a small way, the action of the dirt is pretty well represented by an active dog, digging in loose earth, and throwing it up behind him. Of course, no other known process of working the soil could possibly put it in better order for any crop, particularly one grown from fine seeds.

As to the value of the machine for many purposes, the committee think that there can be no doubt. There were a good many farmers present at the trial, all of whom appeared to be satisfied upon this point.

It is worthy of being highly recommended to farmers as a new, valuable agricultural implement, which has been greatly altered and improved since its first inception, still retaining the original idea of fixing the teeth upon a flexible chain, as far better than upon a rigid cylinder. The proprietor attributes to it the following qualities :

1. Will completely revolutionize the mode of cultivating the earth.
2. Will diminish the cost of preparing the soil more than one-half.
3. Will increase crops from fifty to one hundred per cent.
4 Will add to the quality and richness of all products.
5. Will shorten the time of preparing the soil for planting, seeding.
6. Will hasten the growth, and of course the ripening of crops.
7. Is a safeguard against drouth or very dry seasons.
8. Is a perfect security also against flooding or wet seasons.
9. Any person, even a boy or woman, can easily and safely work it."

The committee think:

1. It will add one more excellent agricultural implement to our present stock, but it will not "completely revolutionize" present modes of cultivation. It will not drive the plow from the field.

2. We are not sure that it will diminish the cost of preparing the soil. It requires four horses to cut thirty inches wide, and it would require three to cut twenty inches, and that we think would be the best way, working the three abreast.

3. There is no doubt that it would increase crops, upon land prepared in this way, over that plowed and harrowed, because it is better prepared.

4. In this all will agree, because the crops are, as a general thing, always of better quality upon land prepared in the best manner.

5. Comparing the preparation of soil by this machine with the hand-fork, which it resembles, the time would be shortened.

6. Of course; because the act of working it so completely aerates the soil, that seeds will vegetate readily.

7. This will depend upon the depth of working.

8. Doubtful. The machine has good qualities enough without claiming any doubtful ones.

9. In this the committee would not agree. It requires as skillful a workman to operate it as it does to work a reaping machine. It never should be undertaken by a boy or woman.

In conclusion, the committee are satisfied to recommend farmers to give this machine a place upon all farms that are tolerably level and free from rocks and stumps. Upon all such, it will work to advantage, though it will not turn sod, and probably would not work well in weedy stubble. But upon deeply turned furrows, if the teeth of this machine were set at a depth not to disturb the grass or weeds turned under, it would fit the surface for any kind of seed better and probably cheaper than any other machine in use. It will undoubtedly prove a very valuable implement upon the great Western prairies.

The report appeared to give general satisfaction to all present, and considerable conversation ensued upon the importance of improved methods of cultivation. Mr Bergen said, the report in one respect, perhaps did not do the machine justice. He was not sure that it would not work in sod ground, though it would probably require a very strong team. The committee have not intended to say anything more than their observation fully justifies. It certainly puts the ground in the very best possible order for crops. The question of expense of preparation must be settled by practical experiments. Mr. Carpenter freely acknowledged that he was disappointed in the working of the machine. He went upon the grounds somewhat prejudiced, at least prepared to believe that it could not supersede the plow and other implements; and if he had expressed his opinion upon looking at the machine before it was operated, he should have condemned it. The more he saw of it, the better he liked it, and that appeared to be the case with every one present. Dr. Dwinnell said that he had been acquainted with this machine from its first inception, and was fully persuaded that now, in its present perfected state, it would become just as popular with farmers generally, and give as good satisfaction as it appears to have done to this committee. The old system of cultivation by the plow and harrow, compacts the earth together; this lifts and scatters it. In virgin soil, before a watershed has been formed by the pressure of the plow, and the feet of the animals drawing it, there is a relation between the surface and the subsoil, the roots of plants freely penetrating the latter. After a field has been a long time plowed, and never stirred below a certain depth, the roots do not appear to even run any deeper. Stirring the soil with this digger will tend to break up that artificial bed so that water and roots can both penetrate it. Thus it will benefit crops in drouth. What the report states about ærating the soil is an important matter. In one field which had been cultivated in strips, one prepared by one of these machines, and one by the plow and harrow, the increase of product fully justified the proprietor in saying that it will increase the crop from fifty to one hundred per cent.

Dr. Wellington inquired of the committee if the horses labored harder in operating the cultivator than they would in doing the same amount of work with the plow.

Mr Bergen and Mr. Robinson thought they did; but the preparation was better. Mr. Bergen said it was the best preparation he ever saw. He plows eight to fourteen inches deep, and if the plows, team and land are all in good order, the land is probably left in as good condition, though not as fine as that prepared by the cultivator. Sometimes it is a great advantage to pulverize soil as finely as it is done by this machine. For all crops it is not necessary, and however finely clay ground is pulverized, it will not remain light and porous, it will pack in spite of us.

Mr. Carpenter thought that an acre of land could be thoroughly prepared for a crop by this cultivator cheaper than by the plow.

Professor Tillman moved the adoption of the report, and that the secretary copy the same upon the minutes of the club. Carried.

Sorgo in Connecticut.

Mr. William A. Bacon, West Meriden, Ct., says: "Our sorgo crop this year is large, and the quality excellent. At Guilford, Ct., the yield is immense. A good many mills are at work grinding the cane and making syrup, but they are not sufficient to work up all the crop."

Varieties of Sorgo—Which is the Best.

Mr. L. F. Hadley, La Salle, Ill., made a report to a convention of sorgo-growers, at Rockford, that must be very useful, for it gives a detailed account of his experiments this year with all the known varieties of sugar-cane grown in that State. The report is published in full in *The Prairie Farmer*, Chicago, Nov. 5. We will make a few extracts. After giving his statement of the growth, time of ripening, appearance, &c., of each variety, he sums up as follows:

"Having ascertained the exact yield of every sort suited to our climate, we are now prepared to ascertain their comparative value; also to compare each kind with corn.

Table Showing the Value of the Different Sorts per Acre.

No. in point of earliness.	Galls. per acre.	Value after deducting ½ for making.
1. Large early Sorghum	90	$45 00
2. Early Sorghum	100	50 00
3. Neeazana	90	45 00
4. White Imphee or the pure Neeazana	90	45 00
5. * Early Red Imphee	70	35 00
6. Shlagoova, or Early Black Imphee—imperfect trial.		
7. Pure Sorghum	145	72 50
8. Eengha	136	68 00
9. Oomseana	102	51 00
10. Boomvwana	102	51 00
11. Eeanamoodee	106	53 00
12. Zoombana (imperfect trial), probably same as the Eeanamoodee, which it resembles.		
13. Zimmoomana	106	53 00
14. Zimmoomana	106	53 00
15. Shlagoonda	110	55 00
16. Vimbischuapa, or a mongrel—not suitable for syrup in this latitude. Yield would probably have been 4° B, about 70 gallons per acre.		

One acre of such corn, to 68 bushels worth, $34.
Corn worth 50 cents a bushel; syrup $1 a gallon.

"Having now ascertained the comparative yield of all the sorts worthy of cultivation, we are prepared to compare the different sorts with a good crop of corn, and though syrup is high, so is corn; and when syrup comes down to forty cents a gallon, it is presumable that corn will come down to twenty cents a bushel, or nearly in that proportion.

"Corn *vs.* Cane.

"I will suppose that husking and marketing corn is worth as much as to strip and haul the cane, which would be nearly equal in some cases, but not in others; and to cover the extra expense of handling the canes, we will allow the odd gallon to be left out for that expense. And it will be seen that the value of the Early Red Imphee just equals the value of the

* It is but fair to suppose this sort would yield more with a better stand. It is worthy of extended trial.

corn. And pure Sorghum more than doubles the value of the corn. Oomseeana (Otaheitan) is worth $1\frac{3}{4}$ more than corn; Eengha, $1\frac{7}{8}$ more than corn; Neeazana, $1\frac{1}{8}$ more than corn; Boomvwana, $1\frac{3}{4}$ more than corn; Eeanamooda, $1\frac{5}{8}$ more than corn; Zimmoomana, $1\frac{5}{8}$ more than corn. (But I believe it costs me $10 more per acre to raise cane than corn the common way.) Of course it is to be understood that the cultivation is the same in both cases. But the canes to be planted as thick again in the rows, and costs as much again to each hoeing, which must be deducted from the cane. I estimate the expense of raising one acre of cane the present year as follows:

Plowing and harrowing one acre, and marking same	$2 00
Planting same by hand (carefully as mine was)	2 00
First hoeing before plowing	6 00
First plowing	1 00
Second hoeing	3 00
Second plowing	50
Third hoeing and pulling weeds	1 50
Rent of land	4 50
Total	$20 50

Muck—Its Value as Manure.

Mr. J. A. Donaldson, St. Joseph, Berrien county, Michigan, writes the following letter to Mr. Solon Robinson: "In a late number of *The Country Gentleman*, a writer over the signature of "Old Hurricane," states, that an intelligent friend of his in New Jersey considers muck of no value as a fertilizer. Also, that a neighbor of his expended a large sum in hauling muck and composting it with lime; but he considered the labor and expense lost, as his corn was no better where the compost was applied, than parts of the field without it. As you were so well pleased to find a muck bed on your friend's farm, I conclude you have a very high opinion of it. Will you please to state before the club whether your opinion of muck as a fertilizer is founded on actual experiment."

To this Mr. Solon Robinson answers: I have had a little personal experience and a good deal of observation in the use of muck as a fertilizer, and am just as well convinced of its value as I am that barn-yard manure is good. I am also satisfied that muck is as variable in its value as soils are variable in their ability to produce crops. Sometimes muck, or what is called muck, is quite inert; it often is when used in a raw state. It is often very unskillfully prepared. This was the case in the article referred to, as it says:

"Our conversation at one time turned on muck, and he said that it was worthless as a manure—not half so good as common earth for mixing with manure. I expressed my astonishment, after reading so much about muck, and buying and carting it myself at an expense of $1.50 per load. It was good as an absorbent on the principle of a sponge, and his opinion was the result of experiments, of draining and cultivating, and selling a forty-acre muck farm. He had taken off the nigger-heads, put them into large heaps, haystack fashion, made them hollow within, filled with lime unslaked, then covered all with more muck, poured on hogsheads of water, left it for a twelvemonth, then uncovered, expecting to find it charred and reduced, but found it uninfluenced by the burning of the lime and contact with it."

These "nigger-heads" are about the hardest kind of things to decompose, and not much more likely to be by the process described than they would be in their native situation; and they bear about the same relation to muck that a stack of bog hay does to a corn crib. Such bogs, or bog hay, when thoroughly decomposed, make manure, but it is of a very low grade of quality. Muck is a different article from bogs called nigger-heads. The best of it is decomposed leaves and other vegetable matter of swamps, which may have been a hundred or a thousand years in this condition, sometimes almost pure vegetable matter, so much so that it burns freely as peat, and sometimes it is mixed with silt, which detracts from its value. Sometimes it is good manure, just as it is dug from the swamp or pond, though it is generally much improved by piling, mixing with stable manure or some animal substance, or decomposing by mixing in lime that has been slaked with strong brine, or else allowed to lie in a heap long enough to become thoroughly decomposed by the natural effect of the atmosphere. Sometimes muck, when first dug, contains so much acid or iron, that it is not only inert, but positively injurious to vegetation. Then it needs long exposure or lime mixed with it. I believe that it is always advantageous to compost muck with other manures. It is an excellent absorbent for the liquids of the stable and pig-pen and slops of the house. "Old Hurricane" says "he has tried muck two years without any satisfactory result, but bought it and used it because others did, and because that other parties with more muck than brains have done the same thing. I have seen but one experiment on a large scale. A poor German near me leased a fifty-acre farm, had no manure, and could not buy it at two and one-half dollars per load. He carted muck through the fall and winter, composting with lime, and putting it on his corn land. No visible good or manurial benefit could be seen over other portions not so treated, and he considered the expense and labor lost."

Another person whom he calls "Judge," says "his idea is that as a fertilizer, it is valueless; as an absorbent, it is good; but placing it far, very far in value below the estimates made in the books." In short, that muck has no manurial value.

With such statements before him it is no wonder that Mr. Donaldson writes his letter of inquiry. For one, I assure him that it would take an "old hurricane," strong enough to blow away all the judges in Jersey, to convince me that muck has "no manurial value, except as an absorbent." I know that I have found other value in something that I called muck, and I believe that by its use some very badly worn out farms have been renovated, and that a great many others might and certainly should be made more productive than they now are. As to its value, that can only be tested by experience in each locality, as the value of almost every muck bed differs from another. It is a question of experiment how far it will bear hauling, or whether land can be manured cheaper some other way. But let no man give up the idea of using it until he proves that it has no manurial value.

Woman as a Farmer.

Mr. Solon Robinson.—What a woman can do, is proved by what she has done. *The Cincinnati Gazette* says that Mrs. Sarah Owen, Clinton county, Ohio, cultivated a farm of seventy acres this year. She had her haying and wheat harvest, and grew eight acres of corn, besides sweet and common potatoes, a patch of sorgo, and a good kitchen garden. She only employed a hired man part of the time. She stripped and cut her sorgo, and dug her potatoes. When the first frost came, she was out at daybreak to cut off the vines of the sweet potatoes before the sun wilted the vines, as that is apt to injure the tubers. Mrs. Owen is a highly educated and accomplished lady, the widow of a soldier, and is a fine example of what a woman and mother can do in case of necessity.

Concentrated Coffee.

Mr. Disturnell, presented specimens of coffee, prepared in cakes like chocolate, by Dr. L. D. Gale, formerly of the Patent Office, Washington, which, upon trial, proves to be a very good article, and very convenient for soldiers or travelers. Its cost is one dollar per pound.

Insects Named.

Dr. Trimble stated that some insects found upon the leaves of a Scotch pine, which were sent to the Club some weeks since by Albert A. Crampton, Henry county, Illinois, proved to be of the family of bark lice, many of which have been destroyed by some parasite.

Apples Suited to Illinois.

Mr. Lucius C. Francis writes from Springfield, Ill., as follows:

"For the benefit of Mr. Fairchild and others, I will give our experience with an orchard of 800 trees, comprising some 30 or 40 varieties. The Wagner is the earliest bearer we know of, producing fruit sometimes the first and generally the second year after setting out. The Hawthornden is an early bearer; so, also, is the Maiden's Blush, Jersey Sweet, Wine Sap, Jewett's Fine Red, Pennock's Red Winter or Big Romanite, Fameuse or Snow Apple, Carolina Red Jane, Victuals and Drink. The manner in which trees are worked makes a great difference in their early bearing. The nursery trees are almost universally root grafted, and with us, generally come into bearing late, while those of our own raising, budded or stock grafted, commence bearing early, I have repeatedly planted seed the same spring I have set out late-bearing varieties from the nursery, cut scions from these nursery trees, and grafted the young trees when they were three years old, picked apples from these trees as soon, and in some instances a year before the nursery trees bore. The stock grafted trees are also more hardy. The winter of 1855 and 1856, which destroyed so many fruit trees in the West, proved it conclusively to me. The Baldwin and Jennetting from the nursery suffered severely, while those stock grafted were uninjured; and were I to set out another orchard, I should purchase thrifty seedlings, set them out in orchard, give them good cultivation and graft them in the top after they were well rooted and growing thriftily."

Emigration to Delaware and Maryland.

Mr. Solon Robinson.—There seems to be a growing spirit of inquiry after lands in states that have heretofore been shunned by emigrants from the free states. Here is a sample of many inquiries:

Mr. Truman Piper, Birmingham, Conn., said he has tried in vain to get some information about Delaware; that many would like to emigrate there, particularly into the south part, if circumstances are favorable. He wants to know the character of the soil, what crops succeed best, whether the region is considered healthy, and any other information useful to one anxious to purchase land and settle in that locality.

Mr. Solon Robinson.—In answer to this I can state that the south part of Delaware is generally level; at least it has no very hilly land. The most of the soil is sandy or sandy loam, except the black land of creek bottoms and swamps, some of which have been reclaimed and are very productive. The upland soil is very light to work, and produces, with manure, good crops of corn, wheat and sweet potatoes, and where it is cultivated, good clover and grass. The best crop in Delaware is peaches. Apples do not do as well in the south as in the north part of the State, where the land is more clayey and rocky. There are but few stones in the two southern counties. There is much good land, good timber, and many good people, and some who hate a Yankee worse than they do the devil. They hate freedom and all its accompaniments. With this exception, Delaware is a good State for Northern men to emigrate to. There was a society organized at Dover to encourage emigration Where is it? Let it speak.

Dr. Snodgrass said that he hoped the action of this Club may have as favorable an effect upon emigration to Delaware as it had upon Maryland. He has no doubt whatever but the letter addressed by this Club to the Maryland State Convention, was really the cause of making it a free State. It was published in nearly all the papers in Maryland, and it showed to the small landholders of Maryland that there was a spirit of inquiry abroad about purchasing homesteads in that State, if slavery should be abolished. From personal observation he knows, that many such owners located in slaveholding neighborhoods have been long anxious to sell but could not, because the slaveholders would not allow the hated Yankee to come among them. As there were only 474 votes majority for the Constitution, it is very fair to suppose that 238 of this number, which made the turning point, were influenced by this letter, as the probability of being able to dispose of real estate. He is happy to mention this subject to show what an influence for good may be produced by the action of a few men organized and acting together as this Club has for many years.

White Willow.

On motion, it was resolved that the Secretary open a correspondence with Mr. E. S. Pike, of Painsville, Ohio, in relation to sending out a member of the Club to examine and report upon the value of the white willow as a hedge plant.

Adjourned for two weeks. John W. Chambers, *Secretary.*

November 29, 1864.

Mr. Nathan C. Ely in the chair.

Sorghum—Where is its Northern Limit of Growth?

Mr. Solon Robinson.—We stated, in a late report of proceedings, that sorghum would not be likely to succeed north of 43 degrees. A correspondent in Wisconsin says we are mistaken, as he has made this year a thousand gallons of syrup, and he lives on the line of 44 degrees. The canes were grown from seed ripened there the previous year. Some of the cane was fit to work on the 15th of August. I began making syrup the 25th. Much of the cane was from ten to fourteen feet high; most of it matured its seed. The White Chinese and Imphee are most trustworthy.

Sorghum Sugar.

Mr. F. K. Phœnix, Bloomington, Ill., sends two samples of sorghum sugar, made by Thomas Moore, who has discovered the art of converting any sorghum syrup into sugar. He prefers Otaheite or gray Imphee, but succeeds with molasses of any other variety that has not been seriously deteriorated, or had the juice ruined by bad management. Mr. P. says that Mr. Moore's theory is that the saccharine matter of sorgum sirup is as much cane sugar as that of the Southern cane, and that, properly treated, its sugar can be extracted equally well. He claims to have produced from $2\frac{1}{2}$ to 8 pounds of good sugar to the gallon of syrup. After experimenting many months he says he has reduced the matter to a scientific certainty, and produces good specimens to back his assertions. Herewith find two of his samples, one from the juice of the Otaheite cane, the other from a common dark sorghum molasses taken from a store. Before making his process public, he desires to place the matter beyond cavil by establishing a factory and making sugar in large quantities. If people write him they must pay return postage. He states that in a few weeks he expects to be prepared to make sugar by the barrel of such molasses as can be "picked up," that will answer the purpose. I learn that there is talk of calling a Sorghum Convention here some time this Winter, to get the people of this section, especially, fully aroused to the importance of planting the best varieties of sorghum largely next season. Any general or suitable inquiries you may propose to him I have no doubt will be courteously answered. Mr. Moore claims to have reduced the vexed question of sorghum sugar making to a practical and scientific conclusion, in which there can be *no failure* if the principles are fully carried out, as he is making sugar from molasses bought at the stores, and it is expected that his process will enhance prices of molasses. He also intends to refine and purify and deodorize molasses for farmers at a small expense, enhancing its value one-third.

Mr. Wm. S. Carpenter.—The sample of Otaheite cane sugar is a very fine specimen, and would bring in this market 23 cts. per lb. The sample made from sorghum molasses would be worth 21 cts. per lb.

Apples for Illinois.

Mr. Henry Morey, Babcock's Grove, twenty miles west of Chicago, succeeds well in growing the following early apples: Early Strawberry, Sops of Wine, Early Red-Streak, Summer Rose, Early Harvest. The Strawberry apples ripen the middle of July.

Osage Orange—Its Hardiness.

Mr. S. W. Noble, Leroy, Ill., comments upon the statement of Mr. Rood about the hardiness of Osage orange. Mr. Noble says:

"Mr. Rood's statement is correct as far as it refers to the plant. But there is one fact which he did not mention, and that is, that when our hedges 'froze out,' in '54 and '55, the root did not freeze, but sprouted up in the Spring much thicker and stronger than they had ever grown before, making decided improvement in the hedge. The dry stocks, which are very firm and hard, answering every purpose for a fence until the sprouts come again. The best hedges on our farm were frozen to the ground in 1855, but instead of killing them, as you infer from Mr. Rood's letter, it was a decided advantage to them. All Osage orange hedges were improved by the freeze. Hedges are improved in the same way by fire. There are Osage orange hedges in this county, on the prairie, where the fires have run through them every winter for the last eight or ten years, and, as a consequence, the plants and sprouts are so numerous and bushy that they will turn quails and rabbits. This idea of Osage orange plant being *tender*, has been a great drawback on the agricultural interests of this prairie country.

"My only object in writing is to call the attention of your Club to the above facts. I have no plants to sell, or other reasons for advocating the claims of the Osage plant."

Hedges.

Mr. Wm. S. Carpenter.—Last evening I was in company with the proprietor of Reed's nursery, at Elizabeth, who suggested that as the subject of hedges is often discussed at the Club, and as he had a great variety of hedges on his grounds, the Club give notice to those interested that it will meet on his grounds and discuss the subject with the various specimens before them.

Dr. Trimble.—I hope we shall adopt the suggestion of Mr. Buchanan and meet there some time next Summer.

Apples.

Dr Trimble exhibited apples which, he said, were declared by Englishmen to be "Blenheim Orange," which Downing describes as sweet, but these are sub-acid, of delicious quality.

Mr. Wm. S. Carpenter.—These apples are the Westchester Seek-no-further. The original tree stands in the grounds of Stephen P. Carpenter, at New Rochelle. It is very old and large, and the fruit most excellent. There is no apple more worthy of propagation.

Cure for Poison Ivy.

A farmer at South Creek, Penn., who has suffered very severely for many years from poison ivy, has discovered a perfect cure in a plant called Wild

Lettuce (*Lactuca elongata*), which grows on the sides of meadows, fields or gardens, from two to four feet in height, and in Autumn the top resembles common garden lettuce. It is not found in pastures, because cattle are very fond of it. Bruise the stalks and leaves and apply them as a poultice, or bathe the spot with the juice. One application has produced a cure in cases that resisted every other known remedy. There is no danger of driving the poison into the blood.

Lard—How to Extract it from Cracklings.

Mr. J. E. Long, Hublersburg, Center county, Penn, gives us the following very important information, appropriate to the present season. He says:

"In rendering out lard or tallow, that which remains in the cracklings after dripping or pressing may be secured in the following manner. While the cracklings are yet warm smash them fine, as you would potatoes for the table; then pour water over them to the depth of three or four inches; bring the whole to a boil and set away to cool. The cellular tissue will sink to the bottom while the lard or tallow will rise to the top in a clear, pure cake. The cracklings must be fried hard enough to crumble easily."

Washing Potatoes—A Cheap, Convenient Apparatus.

A farmer who has tried and is much pleased with it, sends us the following description of a cheap domestic apparatas for washing potatoes for stock or family use:

"Have a tub made of a suitable size to set in another, and not to make too tight a fit. It should have handles like any tub, but should be without the usual bottom. Instead of that there should be a bottom of slats set parallel to each other, and about half an inch apart. They may be about one inch square, and the upper side should be rounded, so as not to catch dirt and hold it. They may be fastened in with nails, but the nails should go in lengthwise of all the slats. Set the tub with slats into the other and pour in the potatoes and water and stir with a stick. When the dirt is removed lift the tub out and pour on clean water to rinse the potatoes. They can then stand awhile to drain, after which they may be set in a convenient place to use."

Cider—Keeping it Sweet by Sulphur.

Mr. R. H. Eastman, Co. I, Heavy Artillery, N. H. V., writes from the Post Hospital near Fort Williams, Virginia, in answer to Mr. Clement's inquiry how to keep cider sweet, as follows: "Let it ferment until suited to your taste, then rack off all that is clear and appropriate the sediment to the vinegar barrel. Wash the cider barrel thoroughly, and put back about one-fourth of the cider. Then make a long-pointed bung that will reach within three or four inches of the cider. Attach to the lower end of the bung a rag dipped in sulphur, which set on fire and replace the bung closely. When the sulphur has done burning, give the barrel a thorough shaking, fill it, bung tight, and the cider will remain unchanged for years."

Grafting Grape Vines.

Mr. S. R. Duven, Woburn, Massachusetts, wants to know if he can successfully graft Delaware scions upon wild vines. The answer is yes, though that variety is a little more difficult to grow than some others.

Mr. Solon Robinson—A gentleman in Brooklyn set a scion of the Iona in a wild vine, and got a growth in one season of over thirty feet.

Staking Fruit Trees.

Mr. R. H. Williams.—There is no question in my mind more important than staking fruit trees. I think, from the experience of orchardists in Westchester county, that a tree three years old staked, was equal to one five years old not staked.

Mr. George Bartlett, who has had a good deal of experience in tree planting, said that he could set trees so firmly by the use of water that they would not require staking "Fill the hole full of water, and then sift in the dirt, and it will form around the tree roots almost as compactly as though cast in molten lead." He had often set posts in the same way, and found them to stand firmer than by any other process. It is a great and useless labor to stake trees.

Mr. John G. Bergen thought that water would not answer upon such loose soil as his upon Long Island, nor was it necessary to stake trees.

The chairman said that he planted his pear trees last spring upon garden soil, using water for part of them, which were as firm two days after as though they had been set a year. The others were planted without water, and he saw no difference in the growth. None were staked, and he did not see any necessity.

Mr. William S. Carpenter thought that staking was quite out of date. He had never used stakes; and there is an orchard of a thousand trees upon a neighboring farm which was not staked, and yet they grew as finely as any orchard that he ever saw. If trees are properly grown in the nursery, there never will be any necessity for staking them. There may be with trees having long, slim bodies, and large tops, if planted without pruning. He would cut away such tops one-third, or perhaps one-half.

Mr. Solon Robinson expressed himself very warmly against the plan of staking, on account of its great cost and uselessnes. He believed the effect of the wind had a natural tendency to strengthen the roots of the trees.

Root-Grafting.

Mr. Henry Morey, Babcock Grove, Ill., says: "I wish to inquire the reason of your preference for top grafting trees, as that is one of my exploded hobbies. I have both kinds of the same variety, and can see no difference."

Mr. Carpenter said some varieties would not grow if grafted upon the root. This was the case with Newtown pippins. For all his grafting he prefers stocks of natural fruit, which have always produced the best results for him.

Mr. John G. Bergen said that scions set upon natural stocks had always proved the hardiest with him, and equally good whether set low or high from the ground. He had not had much experience in root-grafting, and did not care to have much.

Early Apples for Wisconsin.

The following list is given by Mr. George W. Shaw, Garden Grove, Iowa, for an acre, trees twenty feet apart: Summer apples—Red June, 5; Sweet June, 5; Benoni, 3; Red Astrachan, 2. Autumn—Lowell, 3; Maiden's Blush, 5; Cole's Quince, 2. Winter-Jonathan, Genitan, White Winter Pearmain, Winter Sweet Paradise, Wilton's Twig, Domine, 10 of each; Yellow Belle Flower, Sweet Romanite, Small Romanite, 5 of each; Striped Sweet Pippin, 8—making in all 108 trees.

Mr. Shaw wants to know when to whitewash fruit trees.

Mr. Solon Robinson said potash or caustic soda ley is far better. If lime is used, apply the water only.

Curing Sowed Corn.

Mr. A. A. Cook, Hillsdale, Columbia county, N. Y., recommends binding the stalks in small bundles, with straw bands, and set them in stocks of six bundles each, and, when partly cured, lift the stocks to a new spot, to give the butts a better chance to dry. After they are cured and put in stack or barn, they undergo a sweat; then remove and air them and they will not mold.

Flower Seeds.

Mr. William R. Prince sends in for distribution seeds of Bladder Senna *(Colutea Arborescens)*, which grows in shrubs six feet high, bearing yellow flowers. Also *Hibiscus Moscheutos*, a perennial plant with large white flowers, with crimson center.

Early Marketing Potatoes.

Mr. Abel S. Makepeace, Hyannis, Cape Cod, wants to know the best variety of early potatoes, of which he wants to plant two acres upon a clover sod, on good sandy loam, and how many cords of manure per acre the Club would recommend.

Mr. John G. Begen.—I would recommend the Mercer, although we on Long Island raise a great many of the Dyckman, but it might not answer as far north as Cape Cod.

I would recommend the application of at least twenty cords of manure to the acre. Some of our potato growers use all they can get.

Mr. Solon Robinson said that some of Mr. Goodrich's seedlings were highly recommended for early potatoes

Mr. Wm. S. Carpenter said a kind called Early Cottage, gave great satisfaction in his neighborhood. The quality is good and the yield large, say 250 bushels to the acre.

Molasses and Sugar from Corn Meal.

The Chairman stated that a company had been organized in this city, with a million dollars capital, to manufacture molasses and sugar from corn meal. It has been settled that a bushel will yield sixteen quarts of molasses, and when twelve quarts only were extracted the quality was equal to sugar refiners' syrup that is now selling at $1.75 per gallon.

Prof. Mapes.—At one of the early fairs of the American Institute I exhibited several specimens of sugar made from corn, corn stalks, woody fibre, &c., but they were proved to be grape and not cane sugar. In damp weather it is so hydroscopic that dry sugar softens into a wet mass. It is a poor substitute for cane sugar.

There is nothing new in the matter. At the present high price of sugar it may be made to pay a profit.

Strawberries.

Mr. H. A. Catlin, Gerry, Chautauqua county, N. Y., says: "I picked seven bushels of strawberries this season from two and a half rods of ground. The most of them were set in June 1863, in old garden soil, only manured with ashes. They were tilled perfectly, not a weed allowed to grow, and mulched in autumn. During the drouth they were well watered. I picked one day forty-two quarts, and fifty of the largest berries filled a cubic quart measure. The variety was Wilson's seedling, the most profitable for general cultivation."

Cranberries in the Garden.

Mr. Catlin says: "I set cranberry plants last Spring upon dry sandy loam garden soil, treating them like strawberries, and they grew finely and produced some specimens of fruit.

Broom-Corn Seed for Sheep.

Mr. L. Farnsworth, of Sullivan, Ohio, says that Mr. Cipher, of Ashland county, Ohio, has for several years past, during the Winter season, fed his sheep corn or oats daily, and has usually found a large number of ticks on them at the shearing season. But for the last two or three years he has substituted broom-corn seed instead of other grain. The result is the ticks have disappeared, and his sheep are vigorous and healthy.

Now, if any of the Farmer's Club have had experience in feeding this kind of grain, some of us here in the West would like to be informed of the results. If it is a fact that this kind of feed is a preventive of this evil, perhaps some one may be able to tell us why it is so.

Adjourned. John W. Chambers, *Secretary.*

December 6, 1864.

Prof. Samuel D. Tillman in the chair.

Lands and Climate of Maryland.

The Chairman introduced to the Club Prof. Baer of Maryland, who said: It is more important to one buying a farm to know the composition of the subsoil than to know that of the surface.

If he did not look to that he might as well buy when the farm was covered with snow as at any other time. Do not trust to surface appearance.

It is also equally important to look to climate and the condition of the locality for health. If you should write to any county in Maryland for information about buying a farm, you would be told that the locality was decidedly healthy; yet it is certain that some parts of the State are not so, particularly in the thirteen counties of tertiary formation.

In the Eastern Shore counties, it is necessary to be careful always to build the dwelling upon the south side of streams or marshes, because the south wind always comes loaded with miasma, and therefore a site is always more healthy although upon low ground on the south side of a stream, than it is upon the top of a hill on the north side. That side of the State is very fine for Winter residences, but is subject to summer fevers. In all situations, when the air is damp that the house sweats, it will be loaded with miasma if there is any in the vicinity. It is certain that the lower counties of this State are subject to chills and fever. The middle and northern counties, where primitive rock prevails, are as healthy as other similar regions. In a section where bilious fevers are prevalent, all south or south-eastern windows and doors should be closed an hour before sundown, and whenever the atmosphere is damp, fire should be lighted in the house, no matter what is the state of the thermometer.

If you go to the State to select a farm, do not take the opinion of the seller about the healthiness of the location. My practice is to go to the graveyards, and look at the ages recorded upon the tombstones. In some neighborhoods I have never been able to find one indicating that anybody lived over forty years. I do not believe such a location is healthy. Do not take the evidence of a single crop as the productiveness of land. I have known men make exertions to raise one large crop for the purpose of selling the farm. This can be done by guano or some other stimulating manure.

The aspect of a farm is important, not only for health but productiveness. I know farms where the wheat is ten days earlier upon the field with a southern aspect, than in another which slopes toward the north, and the earliest ripening is always the heaviest. I know situations where grapes grown upon the south side of a hill will produce good wine, while those grown only a few rods distant upon ground with a northern aspect are only fit to make vinegar.

The importance of having a deep, dry subsoil is proved by the fact that the roots of wheat will penetrate eight feet deep. I have traced the roots of sorrel three and a half feet, and well authenticated reports say that hop roots have been traced in England 20 feet deep. If the subsoil is impregnated with peroxide of iron, as soon as the roots penetrate it they are killed, and a common expression among farmers is, "My wheat has gone back." It is simply because its roots have gone into a poisonous subsoil. Much of the State of Maryland needs underdraining. In the northern part there is an abundance of stone; in the southern there is none; there tiles must be used.

Speaking of the benefits of lime, Mr. Baer deprecated the use of that which is air-slaked. Magnesian limestone, fresh burned, and slaked with water saturated with salt, is ten times as valuable as lime in any other form. The objection to air-slaked lime, or shell marl, is that it requires a very long time to produce any effect. The hydrate of muriate of lime is soluble. Potash and soda are alike in their action upon the land, and soda is not more than one-third the cost of potash. All gneiss rock is full of potash, and if we use chlorine, we set it free and give it to vegetation; and the chlorine is obtained by slaking the lime in salt water.

Mr. Baer said that farms could be purchased in Maryland at from $5 to $50 per acre. There is some very good land in that portion of the State, which has been overrun by the armies, which can be purchased at a low figure, but it is destitute of fences, and in some places the buildings have been destroyed.

The above is only a brief report of the remarks of Mr. Baer, who promised to write out his notes, but in consequence of ill-health, he has not furnished them.

Dana's Hovey Pear.

Mr. Wm. S. Carpenter.—The pears on the table to-day are the Dana's Hovey. They have been sent to the committee on large fruits in competition for the Greeley prize, for the best pear for general cultivation.

Mr. C. M. Hovey, of Boston, a gentleman well known to the horticultural world as one of our oldest pomologists, is present to-day, and I doubt not will give us an account of this choice pear. I take great pleasure in introducing him to the Club.

Mr. C. M. Hovey.—Mr. Carpenter has spoken too flatteringly of my humble efforts in the cause of horticulture; but I will give you an account of the pear now before you.

It was introduced by Mr. Dana, of Roxbury, in 1854, and has received high encomiums from the Massachusetts Horticultural Society.

It may not be out of place to mention here, that nearly all the American pears, now well known, have been accidental seedlings found in pastures or neglected gardens, where they have sprung up from chance seeds. Of the many varieties in our collection, but a small number have been the result of experiments made in sowing seed with a view to raise improved varieties.

It is a theory with some cultivators that seeds of the finer varieties of pears would never produce improved fruit, and that the fruit so produced always degenerated, or returned to the character of the original type. The theory of Van Mons was gradual improvement from the wild state, by successive generations, and was thought by him to be the only reliable mode of producing great results.

All experience in regard to our American fruits contradicts this, for many of our best varieties have been found in old gardens in the neighborhood of fine old pear trees, and from whose seeds the trees have sprung up, and when grown to maturity the fruit excels that of the parent.

Mr. Dana has had unusual success, and has produced more remarkable varieties than has been raised by the most successful Belgian cultivators out of the same number of trees; and the simple fact of Mr. Dana's achievement, in the production of seedling pears, will now dispel all doubt in regard to the results to be gained by sowing the seeds of our best varieties, and that the theory of Van Mons, though undoubtedly leading to partial success, is only done by the loss of years of time and labor, and is a process which the patience of few men, however ardent in their love of pomology, will ever be likely to attempt. Is it not better to commence where others have left off, than to go over the whole ground again?

A great variety of new seedlings recommended, and with such rapidity that before one kind can be fully tested another is pressed on our notice, consequently we are taking up many of our old varieties which have been overlooked.

According to my experience it takes from fifteen to twenty years to bring into general cultivation any variety of new fruit.

I would advise every cultivator to sow a few pear seeds from choice fruit, and no doubt we shall hear of some valuable varieties produced from them.

Mr. Dana has done me the honor to give this pear my name. It is of nearly medium size, about three inches long and two and three-quarter inches in diameter, form obovate regular, largest about the middle, narrowing to each end, with a small crown; its color is a rich crimson russet, dotted with white and grayish specks; its flesh yellowish white, fine, melting, and very juicy; its flavor sugary, refreshing and luscious, with a most delicate, peculiar and indescribable aroma; ripens in November and December, and with proper care may be kept until the tenth of January. It never rots at the core, but begins on the outside, which may be cut off without injuring the flavor of that which remains.

The tree is almost as remarkable as its fruit. It is very vigorous though not a rapid grower, making a stocky, short-jointed wood, like the Seckel; in habit it is erect and pyramidal like the Buffum; its leaves are rather broadly ovate, and of a deep glossy green, maintaining their color and holding on to the tree till late in autumn.

There is an old adage, "that the proof of the pudding is in the eating." I propose that those present now taste the fruit and express their opinion as to its merits.

At the conclusion of Mr. Hovey's remarks the pear was examined and tested, after which Mr. Solon Robinson offered the following resolution:

Resolved, That the Dana's Hovey is the best winter pear known by the Club, which resolution was seconded by Mr. Wm. S. Carpenter and unanimously adopted.

Mr. Carpenter paid a very high encomium to Mr. Greeley for the offer of his liberal prizes, which alone were sufficient to attract the attention of such men as Mr. Hovey, and bring him here to make known to the world such a valuable new variety of fruit.

What Ails the Pumpkins?

Dr. John B. Rich stated that a disease prevailed among the pumpkins in Columbia county, N. Y., more fatal to the crop than the rot ever had been to potatoes. Upon his own farm and some of his neighbors' the pumpkins had almost universally rotted. He made the statement for the purpose of inquiring if the disease prevailed in any other section, and if any one knew the cause or a remedy. The decay has taken place since the fruit was fully ripe.

Dr. Wellington said that he had never seen pumpkins sounder or better than they were this year in Massachusetts.

Apples for a Name.

The apples sent by Mr. J. Manning, from Youngstown, Ohio, are unknown here. He says that they keep well until April.

Flower Seeds Distributed.

Mr. J. W. Chambers, Secretary of the Club, reports the receipt of large numbers of letters from ladies from ten States, asking for a portion of the flower seeds sent in for distribution. The supply being exhausted, Mr. Chambers wrote to Mr. Prince for more. He replies: "I will send you enough of the four sorts named for one hundred persons. I cannot promise more, but will try to hunt up some other rare seeds. None of these seeds are for sale anywhere. I took this course to distribute them because I am now sixty-nine years old, and have but one year left to do good to humanity, and the propagation of rare plants will permanently beautify the earth My reward will be, when my spirit walks the earth, I may hear people say: 'There are some of the beautiful things that Prince distributed in the last days of his life.' The names of the seeds sent in to-day are the *amorphia fruticosa*, blue flowering shrub; *autumnal perennial aster*, and splendid *double hollyhock*, all colors.

Farmers should Improve their Common Schools.

So writes a farmer from Verona, Wis., who says "that half of the time of children is spent with matters long since entombed. Of what practical use is it to a Wisconsin farmer's child to learn to repeat that old table of the obsolete currency of New England: Four farthings make one penny, twelve pence one shilling, twenty shillings one pound? Or why should our children be taught to measure cloth by the ells of the Flemings, French or Scotch; or to weigh articles by the rule of Henry VIII of England, in aliquot parts of a tun of 2,240 pounds, which is almost as obsolete as New England currency or Flemish ells? These, and many other absurdities still taught in common schools, farmers should eradicate as they would pestiferous weeds that make farming a drudgery; for attending schools is greater drudgery—so much so that children, to escape from it, will perform the worst on the farm. I wish that the Farmers' Club, which has reports in *The Tribune*, would discuss this subject and awaken farmers to the necessity of a reform in all our common country schools."

Mr. Solon Robinson.—The suggestion is a good one, not only for this Club, but for every other club, and for all scientific discussions that could influence the public to produce a reform in this particular. The reform is as much needed in this city as any place I know of, as it is a common practice of grocers to sell articles by the aliquot parts of "100 lbs. gross," which at wholesale are never sold in that way. Sugar, for instance, is sold so much for $3\frac{1}{2}$, 7 or 14 lbs., and not one clerk in ten can tell readily the number of cents it is per pound, and I have often been refused ten pounds, because the grocer could not calculate the price. I must take it by the seven pounds or not at all; and I have sometimes refused to deal with grocers who sold goods in that way. If every one would, it would cure the ridiculous fashion. The only established trade in gross hundreds.

is in flour by the barrel, which is "seven-quarters," after the old English measure of 112 pounds per cwt. If our boards of trade in cities would resolve that all flour, after a certain date, should be packed in barrels of exactly 200 pounds, they would do much to abolish that foolish old English custom. We should all try to introduce the decimal divisions of weights, count and currency in our trade; and there is no better way to bring about this much needed reform than through our common schools.

Sweet Potatoes—How to Grow Them.

A North Carolina sweet potato grower answers the question, "What is the matter with the sweet potatoes?" as follows: "Having had much experience in raising that valuable esculent, I will give it as my opinion that the two principal causes of failure were the deep tillage and probably the kind of manure used. Land for sweet potatoes should not be cultivated to a very great depth, and especially in northern latitudes, as the soil ceases to be a conductor of heat in proportion to the depth to which it is broken. Hence, as they require all the heat that can be given, the ground should not be broken to a very great depth, but kept stirred often while growing. Much depends on the kind of manure used. The potato takes largely into its composition of potash; therefore manures containing it are most suitable. Hence, wood-ashes may be considered about the best manure. All lot manures should be mixed about half and half with ashes, the quality of each being improved. However, the best of all manures that I have ever tried is the dirt and cleanings from under houses, consisting largely of saltpeter. In a careful experiment with some ten or a dozen different kinds of manure, I found the scrapings from under houses best; fowl-yard manure second; ashes and barn-yard manure mixed next; ashes next; barn-yard manure next. It is not an unusual thing to hear it said that certain pieces of land are too rich for potatoes, especially barn-yards; but should you give the same a heavy coating of wood-ashes, you will then find that it is not too rich. It is merely too rich in vegetable matter, but lacks the potash. Potatoes should always be planted in hills."

Sorghum in Illinois.

Mr. D. F. Rogers writes from Waltham, La Salle county, Illinois, that "The present season has been very favorable to sorghum, and the breadth planted was very large. La Salle county makes her own molasses this year, and sends a good deal away to other markets. In spite of the continual cry that the cane deteriorates, the average yield this autumn is larger than the three preceding, varying from 150 to 200 gallons per acre, and richer than common in sweetness. This fall we are making it up at fifty cents per gallon, or half the syrup, and the best sells readily at $1.40 per gallon. I have been a sorghum boiler for four years, and so speak from experience. We find the best cane "all round" is that which comes the nearest, in its spring, summer and fall habits, to the first importations of Chinese cane, though it will be evident to any one who thinks of the matter, that to keep sorghum seed of any variety, or I infer, of any variety pure in flat, open country like this, where winds, birds and bees can carry the pollen from tassel to tassel across leagues of land, is an utter impossibility, notwithstanding all that sorghum conventions may say about the matter. In this county we shall stick to the sort that did best this year, no matter by what name it may be called. As to sorghum, or Imphee, mixing with corn—the best testimony against such an idea is, that they blossom almost invariably some four or six weeks apart, and unless there is some other bond of sympathy between them, they can't mix. Half the cane planted in this county is planted near corn fields, and I never saw it better than this year."

The Osage Orange—Its Hardiness in Illinois.

Mr. Rogers also writes in regard to the Osage orange being hardy in that State the following fact: "Within a circuit of ten miles about me, there are at least twenty miles of hedge of this kind, all the way from one to fifteen years old, some trimmed closely, some running wild. They have all stood the thermometer at 28 degrees below, and are thriving yet."

The Chinch Bug.

Mr. T. S. Clough writes from Mendota, La Salle county, Illinois: "If talk about chinch bug is not threadbare, I will reply to Mr. McDonald, of Nebraska. According to my observation the chinch bug flourishes in a dry season only, the more rolling and dry the land is, the more damage done by it. Your wheat sown upon your fall plowing was probably sown first and up early, thus affording the bug a longer time to operate than upon the later sowing, or it might be they were ashamed of your cornstalk farming; also, thought you would probably need all you might get in that way. Here in Illinois it is a dangerous practice to sow spring wheat upon corn stubble simply harrowed in, unless it is sown very early upon very dry ground, otherwise the weeds will overrun the wheat. In 1859, the year of the great June frost, chinch bugs did much damage; the next year very little. We have now had two dry seasons, and much complaint of chinch bugs. It is reasonable to expect a wet season next year, and I shall expect to hear very little of the depredations of this pest.

"My rule is to farm without any regard to the notion that the chinch bug has a course of three years to run. I do not believe in that doctrine. There is no alternative for Western farmers but to plant and sow as if chinch bugs never existed. When they let us alone, let us make good use of what we obtain, to economize to meet the emergency of a year when they destroy the farmer's labor. Don't give up, but live on and try, try again."

Mr Norman Mattison writes upon the same subject from Berwick, Warren county, Illinois: "I sow without regard to the bugs. I do not believe they will be thicker next spring, where they destroyed the crop this year than in any other place. If corn and wheat stubble are both infested with bugs, I should prefer to sow the spring wheat upon corn stubble without plowing. I would sow two bushels to the acre as early as possible in the spring. Wheat stubble ground will do without being ploughed, if you burn off the stubble clean and harrow it thoroughly. In every case I roll wheat, oats and corn, after the seed is in the ground. My reason for preferring level land for wheat, as stated in a former letter, is, because that smartweed which abounds here grows more upon level than upon rolling land. All the weed seed that matured among the corn lies on top of the ground, and can come up early enough to be one of the causes to prevent the damage of the bugs. I now calculate to sow wheat next spring on corn stubble ground, where the bugs came from my neighbor's field and nearly destroyed my corn for ten rods wide. My experience teaches me that there will be no more bugs there than anywhere else.

A New Disease of Poultry.

Mr. D. D. Hamilton, Clarence, Erie county, New York, gives an account of a new disease of poultry; wants to know if it prevails otherwhere, and if any one has a remedy. The disease is worms in the intestines, sufficient to produce death. In one laying hen that died he found ninety worms, from a quarter to half an inch in length, somewhat hairy, the size of wheat straw.

To Remove Rocks.

Mr. Joseph Green, Jay, Wayne county, N. Y., recommends burning instead of burying rocks. He says: "I dig a trench around the stone nearly to the bottom: a foot wide or more; fill the trench and cover the stone with old wood, broken rails, pieces of stumps, roots, etc., all of which are an incumbrance, set fire to this, and, when burned down, take an iron bar to see if it is not cracked, which is generally the case; get off all I can; if not able to get it all out, fill up again with rubbish as before and burn again; I once burnt one three times; it was eight feet across it, three feet thick in the center, half the thickness above ground. I got it in pieces of 150 to 300 pounds, put them on a boat, thence to the wall. Stones that are clouded with dark green, or black, with white and copper color, are very hard to drill, but readily crack to pieces when exposed to the fire.

Mr. Solon Robinson.—Where wood is worth six and eight dollars a cord, it would be too expensive. It appears to me that burning is not suited to all localities.

Chess or Cheat—Bromus Secalinus.

Mr. Wm. R. Prince says: "There is not a botanical publication in any language that does not explain scientifically the distinctive characteristics of this plant and of wheat. This is an annual plant, and *triticum hybernum* is a biennial one, and their specific attributes are as plainly defined by nature as are those of our oaks and our hickory trees. There is, consequently, no excuse for any man to remain in a state of ignorance, as to the marked distinctions between chess and wheat, any more than between any other grass or grain. It is a native of Europe, and did not exist in America until it was introduced here, mingled with wheat or some other foreign grain. It has been a common pest of the grain fields of Europe from time immemorial, and it long since attained the name of cheat, because of the disappointment of the husbandman, who so often found in some portion of his field a crop of chess in place of wheat. It is natural to humid localities; and, when any portion of a wheat field is winter killed by the wetness of the soil, the chess will start forth and usurp the place of wheat. With this simple statement about the botanical character of this plant, let us close the discussion as to whether wheat ever turned to chess."

Adjourned. JOHN W. CHAMBERS, *Secretary.*

December 13, 1864.

Mr. Nathan C. Ely in the chair.

SORGHUM—HOW FAR NORTH IT CAN BE GROWN.

Mrs. Flora A. Sanborn, Owatonna, Steele county, Minn., says that place is lat. forty-four degrees, yet sorghum is raised by a large number of farmers in this vicinity as regularly and far more profitably than corn. In 1861 our yellow imphee produced a fine syrup at the rate of two hundred and seven gallons to the acre. It retailed at eighty cents per gallon that year. This year the yield of sorghum is abundant, and of fine quality. It retails at $1.50 per gallon. My husband uses an iron mill and Cook's evaporator. Sorghum is grown as far north as St. Anthony, lat. forty-five degrees.

Mr. D. C. Dutcher, Buffalo, Scott county, Iowa, says the variety of sorghum, called Hoang-ho, he believes will mature as far north as lat. forty-eight degrees. "I planted seventy rods of ground on the fourteenth day of May last, and it was fully matured on the twenty-third day of July. The yield was one hundred and twenty gallons, or at the rate of two hundred and seventy-four and two-sevenths gallons per acre."

Mr. R. G. Pardee.—It is pleasant to see what new interest has been wakened about sorghum culture almost all over the United States. The letter just read is very interesting, as it shows us how far north the culture of this plant is successful. I was surprised last summer, in traveling through Pennsylvania, to find that almost every farmer had his little patch of sorghum. With a little more experience it is probable that they will all be able to make their own sugar.

Prof. Mapes.—There is no doubt about the fact that sugar can be made from sorghum. Joseph S. Lovering, of Philadelphia, several years ago fully demonstrated that fact. The trouble generally with farmers is that they do not conduct the process with sufficient rapidity. The exposure of the syrup to the atmosphere to a great extent destroys the power of crystallization. All the manipulations of the syrup lessen that power. The more it is stirred the less sugar it will produce. Natural sugar crystals are converted into molasses. The most perfectly crystallized loaf sugar can be converted by melting manipulation into cream candy. That candy can never be restored again to crystallized sugar. So rapid is the process of the sugar refiners in this city, that they can take raw molasses and convert it into the several grades of refined sugar and syrup, and put the product upon the market again in four days. It is necessary for the farmer to understand that he must use equal rapidity in converting his cane juice into sugar. In boiling, he must use albumen in some form—the most simple is blood, eggs or milk—which collects all the albumen, dirt and fecula of the juice, and floats it upon the surface so that it can be skimmed off. To make white sugar, the syrup must be filtered through bone charcoal. Some of the filters of the refiners here are thirty feet high. For this purpose bones are burnt and ground to about the fineness of common powder, and the dust carefully screened out. In the filtering operation the charcoal takes up all the color. The charcoal is frequently renewed by heating in a retort to a red heat, which burns off the matter collected from the syrup. Our seasons here are too short for manufacturing sorghum sugar upon a large scale, as it is in the West Indies, where they have months to work up the crop, while with us the work must all be concentrated into a few days. Let it be the duty of the Club to send out light upon this subject.

Mr. Jireh Bull thought that because cheese was now made in neighborhood factories, instead of families, that sorghum could be manufactured in the same way. If it is profitable, there would be no lack of capital to establish sugar works in every neighborhood. What is wanted is information upon the subject. Let it be the business of this Club to send out light soon upon the subject.

Mr. Solon Robinson.—The great difficulty about the matter was that the cane is so heavy an article that it would not bear transportation any considerable distance. It can and should be grown for domestic purposes upon every farm. It is very doubtful whether it ever can or will be grown upon a large scale, for the purpose of making sugar, as the true cane is in Louisiana. Some gentlemen think it depends upon the price of sugar whether sorghum will continue to be grown. I do not think so, so far as it affects it as a domestic institution, because maple sugar and syrup have been manufactured ever since America was discovered, without regard to the price of cane sugar.

Prof. Mapes said farmers would be much more successful in boiling their syrup if they could do it more rapidly and at a higher heat, which can only be done in a closed boiler. It is essential to raise the heat to two hundred and forty degrees, particularly as the sorghum juice is weaker than that of the true cane. Strong molasses weighs fourteen pounds to the gallon. As the Howard vacuum pan cannot be used except in a large manufactory, the Professor described and recommended a process by which atmospheric air is forced into the bottom of the boiler through a pipe and discharged, as it were, through the nose of a fine watering-pot. This enables the syrup to boil at a lower temperature, but is not used by sugar refiners, because the product is never as white as when boiled *in vacuo*.

Mr. E. Williams said that associated effort to work sorghum was not always successful. There was such an one in New Jersey this year, and much of the syrup manufactured had soured, and proved almost worthless.

Sugar from Indian Corn.

The Chairman thought that sorghum growing was likely to prove less important in consequence of the recent discovery that sugar could be made from Indian corn. He had been assured that sugar refiners of this city have paid the inventor $400,000 for his patent.

Prof. Mapes contended that the principle was not patentable, neither was it new. Lavoisier, who died in the old French Revolution, gave the process, and showed how sugar could be made from any rooty fiber that contained starch. He thinks that it is highly probable that the new process is simply the old one, and that the sugar refiners have paid for a process long since discovered and published. It has been long known that we could make sugar from beets in this country. So we could from Indian cornstalks. This has not been done, because the price of cane sugar has remained so low that it would not be profitable.

Relieving Choked Cattle.

Mr. F. J. Wellington, East Braintree, Vt., and Mr. Wm. H. French, Salem, Columbus county, Ohio, both recommend the use of oil to relieve choked cattle. About half a pint of any kind of oil poured down the throat of the choked animal, and at the same time rubbing briskly on the outside of the neck, will generally produce relief.

The Langdon Cultivator.

In answer to the question, Prof. Mapes stated that this implement was not now manufactured. It has been superseded by one known as the carrot-weeder, a small V shaped piece of steel, with teeth at the rear to comb out the weeds which it cuts when run just under the surface.

Cure of Black Knot.

Mr. George C. Beecher, Rochester, Olmstead county, Minn., says that he used to cure black knot, when he lived where it prevailed (Livingston county, N. Y.,) by paring away the knot and washing the limb with supercarbonate of soda in solution.

Removing Sod Impoverishes Land.

Mr. James Walker, Orono, Muscatine county, Iowa, says the reasons that the tomato plants, mentioned in a former report, did not grow was because the land was impoverished by the removal of the sods. A piece of corn planted where the prairie sod was removed to build fence, grew about two feet high as well as that upon the adjoining ground, but never made any further growth. Land so stripped of sod is rendered unproductive for several years. Mr. W. says that the cause of the sugar cane falling was undoubtedly the chinch bugs, as he had part of a field of broom corn destroyed the same way. The bugs weakened the stalks near the ground, and the weight of the seed heads caused them to fall.

Mr. L. McBean, Croxton, Ohio, wants to know if apple pomace is valuable as manure, and what is the best mode of preserving dried apples.

Uninviting Farming.

Mr. J. Plocker, Thirtieth Wisconsin Volunteers, Fort Sully, gives the following uninviting picture of Western farming: "The universal success which has attended the raising of corn, and its subsequent conversion into pork, has led Western farmers into a mode of agriculture that presents a very uninviting aspect to visitor or traveler. Orchards old, broken down, moss-grown, are plenty enough, but fruit trees whose smooth bark denotes youth and thrift, and whose spreading branches give an idea of fruitfulness, these are very scarce indeed. High bred stock, and even stock of lower degree, why should it be so scarce when grain is so plenty? Cornstalks to the right, to the left; cornstalks everywhere. Again, why should hogs and mire be so closely and universally connected? Even if mud be a necessity to profitable fattening, might it not be well, for the sake of appearances and consequences, to provide a partly enclosed plank floor for bedding and feeding? As an excuse for cruelty the citizen farmer exclaims, "they are only hogs!" Next from the farmer soldier you hear the exclamation, "they are only Indians, niggers, or secesh," as the case may be, until finally retribution with heavy hand comes to set things to right. Farmers of Illinois, Indiana and Missouri, do not allow your patriotism to be exhausted in Sanitary Fairs, Christian Commissions or brokerage in substitutes."

Honey Locust Hedge.

Mr. H. Paine, Lockport, N. Y., says there is a hedge at Darien, Genesee county, N. Y., forty years old, which he has watched from the start, in hopes to see that it would make a good fence. He is now convinced that it will not answer, because it inclines to drop its lower limbs and grow to a tree.

Sulphur for Mildew on Grapes.

Mr. Paine says he he has tried it thoroughly, and is convinced that a fool and his money are soon parted, whenever he pays for sulphur to kill mildew. The best remedy that he has found is an application of salt annually, at the rate of three bushels per acre. He says: "I have three acres of grapes, and sold my crop this year; the first tun, put up in twenty-five pound boxes, for 12 cents per pound, $240; the balance I sold for 5 cents per pound; picked them from the vines as they grew, and delivered them in town—over twelve tuns—at $100 per tun. I am willing to pay an income tax on that to support the war and help put down the rebellion."

A Variety of Information.

Mr. Robinson S. Heinman, Pleasant Vale, Ct., is desirous as one of the outside members of the Club, to contribute his quota of information "interesting to farmers," which he does as follows:

To Prevent Bugs from Eating Hams.

When they are taken from the smoke house in the spring, dip them in a strong tea made of elder leaves and young sprouts.

Value of Muck.

An old Quaker uncle of mine told me that he used muck from two different muck-beds that he formerly owned, with more profit than he ever used barnyard manure. He did not, however, apply it to a piece of heavy clay soil, but on a piece of warm river land that was naturally sandy. One of my neighbors also has a garden, part of which wouldn't bear beans it was so warm and dry. He put on a little muck about five years ago, and it is good land yet

When to Cut Bushes.

In a discussion of the subject among old farmers, some thought the old of the moon in August, when the sign was in the heart was the time. Others thought there were particular days in every month, that answered the same purpose. Has the subject ever been ventilated?

How to Restore Worn Out Meadows.

I have some meadows that are *run out* that I wish to get back to their original fertility. The regular way for doing this in this part of Connecticut is to plow in about twenty or thirty loads of manure, plant corn, then sow oats and grass seed. I dont have manure enough to get along in that way fast enough. So I had thought of planting more land with corn, and putting on the manure with the oats.

I figure as follows, using the same manure in both cases:

BY MANURING CORN.

	Yield.	Value.
1st year—1 acre corn with 30 loads manure	50 bushels	$50
2d year—1 acre oats	30 bushels	15
3d year—1 acre grass	$1\frac{1}{2}$ tons	20
Total value		$85

BY MANURING OATS.

	Yield.	Value.
1st year—3 acres corn, no manure	50 bushels	$50
2d year—3 acres oats, 30 loads manure	90 bushels	45
3d year—3 acres grass	$4\frac{1}{2}$ tons	60
Total value		$155
		85
Difference in value, that ought to pay difference in labor		$70

I now have three acres improved instead of one.

Are there any members of your Club that can tell me by *experience* whether my *theory* is correct?

Some tell me that the oats will lodge. If likely to do so, might I not cut them green for hay with still more profit to the field?

Some say the oats will draw all the manure from the land. Can they draw more from raw manure than from that well mixed with the soil, as is the case after corn that has been manured?

Another consideration that I value is the saving in grass seed. Experience shows that when barnyard manure is spread on a rye lot no clover need be sown, as there is plenty in the manure.

Mr Solon Robinson.—I raised the largest crop of oats ever seen in the neighborhood by heavy manuring. They did not lodge. I attribute the cause to the use of salt, at the rate of about eight bushels per acre. A smaller crop grown last year upon the same place without manure and without salt did lodge. The straw of the first crop would average five feet long, and strong in proportion. I believe wherever hay is worth $20 per ton, that a crop of green oats would be worth more than a crop of ripe ones. They did not upon my land. Oats after corn will undoubtedly exhaust the soil more than when grown upon the same soil previous to a crop of corn using raw manure. With me this is a new idea. It will only succeed where clover hay is largely used for fodder.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

December 20, 1864.

Mr. Nathan C. Ely in the chair.

Japanese Wheat.

Mr. J. Q. A. Troy writes from White Cloud, Kansas, and sends a specimen of seed from a plant which he has grown three years, the seed of which was bought at a "big price," under the name of Japanese wheat. He wants to know what it is, as he has been told that it is millet, and from his description of the plant, we are sure that he has been told correctly. It is the kind that grows the seed heads in long spikes. He says it yields two or three tuns of hay per acre and stock are fond of it.

Potatoes—Best Early Sorts.

Mr. Preston Eyre, Dolington, Bucks county, Pa., replies to the inquiry which are the best sorts of early potatoes, that he considers the Michigan White Sprouts far superior to any other both for table use and for productiveness. They are extensively cultivated in the neighborhood of Camden, N. J., for the Philadelphia market. As I never see them quoted in *The Tribune* I presume they are not known in your market. If such is the case you are certainly losing very much by not having them. They are a long smooth potato, resembling in shape the blue Mercers, perfectly white, dry and mealy, and are fit for use sooner than any other variety, I think. They have only been known in this section for four or five years.

Mr. Henry A. Catlin, Gerry, Chautauqua county, N. Y., thinks the Carter potato the best grown in that region, but he does not say whether it is early or not.

Lima Beans—How to raise them and how far North.

Mr. J. Stebbins, Highland, Clayton county, Iowa, says that a Mr. Whitney of that county, raised Lima beans abundantly every year, and from him he has learned how to do it, with no extra culture except soon after the first blossoms appear cut off the vines and not allow them to run more than four or five feet long. Seva beans are next to the Lima and similar in shape and color, but smaller; these have answered very well, coming earlier and bearing profusely, which, with the stringless bean for late use, with pod or without, have been my reliance for years for summer and fall eating. The large, long, round white bean I have found the best for winter. But I think of dispensing with all but the Lima, now that I know how to raise it so readily and so early.

A Brooklyn suburban resident recommends trellises instead of poles for all climbing beans. He thinks it absurd to grow pole beans in hills, as the roots are crowded and the vines twisted up together in their attempts to twine around the pole. If planted by a trellis with a wire for each vine they are spread out to the sunshine and will produce twice as much as in hills. The best plan is to have a permanent frame for Lima or other running beans. Set strong posts twelve feet apart, with a slat or wire on top. The posts according to the Iowa recommendation should not be over five feet high. A slat or wire is also fastened upon the posts about a foot above the ground. The beans are planted in a drill under this wire, and when ready to run are led along twine to the upper wire. Such a trellis may be used for a blind in summer, or as an ornamental screen of any part of the garden. Another good form of trellis is made portable in lengths of eight or ten feet. It is formed by nailing strips of lath together, or it may be made of wire or in any form to suit the taste. These frames are set up two or three feet apart at the bottom, leaning together at the top and fastened. The vines are planted upon the outside of each frame. Beans may be thus grown to be both ornamental and useful. A garden, or a part of it filled in the ordinary way with beans on poles, is anything but ornamental. The great secret, hower, of growing Lima beans, is to keep them pruned.

The Chairman said he had been lately recommended to plant Lima beans eight inches deep.

Mr. Williams and Mr. Dodge both declared that if they were thus planted they would never come to the surface; that it was important not only not to plant them too deep, but to set the beans carefully by hand right side up.

Dr. Trimble said it was not only important, but that the young plants should come up and continue to grow straight up from the surface. Sometimes, if the seeds are not set straight, they will not grow at all, or if growing crookedly, they appear to lose vigor. In a country where young cedars can be obtained, trim them with the butt of the limbs a few inches long, and they make the best support for beans of anything that he had ever seen tried.

Mr. Dodge said he greatly preferred the Agricultural bean to the Lima. The latter, to be productive, need constant attention to keep all the runners pruned closely.

Union Men Wanted in West Jersey.

Mr. P. N. Parkhurst, Hammonton, New Jersey, thinks "that instead of declaring New Jersey unfit for the residence of white men because it is so filled with copperheads as to give a majority of votes for the rebel candidate for president, we should recommend good union men to locate there sufficient to overcome that majority. For one, I have strong hopes we can do it, and I do not feel willing to leave this land of my adoption, neither am I pleased to have others advised not to come here from so high a source as *The Tribune*. The same reasoning applied to the city of New York would induce all honest men to leave it. If New Jersey is not fit for a white man, it is fit for colored men, and you may recommend them to leave a city where they are hung on account of their color, and come to this region of cheap lands and rich productions of all that makes life comfortable."

Cheap Lands on Long Island—Information Wanted.

Mr. S. D. Hough, Collinsville, Connecticut, writes as follows: "Can you, or any members of the American Institute Farmers' Club, give any information as to the locality of cheap lands upon Long Island? A few years ago I noticed much relative thereto; nothing lately. The country is flooded with circulars and advertisements of cheap land in small tracts in New Jersey; and many mechanics who desire a small homestead, hold about the same opinion of that State, politically, as was expressed in the reports lately. Is it not for the interest of New Yorkers to desire the increase of the population and wealth of their own State? And if, as I suppose, Long Island contains tens of thousands of acres of uncultivated land, pray let the mechanics of New England know of the locality and price per acre at which such land can be obtained. One can hardly afford to travel upon uncertainties these times. If cultivation for sugar is profitable in France, why not here at present high prices? How much sugar will an acre of beets yield on an average? Is there any work published containing instructions on the manufacture of beet sugar?"

The Secretary.—There are large tracts of unimproved lands on Long Island. By reference to a report of the Club, made 1847, by a committee consisting of many practical agriculturists, they were recommended for cultivation. A full discussion as to the value of these lands can be found in the volume of Transactions for that year. Last season we had exhibited some specimens of chicory, as fine as any I have seen grown on any soil; the small fruits also grow well, especially the cultivated cranberry which sells for a high price.

Dr. Trimble said some of the most sandy regions of N. J. had been made the most productive by the use of marl, the application of which was from an accidental discovery. It was dug from a well and spread upon a sandy surface, and white clover, red clover and grass soon after began to grow luxuriantly. Other parts of the State have been greatly benefited by the use of lime. He had seen its beneficial effects upon an orchard, from an application thirty years previously. It is a fact proved by the census returns that the cultivated lands of New Jersey possessed a higher value per acre than the cultivated lands of any other State. What is wanted to make it one of the best States to live in is, instead of discouraging immigration, recommend good Union men to go there and unite with the good men already there, until they are strong enough to crush that horrid railroad monopoly, which would redeem and improve the State.

Hardiness of the Clinton Grape.

Mr. J. A. Donaldsen, St. Joseph, Berrian county, Michigan, says: "That the Clinton grape in that vicinity is very hardy, perhaps the most so of any one cultivated there. It also endures the winters of Wisconsin and Iowa without protection. It has not proved productive here with close pruning; but I saw last summer a young vine here, in the garden of a young lady who is innocent of the science of pruning, and it was a picture of productiveness. It has been said of this grape, too, that it never rots or mildews, and that it keeps remarkably well through the winter. If it is as hardy as generally reported, it would perhaps be well to recommend it, where better kinds would not stand the winters, to that class of persons who cannot be induced to cover their vines."

Growth of Delaware Vines.

Mr. H P. Spencer, Rockport, Cuyahoga county, O., gives the following account of the growth of a Delaware vine:

"The vine, a little thing, something larger than a common knitting needle, and containing three or four buds, was received in a four-inch pot in the fall of 1860, it having made one season's growth. It was planted immediately in naturally well drained soil, after having been prepared by digging a hole six feet across and two feet deep, and refilled by placing soil that was originally on top at the bottom, and the vine well protected by covering for the winter.

"In 1861, it made a moderate growth.

"In the spring of 1862, part of the growth of the previous year was laid down for the purpose of propagating vines, and I took away several good layers.

"In the spring of 1863, part of the previous year's growth was laid down for the same object as before, and last spring (1864) I took away fifteen vines, (layers,) each of which I should rather have than mine when first received.

"1864.—The vine was trimmed to two canes, each about two feet in length, and tied horizontally to stakes, and received no pruning of any kind during the growth of the past season, and grew so far beyond my expectations that I took pains to measure, and find it to be the following, of well-ripened wood, exclusive of laterals: Eleven canes, ten feet each, one hundred and ten; seven canes, nine feet each, sixty-three; two canes, seven feet each, fourteen; three canes, six feet each, eighteen; two canes, five feet each, ten. Total, twenty-five canes, two hundred and fifteen feet, besides fifty-five bunches of grapes."

Mr. John G. Bergen.—With me the Delaware vines which I have purchased and planted on my place, near Brooklyn, have always made a very slow growth, while vines which I have obtained from layers have generally made a very rapid growth. My Clinton vines have borne four years, two of which they have rotted badly, I think, on an average, two-thirds of every bunch. In 1864 they bore a generous crop, and did not rot as much, perhaps not more than one-third of every bunch. I have pruned my vines, but if they will do better untrimmed, it is an important fact which ought to be generally known.

Mr. Dodge said he had found his Clinton vines very rampant growers, very hardy and fruitful, and not rotting much.

Will Sorghum Kill Cattle.

Mr. Robert Means, near Buffalo, Scott Co., Iowa, says: "I saw, about two years ago, about four acres of sorghum, that had been cut the previous autumn, stripped and put in close shooks for shelter ready for manufacturing, but was left in that condition in the field, where a number of cattle on the farm had access to it all through the winter, and none of them appeared to be injured by the use of it in any way. It is stated, by a man from Summit county, who fed a cow liberally one evening on suckers which he pulled from his sugar-cane, that the next morning she was dead. I am well acquainted with a practical farmer who states to me that he has fed sorghum suckers to his cows giving milk from three to four weeks, and that the quantity and quality of milk was very materially increased. The butter made from the milk was very rich. It was entered at the county fair, where it took the first premium, and the only objection that was made by the committee was that it was almost too sweet. The butter had a very rich color.

It is believed by many that sorghum bagasse is injurious to cattle and hogs. I have seen, this season, a large quantity of sorghum bagasse ground and thrown on the side of the public road, where cattle had at all times access to it, and I have not seen one instance in which the slightest injury has been done, and they have been around it for weeks together."

Care of Farming Tools.

A farmer wants to know if all the farming tools have been taken care of as such costly things should be for the winter, as exposure injures them more than use.

He says, if you have no other shelter, put up a rude hovel, with evergreen boughs woven in for sides, and a thatched roof. And as the season for snow approaches, see that every tool not in actual use at the time, is kept in its appropriate place. What farmer that does not recollect the annoyance of sometimes having an ox-chain, an axe, beetle and wedges, shovel, iron bar, or some such implement, buried beneath the snow, to be found only by a long search, or perchance not until the melting snows shall have discovered it in spring.

Mr. Solon Robinson.—I like the plan of a house devoted exclusively to implements and tools, including a good carpenter's set, with an outline painting of each article in its appropriate place on the walls. If anything is missing, its blank outline staring at you is a reminder that the article is out of place.

Culture of Sugar Beets.

The Chairman in answer to the question asked by a correspondent, stated that several works had been published in France upon the beet culture and the manufacture of sugar, and he believed a work had been published in this country upon that subject.

Mr. Carpenter, of Kelly's Island, Ohio, said that the last volume of the Ohio Agricultural Reports contained an article upon this subject, and a detail of experiments made by a Frenchman near Columbus in the growth of beets and manufacture of sugar, which determined the fact that the business could be made profitable in this country.

Mr. Solon Robinson stated that extensive experiments had been made in Illinois, and a considerable sum of money expended in the erection of a factory, which, according to a report in *The Prairie Farmer*, proved that beet culture in this country may be made very profitable.

Mr. R. H. Williams contended that it never would be profitable; that beets may be profitably grown for stock, particularly milch cows, but never for sugar-making. When grown upon some soils, they possess such a small amount of saccharum as to render them unfit for the purpose of sugar-making. He thought farmers should all confine themselves to the production of some sweet substance, or else give up the attempt to make their own sugar. The climate of our country is more suitable to raise Sorghum and Imphee than the beet, and therefore sugar can be made cheaper from these than from the beet.

Dr. Trimble thought it was no use to war against climate. This portion of the earth was not adapted to sugar-making. All Northern farmers will fail who attempt to make sugar. They cannot compete with tropical climates. They are all prosperous now with ordinary crops. Let them sell them and buy sugar and coffee, and pay the war tax on them, and not try to shirk that and be always looking for a substitute for coffee. There is Mr. Robinson continually recommending chicory, rye or some other substitute.

Mr. Solon Robinson.—I do it upon principle; not to avoid the tax, not because coffee is so high, but because I think some of the substitutes recommended are more wholesome and more economical than coffee, and their general use will enable people to pay their war taxes.

The Chairman concurred in this opinion; he was not in favor of recommending any of the mixtures or concoctions advertised as substitutes for coffee; but he does recommend the use of cereals, such as farmers can produce and prepare without much cost. He said he had lately drank a preparation of coffee made by mixing rye and coffee, half and half, and he doubted whether any old coffee-drinker could have detected the adulteration. Good coffee is now worth about sixty cents a pound, and he thought very few farmers would feel as though they could afford to pay that price.

Coffee Roasting.

Mr. S. B. Ward exhibited one of Mills' coffee roasters, and stated that it was the invention of a physician who, in his practice at the West, had discovered the great want of such a culinary utensil. There, where the women generally do their own work, and often live in houses of very limited capacity, the coffee roasting is often neglected, and sometimes the costly coffee berry is spoiled in roasting and rendered worse than valueless. Rye, too, is very largely used, and is only fit for use when well prepared. He found the smoke of roasting rye often very annoying to his patients. As he was a Vermont Yankee, he at once set his mind to work to devise a machine that would obviate these difficulties. It is composed of brass clock work in an iron case, operated by springs, which give a rotary motion to a woven wire cylinder, about a foot long and four inches in diameter. This will hold a quart of grain or coffee, and the cylinder is enclosed by a tin cover, which prevents the aroma from escaping into the room, and prepares the coffee far better than can be done by any ordinary process within reach of the farmer's wife. The present cost of the machines, now that all metals are at gold prices, is $6, $9, $12, according to size. The examination of the machine elicited much attention, and the Chairman stated that the opinion appeared to be unanimous in its favor, not only as a labor-saving machine, but one which would tend to reduce the consumption of coffee, by enabling farmers' wives to prepare substitutes out of the produce of the farm. Mr. Ward recommended growing the coffee bean as the best known substitute for the coffee berry. He said the next best substitute was dried sweet corn.

Mr. Williams recommended whenever farmers are disposed to use any kind of grain that it should be ground, baked in bread, and that dried and crumbled and then roasted.

Mr. Ward said that rye was greatly improved by being previously parboiled.

Lime as a Manure.

Mr. R. H. Williams.—I think a small quantity of lime will not hurt manure if spread upon the surface. I think the whole of the lime would be taken up by the soil. It should not be used in such quantities as would burn up the manure.

Dr. Trimble contended against the practice, because lime is not a manure, and its action in the soil is that of a solvent of inert matters, and manure does not need a solvent. He is sure that the best farmers do not practice liming and manuring at the same time.

Mr. John G. Bergen said that he did not know that it was the practice with the best farmers, but he did know a good many successful ones who did practice it. Some of the Long Island farmers who use manure the most extensively, spread it broadcast, and also lime, sometimes at the rate of fifty bushels per acre, and use manuré in the hills or rows with the seeds. Mr. Robinson's recommendation never to sow grain in a young orchard is correct.

Mr. R. H. Williams.—Would any one present object to the use of ashes with manure. I think not; we want an alkali added to the soil.

Mr. John G. Bergen.—We cannot grow cabbage or cauliflower on the same ground except we use lime, and I have never seen any injury from its use.

Adjourned. John W. Chambers, *Secretary.*

December 27, 1864.

Mr. Nathan C. Ely in the chair.

Pears.

Mr. John G. Bergen exhibited some Beurré d'Anjou and Beurré Diel pears to show their relative condition of ripeness. The Beurré d'Anjou was a large, handsome pear, ripening from the outside toward the center, and just now in good condition for eating. Mr. Bergen considers it a very valuable variety. The Beurré Diel, on the contrary, has not yet changed its green color, but is withering and worthless.

The Chairman remarked that it was the same with his Beurré Diels, that he had not had one this winter fit for eating.

Fruit-Growing in Iowa.

Mr. C. R. Bent, West Union, Fayette county, Iowa, gives the following very encouraging view of fruit-growing in that State. He says: "I have an orchard of 500 apple-trees and a vineyard of 1,500 grapes set last spring, which appear to be doing well. I have set only Concord and Delaware grapes. I would like the opinion of some person that has had experience in cultivating the Siberian crab-apple for the purpose of making cider. Can there be as much in quantity grown from an acre as of apples? What is the value of the juice compared with apple juice? What varieties would you recommend? How far apart would you set them? The Siberian crab-apple is the hardiest fruit-tree that we have in the west. Would you now advise a person to set for the purpose of making wine the Iona in preference to the Delaware grape? I am a little prejudiced against the Iona, from the fact that Dr. Grant claims to know a little more than all the fruit-growers in the United States. I think that class of men are more liable to blunder or willing to deceive."

Mr. Solon Robinson.—I would advise the gentleman to plant some other varieties of grapes if he intends to grow a vineyard for wine, as it is not quite settled that the Concord, although a good table grape, will be profitable as a wine grape. I believe the Delaware more valuable for the table than for wine. All the Delaware wine that I have tasted is very rich, sweet, too much so for a common healthy drink. I do not wonder at the doubt expressed about Iona. I know that the same cause has produced the same effect upon many minds. But I assure Mr. Bent, and every other doubter, that I believe the Iona the best American grape ever discovered.

Information about Crops, Climate and Land in New Jersey.

An old resident of Salem, New Jersey, sends the following information, addressed to the New York Farmers' Club. Having had some experience in the culture of the cane, and having manufactured above 3,000 gallons of syrup each of the last three years, I will offer you my experience in reply to some of your questions in regard to its deterioration, hybridizing, &c.

"SORGHUM IN NEW JERSEY.

"I have worked cane grown on light sandy soil, on heavy clay land, and on all intermediate mixtures of land, and on tide meadow, and have made good light colored syrup from cane grown on all these kinds of soil. Not good light colored, like New Orleans, but much lighter colored and better; nor like your Illinois correspondent, containing much acid, but much more like honey in taste and color. Light sandy and gravelly land produces generally the best and highest colored syrup; and yet I have had some cane from all these kinds of soil that did not work well—did not produce good syrup. The cause is the gum of some other constituent of the juice gravitating to the bottom and burning on the pan while in the process of evaporating the water. The smoke from this gum escaping through the syrup imparts to it a dark color, and sometimes a burnt and bitter taste, and makes the syrup of an inferior quality. Some lots of cane produce a syrup very light colored, and apparently good and sweet, but will not make a fine hair stream. Such in time becomes more like jelly—owing to gum or other impurities contained in it. Green cane produces more of the latter kind of syrup, and that grown on low wet land more of the former.

"This year's crop produced only two-thirds as much syrup per acre as last year's crop, owing to the drouth. The richness of juice I have not found confined to cane grown on any kind of soil on land that has been limed, but cane that stands thinly on the ground is generally the richest. The saccharometer stood at twelve degrees in the richest juice, and at six degrees in the poorest. Sorghum cane does not deteriorate by cultivation in this country, only as it hybridizes with broom corn, or something else. The stalks of such grow much larger, and contain, when ripe, little or no juice, and are entirely worthless for syrup. Have seen fields of cane half of which was a hybrid with broomcorn. It mixes in the seed the previous year. I tried a new importation, the last year, planted it, and compared it with that from seed from a former importation: it was no better. Sorgo cane is not poisonous; have made hogs very fat on the green skimmings alone; have lost some hogs by eating too much when first fed to them, but not afterward. Have lost hogs by eating too much whey—but who would infer from that that whey was poisonous? The husk of the cane is too sharp and hard for cattle, but they will eat some while it is sweet. Have seen their mouths bleed in their efforts to masticate it. Had some cane topped and bladed by calves after it had been blown down without any injury to them. The seed makes good feed for stock, poultry included. Have known above fifty bushels of seed per acre. The bagasse was worth last year $15 per ton at the paper mills. Have tried Indian corn stalks and watermelons for syrup. The saccharine matter in both is very small compared with that in the sorgo cane, and the syrup is very inferior. The steam rising from the evaporator while boiling them was almost sickening.

"MUCK AS A FERTILIZER.

"A few years ago we had a water course cut twenty-four feet wide, six feet deep, and three miles long, through the best of tide-meadow mud mixed with mud to the bottom, which has gone down as the country subsided and new mud from sediment made over it. I hauled three years ago last summer one thousand loads of this mud and spread it on a field of twelve acres, or eighty loads per acre. The same year I spread a strip with green sand marl, a rod wide across the poorest part of the same field. The mud was spread on a clover sod after harvest and left one year to pulverize. I then plowed it all under with the clover for wheat. The marl has about doubled every crop I have had off of that strip, but I have yet to see the first benefit arising from the muck."

"DELAWARE AND JERSEY COMPARED.

"A member of your Club replies to a correspondent that Delaware is better than South Jersey for planting a vineyard, but does not assign any reasons for such a decision; does not specify any particular part of either State. If he means to call Vineland, South Jersey, with its two or three inches of soil, and that clay intermixed with fine gravel sufficient to make their roads good turnpikes, and compare that with some parts of Delaware, I can agree with him fully, having traveled over much of Delaware, and visited Vineland recently. When there I witnessed the poor clay and gravel from the cellars being spread on the land to enrich or give it fertility, at the suggestion of agricultural writers perhaps that Vineland was once an ocean bed, and the cultivators had only to plow or dig deep to reach the phosphates! I landed at the depot and set off on foot on a stroll of several miles, to examine the soil and witness the productions. Did not see any good land—land that would in its natural state produce good crops of grain or grass without help. It is beautifully rolling, particularly along Landis avenue, and is susceptible of improvement, but would be attended with great expense to improve it sufficiently to produce truck or small fruits to profit. There is some nice truck land half a mile west of the depot, without gravel and without improvements. Was on one field that had been in wheat; the stubble was the finest certainly I had ever seen; corn was small; the best would yield probably twenty to twenty-five bushels per acre. That in the village was very poor. Round potatoes did not look promising; neither did clover sowed to fertilize the land; the undergrowth of scrub oaks had taken possession; sweet potatoes were more promising; dwarf pear trees and grapevines the most promising; peach trees showed signs of decay; standard pears and apple trees will probably succeed because they delight in a clay subsoil. The summer has been very dry, which will account in a measure for the failure of crops. There is land in Salem county, where it was equally dry last summer, that produced thirty-five bushels of wheat, sixty bushels of oats, and sixty bushels of corn per acre.

"FRUITS IN SOUTH JERSEY.

"If your Club will visit the grapery of Wm. S. Sharp, printer, Salem, New Jersey, they may see some thirty varieties of vines more flourishing, I have no doubt, than they ever imagined for South Jersey, if not in their most favored localities. Pears grow quite as large and fair here as they do about Rochester, if those brought from there to our first exhibition are fair samples. I have seven hundred pear trees coming into bearing, half of them standards. Have had Belle Lucratives to weigh nine ounces each, and they the smallest of twenty-five varieties of *good* pears—the Bartlett being the poorest. If I were to assert that there have more varieties of *good apples* originated in the country in South Jersey bordering on the Delaware, than in all our country besides, you might think it great arrogance in me; and yet, if we take our pomological societies' proceedings, and our nurserymen's catalogues as guides—as producing the best—with Downing and Cox as authors, that assertion would certainly come within the bounds of truth; and a country that can originate such good fruit can grow that fruit in the greatest perfection; and yet, with all their advantages, not a fit residence for any respectable white man!

"I had intended to say a few words about a remedy that I discovered last spring for the yellows in the peach tree—or rather a cure. But perhaps I have said too much already. I will just add—the trees I operated on were nearly dead, apparently past recovery. They were in blossom at the time. They soon after put on a green color, and formed plenty of buds for another year, and the fruit hung on the trees a month after the usual time for ripening. If the trees continue to do well next spring I will write you the particulars. The remedy is within the reach of all who plant peach trees."

The reading of this letter was listened to with marked attention, and the good-natured hard hits of the writer were received with equal good nature, because it embodied a great deal of valuable information to the public. Some members were a little surprised at the statement touching the infertility of muck, though all were conversant with the virtues of Squankum marl.

Dr. Trimble expressed his surprise that this valuable fertilizer was not used outside the State of New Jersey.

Mr. John G. Bergen.—We have a gentleman with us this morning who has had some experience in the use of Jersey marl. I would therefore call upon Mr. Townsend to give us some information upon the subject.

Mr. B. S. Townsend, Bayridge, Long Island, said he had obtained two sloop loads for the purpose of experimenting upon its value upon his farm on the west end of Long Island. His investigations have shown him that there is great difference in the value of green sand marl from different localities, and even from the same locality. One load that he obtained is of a light green and the other of a dark green color. Much of the marl found under the soil of farms in Monmouth county is of such low manurial value that it will not bear transportation beyond the limits of the farm. That which he obtained from Squankum cost him 11 cents per bushel delivered at the wharf, to which the cost of cartage to the farm must be added. He finds that it averages about twenty bushels to the ton, which will make the cartage very expensive if hauled any considerable distance. He thinks one of the good qualities of the marl upon the sandy soil of Long Island is that it helps to retain moisture.

One of the experiments which he tried this season was upon a crop of turnips, one-half of which was dressed with stable manure, and the other with an equal value of marl. The marl portion was the best from the start, and it was estimated that the product was 33 per cent heavier than the manured portion. He did not obtain his supply early enough in the season for general crops, because the orders of New Jersey farmers were so large that they were unable to fill them as fast as required. Mr. Townsend tried another experiment upon grass to test the value of the light and dark-colored marls, the dark being considered the most valuable. He dressed a piece of grass heavily, and found that instead of being a protection against drouth that the park marled suffered more severely than the undressed portion, and the grass was the worst killed upon the part dressed with the light green marl. No good effect is visible upon the grass this first year.

Dr. Trimble insisted that where marl had been long used it does prove an advantage in time of drouth. He said Professor Rogers had proved by analysis of marl that it contained the constituents of ashes of straw.

Mr. E. Williams said that he had found a great difference in the quality of marl, and that that which contained most clay was the best upon sandy soil, showing that it has a mechanical as well as chemical action.

Mr. John G. Bergen.—I am very glad to hear from Mr. Townsend's statement that Jersey marl is likely to prove successful upon Long Island. We certainly need some cheap fertilizer; and as geologists say that New Jersey is gradually subsiding, I think that we ought to hurry to get all that there is valuable out of it before it goes under the sea again. I know several of Mr. Townsend's neighbors who have tried the green sand marl and find it did not pay cost. I have seen a great deal of its beneficial effects in New Jersey where it is convenient that it can be used in large quantities, even if it is not of the best quality, it certainly does a great deal of good. But it does not follow that it will do good everywhere else. I am sure that none but the very best quality will bear transportation. I am willing to credit marl with all its due, but it is idle to say that it will prevent the effects of drouth. I saw corn in New Jersey last summer upon land that has long been marled, where the crop would not pay the expense of gathering. Unless we are sure that marl is valuable in other sections, I do not think it quite right to bring it away from New Jersey, for there are millions of poverty-stricken acres in that State which require all the marl that can be found beneath the surface. As to the experiment of Mr. Townsend with marl upon grass, he said it appeared to benefit the crop when first applied. Perhaps any other substance would have done the same. It is a common practice with my brother, whose farm is of similar character of sandy soil, to cart clay and spread upon the grass which proves very beneficial.

Cotton Growing in California.

Mr. Solomon W. Jewett, writes from Kern River, Buena Vista county, California, Nov. 15, and sends a sample of very handsome upland cotton, grown upon an adjoining ranch. He says: "An experiment of three years fully proves its natural growth here, and it will produce as well as in the old cotton States. So old cotton planters tell us. Much uncultivated lands here might be applied to that use, that can be taken up by the actual settler. The best mode of fencing the crop is by planting out willow sticks about six and a half feet long and from two to four inches in diameter. They are set from four to six inches apart in the row, secured by a horizontal pole, four feet from the ground. The first year they form quite a top, are firmly rooted, assisted by a slight ditch, for water to pass near them. Under good cultivation from four to eight hundred pounds of cotton can be grown upon an acre between the 20th of May and 15th of September. Wood and water are in abundance. For the first year's crop the planter should prepare his lands by inclosures, and clearing off the weeds, and in some parts small bushes. The land is easily cultivated and sugar cane produces well. So it does small grains and vegetables in abundance, as well as fruits, where encouragement has been given."

The sample showed a staple of good length, but of remarkable coarse fiber. It would be valuable for heavy fabrics.

When Should Timber be Cut?

Mr. G. J. Locke, Danby Four Corners, Vt., gives as a reason why timber should be cut the last of August, that the sap does not then leak out but dries in the cell into a substance like hardened glue. He says: "I know that timber cut at this time and left untrimmed a few weeks, will not powder post. The cells being full of dried sap, there is no room for the worms to work, and the timber has more weight. But I do not claim that I may not be mistaken as to the best time for cutting, as my experience has not been large."

An Apple Tree Hedge.

Mr. Locke says: "The best live fence I have ever seen was an apple tree hedge. I saw it at six years old. The farmer informed me when it was about two feet high he began to shear it, to make it grow thicker, and at the time I saw it, it would stop cattle, or a dog, if he cared to come out with a whole skin."

How to Utilize Coal Dust.

A Welchman sends the following suggestion for the utilization of coal dust. He says that "when a boy, living in South Wales, I remember that the coal which was abundant in the neighborhood was very small—every cartload containing nearly a quarter of dust. This used to be mixed with clay, and was moulded by hand into longish oval cakes, which, when dry, were laid in rows upon the fire and gave intense heat, with plenty of dust. It has occurred to me lately, having been much annoyed by the quantity of coal dust in every scuttleful of coal, that this dust and very fine coal might be mixed with the refuse of the petroleum and resin refineries, and made into small rolls, which might make admirable kindling. A ball or two put on a low fire would soon brighten it up, and the saving of this now useless dust might be important."

Do Turnips Exhaust the Soil?

A correspondent in Nebraska sends the following question to the Club: "Why do turnips, containing so large a percentage of water, so completely exhaust land, and yield so little manure in return?"

Mr. Solon Robinson.—For one I answer this question by denying the position *in toto*. I do not believe that turnips exhaust the soil any more than any other crop of equal weight taken from it. I do believe that a crop of turnips plowed under would add more to the fertility of the soil than any other crop ever used for that purpose.

Home-Made Hominy.

Mr. C. S. Osgood, Coos, New Hampshire, says: "In preparing fully dried corn I would cover it with boiling water and let it stand some fifteen minutes, or longer, if to be ground immediately. The object is to soften the outside of the grain only, so that in the operation of grinding the stones will rub and tear off the hull perfectly. The coarse meal sifted out of hominy makes first rate hot cakes if treated right. Now, friends, give this subject a little attention, if you have not before, and I will warrant you it will pay—pay in health, and in economy too. Have a good lot ground up, spread and dry, and then put away for use the year round."

Mr. O says: "As wholesome and palatable nutriment may be obtained from Indian corn more cheaply than from any other known source, let me talk up the subject of its preparation a little. The greatest trouble about corn is, that it requires a great deal of, or at least a great time in cooking, in whatever shape we use it. And the coarser it is of course the longer time is required to make it tender and good, so that hulled corn needs stewing a whole day, good coarse hominy full six hours, and meal for bread should be scalded and allowed to stand awhile before baking, and then baked long. In cooking hominy put on a good pot at a time, so as not to have the fuss for nothing. Put it into the water it is to be boiled in over night; boil pretty briskly for two or three hours, keeping in plenty of water. After this time let the fire run low, or set the pot on top of the stove, and let it coodle two or three hours longer, keeping at boiling heat all the time. Add no water toward the last, but let it thicken up as much as will do without scorching, then finish by stirring in carefully wheat or rye flour till about as thick as it can be stirred."

Mr. J. K. Davis, Bradford, Vt., asks information about fruit growing in New Jersey. He says: "I have been informed that apple trees do not thrive well in New Jersey on account of a large yellow worm that eats up into the trunk of the tree, and that whole orchards are often killed in this way. Is there any remedy for this, and what is it?"

Dr. Trimble replied that there are some orchards in New Jersey infected with borers, but no more so than in any other State. They are the great pests of all orchards, and have killed many trees. I have a section of one not more than five inches in diameter, that has twenty holes through it. Their period of existence is three years. The first year they work near the bark, girdling the tree, which causes the greatest damage. They are then easily found and removed by probing with annealed wire. The second year they work inward and upward. The third year they come back again to the bark, where the transformation takes place. They work in all kinds of trees, and are often sent from nurseries into sections where they were not before known. It is very easy to discover trees affected by borers, as their chips are always exhibited upon the ground. It is very hard to find the beetles. No person need hesitate to settle in New Jersey on account of the apple borer. They do destroy orchards and will destroy them wherever they are not attended to. Mr. Davis also wants to know if there is any remedy for wild onions, which he is told infest the pastures of New Jersey.

Flower Seeds and Flower Culture.

Mr. Wm. R Prince sent in for distribution the following flower seeds:

Aster Purpurascens—Perennial purple aster.

Bignonia Coccinea—Scarlet Trumpet Creeper.

Lythrum Salicaria—European purple Lythrum.

Amorpha Fruticosa—Blue Flowered Amorpha.

Information for Missouri Emigrants.

Mr. Philip W. Kohler, Hopewell Academy, Warren county, Mo., wrote a letter to the Club some time since, offering to give information to persons desirous of emigrating to that State. He says he has been overwhelmed with letters since he was thus advertised in *The Tribune*. He now asks the privilege of making a few general statements to this Club which may serve as information to those who desire it,

"Warren county is about the third in size in the State. The war has taken away many of the male inhabitants. At the late election the county gave Lincoln 948, McClellan 271. Many of the McClellan men are far from being Rebels. A majority of them sympathize with the South, but not one in six would harbor bushwhackers. The radical Union men control the county. Warrenton, the county seat, probably contains 2,000 inhabitants, three hotels, one of which is a splendid brick building. The county clerk's office is stone and brick, fire proof. There are four churches, and five stores, a steam saw and grist-mill, and nearly all mechanics but coopers. They are scarce, though cooper stuff is plenty.

"Warren county is composed of various soils. On the north it is mostly prairie, together with tracts of heavily timbered land and creek bottom. On the north it is river bottom from one to three miles wide, and in the center and various parts it is hill or ridge land. The whole county is well supplied with an abundance of good timber and water, and building stone in abundance. The ridge land is heavily timbered, some trees from three to four feet across the stump, and will make from two to three cuts of rails eleven feet long. The land is broken but the tillable portion of it is level or gently rolling enough to carry off the water after heavy rains, the most beautiful sites for orchards and vineyards in the world. Unlike most hill land, if you manure it, it stays there. We have to dig cisterns for water for domestic use, eight feet wide and from fifteen to thirty feet deep, which furnishes an abundance for all purposes. In the valleys, which are narrow, there is an abundance of never failing springs, and splendid range for all kinds of stock. Cattle or hogs turned out here in the spring, will return in the fall, fat. Wheat raised on this ridge land will weigh from three to five pounds more to the bushel than wheat raised on the adjoining bottom lands, but it will not yield as many bushels per acre. A better wheat country I never saw in Missouri. Farmers here who only run two plows have sold, this winter, from 600 to 800 bushels of wheat at from $1.70 to $1.85 per bushel.

"I know of no land or farms to rent in my immediate neighborhood, but there is a plenty to be had if you come in time—the 1st of March is moving time with us. Cash rent from one to three dollars per acre, or one-third of the crop. A plenty of saw and grist mills all over the county. A plenty of fruit of all kinds, which do much better than fruit in most of the other States. Missouri can't be beat for fruit. At St. Louis and Sherman there are a plenty of good nurseries that raise fruit well adapted to our climate. Some of us have been badly sold by the agents of eastern nurseries, which has impaired our confidence. Squire Wilson, in the bottom, bought some beautiful pear trees from the agent of a Rochester nursery at fifty cents a piece; the following year they bore a crop of crab apples. Timothy and clover do well on the ridges, therefore this land is well adapted to sheep raising. You can buy a small or large farm, with good improvements, at from three to five dollars per acre, probably one-half or two-thirds of the land would be level, good tillable land, the balance broken but heavily timbered. In the hollows you are apt to get a good sugar camp, large trees. It is frequently the case that you can make a good field in the valley for corn, wheat, &c., which we call branch bottom. Vine growing is a profitable business in this State, especially on these high ridges.

"Mr. George Husman estimates the value of vineyard land in Missouri at $1,000 per acre. He made 1,200 gallons of wine from three acres, and sold from the same $300 worth of grapes. Any family accustomed to weaving would find profitable employment in this county. The usual charge for weaving jeans is twenty-five cents per yard. Our next State convention will abolish slavery and disfranchise rebels. As soon as the war is over land will rapidly increase in value. It has already increased, as, two years ago, you could have bought almost any farm in the county; now, I only know of three or four for sale, which are held at $4 to $5 per acre. There are eight churches and ten school-houses and four physicians within six miles of my house. The diseases are mostly bilious fevers and fever and ague in the bottom lands. A doctor who depended for his living upon the inhabitants of the ridges would starve. My doctor's bill for five years amounts to $7.65, and I have a wife and five children. This ridge land is the place for invalids to recruit health. In conclusion, I would say that I am ready to extend the hospitalities of my house to any *loyal* man who wishes to settle in Warren county."

Agriculture of Peru.

Solon Robinson announced that Hon. E. G. Squier, the traveler and historian, who has just returned from Peru, would address the Club, at some future meeting, upon the subject of agriculture in that country, and exhibit some curious specimens, one of which is some remarkable Indian corn.

On motion of Mr. Bergen, it was

Resolved, That the Secretary address the Hon. E. G. Squier, and invite him to address the Club on the Agricultural Productions of Peru at an early day.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

January 3, 1865.

Mr. Nathan C. Ely in the chair.

Exhibition of Industry in Prussia.

The Chairman read a letter from Mr. Charles J. Sundell, United States Consul, Stettin, Prussia, which states that a general agricultural and industrial exhibition is to be held at that place, in May and June, 1865, to which exhibitors of all nations are invited. The exhibition will be opened May 15, and continue to the end of June. Circulars containing particulars may be seen at the rooms of the American Institute.

To Prevent Rabbits Eating Trees.

Mr. William A. Goodrich, Paxton, Ford county, Ill., writes that a "quarter of a pound of sulphur, thoroughly mixed with one pound of soft grease, and either put on the tree or shrub needing the protection, or put on a stake near the same, is a sure preventive, as I have tried it for years. I keep it in a tin pale and watch the depredations of the *varmints*, and when I see the mark of the teeth, which is mostly in February and March, I take my pail, with a piece of shingle, and put a little on each tree or shrub I wish to protect, which I have had to do for the past seven years at the time above named. I live on the open prairie, about two miles from timber, and rabbits are plenty and have been ever since I have lived here."

Apples—The Swaar.

Mr. Richard Johnson, East Groveland, Livingston county, N. Y., presented to the Club some specimens of Swaar Apple from his farm, to show that this variety grown in that vicinity is one of the best apples on the list. Its appearance, when fully ripe, seen at a little distance, much resembles oranges as they are frequently sold in this city, having a slight greenish tinge, being of about the same size and color. Mr. Johnson considers the Swaar better than the Northern Spy, Tompkins County King or Baldwin, although the red color and large size of the latter make them more saleable in this market. As the Swaar does not take on its handsome golden color until winter, it is not much in favor with apple growers in autumn. It keeps sound and good until March, and "with me," said Mr. Johnson, "it is the best variety I have, and I have been a cultivator of fruit since twelve years of age. It may not suit all localities; it certainly does mine. Livingston county is good for all kinds of fruit, though pear trees are subject to blight. The Baldwin apple does well and sells high. My best early apple is the Sour Bough. It is the size of the Swaar, yellow, and ripens before the Harvest apple. The Fameuse is a good late autumn apple. The Bailey, red color, is the best sweet apple. The Tallman is excellent for winter. There are but few really excellent apples, and it is a great mistake for farmers to try too large a variety. It is very important to get about a dozen goods sorts. I have cultivated many that proved worthless."

Dr. Ward.—These are words of wisdom which ought to be engraven upon the minds of all farmers. Let them confine themselves to a few good sorts, and not incumber the ground with a great variety. A dozen sorts surely are enough, divided between summer, autumn and winter. Here, for instance, is this excellent apple, the Swaar, which, with a sweet apple, would be all that a family could desire during its season. The same remark is true regarding pears; a dozen sorts will make an assortment all-sufficient for a family, and those which are most saleable will generally be found the most satisfactory for family use. I press this idea of a small number of sorts upon the minds of all who desire to plant fruit trees. Mr. Carpenter said that this depends whether the fruit is to be grown for home comfort, profitable sale, or to test the value of various sorts. If a farmer depends upon one sort only for market, his crop is liable to fail. In this vicinity, this is particularly the case with Fall and Winter pippins. We cannot have all the excellencies in three or four sorts, and besides we are getting new and improved varieties every year; witness the new pears, grapes, currants, strawberries, &c., which have been developed within a few years. It is important also in recommending apples that they should be described by their right names. The one spoken of by Mr. Johnson as the Sour Bough is undoubtedly the Yellow Harvest.

Mr. Wm. S. Carpenter.—We are progressing; I am in favor of growing all new improved varieties. Within the past few years a number of new varieties have been introduced. It is important that these new varieties should be tested, besides, every one does not grow fruit for profit.

The Chairman said: "I certainly concur with the gentlemen who recommend a short list of varieties. If a young farmer undertakes the whole assortment he will be confused and discouraged. I believe a dozen varieties of apples sufficient. To that list he can add any well established new sort from year to year."

Distribution of Flower Seeds and Bulbs.

Mr. Solon Robinson.—It may be recollected by readers of these reports, that last year Mr. Johnson, evincing a most noble liberality, coupled with a desire to extend the cultivation of flowers among farmers, so as to make their homes attractive and pleasant, offered to send without charge a quantity of bulbs and flower seeds. In a few weeks after that letter was published, he had received more than five hundred letters, and has since sent off over 3,000 bulbs and packages of flower seeds of different varieties. Although the tax resulting from this proposal has been somewhat onerous, Mr. Johnson does not regret having made the offer. One of its results has been to introduce to him several pleasant new acquaintances.

Sorgo Syrup—How it is Manufactured in New Jersey.

Mr. Robert Hopkins, Verona, Essex county, New Jersey, says the process of making sorgo syrup may be as simple as it is with the real sugar cane. In that case, as soon as the juice comes from the mill it is tempered with unslaked lime, and neither blood, eggs or milk is used. The kettles should be four in number, graduated in size, the last not being more than one-fourth the size of the first. The juice, when sufficiently boiled, is dipped into large wooden coolers, and the molasses left to granulate, and it is afterward left to drain from the sugar. And he evidently thinks, from the reading of his leter, that sorgo can be manufactured in the same manner. He says: "I have never seen the Chinese cane grow, therefore know nothing of its length or thickness, wherein consists the quantity of juice to be obtained. I only am able to judge by the syrup I have seen."

Sugar From Corn.

Mr. David Sears, Magnoketa, Jackson county, Iowa, thinks the statement lately made in the Club about making twelve or sixteen quarts of molasses from a bushel of corn almost incredible "Yet," he says, "when I reflect that a multitude of statements, once apparently as incredible as this may be, have now become established and familiar facts, it is with the greatest anxiety I inquire and wait to know how so much molasses can be made from meal—nearly its own weight. Iowa, if not the best, is at least one of the best States in the Union for corn raising. Not more than one-tenth of the land is cultivated at all, and that tenth produces no more than half what it would if all was reasonably well cultivated. It is now sold in different localities from 25 to 50 cents per bushel. If so much and so good molasses and sugar could be made from corn, it seems to me as soon as it was known there would be a great rush to occupy the opening for the business. From twenty years' experience and observation in Iowa, I find that corn and grass are the best paying and surest crops that can be raised with little labor. To be sure, sorgo, onions, tobacco, and many other things might pay greater profits on the land, but they require more labor. As I see from the market reports, pineapple cheese sells higher than any other, I should like to have the particulars of the process of making.

Flowers—Change of Color.

Mr. D Williams, Fly Creek, Otsego county, New York, says: "I have a dwarf geranium, the Tom Thumb, three years old. The color of the blooms has always been salmon red until this winter; now the flower is pure white, with a pink eye. I have shown the flowers to several of the best florists in Cooperstown; they cannot account for it. Can you, or some of the members of the Club, do so? The plant has been occasionally watered with a solution of sulphate of ammonia, one ounce to a gallon of water. The change is a decided improvement, if it will remain as it is now." The writer also says: "One of my neighbors has a Garnett Chili potato weighing four pounds seven ounces. Can any members of the Club, inside or out, beat it?"

A lady present stated that she had frequently seen the color of hydrangea changed by the use of different kinds of manure.

Mr. Solon Robinson stated it was reported a few years ago that ex-Mayor Tiemann, who is a color manufacturer, had used the refuse of his factory upon his garden, and the result was a very remarkable change in the color of various flowers. I believe it is a well known fact that the use of charcoal darkens the color of many flowers.

Mr. Wm. S Carpenter called attention to the great improvements that had been made within a few years in growing hollyhocks. They have become quite fashionable among cultivators of flowers in Europe, and several of the members expressed themselves favorable to their extended cultivation in this country.

Hedge Plants.

A farmer of Penn Yan, N. Y., wants the Club to discuss the question of hedging, and what is the best hedge plant, because, whether we like it or not, we shall soon be driven to the necessity of making live fence, not only on the prairie but in all the Eastern States. It costs more now in the oldest settled portions of New York for the fence of the farm, than the land is worth without fence. Rochester nurserymen are selling and recommending honey locust for hedge. What says the Club; is it a good hedge plant? Is it as liable to be destroyed by the borer as the common black locust, and how about its tendency to spread over the ground from the roots? There has been much said lately about making a fence with the Barberry, but I am not aware that it has ever been tested. This plant, I believe, does not grow over seven or eight feet high, and consequently would not need the constant pruning which other hedges require. Are any members of the Club well enough acquainted with the habits of this shrub to tell us whether it would be likely to succeed as a hedge plant, and, if so, where the seed can be obtained and how should they be treated?

Is there any cheap and expeditious way of tanning, which would enable farmers to tan pelts and skins either with or without the wool or hair on?

Mr Solon Robinson.—Then the sooner you learn to do without fence, the better, "for to that complexion must we come at last," unless something is discovered for making live fence that proves more successful than anything yet tried in America. One of the great errors in American farming is fencing too much. The *Tribune* has shown by indisputable statistics that the fence tax is greater than all other taxes put together, and is a most onerous burden upon the farmer.

Some of the Club are as much in favor of the honey locust as the Rochester nurserymen. For my part I have no faith in it; nor, indeed, in any plant that naturally grows to the size of a tree. It is true it is not as liable to the attack of the borer as the yellow locust. I have never seen the barberry tried for hedging, but from the character of the plant I should think favorably of it.

There are modes by which every farmer could tan his own skins. The only question is whether it would be profitable for him to do so. Sheepskin may be dressed with the wool on, by saturating the skin while in a fresh state with an equal mixture of salt and alum. Afterward, scrape off all particles of flesh with a dull knife, and wash the skin and wool perfectly clean, and rub it continually, just before it is entirely dry, to make it soft.

Mr. Wm. S. Carpenter.—I consider the honey locust as one of the best plants for hedges. It is not so much affected by borers as the other locusts, and does not sprout up all around the plant. If I was to abandon the use of stone walls, I should use the honey locust. It should be pruned twice a year, in Spring and Fall. It will make a good fence in four years, and will turn any kind of cattle. The barberry would be an ornamental hedge for a few years, but I doubt whether it will be valuable as a farm hedge.

Salt as a Manure.

Mr. Solon Robinson.—A book was published in 1748, in England, by Owen Brownrigg, who contended that the whole kingdom might be enriched by applying salt to the soil. In this he was correct—though others following his advice would be liable to disappointment. Salt is no more a manure than rum is food. Both may stimulate the bodies to which they are applied. While we earnestly recommend the application of salt, particularly to barren pastures and hide-bound meadows, we fully agree with a writer in *The Germantown Telegraph*, who has the following sensible remarks upon the use of salt, which we commend to the attention of all farmers:

It is certain that, in many instances of the application of salt, those who apply it are disappointed with the result, which, in all cases, I think, may be attributed to a want of knowledge of its effects, and may be accounted for by one or more of the following reasons: Salt furnishes to the soil but two constituents, namely, soda and chlorine, and hence it cannot, like barnyard manure, be applied *ad libitum*, for, unlike the latter, it does not furnish all the saline parts needed by the crop, and hence, because the soil already contains sufficient of these two constituents, a second application of salt may produce little or no immediate effect, and disappointment ensues.

Again, some plants are more benefited by the application of salt than others, and hence, by not understanding the wants of the crop, the application may not, as far as that particular crop is concerned, produce any effect; or, if it does, it may be an unfavorable one.

Failures are many times caused by supposing that, inasmuch as one application was good for a crop of corn, another will benefit the succeeding one of oats; but, if the first application was a liberal one, it will not, because the soil already contains enough of the constituents of salt needed for that crop, but sooner or later the second application will begin to show itself.

One of the main benefits which I have derived from the use of salt, as a manure, has been when I have turned under a heavy crop of clover or rye for wheat. I find it has a tendency to stiffen the straw and prevent its falling down, as is often the case when green manuring is practised. I usually sow it broadcast at the rate of one sack (three bushels) to two acres. The most suitable time which I can find is either just before the last harrowing or before the drill, if the seed is put in in that manner. It is very easy for those who have been used to broadcast sowing to arrive at the proper amount.

I found, from experiment, that salt has the effect of increasing the weight of the grain. In one case of two lands, side by side, one of which, in addition to a good coat of manure, was top-dressed with salt at the rate of one and one-half bushels to the acre, and the other had nothing but the manure; the wheat upon these two lands, and in fact upon the whole, was heavy, particularly so in the straw. On the salted land it stood up well and the straw was bright; while, on the remainder of the field, it was all more or less lodged and down. The salted land produced wheat weighing three pounds more per bushel than that on the remainder of the field. During the winter the wheat on the land to which the salt was applied was of a deeper green, and from the time the wheat was up until harvest, any novice could select the one land from the remainder of the field.

In one experiment the above writer gained a ton of hay from an application of six bushels of salt.

In another case, when sown from wheat, at the rate of one hundred and sixty pounds per acre, it increased the crop seven bushels per acre, making the additional wheat cost about twelve cents per bushel.

In a third experiment, when applied to oats, at the rate of one hundred and twelve pounds per acre, it decreased the crop (as compared with a plot exactly similar in soil and size) at the rate of six bushels of grain per acre, and the straw at the rate of three hundred pounds per acre, making it harsh and stiff.

All the experiments which have been tried have tended to prove that salt is not favorable to the increase of oats crop, and, if applied to the corn at the rate of more than one or one and a half bushels, it will decrease the succeeding crop of oats; but they tend to prove that it may be applied to wheat in any amount from one to twelve bushels without any danger of a bad result.

Dogs and Dog-Laws.

Mr. Solon Robinson.—I urge the Club to call the attention of the present Legislature to the necessity of an amendment to the dog-law of this State. H. P. Fitch, Oswego county, N. Y., in a letter to *The Country Gentleman*, says: "There are more sheep killed by dogs in the State of New York every year than the whole race on earth is worth. There are farmers of my acquaintance who have for the last fifteen years lost on an average annually ten per cent of their flocks by dogs, and still the evil is allowed to continue.

"We have a dog-law, such as it is, levying a tax of fifty cents per head, and making it the duty of the collector to kill all dogs on which the tax is not paid; but it has never come to my knowledge of the first dog being killed by said collector in default of collecting the tax, and it is notorious that a large percentage of dogs escape both the tax and the penalty.

"What we want is a law similar to the Massachusetts dog-law, and then if people wish to enjoy the luxury of keeping dogs, they can do so by complying with the requirements of the law."

The dog-law of Massachusetts provides that every owner or keeper of a dog shall annually, on or before the first of May, cause it to be registered, numbered, described and licensed, in the office of the clerk of the city or town wherein he resides, and shall cause it to wear a neck collar distinctly marked with its owner's name and registered number, for which license he is to pay $1 for a male dog and $5 for a female dog. Any person keeping a dog, not thus licensed, registered and marked, is subject to a penalty of $10; and it is made the duty of every police officer and constable to kill all dogs running at large, not thus registered and marked, for which they are to be paid, by the city or town, fifty cents for each dog so destroyed by them. There are various other provisions, but these are the ones which give the law its effective power.

The Chairman.—There is a similar law in Connecticut. I found last summer, in moving to my country residence at Norwalk, that to keep a small rat terrier which I took up with me, it was necessary to take out a license and pay a tax of one dollar.

Mr Carpenter.—If it were not for dogs the rough lands of Westchester county might be stocked with sheep, where they are almost valueless for any other purpose. As it is now, not one farmer in a thousand in that county can keep sheep profitably. I tried to establish a flock, but lost nearly half of it in one night. The dogs, not satisfied with the first attack, made a second one, killing and wounding most of the remainder. For his part, he was quite discouraged, and so were all his neighbors. At the suggestion of the Chairman, Mr. Robinson moved a resolution, which was unanimously adopted, asking all agricultural societies and farmers' clubs in the State, and all influential farmers, to make a strong appeal to the Legislature, at the present session, to have the dog-law of this State amended so as to conform to the law in force in Massachusetts and Connecticut.

Dr. Trimble urged the consideration of the fact that the owners of sheep-kiln g dogs are generally the most worthless persons in community. Any law that requires the detection of trespassing dogs is useless. One of the most pitiable sights that he had ever witnessed, was a flock of sheep which had been mangled by dogs. The value of those not killed was very much impaired, for the flock ever after was so timid it did not prosper.

Adjourned. JOHN W. CHAMBERS, *Sec'y.*

January 10th, 1865.

Mr. Nathan C. Ely in the chair.

HOP CULTURE.

The Chairman.—We have with us to-day a gentleman from Otsego county in this State who is well versed in the hop culture, and as this branch of industry is becoming of great importance to the agricultural interest of the country, I hope he will give us important information on the subject. I take great pleasure in introducing Mr. T. W. Collins to the members of this Club.

Mr. T. W. Collins.—Otsego is one of the leading hop-growing counties in the United States. It is not so because the soil, climate or situation is best adapted to that culture, for hops are indigenous to the whole country, and are cultivated from Maine to Minnesota, and from Vermont to Virginia. The cultivated hops are probably derived from England. There are three distinct varieties—the English cluster, which grows in large clusters and large sized hops, and is generally preferred; the grape cluster, which grows in more compact bunches, and the hops are firmer than the other; and the Pompey hop, which is of a coarse and not as valuable sort as either of the others. It is, however, difficult to get either variety pure, as there are few hop yards that do not contain all of these sorts. The best time to plant a hop yard is in the spring, as early as the ground can be worked. The ground should be plowed and made as fine and mellow as possible. Seed is never used. The plants are obtained from offsets of the old roots and are best planted with a dibble, though some plant them in a rough manner, covering them as they would potatoes. Corn, potatoes, or any other hoed crop can be raised the first year with the hops.

The proper distance to plant hops is eight feet apart each way, but upon the rich bottom lands of the west, nine or ten feet apart. Care must be taken to keep the sets from male plants separate from the others. There should be about one male hill to every eight hills, each way, or one in sixty-four, making about eight to twelve to the acre. These hills should be marked by a stake at planting, to enable one to distinguish them at a glance.

The ordinary method is to set two poles to each hill. These are from twenty to thirty feet long, and must be set very strongly in the ground, or else they will be liable to blow over when heavily loaded with the vines. Two vines are trained up each pole, and the ordinary yield is from 700 to 1,200 pounds merchantable hops per acre. One thousand pounds per acre has been considered a good average for many years, and when the price has averaged ten cents per pound, it has been considered as good as a grain crop at the average of the last ten years. This year the yield has been very light and quality inferior. There is probably not half an ordinary crop. This has been caused by the great drouth, by aphis and mildew. The aphis has affected the crop only during the last two years. It is customary to manure the hop yard in the fall, by placing a shovel full of good barnyard manure to each hill. This requires only four or five stout loads per acre. Lime and ashes are also very beneficial, applied at the rate of about one pint to the hill in the spring, which has a tendency to prevent the work of the grubs. The best prevention of them which I have found is to bury the surplus shoots which we trim off, as these serve as food for the grubs, and while they remain fresh the grubs feed upon them in preference to the hard vines which are reserved to climb the pole. A hop yard must be cultivated as carefully as a corn crop. Although Otsego is the largest hop-growing county in this country, it is, as I said before, not because best adapted to their culture, but because the first settlers of that county found it too poor for wheat, too high and cold for corn, and not very profitable for any other grain. They found the lands extremely well adapted to dairy purposes, but they wanted some other salable crop, and they accidentally hit upon hops. I look upon it as about the poorest county in the State for that crop, and I see no reason why the cheap lands of Jersey, Delaware, Maryland and Virginia, may not be used for hop culture as well as Otsego. Hops do well in any good limestone soil, and so they do in any soil that will produce Indian corn, with about the same amount of preparation and cultivation, and with less manure. I believe the only necessity for making new yards arises from the old English method of growing hops which has been adopted in this country; that is, growing them upon long poles, which renders it necessary to take them down when the crop is picked. This is done by cutting off the vines and drawing the poles out of the ground by a lever and dog which takes hold of the pole, which is lifted up by one man while another takes it upon his shoulder and carries to the picking boxes. Cutting the vines while in a fresh growing state causes them to bleed as badly as grapevines cut during the growing season. This sometimes so exhausts the vigor of the roots that a considerable portion of them die during the winter, and they are unproductive the next season. I saw this fully illustrated near Cooperstown a few years since. A yard one year produced an extraordinarily heavy crop; it was picked while the vines were still in a vigorous growth, and they were observed to bleed profusely. The next year the vines were weak, grew small, and produced very few hops. This was charged to their over-bearing the year before. By a different plan of treatment, I have repeatedly proved that what is termed over-bearing never produces this effect. I have adopted a new and very much improved system, which obviates all necessity of cutting the vines until they are entirely ripe. Indeed they may be cut any time during the winter. This improvement is in using poles only seven and eight feet high, with twines drawn from the top of the poles in each direction across the field; they need to be only just high enough to allow a horse and boy, if one is employed for a rider, to pass under the twines while cultivating the crop.

By this system the yield is increased to 1,500 or 1,800 pounds per acre, and the saving of expense in poling is very great, as not more than one-tenth of the weight of timber is required, and almost any sort will answer for these short poles, while for long ones the very nicest sort of long, straight, slim young trees, of some durable wood, is required, and of such, the hop growing counties have become exhausted, and poles are imported from Canada at great expense. The cost of twine is not onerous, as it can be saved and used from year to year, and the poles do not need to be taken up and reset, only when they decay, and they do not need to be set near as firmly in the ground as long poles, because the wind has but little effect, as the twines run at right angles, from side to side of the yard, connecting all so firmly together that not one can fall, even when rotted off at the surface of the ground. There is another advantage in this system of poling; that is, if these short poles are set for the first season the vines will climb them and produce nearly half an average crop of hops without injuring the corn. The next year the twines are put on, and the vines trained along them in each direction so that the hops which always grow upon branches many of them being within easy reach of the picker. In this system, instead of taking up and carrying the poles to one spot to be picked, the pickers pass through the field, loosening the twines from the top of the pole as they proceed and leaving them to fully mature before being cut. The picking is usually mostly done by girls who receive upon the old plan twenty-five cents a box which holds about ten bushels. I pay a little higher per bushel for picking, say four to four and a half cents, but I save the expense of taking up and carrying the poles to the boxes. Another advantage, there is less carrying and shaking of the hops. A bushel of hops will make about two pounds when dried. That would make the cost of picking an acre at two to two and a half cents a pound, $20 to $25 per acre. If a man has five acres, and a kiln sufficient to dry the crop as fast as picked, he should employ twenty-five or thirty girls.

Picking and curing is the most important operation connected with the hop crop. The season commences the last week in August, and the work should be continued as rapidly as the hops can be cured. The old fashioned curing house is made with a room twelve to sixteen feet high, the lower part occupied by a stove or some kind of heating furnace, and the floor overhead made of wooden slats, upon which a thin cloth is placed, and on this the hops twelve to twenty inches thick. They require from eight to twelve hours' heat, and must be stirred once or twice during that time, because the portion lying over the slats is not as much affected by the action of the fire as that in the space between. When sufficiently cured they are carried to a drying room. This process requires a good deal of handling and loss of the lupulin; as the kiln must be kept going night and day the owner cannot always be present. A great improvement in kilns has been made; wires are substituted for the wooden slats, so that the hops do not need stirring while drying, and when dry enough they are removed without touching them by hand. One edge of the cloth is attached to a roller, which, being turned, draws the load upon the cloth along and empties it over into the store room.

The telegraph plan of training hops has not proved successful. This plan consisted in stretching wires from side to side of the field, to support twines or smaller wires up which the vines were trained. In one case a yard of six acres trained upon wires in this way was all destroyed by a single flash of lightning.

Frost, both spring and autumn, sometimes injures hops. If the plants are injured when about a foot high it is best to go over the yard and cut off the frosted plants, and trust to new shoots. A severe frost in autumn injures the crop. As to the rapidity of picking, I knew one yard of fourteen acres at Rochester picked in five days. One of the acres, which yielded 1,000 lbs., was picked in two hours. It will take thirty good hands to pick an acre a day. A first rate picker will average from 50 to 60 lbs. of cured hops per day.

Dr. Ward.—What manure do you use?

Mr. Collins.—Most of our hop growers keep cows, the manure of which is used on the hop grounds. Ashes are also good.

Mr. Bergen.—How do you start a new yard?

Mr. Collins.—There are sets running under the ground, this root we cut into pieces four or five inches long, each having a pair of eyes, then we dibble in so that the whole is covered.

The remarks of Mr. Collins were listened to with marked attention, and at its close a vote of thanks was unanimously tendered for his interesting discourse upon the Hop culture.

Flower Culture and Distribution of Flower Seed.

A few weeks since Mr. Wm. R. Prince sent in a quantity of flower seed for distribution by the Club. This being noticed in the published reports of the Club, brought numerous letters, a portion of which were referred to Mr. R. G. Pardee, with the request that he would make a brief report, adding some remarks upon flower cultivation.

The following is his interesting report:

"Prompt and earnest responses from Maine to Minnesota, from Nebraska to Kentucky, and often from most secluded locations, have come as applicants for a few choice flower seeds, showing how the spirit of enthusiastic love of flowers lives among the people. I have looked over the letters of between 200 and 300 ladies, and make a few brief extracts. I wish there was time and room for more of these pleasant epistles. One lady in the far interior of Minnesota says: 'All our flower seeds and bulbs were destroyed by a fire which consumed our new house and household furniture on the 24th December, 1863, and I shall, therefore, thankfully receive some seeds, as I have always had choice flowers from childhood, and think any place desolate and lonely without them.'"

Says another lady in one of the Middle States: "I am not rich enough to buy flowers, but I dearly love them. They seem to bring the angels nearer to earth and breathe over our spirits beautiful thoughts and tender affections of the better land where they dwell, and lift us above the grossness and selfishness of earth. I have often thought that the sweet face of my angel daughter looked at me from the purple and golden petals of a pansey. The dear flowers, who could not love them. Poor indeed is that heart that loves them not."

Another lady from Wisconsin also says: "I shall receive the seeds with heartfelt gratitude, as we only moved here last summer, and have not a plant or a seed to begin with."

Writes another lady in an extreme section of Illinois, five miles from any postoffice, and twenty miles from our nearest market: "It seems to me if the inhabitants of the thickly populated East, only knew how isolated we poor mortals are from our neighbors, and how few our sources of enjoyment are, compared with theirs, they would commiserate us sufficiently to divide their flower seeds and roots with us."

Another writer says, he is a boy, "but he loves flowers as well as any lady."

Another in far Iowa writes: "That he has retired from the active scenes of commercial life to the far western prairies, a pair of us, as was in the beginning, male and female, at the age of sixty-five years, we are endeavoring to prolong our stay in the modern garden of Eden, by cultivating it with our own hands. It makes our stay more pleasant to cultivate fruits and flowers. Please say to the Club, that I am deeply interested and materially assisted in my labors by their weekly reports."

These brief extracts will serve to illustrate the spirit and scope of their interesting letters. They demonstrate several things, to wit:

First. That in the most retired and humble homes of our land there are multitudes of American ladies who are so refined, as to love enthusiastically the cultivation of flowers.

Second. That good flower seeds, worth cultivation, are hard to obtain, even from some seed stores.

Third. That the generous offer of Mr. Prince ought to be succeeded by others of a similar kind, thus rendering the American Institute a rival of the Patent Office. If it will send out good desirable seeds *only*, it will soon prove a blessing to the country.

Fourth. These letters clearly demonstrate another thing, that there is a very great want of plain, simple directions how to cultivate flower seeds well.

Fifth. That florists and amateurs must "help those women," who so earnestly long to make their homes attractive and beautiful, especially those who are united to husband farmers, who, as one lady writes, do not care whether weeds or flowers grow around their homes, or at least will not make the least effort to check the weeds or cultivate flowers.

Mr. Pardee gives the following remarks about

The Cultivation of Flowers.

In the beautiful language of Wilberforce, who said "Flowers are the smiles of Divine Providence," let us then prepare the way for these smiles in all gardens and windows. To do this, we must study their nature and adapt the earth to their wants, and then we shall brighten the smiles of all around us. A lady says: "My flowers are stunted, miserable, unsightly dwarfs; the blossoms single, when I desire them double. Why is it so?" I will try to answer this practical important question. For such coarse productions as corn and potatoes, farmers plow, harrow and furrow for planting, and plow, hoe and cultivate two or three times, thus frequently stirring the earth. How is it with your flower bed? Is it half prepared as it should be? Many persons spade and rake the bed and put in the seeds the same day. It thus has but a single up-turning, and it receives an occasional scratching to the depth of half an inch, with rake or hoe, and that is all the action the soil gets in the culture of rare, delicate and beautiful flowers. It is not surprising that the soil packs almost as hard as a brick, and that stunted plants only grow. A flower bed should be finely spaded or forked, and thoroughly stirred two spades deep as early in the Spring as it can be worked. Let it rest a little, and then stir it again in the same manner, taking care to keep the best soil on the surface, which must be thoroughly raked, pulverized and aired. After the most thorough raking, when you are ready to plant the smallest seeds, smooth the surface with the back of the spade, then sprinkle the seeds in rows on the surface, and cover by sifting the soil through a fine sieve. The finest seed should not be covered more than one-sixteenth to one-eighth of an inch deep. Sometimes small seeds are driven too deeply into the earth by rains. To prevent this, cover with boards or cloths. If the weather is very dry, water the beds daily with a fine rose watering-pot. If the sun is very hot when the young plants appear, shade them. Watch the weeds and pull them out when small. Weeds soon strangle fine plants. Give them thorough cultivation and constant care. Water if necessary; see that the growth is never checked. The earth is to be mother to the weeds, but only step-mother to the flowers. Some plants, like the Asters, Balsams, &c., will be benefitted by transplanting, or even repeated transplantings; while other plants, like the Poppies, Lily of the Valley, &c., can rarely be removed with safety. If the soil is too heavy with clay, add pure sand. If too light and sandy, work in the clay. If the soil is too old, black and heavy, add fresh virgin soil. If the soil is foul with old vegetable matters, or is infected by the worms, bugs, or the eggs of worms, apply the salt and lime mixture, made of three bushels of lime, slackened, with one bushel of salt, dissolved in water. If the soil wants enriching, we prefer hog or foul manure, old decayed leaves, or leaf mold and muck; but let no kind of manure be applied to your garden until composted to the consistency of black mold. The salt and lime mixture will greatly expedite this process. If you want fine flowers, care should be taken to get and preserve the best of seed. The best varieties that can be selected from the florist's will be the cheapest, even if of higher price at the first. Of the numerous varieties of the Asters, Balsams, &c., some two or three kinds are richly worth cultivating, while the commonest kinds would not be cheap as a gift, if you could purchase better ones. High priced novelties are not always desirable. When a fine variety is obtained, be careful to preserve the seed and keep it pure. This can only be done by pulling up by the roots and destroying at once all plants which show on the opening of the first flower a single or semi-double bloom. I know it will be hard to do this if the semi-double chances to be handsomer than you have ever raised previously; but you must do it fearlessly if you wish good seed for double perfect blossoms next year. If you have a fine bed of beautiful double Asters, Balsams or Zinnias, and permit one single flowering plant to blossom in the bed, it will hybridise and destroy all the other seed. Vigilance here, as well as in other duties, is the price of safety. Save all the soap suds for watering your garden. Such water is particularly fertilizing and refreshing to the flower bed.

Hardy Flowers.

Among the most valuable flowers in a garden is a class that when once placed in the ground will remain, and, with good cultivation, will spring up every year and flower with great profusion. They are the Dielytra, Pompone and large Chrysanthemums, Hardy Phloxes, Peonies in variety, Japan and other varieties of Lillies, Double Holyhocks, &c. The following hardy perennials may be raised from seed, and the newest and best varieties are very desirable, viz: Sweet Williams, Hardy Pinks, Snap Dragons, Pansies. For a few annuals we would select the best varieties of Asters, Balsams, Amaranthus, Clarkias, Tom Thumb, Nasturtium, Portulaccas, Double Zinnias, Phlox Drummondi, Linum and Lupins, Everlasting flowers in variety, Larkspurs, Sweet Alyssum, Canary Bird Flower and Cyprus Vine. For the florist's catalogues you may add to this list from time to time, provided you will cultivate them as they should be. If possible, obtain from the florist every Spring a few plants of Verbenas, Petunias, Geraniums and Lantanas, Fuchsias, &c.

If you want a few hardy shrubs, of course you will get the spireas in variety, Wigelia Rosea, Forsythia, Deutzia, Altheas, Rhododendrons, Mahonia, Japan Quince, Lilacs, Honeysuckles, Venetian Sumac and Hardy Azalea.

For desirable roses I name the following: La Reine, Baron Grosse, Madame Laffay, Caroline de Sansal, Lord Raglan, Madame Pladue aimee, Blanche Vibert, Persian Yellow, Gloire di Dizon, Souvenir de Malmaison, Devoniensis, Queen of the Prairies, Baltimore Belle, Solfataire, Prince Albert.

On motion of Prof. Tillman, it was

Resolved, That the thanks of the Club be presented to Mr. Pardee for the report on the letters referred to him and for his interesting paper on the cultivation of flowers.

Rabbits—To Prevent Gnawing Fruit Trees.

Mr. L. R. Noyes, Linn county, Iowa, recommends as the cheapest and best protection against rabbits, to peel sections of forest trees of suitable size, and take off pieces of bark around the body without breaking, some two or three feet long, and place one of these around each apple tree in danger of being gnawed by rabbits. These bark shields should be taken off in spring and stowed for future use, and will thus last for years.

Mr. Suel Foster, Muscatine, Iowa, says: "Let me repeat it, for my neighbor says several of his fine young apple trees have been ruined lately by the rabbits gnawing them: Take thick lime whitewash and thin it with strong tobacco juice. A bucket full will serve 200 trees, and a man can make it and put it on in half a day. It is effectual for I have tried it."

Mrs. C. A. E. Brown, Lawrenceville, Tioga county, Penn., gives in detail her experience in protecting trees from rabbits and mice with circles of bark. Besides the advantage of protection from rabbits, she found another important one. She says: "The first year I placed the barks around the fruit trees, just as I had taken them from the forest tree, and I let them remain until the last of April; then I removed them, and my peach trees were at least one week behind my neighbors in blossoming, but they escaped the early frost, and I had a full crop while they had very few. The next year I set them tunnel shape, the small end up; in both cases I saw that peaches and plums yielded larger crops than those without this rabbit protector.

"In Pennsylvania I used hemlock, in Wisconsin poplar bark; there the ground is generally soft and the end of the bark can be pressed into it. Where the ground is hard, dig a little circle and imbed the end of the bark firmly to prevent the wind blowing it against the tree. In using barks that have been kept over the season, they must be soaked to spring them open so as to go around the tree, and it may be necessary to tie them together. I have found having barks around the tree the whole year injurious. I do not like tarred or greased paper, for young trees like little children should have plenty of breathing room."

Mr. A. Curtiss, Clinton, Kansas, says: "I protect my trees with buts of corn stalks, which are worth nothing for fodder. Cut them eighteen inches long and tie them around the trees. A man can protect 150 a day."

Dr. Ward.—I find one of the best protections, is to prune late in autumn and lay the limbs where the rabbits can get them. They will eat the buds in preference to gnawing the barks of trees. A few trees may be protected with bark, &c., all in a nursery cannot. The pruned limbs may save them.

Mr. R. H. Williams.—I have seen the bark of the basswood and chesnut used for the protection of young trees from rabbits; the bark of the basswood is rapidly pealed and may be applied very readily, it should be inserted just below the soil and extended up the tree and securely tied.

Delaware Vines in Iowa.

Mr. H. Parker, Mt. Pleasant, Iowa, says: "Mr. N. Van Vost of this place purchased of me last spring thirty of Dr. Grant's No. 3 single eye Delaware vines, one year old, and they were about the smallest specimen of the Delaware vine that I ever saw. He had prepared his ground in the fall by trenching, putting the top soil underneath to the depth of two feet, and placing the clay subsoil on the top. In the spring (some time in April) he opened the trenches, and planted his vines so as to leave the lowest but about six inches below the surface of the ground, and as the vines grew, he hoed the dirt to them until the trench was filled to the level of the ground around them. He then gave them no further attention, neither staking nor pruning, and in the fall I went over with a friend and measured the vines. They had made an average of fifteen feet growth, of good, strong, well ripened wood, the main cane near the surface of the ground being about a quarter of an inch thick. Some of the vines had made twenty-five feet of wood. Mr. V. Made about twenty layers, every layer being as large as half a dozen of the original vine. The vines were planted on a side hill, a gradual slope facing the south, and as the season was very dry, I consider this an extraordinary growth."

Beet Sugar.

Mr. Ludovic Lechaut, a native of France, now resident of Monsey, Rockland county, N. Y., says:

"The beet sugar manufacture of France commenced in 1805. After many unsuccessful experiments, and a great waste of time and money, it has proved a complete success, and it is to-day viewed in my native land as one of the greatest, if not the greatest, blessings of the French agriculture, not only for sugar making, but also as a root crop for fattening purposes. Flanders, Artois, Picardy and the environs of Paris have become rich on the *beta vulgaris* and *beta saccharifera*, and the soil has increased considerably, both in value and fertility, since the regular introduction of the beet in the rotative cultures of the northern farmers in France. But it has been ascertained, scientifically and practically, (and this is the incentive of the present letter,) that, as far as sugar making is concerned, beets cannot be grown profitably beyond a certain climateric limit. It seems that an All-wise Providence has ruled that those two great crystallized sugar-producing plants, cane and beets, should not interfere with one another; but, on the contrary, would be confined within certain limits. In France, south of the great and beautiful river Loire, it is too warm for the beet to keep sweet and capable of yielding sugar, an important portion of this last substance being transformed into potash before the root attains its complete maturity. I am not acquainted sufficiently with the climate of the United States to venture an opinion about the extreme southern limit of the sugar beet (as a sugar-giving plant) in North America, not knowing even the localities of isothermal lines corresponding with those of Europe; but what I want to say is that there is a limit in France where the beet cannot be grown for sugar with the least chance of profit. That limit begins a little north of what we call the olive-tree region. Is it not reasonable to suppose that such a limit does exist here, and that farmers should be very careful not to engage in large experiments in that way before ascertaining accurately if they are on the safe side? Very probably the want of knowledge of this important fact will lead to many splendid failures, and will eventually involve nice losses of money, beside the ordinary croakings about the humbug of beet yielding large quantities of beautiful sugar. It was this idea that emboldened me to write to you."

How to Head the Chinch Bugs.

Mr. D. K. Emerson, Stoughton, Dane Co., Wis., says that Mr. H. J. Everest, of this place, has discovered how to head the chinch bugs. Several persons tried his plan the last season, and are satisfied with the result. Everything that will tend to stop the ravages of these great pests of the Western farmer should be made known. He therefore gives the following formula: "When the bugs are seen marching (for few fly at that time) take common fence boards, six inches or less wide, and run them around the piece, set edgewise, and so that the bugs cannot get under them or between the joints, and then spread either pine or coal tar on the upper edge, and they will not cross it. The tar needs renewing till the edge gets saturated, so that it will keep wet and not dry in any more, and either kind of tar is effectual. Then dig holes close to the boards, about like a post hole, once in four or five rods, and run a strip of tar from the top of the board to the bottom on the outside opposite the hole, and they will leave the board, and in trying to get around the tarred stripe will slide into the hole, where they will be obliged to remain till they can be buried at leisure, and new holes opened for more victims. It is seldom one has to fence more than one side of a field, but wherever the fence is it is a sure stop. After they commence flying, corn is too far advanced for them to damage, as it is too ripe to roast. Chinch bugs always fly with the wind—never against it. I have no doubt if these means had been thought of in season we might have saved thousands of acres of wheat in this county alone which were entirely destroyed. At any rate it will be extensively tried hereabouts if the bugs appear next season. The bugs generally commence on some small dryish patch, frequently in the middle of a large field of wheat or corn, in which case it would only be necessary to fence them in, instead of out."

Mr. J. H. Knight, Monroe, Orange Co., presented a new seedling apple.

On motion of Dr. Ward—Pruning of Trees and Vines was made the subject for discussion two weeks from to-day.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

January 17, 1865.

Mr. Nathan C. Ely in the chair.

A GOOD PLACE FOR EMIGRATION—ATLANTIC COUNTY, NEW JERSEY.

Mr. Nathaniel Hine, Absecom, recommends the above county to persons in pursuit of new homes upon cheap lands. He says: "I have one half acre (400) vines, set in the spring of 1860, from which I have sold, of fruit and must, $620 worth. One of my neighbors has 300 vines, set in the spring of 1861. Last October he sold $285 worth of must, besides furnishing a large family with fruit. Other small vineyards are equally productive. I lived thirty-three years on the shore of Lake Erie, not far from Kelley's Island. I believe this place preferable for grapes; the quality is superior. I have now twenty acres set with Catawba vines, which are perfectly hardy here on the sea-shore. I have one-third of an acre in bearing, from which I sold one hundred and fifteen dollars worth of fruit and made forty gallons of wine. I understand others in the county were more successful. I have been informed that in the new settlement of Hamonton, in this county, they expect to load three freight cars a day next season with strawberries. They have raised strawberries only two or three years for market. But they are 'white men' that have come and settled in New Jersey. With our experience, which we will readily give, other white men can do better in the same time than we have done. Good land for grapes and berries can be bought within two or three miles of the station or the shore for twenty ($20) dollars per acre, accessible to good churches and first-rate schools. All kinds of berries also are profitably grown here. This place is fifty miles from Philadelphia, on the Camden and Atlantic Railroad."

Root Grafting.

Dr. Benjamin F. Long, Alton, Illinois, says: "I am a practical fruit-grower, laboring with my own hands and overseeing all of the operations pertaining to the orchard. With regard to grafted trees for my use, I prefer the root grafted, and if necessary would pay a premium to obtain them. I planted one year one thousand of them, different varieties; also 133 top grafted trees; of the former all lived, of the latter three did not start. If by accident a small tree is broken off near to the ground, you will obtain a sprout from the stump and that will be of the improved fruit, and will make a tree quicker than a new youngster put in its place."

Agriculture of Peru.

Mr. E. G. Squier.—I shall to-day make a few remarks upon the agriculture of Peru. I shall endeavor to demonstrate to American farmers the great advantage they would derive from irrigation, not only in time of drouth, but in the benefit of the water as a fertilizer. On the coast range of Peru rain never falls, and there no crops can be grown without irrigation, but I found that planters in the interior, where it does rain, valued irrigation almost as highly as others did where it was indispensable, because it rendered them perfectly independent of the clouds. I surveyed one of the ancient irrigating canals, that was over 200 miles long, which brought the water from the mountains, following the level around the points of the spurs, and then far up one side of valleys and down the other, giving out water at various points. This canal is supported along the mountain side by the most substantial masonry, and all the conduits for discharging water are solid stone pipes or troughs. Wherever he traveled he was hardly ever out of sight of these ancient works for irrigation, some of which are in decay, while others are still in use, though to a far less extent than formerly, owing to the wretched condition of the country, which barely produces food enough for a very meagre supply for the people. In many places where streams were insufficient, extensive reservoirs were made, and the water of the wet season stored up to supply a deficiency in a dry time.

The mason work of some of these reservoirs is very substantial and extensive, and in modern times would be expensive. Under the system of government by the Incas, all the labor required for the public good was levied upon the people. Without water, Peru could never have supported the dense population that existed there at the time of the Spanish conquest, which Mr. Squier thinks has been a great disadvantage to the world, as the state of civilization now is far below what it was when the Incas ruled, and the agricultural productions are very much smaller. A very large proportion of the country is incapable of being cultivated, and in ancient times the mountain sides were terraced to an extent no where else to be found in the world. He often saw the terrace walls twice as high as the level at the top was wide, and all these terraces had to be watered from some stream higher up. No animal, except the Llama tribe, could traverse many of the steep hill sides that were terraced and cultivated.

At present there are a few very fine sugar plantations, the cane of which yields nearly twice as much sugar as cane does in Louisiana, probably on account of its more perfect growth, caused by irrigation. One sugar estate owned by a Mr. Swain, a Scotchman, was conducted in the most admirable manner, with improved machinery, which he had introduced in spite of the most persistent opposition from native planters, who do not appear to desire any improvements upon the old crude methods. Indeed, agriculture in Peru appears to be at a very low ebb, and in no point of view is there anything in that country to tempt an American farmer to go there to settle.

The agricultural labor of Peru is done mainly by Chinese under a sort of limited system of slavery, and by native Indians, who are not much to be relied upon, and who still entertain the hatred of their fathers toward the race, that conquered and subjugated their country, and they have become indolent, ignorant, drunken and wretched, living in hovels upon scanty food, and growing nothing more than absolutely necessary for their own wants.

Some of the food plants of Peru, I think, might be profitably introduced into this country. For instance, Quinua, which grows high up the mountains, above the level of the cereals. This in two or three varieties would grow around Lake Superior, where cereals fail. I have seen quite a crop gathered from plants in such a cold region that they only grew a few inches high. This plant grows not unlike our common dock, the seeds being small as mustard or similar seeds.

There is also a kind of pulse, a small white bean, that yields 2,500 to one planted; this, I think, might be profitably introduced into American agriculture.

Maize or Indian Corn.

"Maize or Indian Corn in found everywhere is Peru, except in the high Punos, and presents itself in numerous varieties. I shall not enter into a discussion of the question whether it is indigenous in Peru, but am able to assert that it existed there at a very early period. I found it in making excavations among the ruins of Pachacamac and elsewhere, buried with the dead, in places where there were three layers deep, and where the walls of structures, ruined centuries ago, had been built over the forgotten graves.

"On the coast the maize flourishes very well, but ripens slowly, and is liable to mildew. The ears are generally short, but with a small cob, set round with more rows than ours. The ordinary variety is yellow, but there is also the white, and a stumpy variety of red and dark blue. The latter is most frequently found in the ancient graves, wrapped up with the dessicated bodies of the dead.

"In the Puno it will not grow at all, except in the immediate vicinity of Lake Titicaca and on the islands in the lakes. Here the stalks attain from two to two and a half feet in height, and the ear, which is seldom more than three inches long, starts from the ground close to the foot. The production is therefore very small, and the grain is almost wholly used for parching, for which purpose it is unsurpassed. The parched corn of the Puno would make the fortune of the old woman with the apple-stand on the corner, or the lame man who supplies the offices down town. This maize, or rather that produced on the sacred islands in Lake Titicaca, and on the Peninsula of Copacabana, was dedicated to the Inca, and made into bread for him by the Virgins of the Sun. It was also used in the rites of the ancient religion.

"But the maize *par excellence* of Peru is that produced in the deep valleys of the snowy Andes, through which the head waters of the Amazon have their course. These valleys are relatively warm, even at the altitude of from 9,000 to 10,000 feet. They are very narrow, often nothing more than gigantic chasms, where the rivers flow between almost precipitous walls, but sometimes they widen out and give strips of intervale land, which the Incas widened by terracing up the sides of the adjacent mountains. In these places the soil is usually rich, and is pressed up to its full measure of production by careful irrigation. This valley, most famous for its maize, is that of Yucay or Uru Camba, about eighteen miles to the northeast of Cuzco, the old Inca capital, through which flows the River Vilcanote, one of the principal sources of the Amazon. This, though small, is perhaps the finest and richest valley in Peru. It was here that the Incas had their royal gardens, their baths—in short what might be called their country seat. The lands are all beautifully leveled, and nowhere in the world is there so fine and symmetrical a system of terraces, or so complete a system of irrigation. Flanked by mountains of disintegrating limestone, the soil of the valley is wonderfully rich, and here is found the celebrated *maize real* or royal maize of Yucay, of which I present some average specimens.

"The stalk of this maize is rather thick and stout, the leaves rather broad than long and very fleshy. It grows no higher than good corn in New Jersey and Pennsylvania. The ear, as will be seen, is short, but very thick, and the grain twice or three times as large as that of our largest varieties of maize. Five or six ears of nearly equal size on each stalk is a common product, and makes this maize probably the most productive in the world. The pellicle or skin of the grain is thin, and the interior farinaceous to an unequaled degree. The same varieties of color exist here as on the coast, viz: white, yellow, dark red, and black or blue black. The black variety is sweetest, and hence is most sought for purposes of fermentation, in making *chicha*. The white is usually boiled, the pellicle peeled off, and then eaten with pepper and salt or with sugar. I may mention that the maize in the Sierra of Peru is planted in rows, and not, as with us, in hills. It is drilled very thick and afterward trimmed out by hand. The tools used in its cultivation are extremely rude, the plow being a crooked stick pointed with iron; just such, however, as is now in use in half of France. The hoe is more like a small adze, such as carpenters use, than anything else, and this is worked with one hand. The rows are about as far apart as with us. I cannot state the yield; it must be light, for manure is not much used. The Peruvians sell guano, they do not use it extensively. Eaten in a green state this corn is very nutritious. I advise every one present to take a few grains and plant them, and see what the product will be here.

POTATO.

"The potato is more used than any other article of food in Peru, where; as it is well known, it is indigenous. It is not extensively cultivated on the coast, but on the first range of ridges inland it grows in great perfection. The best variety is the *Papa amanilla* or yellow potato, which is unsurpassed for richness and flavor. It is grown in the *Camas* ten to twenty leagues back of Lima, and does not appear to bear transportation from certain favored localities. I am told it degenerates into the ordinary potato if planted on the coast or taken higher up in the Sierra.

"High up in the cordilleras of the Andes, the potato forms, with the *quinua*, the chief support of the people. Here, however, it is small, and presents several rather widely separated varieties, viz: the *Ulluco Oca*, and *Maca*. The *Ulluco* is small, seldom larger than the English walnut, round and watery, of rather a sweet taste. Its leaf is like that of the potato, but smaller. The *Maca* is another fig-shaped variety, very sweet and subject to ferment. The *Oco* (*oxalis tuberosa*) is extensively produced. It resembles somewhat our "Lady Finger" potato, seldom more than four inches long, and little if any thicker than the middle finger. It is generally a beautiful clear pink, darker in the eyes, but sometimes is prettily variegated with yellow and pink. Like the others just mentioned it is sweetish, very pleasant to the taste when boiled or roasted. The Ulluco, Maca, and Oca are almost always subjected to a course of alternate exposure to frost at night and sun by day, before eaten. The Oca by this process becomes mealy, and loses the slightly sickening taste which it possesses when freshly taken from the earth. The Maca is thus exposed for a long time, until well dried, and then put in a cool dry place for preservation. The Ulluco, through this process, may be preserved for years.

"The common form in which the potato is used or offered for sale in the elevated departments of Junin, Aqucucho, Cusco, and Puno, as well as in high Bolivia, is that of *chuno*. The *chuno negro*, or black chuno, is made of the ordinary edible potato, and the *chuno blanco*, or white chuno, of a larger and bitter variety, which is more productive than the other. The potatoes are exposed on a smooth piece of ground, slighly covered with *ichu* grass, sometimes on clothes spread on the ground, and allowed to freeze at night and thaw by day for from fifteen to thirty days, being frequently turned, until they become perfectly dry, when they are stowed away for use, or packed in bags for exportation. Many reach the towns and cities of the coast, and are much valued for use in that abominable drench or stew called *chupe*. In taste the *chuno*, when boiled, is something like the boiled Spanish chestnut. To the teeth its feel is like what I suppose that of half-decayed gutta percha might be. The potatoes are sometimes soaked in water for some days before being exposed as above described. Another way of preparing the potato for preservation is to boil it, peel it, and then expose it as before. The objects of this process seem to be the longer preservation of the potato, for as chuno they will keep for years, the reduction of bulk and weight for ease of transportation, a matter of importance in those mountain regions, and finally to render the vegetable mealy and more easy of use. Foreigners generally acquire speedily a taste for the chuno, and prefer it to the potato in its other forms. Perhaps our farmers, having their potato crop overtaken by frost, may take a hint from the Peruvian practice, and make a little chuno on their own account. They will, however, hardly find the clear frosty nights, cloudless days, and dry atmosphere of the Altos of Peru to assist them in the process."

The Quinua, the Grain of the High Mountain Regions.

"The only grain grown in these high barren regions is the *quinua* or *quinoa* (*Chenopodium Quinoa* of the botanists). It belongs to the same class of plants with the beet, spinach and sweet dock, and the grain is a wholesome, nutritive, and not unpleasant article of food. The leaves, while green, are used like spinach, and are quite equal to the spinach in flavor. The grain is cooked in a variety of ways, but more particularly in the *chups* or soup (the universal dish of the Sierra), which it thickens, and to which it gives a slightly pungent flavor. It is sometimes boiled into a thick paste and eaten with salt, or salt and butter, and with sugar. Sometimes, also, it is cooked with cheese and the *aji*, pepper. Its light, dried stems are used for fuel, giving a quick, bright, but fleeting, flame—something of value, however, in a country where the dried dung of the llama and vicuña constitute about all there is of fuel.

"The people of the Puna distinguish four varieties of the *quinua*, viz.: *Q. blanca*, or white *quinua*, which has the largest grain: *Q. real*, which is very like the *Q. blanco*; the *Q. acorito*, or gray *quinua*, and the *Q. canagua*, smallest of the varieties, but most hardy, and grows at the highest altitudes. I found the *Q. canagua* at the apechita of Tiahuanaco, overlooking Lake Titicaca, 16,500 feet above the sea. It was not over five or six inches high on the average, but well spread out and loaded with seed or grain. Lower down it was larger, and on the islands in Lake Titicaca, I found the *Q. blanca* four feet high, with stalks as thick as one's thumb.

"The *quinua* produces largely, but I am unable to give even an approximate estimate of its yield per acre. It is a grain which, I am sure, might be introduced successfully in the colder, sandy, and more arid regions of our own country, where the better grains will not flourish, among the Adirondacks and around Lake Superior, as well as in many parts of Canada, even into Labrador and around Hudson's Bay. The attempts to introduce it in Europe do not appear, from what I can learn, to have been very successful, principally, I believe, because it is not well liked as food; but there seems to have been no difficulty in its acclimatization. I know that it is grown in the vicinity of Marseilles, in France, where it reaches the height of six feet and upward, and where its leaves are sought as an improvement on spinach."

Grapes and Cotton.

The grape grows with great luxuriance. The inhabitants make a very good wine from them, similar to sherry.

The product of cotton has doubled within the last two years. It has been estimated that 40,000 bales will be made this year.

A great many Chinese are employed in various agricultural labors. They are paid about eight dollars per month for eight years; then they become free. Many of the Chinese become rich.

At the close of Mr. Squier's remarks he distributed various kinds of corn, and other cereals, to the members of the Club, after which Mr. Solon Robinson offered the following Resolution:

Resolved, That the Club has listened to this discourse on the agriculture of Peru with an interest that is very difficult to express. It conveys information of great importance to the American Farmer. For this the American Institute Farmers' Club tender their sincere thanks to the Hon. E. G. Squier.

The resolution was seconded by Mr. Carpenter and unanimously adopted.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

January 24, 1865.

Mr. Martin E. Thompson in the chair.

SORGHUM AND ITS PRODUCTIONS, AND WHERE IT CAN BE GROWN.

Mr. Nathan C. Ely presented a specimen of very superior syrup made by J. P. Tilton, Monmouth county, N. J., the product being 200 gallons per acre, of a quality that would readily command $1.50 per gallon. Mr. Tilton states that a good deal of the same kind was produced last year in that county, and the prospect is that the crop will be very much increased in 1865.

Mr. Wm. S. Carpenter thought that if 200 gallons per acre can be relied upon in this vicinity, sorgo would prove the most profitable crop that can be planted. He inquired what was the expense of manufacturing.

Mr. Solon Robinson replied that those who established mills would gladly receive and grind the cane, and manufacture the syrup for one-fourth the product. He, however, begged those who might be tempted to plant their whole farms in sorghum, not to forget the very important fact that the syrup which is now worth $1.50 per gallon, has been and may be again sold in this city at one-third that sum. The refuse cane is valuable only for fuel.

Mr. R. H. Williams.—Some weeks ago there were exhibited several fine specimens of sugar made from sorghum, and if even fifty cents per gallon is realized from the syrup it will pay. From my observations I consider this crop very exhausting to the soil.

Mr. Wm. S. Carpenter.—As to the question of exhausting the soil I think there is some error, for we know that Indian corn has been raised several years in succession.

Mr. R. H. Williams.—To grow crops in succession it is necessary to restore to the soil, the material which the crop has taken out, and that sorghum required manuring every year, and that a single crop appeared to use up all that was applied.

Mr. Dodge said: "Then sorghum is just the kind of crop that I should like to grow, for I want a crop that I can manure highly, and be sure that the crop will convert all the manure into a salable product. If sorghum can do that, then it is just what we should recommend all farmers to plant."

Mr. P. T. Quinn said that he had grown sorghum near Newark, New Jersey, upon a small scale for a number of years. He believes the cultivation just about as expensive as that of corn, and that it is in no degree more exhaustive of the soil. He finds it an excellent crop to grow for soiling purposes. At first, the seed was used in the poultry yard, but that was discontinued because somebody said that sorghum seed would kill fowls, and he had never been able to investigate the truth of the assertion.

Mr. F. Margan, Wawanda, Wisconsin, writes that he lives a little north of latitude 44 degrees, and that he grew sorghum there last year which ripened the first of September. A Mr. Hillman raised about seven acres, which being of a late variety, did not all ripen. He made about a thousand gallons, which sold from $1 to $1.50 per gallon.

Sugar from Indian Corn.

Mr. George Bartlett said : It is very proper to state in this connection what I have lately ascertained in relation to the patent which has been talked about so much here, and upon which a company with a very large capital has been organized in this city for the manufacture of sugar or syrup from Indian corn. Professor Seely, of this city, who, as some of you know, is a very competent judge of such matters, has lately returned from Washington city, where he examined the three patents issued to the German chemist of Buffalo, who it was alleged had made the great discovery that cane sugar could be manufactured from Indian corn at a rate per bushel that was somewhat astonishing. Professor Seely says that the matter patented is simply what has been known to scientific men for many years, that starch could be converted into grape sugar. His process requires the corn to be converted into starch by the ordinary method, and then into syrup of sugar. One of his patents is for a process of mixing corn sugar with cane sugar. The whole secret of the new process and the new organization for the manufacture of this sugar is a contrivance to adulterate the sugar of commerce.

Mr. Nathan C. Ely stated that proposals had been made to him to invest money in this new project, but investigation had satisfied him that the process was not a new one. Nevertheless, men in this city had invested a large amount of money for the patents, and were erecting a large building in which they intend to manufacture sugar and syrup from corn. It is not for him to say what they will do with it. The establishment is nearly ready for operation, and the proprietors are well satisfied that at the present prices of sugar and corn, the manufacture will be a very profitable one.

Merritt's Patent Tree Protector.

Mr. A. C. Felton.—This invention is designed to prevent the ascent of the female insect, which deposits the eggs that produce the canker-worm. It is the invention of Benjamin Merritt, jr., of Newton, Massachusetts. It consists of a peculiarly-shaped glass circle held in an iron frame, made in two parts to encircle the tree, and is held in place by a cloth hood, which is tied tightly around a few inches above the ring.

It should be borne in mind that the females of all these worms are wingless, and that the males which are fully winged are provided with no instrument capable of damaging any part of a tree; so that although they may settle upon the trees, no injury can thus ensue.

As the females must crawl up the trunks of the trees in order to deposit their eggs, or if they lay them upon fences, &c., the young caterpillars must crawl up the trunks to feed upon the leaves, the moment it attempts to traverse this smooth semi-circle of glass, the weight of the lower part of its body throws it off its balance, and it falls to the ground. The cost of these protectors is said to be at present eight cents per inch diameter, and that it is absolutely effectual to prevent the ravages of the canker-worm. It either wholly prevents, or greatly checks, the ravages of any other insect which reaches the branches of the tree by crawling up the trunk, and when once applied, it requires no further expense, care and attention, or so little as to be of no consequence.

Pruning Trees and Vines.

The regular subject, pruning trees and vines, was then taken up.

I have an orchard which has been planted twelve years, and I have pruned it at all seasons of the year without perceiving that one had the advantage of the other. I made my last pruning of large limbs in midsummer, because I had read that it was best to do so when the trees were making a vigorous growth. The article stated that in August the sap is descending, and causes the wounds to heal over more quickly. I found this to be the case—that some limbs four inches in diameter, cut off two years ago, are now entirely healed over.

Mr. Ward said—I have pruned at different seasons, and for Winter pruning prefer the last of February or first of March. I have never seen any ill effects from August pruning. I think that all wounds made in early Autumn heal quicker than at any other season. If the pruning is done late in the Spring, the wounds are apt to bleed and injure the tree. I never met with this difficulty with limbs cut early in March, and it is economy of labor to do the work at that time. I have noticed when limbs are cut for grafting that if the weather is such that the growth remains dormant for some days, the wound heals readily. Upon small trees, pruned with a knife, I would cut at any season. It is the best plan to pinch back the limbs of dwarf trees, instead of letting them get such growth as to have to be cut away.

Mr. George Bartlett earnestly recommended the use of gum shellac to cover all wounds made in pruning, budding or grafting. He said: I used to raise all my own apple trees, because I could do so for less than the cost of their transportation from the nursery. I found when I cut away the stalk close down to the bud that I frequently lost my labor, beside a year's growth. After I adopted the plan of covering the cut with shellac I never lost a tree. I consider shellac indispensable in every orchard or nursery.

Mr. Smith, of Lebanon, Ct.—I have twenty-five acres in apple trees, and I have tried pruning in all seasons. I would rather do it in Winter than not at all; but of all others I prefer the season of blossoming. If necessary to make a second pruning I would do it in August. It should be a rule never to let limbs get large which will require to be afterward cut away.

Mr. Peter G. Bergen, Long Island.—My object in pruning is to get fruit soonest. The difficulties I labor under are that my pear trees grow wood rapidly and do not produce fruit; what shall I do with them? Trees that are of moderate size and grow but little wood are most productive. Some persons say, prune in Autumn to make trees fruitful. Shall I cut off all the new wood?

Dr. Ward.—Growth may be undoubtedly repressed more by pruning in Autumn than at any other time. I inquired of the late Mr. Reid how I should obviate this very difficulty. He said: Wait patiently until nature effects the remedy by giving the tree its proper time for growth. If you cut away the limbs, others will grow in their place. You must trim to bring the tree into shape; it is difficult to force its fruitfulness by the pruning-knife.

Mr. P. T. Quinn, of New Jersey.—From the observations made to-day, the pruning seems to be applied to old trees, but as a number of us are setting out trees, the remarks I shall make will apply to young trees. It is by the knife alone that dwarf pears are brought into proper shape. One year from the bud there is a single shoot. It must be cut back so as to leave a stem of from one to two feet. Then several shoots start. At the end of the second year they are generally sold at the nursery. The bud in the quince stock is then about six inches above the surface. If planted the same depth, the heavy top is apt to break off at the junction. If set a few inches below the junction, the pear strikes root. After the tree is planted, leave one center shoot, and prune and train the others so as to make a pyramidal form. Keep the fruit spurs as near the base as possible. I prefer to prune in March and April. It is very important in picking the fruit that you are careful not to injure the fruit buds. I often tie the long, slender limbs of pear trees into a circle to check their growth and make them fruitful.

Mr. Wm. S. Carpenter.—When the trees are young, they grow rapidly without making fruit buds. There are several ways to induce trees to bear, binding the limbs, &c. When a tree comes into bearing you will find it does not make such rapid growth, but produces fruit buds. Pruning of fruit trees is a beautiful study.

Weeds for Bedding.

A person who lives in the suburbs of the city recommends the use of weeds for stable bedding, "because straw at six to eight cents a small bundle is an expensive luxury. Last season I made a loose scaffolding in my barn, and began in early summer to spread over it weeds from the garden, along the road sides and from vacant lots, even incorporating a lot of thistles. These I placed upon the scaffold every few days, and if not dry when put on they became sufficiently so before more was added. I am now using it daily to bed a cow and horse, and the supply will last some time longer, but I shall lay in a larger stock another year, and add some forest leaves. Besides the weeds were a few potato, tomato and bean vines, all of which answer a good purpose, and my manure heap is larger and more valuable from these additions."

Flower Seeds for Distribution.

Mr. Wm. R. Prince has sent to the Secretary the following flower seeds for distribution:

Clematis Viticella purpurea—Purple Virgin's Bower, a hardy climber.

Bignonia flava—Bright Scarlet Trumpet Flower, a hardy shrubby climber.

Hibiscus roseus Jallidus—Pale rose Hibiscus, a hardy perennial.

Cassia Marylandica—Maryland Cassia, a hardy perennial.

Bignonia Princei—Prince's splendid Bignonia.

California Splendid Lupin—Perennial.

Liatus pyramidalis—Purple spiked Liatus, perennial bulb.

Hibiscus militaris—Halbert-leaved Hibiscus.

Indigo Shrub.

Mr. Prince says of the Crimson Bignonia, that it is a seedling of B. grandiflora. It is the most magnificent of the whole family, and blooms in immense pendant clusters. Not a plant exists out of my possession, and these are the first seeds distributed. Any lady inclosing a prepaid envelope to John W. Chambers, Secretary of the Farmers' Club, New York, he will take great pleasure in forwarding the latter seeds, with any other he may have on hand, to the applicant.

Planting Forests on the Western Prairies.

Mr. James Vincent, Taber, Fremont county, Iowa, having approvingly read in the reports of the Club an article upon the economy of fuel, is moved to make an urgent appeal to all prairie farmers to plant timber trees as among the most profitable crops they can put upon a portion of their lands. For this purpose the soft maple and cotton wood is valuable out here, as both will grow rapidly on the high land. I have in my garden soft maples from four to ten inches in diameter at the butt, which I raised from the seed planted seven years ago. Some of them have borne seed for two years, ftom which I have raised other trees. These I have sold, though I do not make this my business. In no other way that I know of can a farmer so rapidly improve his farm and increase its value out on the prairie as by planting a part of it to timber. Soft maples, one or two years old, will bear transportation well, and would it not be well to suggest through the 'Farmers' Club' the use of this valuable wood and handsome tree, for the improvement of prairie farms in Illinois and Iowa.

To Prevent Rabbits Eating Trees.

Mr. C. H. Bradish, Adrian, Mich., says: "Make a strong decoction of tobacco, simmer down in lard to the consistency of thin paint, add a little soft soap, stir well, and it is ready for use. Apply with a swab or brush from the root of the tree to above the reach of the rabbits. We have also found that this remedy is equally good in preventing the depredations of the so-called 'Sap-sucker.'"

Blind Staggers in Sheep.

Mr. James B. Anderson, Sparta, Ill., asks for an easy remedy for a disease in his flock, which according to his description is known as the blind staggers. As there are no practical shepherds in attendance to-day, we shall leave Mr. Anderson to the care of outside members, in the meantime recommending him to purchase Randall's "Practical Shepherd."

Another Disease of Sheep.

Mr. D. N. H. Howard, Winawig, Fulton Co., Ohio, writes as follows about a disease among his sheep:

"I wish to learn, through the American Institute Farmers' Club, what is known of a disease in sheep, commencing in *brown canker sores* on the edges of the lips, and extending inside of the mouth. I never heard of the disease until it was brought here this fall by sheep from the East. The disease is contagious, as a number of my sheep have it by being exposed to a diseased flock, over night, in a barn, separated only by an open board partition. Is the disease a fatal one? and what are the remedies? As yet none have died."

Stamps for Marking Sheep.

Mr. A. Todd, jr., Ontario, Wayne Co., N. Y., sends us a set of cast-iron figures and letters for marking sheep. They are about two inches long, made with a convenient wooden handle, to be used as types to print letters or numbers upon the sides of sheep after being sheared, the mark being retained until next shearing-time. In this way a complete register can be kept of the whole flock.

Millet for Sheep.

Mr. L. Marston, Vermillion Co, Ill., asks the following question: "Is millet a good feed for sheep? It is admitted on all hands to be good for wethers and lambs; but is it good for ewes, especially for those with lamb? It is raised by many farmers instead of Hungarian grass, but encounters the same prejudices or objections as food for horses, and is rejected by some as unfit for ewes. What says the Club; or if no one has tried it, will some outside member answer?"

Solon Robinson replies that as Hungarian grass is millet, whatever is true of one probably is of the other. I believe the only objection to the use of millet is the diuretic effect produced by the seeds. When cut before the seed is ripe, any of the varieties of millet make good hay.

Poison Ivy Cure.

Mr. John F. Coburn, Spencerville, De Kalb Co., Ind., says that a saturated solution of blue vitriol or common salt will cure the poison of ivy, if the part is washed repeatedly when the poison first makes its appearance.

Trenching for Grape Vines.

Mr. H. Schroeder, Bloomington, Ill., a successful grape-grower of that State, thinks that it is full time that the teaching that the ground must be trenched two or three feet deep has been a great drawback to grape culture, and as labor is scarce we must adopt other methods. If we had to trench all our vineyards in the old way, no part of the great West could ever become a grape country.

"The land for a new vineyard should, when possible, be plowed in the fall, or if in the spring just as soon as the ground is dry enough. To do this rightly, take a strong plow and plow as deep as you possibly can; in the same furrow follow with a deep tiller plow, putting it as deep as the horses can draw, turning the subsoil, or at least well pulverizing it, and so go over all the land. If you have time enough, it will be better to let the land lie for a few days or weeks before laying off your rows; eight feet apart is the preferred distance. To lay off your rows and have them straight, take poles eight or ten feet long, and put them at the end of the rows; on each pole put a handkerchief, cap, or a loyal, and if possible, a radical newspaper; use the poles as a guide. Then, with a good team, plow a furrow straight between the poles from one side of the vineyard to the other, changing your guide poles for each row. After making the first furrow across the field, returning make another furrow two feet from the first; so go up and down each row with the plow until you have thrown out a ditch, say two feet wide, along where each row of vines is to be planted. Now take Patrick with the spade and have him spade the ground you have so plowed as deeply as he can. That is, have him spade the bottom of the furrow thoroughly. If you have rotten manure, ashes or compost, go along each row with your wagon or cart, and throw in two or four inches of the manure into each ditch, covering the bottom well with it. Now put your plow on again, and plow so that every ditch will be filled up and a ridge formed along each row. By this plowing and spading, you loosen the soil two or three feet deep. This frequent plowing thoroughly pulverizes the soil, and leaves it in a fit condition to be penetrated by the tender rootlets of the young vines. It will be seen that in preparing the ground in this way you will have an open drain on either side of each row of vines. It would be better if all these side drains could empty into an open drain, of larger size, at the end or ends of these small ones. Now you are ready for planting.

"If you have no faithful German, go to work yourself, with a common garden-hoe, make a slanting shallow hole into your ridge where you wish to plant the first vine. Take your vine from its water-bath in a bucket, where it should be kept until the moment before planting, or from its grouted bed, spread out the roots and cover your vine. To every vine, put down a small stake three or four feet long; to this your vine is to be tied during the first year's growth; trim your vine so that you have but one eye above the ground. With your six or eight feet pole measure off for your next vine, and plant as before, and so on until you get through your vineyard. If you have anything suitable, it would pay you to mulch your vine-row. It will save you many a vine during the hot, dry days of our summer, and at the same time will enrich your ground.

"You can now plow your ground between your rows, and between each row of vines plant two rows of strawberry plants; keep these plants in rows by frequently using the cultivator between the grape-rows and the strawberry plant. By this you keep your strawberries within bounds, and at the same time you keep the ground around your vines in good condition. Let no weeds grow in your vineyard nor among your strawberry plants. By this plan of raising strawberries, last year I sold over $3,000 worth from four acres of my old vineyard. These plants will pay you for all the treatment of the land as well as for the vines. It is very essential to have good healthy vines for planting any vineyard. The most failures have been made in consequence of planting inferior vines. Many good varieties of grapes have been condemned and called humbugs, by reason of nothing but inferior steam plants having been planted. Many of these new kinds have been sold at enormous prices, and have given nothing but dissatisfaction to all buyers."

Underdrains, where there are no Stones or Tiles.

Mr. Wm. K. Griffin, Equality, Ill., gives his experience in underdraining, which may be valuable to many other persons similarly situated. He says: "My wet land has a clay subsoil; there is no stone near by; the nearest saw-mill is five miles away, is run by steam, and never sells lumber for less than one dollar per hundred in gold; and there is no tile manufactory in these parts. I found that open ditches filled up from frost and overflow; besides, they were in the way of team and plow. About three years ago, after several experiments, I adopted the following plan for underdrains, which has proved highly satisfactory thus far. When the ground is saturated with water, I dig a ditch three spades deep, and thirteen inches wide at the bottom. In the bottom of this primary ditch I dig a subditch eight or nine inches wide at the top, six or seven inches deep; the sides sloping so as to meet at the bottom. I prepare a material for covering the subditch, by cutting a tree of some durable and free splitting timber, sawing it into sections thirteen inches long, removing the bark, dividing each section into eights by means of the wedge, and continuing the division as long as practicable with the froe The pieces thus obtained are from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in thickness at the bark edge, and of course much thinner at the heart edge. They are placed over the subditch, the thick edge of each lapping a little over the thin edge of the piece preceding. The ditch is then filled.

"The discharge of water into the drain is greatly facilitated by the action of crawfish, which perforate our wet lands here in every direction. I found that my first ditch drained the surface pretty effectually for four rods on each side, so I constructed my drains about eight rods apart. The project works like a charm, greatly to the surprise of my neighbors, very few of whom had ever heard of underdraining before. After long rains I have seen some of my drained land six inches under water, and in twenty-four hours after dryer than the hillsides. Situated as I am, the cost of the above described covering for the subditch is less than one-fourth that of sawed boards a foot wide. I think that two men, familiar with the use of the saw and froe, could, in free timber, get out enough for sixty rods per day. The size of log that works to the best advantage is that, the semi-diameter of which is about equal to the length of the froe.

"Can any one tell by experience whether these subterranean passages will remain after the covering shall have rotted away? My theory is that they will; but I should like to know what has been the experience of others."

Mr. P. T. Quinn.—The difficulty with the plan is that the wood decays so soon, and then, I think, the drain will clog and cease to operate. I have had to take up a stone drain lately that operated well at first, but after being down seven years, became clogged. I do not think that the drain the gentleman describes will fail as soon as the wood decays.

Mr. Solon Robinson.—Still, for persons situated as Mr. Griffin is, I would recommend that mode of draining, even if it had to be renewed every seven years, for the benefits would more than counterbalance the cost.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

January 31, 1865.

Mr. Nathan C. Ely in the chair.

VEGETABLE FLOUR.

Mr. H. G. Bulkeley, Cleveland, Ohio, sends for the inspection of the Club, three specimens of vegetable flour, dried by superheated steam, with pressure only sufficient to balance the weight of the atmosphere. The steam comes into direct contact with the vegetables, and they are taken from the steam dry enough to grind into flour in a common grist mill. The steam dispels the air, and takes its place to convey heat. Steam will carry heat, by convection, ninety to three hundred times as rapidly as the air, in drying. The sample of pumpkin flour inclosed is taken from ninety pounds—the product of two double loads of pumpkins dried by steam, and ground in a grist mill, directly from the steam. One pound of this flour will make ten to thirteen pies. This allows of having pumpkin pies in the *spring* of the year, when milk and eggs are plenty, and when other pie material is scarce. The dried carrot is much esteemed by some for improving the color and richness of coffee. The potato flour may be shipped around the globe. All kinds of fruit can be dried quicker, better and cheaper by this than by any other mode. It greatly improves the quality of tobacco and prevents waste by shorts. Four years old tobacco can be made by this process in as many days. Superheated steam, without pressure, is a disputed principle. I have been perfecting this principle for seasoning and drying all kinds of substances for eighteen years, at a very great expense, and will explain to any one who desires to know more about it. Fruit and vegetables may be placed on frames, and the frames piled on cars, and dried while the cars are passing through the dryer. Some persons use as many as thirty-five cars in one kiln. As soon as a car load of the dry material is taken from one end of the dryer another car of the undried is run in at the other end, pushing the cars ahead on that track. In this way the dryer is perpetual, and no cause for going into the dryer to add or remove the drying substance."

The samples of pumpkin, carrot and potato flour were as fine and dry as wheat flour, and looked as though they might be as easily preserved.

ROOFING—WHAT IS THE CHEAPEST.

Mr. John C. Reed, Seneca Castle, Ontario county, N. Y., wants "to know if there is any cheaper method of renewing the roof of an old building than by shingling. We may dispense with fences but we cannot with barns and sheds with tight roofs. I have thought of making a cement of water, lime and sharp sand, and plastering over the old shingles, and after it becomes dry paint with coal tar. How do the Club think such a process would do for barn roofs?"

Mr. Solon Robinson.—I think it will not answer. It is very difficult to repair an old shingled roof, by any process except reshingling. A great many roofs have lately been made with pitch and coarse gravel, laid upon cloth nailed to a boarded roof, pretty flat, and some persons who have them prefer them to all others. We think if they are skillfully put on by experienced workmen these roofs are good, durable, and not excessively expensive. It is certainly time for farmers to be considering what they can use for roofing as a substitute for shingles. We have never been able to discover the reason why thatched roofs have gone out of use in this country.

The Dog Law.

Mr. H. P. Fitch writes from Oswego, New York, a congratulatory letter to the Club, for agitating the subject of an improved dog-law in this State. He says: "It is a move in the right direction, and now is the time to act. Don't stop agitating until we have such a law as we desire.

"There are men in every town that would be glad to circulate a petition, but they perhaps do not know exactly how to draw up one—that is, how to word it. If the Club would frame and publish a form, it would be copied and circulated in many towns, and prove a dead shot to dogs."

Mr. Solon Robinson.—Here is a form that will suit the purpose:

To the Legislature of the State of New York:

Your petitioners ask an amendment to the "dog law" of this State. We ask for one similar to the laws of Massachusetts and Connecticut, which requires all dogs to be registered and licensed to live, upon paying a tax and wearing a collar. Make it lawful for any one to kill an unlicensed dog, and the duty of all officers to execute them. We believe in protecting sheep. We believe there is no mode of doing it equally effective as taxing those who will keep dogs, for they prevent farmers from keeping sheep. We pray you, make the dog tax a general fund to pay all damages done by dogs.

Dr. John B. Rich related a circumstance of fourteen valuable sheep destroyed one night in Columbia county, by a small wire-headed terrier, which no one suspected to be able or disposed to do such mischief. He said he was obliged to keep dogs upon his farm, and wanted a law that would protect good ones and destroy the vicious.

Mr. Dodge said the damage usually done sheep, as in the case mentioned by Dr. Rich, was by dogs which had no owners. He presumed there were ten thousand dogs in this city in that condition.

A gentleman present said he had seen 75,000 sheep in one flock in South America, and the flocks there are constantly attended by a number of dogs which are trained to be their natural protectors. The pups are taken from their mothers and suckled by ewes. The sheep will follow the dogs where-ever they lead, or in case of danger will huddle together while the dogs run around upon the outside of the flock.

The Chairman.—At the Ohio Woolgrowers' Convention, which met some time since, a statement was made that sheep to the value of $25,000 were destroyed by dogs in that State in one year.

Mr. R. H. Williams thought that we should improve the breed of dogs.

Cranberry Culture.

Mr. C. W. Hartshorn, Jacobstown, Burlington county, New Jersey, highly recommends South Jersey to cranberry growers.

He says the mode of preparing the land there is to grub up the bushes and roots and cart them off, and then plow the ground. It is harrowed level, and marked in furrows two and a half feet apart. Vines are set in the row one foot apart, and cultivated the first season with a horse-hoe afterward with a hand hoe only, and by pulling out the weeds. The great object is to keep them clean without disturbing the runners till the ground gets completely covered over with the vines. Now as to the selection of the ground for the garden, the best is along a good stream of water where it can be dammed to overflow. Ditches should be cut at right angles to back the water into in a time of a drouth, about every thirty or forty feet. The cost of the land and preparing it, and setting out the vines, is from $50 to $150 per acre. The yield per acre in this section of New Jersey is about 100 to 200 bushels per acre. The price of the berries in the market varies from $3 to $8 per bushel. The climate in South Jersey is as good as any in the United States for the cranberry, if not the best, as the New Jersey berries bring the highest price in the market. Thirty dollars a barrel for cranberries is a great price, and should begin to open our eyes and mouth to the discussion of the subject of the cultivation of the cranberry."

Poison Ivy.

Mr. James Bailey, Sunbury, Delaware county, Ohio, says: "There are two kinds of ivy. No one was ever poisoned by the five leaved vine; it is only the three leaved vine that poisons, and but few persons are affected by that or sumach. The five leaved variety is a perfect antidote for the poison of the three leaved variety. After suffering indescribably from the poison, I took a few leaves and chewed them, and rubbed some blisters on the back of my hand with the juice. It stopped the itching at once, and in less than twenty-four hours the blisters had dried up and become flat. I have not had a blister on me since that time from poison, although I have been frequently exposed to both ivy and sumach, and I have seen others use it with the same good effect. The leaves of the five-leaved ivy, when first chewed, have a pleasant, sour taste, but if chewed too long they have a pungent taste like wild turnip."

Hedges.

Mr. John B. Wood, Great Falls, N. H., says that barberry will not thrive as a hedge on dry soil, and he presumes that no farmer, after a few years experience, would tolerate a honey locust. He says: "I think the apple or pear is the best article for a hedge in any climate where trees are liable to be killed by freezing. And I would suggest that a hedge of apple trees, with a good mixture of tall blackberry bushes, would make a hedge through which no creature would be willing to risk his hide. And then only think of the delicious blackberries peering out from your hedge and saying, 'come eat me.'"

White Acacia Seed.

Mr. A. B. Bradford, Enon Valley, Lawrence county, Penn., writes as follows: "Enclosed you will find some seeds of the White Acacia which I found growing on the island of Kulung-Su, opposite the city of Amoy, China. The Yellow Acacia grows there, too, in great luxuriance, and it forms so beautiful a hedge, that I brought with me a half bushel of the pods, which I picked with my own hands. In my anxiety, however, to preserve their vitality during the voyage from the effects of sea damp, I exposed them when crossing the equator to the rays of the sun, till I fear the germs were injured. The enclosed, however, were recently sent me by a gentleman in China, and are to all appearances entirely sound, They are the seeds of the White Acacia. In China I saw the most beautiful and perfect hedges of this plant, growing in the poorest soil in the world. As it is found all over that country and Japan, it occurred to me that if it would bear our climate and soil it would be invaluable, especially in the West, for fencing. It is very tenacious of life, is satisfied with a very poor soil and dry weather, and forms a perfect hedge. The Chinese plant it around their dwellings to protect them against the thieves, and from its umbrageous character it is altogether superior to the Osage orange. As materials for fencing are becoming scarce and expensive, I send you the enclosed, with a request to put them into the hands of some practical man who will plant the seeds, and ascertain whether the plant will thrive in our climate. I have no hesitation in saying that if it will do as well here as it does in China, it would be worth untold millions to our prairie farmers."

Muck for Manure.

Mr. N. E. Newton, Sussex county, New Jersey, says: "Muck I have tried on slate land here in Sussex county, and it is certainly equal to good barn yard manure; rye and clover growing full as good as where manure was used. Each one separate was the way I tried their qualities."

Flower Culture.

We make a few extracts from the many letters received by the Secretary from women who write for flower seeds. Mrs. Fry speaks highly of "the beautiful employment of flower culture." It seems that if the men realized how much good it did their wives and daughters to spend a portion of their time in the open air instead of steaming over a hot stove, embroidering or crocheting, they would encourage them in it, and offer at times a helping hand. Who doubts but what flowers grew in the garden of Eden? For what purpose were flowers made if not for enjoyment? When wearied with household duties, instead of throwing one's self upon a bed, or lounge, confined from the fresh air, to snooze away, would it not be more exhilerating to take a short walk among flowers, and rest ourselves, not on our feet, but upon a stool made for the purpose, and with our fingers, if nothing better, pull out the weeds that are depriving the beautiful flowers of the nourishment they require? Besides, it imparts a look of neatness to the surroundings. Then, how it diverts the mind from trouble, care and sorrow, to seek employment among their different farms, and developing and displaying our taste in their arrangement. In connection with the flower garden, botany would be more interesting. Its study exalts the affections, and teaches us to 'look through nature up to nature's God.'"

Mrs. S. Martha Malony writes from Albion, Noble county, Indiana: "We moved to this State two years ago. I brought a variety of flower seeds along with me. Our land was all new and unimproved. After we got a spot cleared and a house up, and moved in, I took a survey, and the prospect was not very flattering, as the stumps were so plentiful. My husband said I had better give up raising flowers till he could dig out the stumps and have time to assist me. But I told him I could not wait so long, for it might be years. And every thing looks so wild and rude after land is first cleared, I feared I would get homesick if I had not something beautiful to look at. So I commenced and made my flower beds as best I could, and planted shrubs and flowers around the stumps to hide them, so that by fall things began to look quite home like, for the plot in front of the house was all one glory of asters and petunias. And this year I have succeeded still better, and have distributed a quantity of seeds among my friends.

"Now if I am lucky enough to receive any of those flower seeds, I will promise to cultivate them with care, and if I succeed, will distribute seeds to others, as I have many friends that would be thankful to receive them."

We commend the example of Mrs. Malony to every woman whose lot is cast in a similar situation. She is certainly a good pattern for any American farmer's wife.

Mrs. E. M. Voorhees, Lodi, Seneca county, N. Y., says: "My husband is a farmer, with all he can do to till the soil for corn, wheat, potatoes, &c., but I want to see and smell something more beautiful than these, and though my hands are full of household cares, I feel sure I can spare some minutes each day tending a few flowers. Our children, too, will be made happy by being so sweetly repaid for their labor in helping to tend them. I wish you, and all who freely give flower seeds to those who are likely to appreciate them, many good gifts from our kind Father in Heaven."

Mrs. C. B. Allen, Johnson, Vt., says: "Four years ago I was married and settled here among the hills, and for the loss of dear friends and acquaintances which were left in a pleasant city in Massachusetts, flowers were introduced in and about my dwelling. For the first two years I engaged much in their culture and companionship. The third I was sick in the fall and not able to save seeds, and therefore shall rejoice to receive new ones. I love to weave about my country home garlands of flowers, all the while growing and expanding. Are they not a fair type of the human soul as it should be growing in grace and wisdom, ever showing forth some new beauty?"

Mrs. Levina S. Leavitt, Meredith, N. H., says: "It rejoices my heart that there are some hearts large enough and good enough to nourish the beauful flowers—God's own finger-work."

Pruning Vines.

Mr. Geo. H. Hite explained the method he adopts in pruning grape vines, so as to grow the fruit on a single cane. I prefer fall pruning, leaving an extra bud until the spring, which should then be rubbed off.

Mr. Wm. S. Carpenter.—I think it injures vines to allow them to bleed, if the injury is not seen immediately it will be found at a later period. I would recommend that the vines be trimmed late in the fall after the falling of the leaf, or early in the spring.

Mr. Thos. Cavenach.—I have never seen any ill effects from the bleeding of the vine.

Dr. John B. Rich.—I am a seeker after knowledge, but reasoning from analogy I should say that any waste of sap is an injury to the vine.

Mr. Cavenach.—I know that in planting shade trees in streets, we are often obliged to cut off the lower limbs, these bleed very much, and run down the stem and injure the trees.

Mr. R. H. Williams.—I deem this an important question. I have lived the best part of my life in a sugar making county. I have never seen any ill effects from repeated tapping of maple trees. I have seen grape vines trimmed in the spring which bled very much, but still the vines bore a large crop of grapes.

On motion, it was resolved that Mr. Thos. Cavenach be invited to give some experiments in training flowering shrubs, at the next meeting.

Adjourned. John W. Chambers, *Secretary.*

February 7, 1865.

Mr. Nathan C. Ely in the chair.

Earth Fences.

Mr. Adrian Bergen called attention to a notice of a new patent earth fence which can be made for fifty cents per rod, besides labor. It is said to be applicable for all soils and climates. It is never affected by frost. He wished to know if it is worthy of attention.

On motion of Mr. Carpenter it was

Resolved, That Mr. A. Bergen be a committee to examine and report upon the merits of this fence.

Dr. J. H. Warder, of Cincinnati, Ohio.—I have seen miles of these fences in Illinois, but I believe that they have been condemned. They look very beautiful when first built, being sodded on each side, but the frost soon affects them. These fences were built by English farmers who settled in the Rock River county. I think, however, that we should fence our own cattle in and not our neighbors' cattle out.

To Prevent Marks of Small-Pox.

Mr. Adrian Bergen.—The people in my neighborhood are excited about small-pox, and the young folks dread it on account of the disfigurement of the face. Now, I have heard Mr. Solon Robinson say that he has had the disease, and as he does not appear to be marked with any of its usual pits in the face, if he can tell others how to avoid them, he will do a greater favor to farmers' boys and girls than he would by telling them how to grow better crops, or anything else about farming.

Mr. Solon Robinson.—I have told how in print repeatedly. I will again. Get a small bottle of collodion (liquid cuticle), costing not over fifty cents, and as soon as the pustules begin to discharge, varnish them over with collodion, and take care to keep them constantly covered with it; that is, if the discharge lifts the film, put on more. This keeps the air from the sore, and it heals and leaves the skin smooth. A torn rag, rolled, with the fringe at one end, makes a good brush. Let the patient be kept in a cold room, not necessarily a dark one. At first the scars are red, then white, then they disappear.

A New Grass.

Mr. John K. Hale, Wyandotte, Kansas, sends a specimen of a new grass, a single tuft of which he found last autumn. He says: "From the fact of its longer growth than any other grass in the locality where found during the extreme drouth of last summer, it may be peculiarly adapted to this 'thisty land.'

"I feel a great desire to know its genus, and trust you will have it examined, and if indeed a new variety, reported on."

Mr. Solon Robinson.—This grass is common in Florida. It is out of place in Kansas. It is not worth cultivation.

Irrigation.

Mr. Hiram Brown, Carlton, Orleans county, New York: "We want information about irrigation upon this shore of Lake Ontario, where the soil is good, but suffers from drouth. Last year it injured our crops seriously, and it appears to be growing worse and worse Streams are numerous, which could be used if we knew how and had some general system."

Mr. Dodge replied that we never can successfully practice irrigation in this country for want of concert in action among the numerous owners of small farms. The system needs studying and laws to promote, and educated engineers to carry into effect.

Mr. George Bartlett said he had seen some very beneficial effects from irrigation in Massachusetts. In one case a piece of poor sandy land was made to produce great crops of grass by irrigation of water from a woolen factory.

Dr. Sylvester Lyons, Wayne county, New York.—Irrigation is carried on in the South in the raising of rice. The lands have to be banked. Water is allowed to flow on the land in which the rice is planted. This is called the bud-flow, and again at a later date the land is again flowed, which is called the harvest-flow.

Mr. Wm. S. Carpenter alluded to the value of irrigation for strawberries, which cannot be successfully grown without a free supply of water.

Mr. Solon Robinson thought irrigation of far greater value for grass than strawberries, as the value of the crop can be doubled upon any land by the use of water alone. He said that Dr. Sylvester was mistaken about rice, that it could not be grown inland. There is a kind of upland rice that grows like wheat upon dry land. He has seen it produce sixty bushels per acre in the interior of South Carolina.

Apple Tree Insects.

Mr. J. S. Woodward, Hess Cross-Roads, Niagara county, New York, sends the following :

"With this receive a box containing some apple limbs, which are punctured and contain some eggs—of what insect? Also a limb marked '1,' on which are a pile of eggs—of what? Also a cocoon marked '2,' on which are a lot of eggs—of what? Also a few cocoons marked '3,' some of them perfect, and some containing some other insect. What are the insects making the cocoons, and what the insects which they contain?

"The cocoons are fastened to the limbs, and the leaf to the cocoon, on the upper side.

"There are three worms which have appeared on orchards in this vicinity within four years.

"First and worst, a worm about one and a half inches inches long, reddish brown or dark orange, with gray spots; its head is smooth and a dark, dull red, and at about one-third of the distance from the head back it looks as though its back was broken and a callus had formed of the same color as its head.

"These worms when first seen are all on one leaf, about one-sixteenth of an inch long, and the first leaf is only eaten so as to leave a skeleton leaf, and when they move they all go to another leaf, and then range in a row around the edge, just as thick as they can lay, and eat at the edge, and in this way go from leaf to leaf, and soon a young tree is entirely stripped of leaves. I have frequently found eggs like those on limb No. 1, where these worms had been. What worm is this, and is there any better way than to watch him and crush him in his infancy?

"Second, but not half as bad, a green worm about four inches long, and having two rows of spines or protuberances along his back, of an orange color, one-quarter of an inch long, and the first pair next his head are one-sixteenth of an inch in diameter, and are covered with black spots or dots. These go in pairs and are voracious, and will soon clean a tree four or five years set entirely of leaves. What worm is this, and is there any better way of getting rid of him than to shake him off and put a foot on him, for I cannot bear to to touch him with my hand?

"Third, a little fellow, one-half or five-eighths of an inch long, a dirty white, and lives in the end of the young shoots when they are two to four inches grown, and eats down the inside and kills the shoot entirely. This is not very destructive, but is very vexatious, as he spoils the shape of our young trees by heading them back just when we don't want them headed back. This is the hardest to find of any of the worm family; and when we have found him, he has done all the mischief. These are all apple pests, of course.

"Which is the best way of pruning a young orchard, to cut out the centers, or to leave that and form the trees pyramidal as much as may be? Please present this to the Club for consideration, and information to the fruitgrowers in this vicinity."

These specimens were submitted to Drs. Trimble and Warren, both good entomologists, who say that the limbs are pierced by the tree hoppers, or flower crickets. The parcel marked No. 2 contains the eggs of the dusky vapor moth (*Orgya leuco-stigma*), one of the most beautiful of insects. The parcel marked No. 3 is the same which have been destroyed by ichneumon flies, the chrysalis of which are left in place of the eggs. The protuberances on the limbs are a group of the pupa of some ichneumon fly. The worm with the protuberances is seldom numerous enough to do much mischief. It carries its eggs on the outside in those bunches. The male is a brown moth, with wings. The female has none. If we all knew how to distinguish the ichneumons and preserve them, while we destroy the eggs of worms, we should soon get rid of the pests. There is one class of ichneumons, said Dr. Trimble, that greatly resembles the common house fly. This one has no ovipositor, and so she fastens her eggs upon the outside of the worms, into which the young ones eats as soon as hatched. These are God's intruments to destroy worms that are noxious to us, and we ought to study them carefully. The tree hopper that has pierced these limbs did so to deposit eggs to remain until warm weather in spring. This leaf is fastened to the limb and cocoon by the female that laid these eggs, for their protection.

Mr. Dodge inquired if we could learn which insect to destroy and which to save.

Dr. Trimble.—"Certainly, just as easily as you can learn anything else, by careful study."

The ichneumon fly destroys great numbers of catterpillars; these flies appear to be made on purpose to destroy catterpillars.

Sheep Shedding Wool.

Mr. Daniel Reed, Morenci, Lenawee county, Mich., wants to know what will prevent sheep shedding their wool in winter. He says:

"I have about one hundred sheep, which I keep in a warm, dry stable, never allowing them to get wet. I turn them out on pleasant days for a few hours, and feed twice each day with clover and timothy; with a small quantity of corn once each day, with a good supply of water; and yet my sheep commence to shed their wool badly. Can you give the reason? I do not think there is any disease among them; they all look first rate, and seem to do well."

Mr. Solon Robinson says that one of the best remedies for this disease, for it is as much a disease as any other, that he has ever tried, is feeding the flock plentifully with turnips.

Perhaps some of our outside members can give the cause and cure of the disease. If so, it will be acceptable to a great many young shepherds, particularly in the West, where the complaint is more common than at the East.

Acclimitation.

Mr. Solon Robinson.—It is stated that not until the sixth century wheat was first sown in England. Up to the sixteenth century Englishmen grew few fruits and vegetables. What they consumed were imported. Their chief food consisted of bread, beef and mutton. Nearly all the favorite flowers in England are exotics. The rose came from France, Flanders and Italy; the honeysuckle, hawthorn and passion flower from America; the lavender, rosemary and mignonette from the south of Europe; the laburnum from Hungary; the laurel from Portugal; the bay tree and daffodil from Italy; the weeping-willow from the Levant; the foxglove from the Canaries; broccoli, beans and cauliflowers from Greece; peas from Spain; carrots and celery from Flanders; asparagus and kidney beans from Asia; lettuce, artichokes and cabbage from Holland; parsley from Egypt, and potatoes from America. The mulberry is from Italy; the apple and plum from Syria; the grape from Portugal; the nectarine and peach from Persia; the gooseberry, cherry and strawberry from Flanders; the currant and apricot from Greece; the quince from Austria; the pomegranate, orange and lemon from Spain, and the raspberry and walnut from America. The hop plant came from the Netherlands.

Taxing Dogs.

Mr. Solon Robinson.—The subject of taxing dogs is agitated now in many directions. The *Ledger*, Philadelphia, says: "The Legislature of Pennsylvania is considering the propriety of taxing dogs.

"In the report of the Agricultural Department for 1863 is a very valuable article on the whole subject of legislation in regard to dogs, especially in the bearing of it on sheep-raising. This very clearly shows that if we would have sheep cultivated and wool cheap, we must abate the dog nuisance. Every year shows that laws of increasing stringency are being enacted in the different States against dogs. While in some countries of Europe they are also of increasing severity.

"In fact it would seem that, whether right or wrong, the days of dogs are numbered. Sprung originally from the wolf, the fox or jackal, they seem to have been domesticated, and thus entered into a sort of Gibeonitish league with man, that has prolonged their term of existence. From the oldest historic periods, dogs have been the companions of man. And the very opening lines of the Iliad of old Homer shows that even then they were regarded also at times as his most fearful of enemies and tormentors, both in this world and even the next. Cities have long since had to pass laws against the race, of great severity, for fear of hydrophobia; but in the interior of this State at least they have had a good time generally, free from taxation, and, if the report may be believed, with even more liberty than was good for the community."

Yet we are quite behind other communities, for instance:

In Munich, Austria, all dogs are sent to the police twice each year. If in health, each receives a ticket, which he wears round the neck; if not, he is killed. In Rhode Island every dog has to be numbered, registered, described and licensed, with the payment of $1.15 for each male, and $5.15 for each female. Any one violating this law is fined ten dollars, and all unlicensed dogs are to be killed and buried at the public expense, $1 being paid for each dog so killed. Fifty dollars is the fine for removing a dog's collar. Damages to sheep are recoverable from the town or city treasury, and the town may then recover from the owner of the dog.

In Maine dogs may be taxed in any township where the citizens so agree; and in Massachusetts double damages are recoverable from the owner of any dog. In fact, to lead a dog's life means something worse and worse every year, as all the Northern States are bent on raising sheep and obtaining wool; and even the shepherd's dog has lost his old character for faithfulness, and is voted old-fashioned, and a sort of public enemy.

Many reasons are urged for this reform. The cost of keeping our 3,000,000 dogs in the United States is put down at $30,000,000 per annum, or as much as all the petroleum has produced during this last year. Then a million and a half more is put down for sheep destroyed and damaged.

Let legislatures then impose taxes; let them register and restrain; it will probably only extirpate the vicious breeds and mongrel curs, while the nobler forms will yet sufficiently survive only under those more tamed and proper restraints that shall prevent them from doing harm to the community. The fear of them must be no hindrance to the keeping of sheep.

Grapes in Winter.

Mr. Solon Robinson.—I have just received a sample of Catawba grapes from R. T. Colburn, of this city, preserved in Cleveland, Ohio, in the fruit house built there upon the plan of B. M. Nyce, Greensburg, Indiana. These grapes, after being a week out of the preservatory, are just as fresh and sound as though only a week from the vines in October. Ice is used to keep the room cool, and science has been invoked to preserve a degree of dryness in the atmosphere that keeps the fruit from decaying. At first, chloride of calcium was used, but a later discovery has proved that the bitter water of salt works, which is absolutely costless, furnishes a valuable substitute for the chloride of calcium of commerce, to absorb the moisture given off by the fruit. I may state that calcium is a silver-white metal, which by its union with oxygen forms lime. It is not known to exist in nature in an uncombined state. Chloride of calcium is produced when chalk, quicklime or marble is dissolved in muriatic acid, and a solution of chloride of calcium, sometimes called muriate of lime, is obtained. This solution occurs in sea water, in the refuse of salt-pans, and is sometimes allowed to flow away as waste, from chemical works. Mr. Nyce produced his chloride by immersing marble spalls or common limestone in muriatic acid, which produces fermentation by dissolving the marble, and becomes chloride of calcium in its fluid state. This is heated in a large pan of sheet iron until it becomes very hard and dry. It is then broken to pieces and put into troughs, where it becomes fluid again by taking up moisture in the room. It is then again taken out, dried, and the same substance may be thus used twenty or thirty times.

Although this process is quite inexpensive, yet I am told that the use of the bitterns is still less. The air of the fruit room is agitated by a fan connected with a cheap windmill on the top of the building. The temperature is kept at 34 degrees, and the dryness is regulated by a hygrometrical contrivance. The rooms are gas-tight, and Mr. N. keeps them most of the time so immersed in carbonic acid, created by the gradual ripening of the fruit, that a common candle or lamp will not burn in it. The reason for doing this is found in the principle enunciated by Liebig, viz: "That decay is much retarded by the absence of moisture, and by the substance being surrounded by an atmosphere of carbonic acid, which prevents the oxygen of the air from coming in contact with decaying matter."

Butter, eggs, meat, game, partially cooked fruits, fruit juices, or almost any substance liable to decay, can be kept in one of these preservatories.

The regular subject, Pruning, was then taken up.

Mr. Thos. Cavenach.—Visitors to the Central Park, cannot fail to observe how systematically the trees and shrubs, which adorn that beautiful resort, are pruned; all superfluous branches are removed and the greatest care taken to form the remaining branches into a symmetrical shape. Pruning, when judiciously performed, is an operation which is highly beneficial to most kinds of trees and shrubs. By pruning we not only bring the plant into a better form, but we can, in a great measure, control the vital forces, distributing them through all its various ramifications; giving each fruit and flower a due proportion. The secret of successful pruning, consists in knowing the nature of the particular tree or shrub to be operated upon, and the future use of each shoot or branch. If carried to too great an extent, the object is not attained, for every plant requires a certain amount of leaves for the elaboration of its sap; if this be reduced too much, flowers are produced less abundantly. On the other hand, if the branches are allowed to grow too thick they shade those beneath them and so exclude the light as to prevent that perfect elaboration of the sap, without which no blossom buds are formed, but an excessive amount of leaves are formed in the vain effort to obtain, by a larger surface that elaboration, which a smaller surface would effect in a more intense light. Only a few general rules can be given, as the particular treatment necessary, for each tree or shrub, must be decided at the time the operation is performed. The first pruning a tree or shrub receives is when it is young, and this is for the purpose of giving it a regular form. If the tree is to be grown as a standard, most of the side branches should be cut away and the main stem topped, when it reaches the height at which it is desirable to form the top; but with dwarf trees we must reverse the treatment; we then cut back the main stem lower down to induce the side branches to grow. When a tree has produced a number of side branches, care should be taken to remove all superfluous shoots, as they generally throw out many more than is needful. Most people think it will ruin a plant to remove strong and healthy shoots; but it should be borne in mind, that each shoot will not only increase in size, but will produce more or less side branches which will cause the space between them to be filled with small and weak shoots, and in this way producing a weak growth all over the tree. Some kinds of trees, as the apple, plum, pear and cherry, produce their fruit on spurs of one or two inches in length, which grow from the main branches; these spurs if not injured will continue to bear many years; so that when we have produced a proper number of main branches, regularly arranged, all that is necessary, for some years, is to keep the new branches from coming in contact, or any particular one from taking the lead, and thereby drawing to itself more than its proper share of sap.

Trees of the kinds named, when trained as dwarfs, require a continual shortening in of their branches, as well as thinning out to keep within proper bounds, and to promote fruitfulness. For general pruning the winter months are to be preferred, but no tree or shrub can be said to require pruning only once a year, for one pruning will generally create a necessity for a second and sometimes a third. This is the case with roses, when first planted, it is customary to prune them down to three or four buds, each of these will produce a shoot which must be again cut back to two eyes or buds, and so on until the plant assumes a symmetrical shape. The flower buds are produced on young shoots of this season's growth ; when done blooming, these shoots must be cut back two or three buds, which will cause it to throw out young shoots, and so continue during the season. Climbing roses require to be pruned closely every year, removing all the old wood which bloomed the season previous ; the strong growing varieties, as Prairie Queen, Belmont and Russel's Cottage, require close pruning; they are very rampant growers, and if the old wood is allowed to remain, it soon becomes weak and eventually dies. The hardy varieties of monthly roses generally lose some of their wood during the winter ; this must be cut away, otherwise the young shoots will be weak and consequently produce poor flowers. The perpetual varieties such as Giant de Battailes, Pius the Ninth, Baron Prevost, will flower in perfection in the fall if pruned in July, or as soon as they are done blooming in the spring. Almost all the flowering shrubs are benefited by pruning. Of course it requires some little knowledge of their various characters before commencing the operation. Those that produce their flowers on the young wood, as the Althea, or Rose of Sharon, Syringa Gordoni and some of the spireas, require to be cut back so as to induce them to make new wood. The Lilac, Wigelia and Forsythia, require very little pruning, only sufficient to keep them in proper shape. There is another class of shrubs which the Rhododendron may be said to represent. This class produces their flowers on the end of their branches. These should never be shortened except for the purpose of increasing the number of branches, and then no flowers can be produced before the next season. The hydrangea requires no pruning except to remove the old decayed wood of which bloomed last year, its duty being done. The different varieties of running vines next claim our attention. The ivy, which is not altogether hardy in this country, yet does very well in some situations, requires only to be let alone ; it attaches itself to any rough surface as brick or stone-work, and even rough wood, in fact anywhere it can find room to creep into. The bignonia or Trumpet creeper is similar in its habits. This plant we recommend highly for planting next barns, fences, or any out-buildings where the boards are rough or unplained ; it will not creep on a smooth surface. Care should be taken to prevent its running over roofs, as it is very apt to raise the shingles and to cause leakage. This requires close pruning of the young wood of last season's growth. Wistaria sinensis, one of the most showy of all the hardy vines, is of very rapid growth and needs very close pruning. Cut back all the young wood not required for an increased size to two or three eyes or buds. Lonicerra sinenses or honeysuckle, is the most troublesome of all the running vines to keep in a proper shape. It will twine itself around a stick, string, piece of wire, or in fact anything, and like a disagreeable tenant, it is difficult to get rid of. If properly trained, it is a beautiful ornament, loaded with fragrant flowers. It blooms at intervals during the season, and retains its leaves nearly all winter. In pruning, all the young wood of this season's growth should be entirely removed. In training, copper wire should be used, as it is not liable to rust, and will last several years. These variations in the characters of plants call for a corresponding variation in their pruning, and all that is necessary to acquire a thorough knowledge of their structure and habits is careful observation; and while we are pruning we should remember that nature may have designed that the plant should exert all its strength in perfecting seed wherewith to perpetuate its species, while we desire that its powers should be diverted from its natural channels to perfect that part which we think is of more value to us than that which is designed by nature.

Mr. Cavenach illustrated his remarks by pruning a great variety of shrubs.

Dr. Warder asked in relation to pruning gooseberries and blackberries?

Mr. Cavenach.—Gooseberries will not need renewing every third year, as some persons suppose, if the old wood is carefully cut out every spring. Blackberries should be pruned in March, by removing all the old wood and shortening the young branches. I do not recommend autumn pruning of blackberry or raspberry bushes.

The mention of blackberry bushes called up the new variety known as Kittany, discovered a few years since growing wild upon the mountains of Sussex county, N. J., which, it is believed by those acquainted with it, will entirely supersede the variety known as the Lawton.

Dr. Sylvester.—I have seen this new blackberry. I think it will be one of the best known for canning purposes.

On motion of Mr. Carpenter, the thanks of the Club were presented to Mr. Cavenach for his interesting and instructive dissertation upon pruning and that he be requested to furnish a copy of his remarks for our Transactions.

Fruit Trees by the Roadside.

Mr. G. Candee, Fort Butler, Wayne county, N. Y., wants the Club to urge upon the people of the State to plant the road with fruit trees. He says: "If they were set with cherry, apple, pear, plum or peach trees, each neighborhood selecting varieties adapted to their locality, I believe the small outlay would improve the State more than the same amount appropriated in any other way. Let each owner or occupant set along the highway occupied by them, and the work would be done with trifling expense to each. It would do much to improve the vandals, and help sustain the law prohibiting cattle trespassing in the highway."

How to Build a Cheap House in a New Country.

Mr. Thomas Tasker, Scott Township, Steuben county, Indiana, writes as follows:

"I see by the proceedings of your Club that D. M. Strong of Minnesota, wants to know the best way to make building brick; and as no one has answered that question, I will give my plan. I dug a circle large enough for a yoke of oxen to work in. I then removed the loam, dug the clay one foot deep, (any ordinary clay will answer.) I tread this clay with oxen, and added some straw cut three or four inches long. After the clay is well tempered with working it with cattle the material is duly prepared for making brick. I then made a mold twelve inches long, six inches wide and four inches thick. Two molds are enough, as one man will mold as fast as another man will carry away. The bricks are placed upon the level ground, where they are suffered to dry two days, turning them up edgeways the second day; then packed in a pile, protected from the rain, and left to dry ten or twelve days. In all cases, before commencing the walls for the first story, dig down to a solid foundation and fill up with stone to at least one foot above the level of the surface of the ground; and if the stone of the foundation was laid with lime mortar, so much the better, although mine is not laid with anything. These bricks are not burned, but dried in the sun. You can make your molds larger or less just as you like. I have built a house twenty-four feet square, with a wing twelve feet, and I would not trade it for any frame house of the same size that I have seen, and I am satisfied a house built of unburned brick don't cost half so much as a frame, and any laboring man can build his own house. I came from England a few years ago, having been engaged in the bleaching business all my life; never having seen a house of this description; did not know anything about building, and I have as comfortable a house as any in these parts. I am satisfied that a house of unburned brick can be built for less than a log cabin of the same size, and it is worth five log cabins."

Cheap Underdraining.

Mr. Tasker also gives his experience in underdraining. He says:

"I believe that there is no outlay on a farm that pays half so well as draining. I had a field of three and a half acres of what we call upland, that is, it is hard land. In one corner there was a low place, generally wet, and on one side there was another low place, always wet. These two places kept about all the field wet. I had tried several times to raise corn, potatoes and wheat, it was always a failure. I went at it and cut timber four feet long and two by four inches wide. I dug the drains three feet deep, and from two to three rods apart. Most of the drains were very hard cutting; it was this yellow clay mixed with gravel, very compact. The result was, I got a first rate piece of corn. I sowed wheat after corn, and got twenty-nine bushels per acre, and seeding it down to grass got a first rate crop of hay. Plowed again last spring for corn, but the summer being very dry the corn was not extra, but a good crop. Last fall sowed it to wheat, and am satisfied it will yield forty bushels per acre if it don't lodge. This field, costing me $100 in labor, has more than paid for itself. It has been drained four years.

"I drained another field the same size, also with the same material, and on the same plan. It was a great deal better to dig, being a blue or black clay. Being more porous we put the drains about three rods apart. This field was drained three years ago. The first year got sixty bushels of shelled corn; after corn, twenty-nine bushels of wheat per acre, badly lodged; harvested last harvest forty bushels of wheat per acre. This lot was in a worse condition than the other, as it would grow nothing but grass. You can judge whether draining pays when I tell you I got $2 per bushel.

"This lot cost $74 in labor, saying nothing about the timber. It will take about one large tree and four or five cuts off another to drain three and a half acres. I cut the timber two by four inches, lay one on each side, and cover with a piece of the heart; if I have not enough of hearts I split some a little wider. I am satisfied that the extra produce of this lot on any one crop has paid for the draining.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

February 14, 1865.

Mr. Nathan C. Ely in the chair.

DISTRIBUTION OF FLOWER SEEDS.

The Secretary, J. W. Chambers, reports that since the first notice that Mr. Prince had sent in some flower seeds for gratuitous distribution to any lady who would send a paid envelope addressed to herself, he has received about three thousand letters—five hundred of them during the last week, and he has returned many and will others as soon as possible, until the supply of seeds is exhausted. Several persons have sent seeds for others, with their application, thus creating a pleasant exchange. Mr. Prince has also sent a few more of the following kinds:

Laburnum, or Golden Chain, a beautiful flowering tree.

Hibiscus Syriacus, Rose of Sharon, a flowering shrub.

Bignonia flava, Golden Trumpet Flower, a climbing shrub.

Perennial Aster.

Bignonia Princei, a new seedling, alluded to in our last report.

Mr. Solon Robinson read several letters from ladies asking for these seeds. The first is from Mrs. O. P. Gates, Morrisville, Vt. She says:

"I am a widow; my only son is in the army, and my only daughter died a little more than a year ago, leaving me quite alone.

"I have a few house plants, and if you will please send me a few flower seeds that I can cultivate in my yard another summer, it will cause many a lonely hour to pass pleasantly."

The next is from Mary Cordelia Atkens, Jefferson, Ashtabula Co., Ohio, written neatly, and you shall say whether it does not touch a cord deep down in your heart. Mary says:

"I am a little girl, nine years old. I love flowers very much; but Pa has been in the army nearly four years, so we cannot have many flowers. Ma says if you will send me a few flower seeds, that she will let me have a bed in the garden, and when she hires a man to make the garden, she will get him to help me with my flowers. I would like a white lily very much, if you can send me a root."

Mary Jane Dean, Pultney, New York, asking for some of the flower seeds, says: "If you will please send me some of what you have, or such as you may hereafter get, they will be thankfully received, and I will try and cultivate them to the best of my ability, and will ever hold you and the kind donor in grateful remembrance."

Mr. Dodge moved to have the whole of the letters referred to a committee of five, for the purpose of discovering other fragrant flowers, like those which Mr. Robinson has just presented.

Mr. Dodge, Mr. Carpenter, Mr. Bergen, Mr. Bull, and Miss Allen, of Vermont, with the Chairman, were appointed said committee.

Sweetbrier Seeds.

One of our lady correspondents "wants to know how to grow the seeds of sweetbrier, in which she has not been successful." Mr. Cavenach replies: The buds must be gathered as soon as ripe, and the seed washed and placed in moist sand and frozen until the next spring, and then it will grow without difficulty.

Habits of the Chinch-Bug.

Mr. B. E. Fletherty, North Prairie, Knox Co., Ill, gives the following reason why the plan of sowing spring wheat upon unplowed corn-stubbles tends to prevent the ravages of that terrible pest of wheat-growers in Illinois, the chinch bug. The bugs that lay eggs in the spring do not deposit them until after the wheat is up. Then they work their way deeply down in loose ground and fasten their eggs upon all the fibrous roots. He says: "Last spring I carefully extracted some wheat that was in some very loose ground, and it was astonishing beyond anything I ever saw of the kind; the little roots were literally loaded with eggs. Where this took place, the ground was broken in the spring, and the wheat was not worth cutting. That which was harrowed in when the ground was thawed about two inches deep yielded me about twenty bushels per acre. These little pests can't work in the hard ground to deposit their eggs on the roots, so there are no young bugs. Now let every farmer make all the inquiry he can, and see if this theory does not hold good. One thing should be remembered: the bugs do not choose to lay their eggs in wet ground. D. K. Emerson, of Dane Co., Wisconsin, says the bugs generally commence on some small, dryish patches, because there the ground is more loose and generally deeper than other places, and they can penetrate to the roots to lay their eggs."

Corn Worms.

Mr. James V. Thompson, Richland Co., Ohio, says: "I discovered, last summer, on James River, Va., that nearly all the corn, when in the milk, was infected with worms, feeding upon the succulent kernels at the end of the cob. These worms, in size, color and general appearance, were much like the cut-worm; and so far as I could see, every ear in the field was attacked by this enemy. Can the Club give us the benefit of their remarks on this subject?"

Dr. Trimble.—This worm is from the angoumois moth; it has long been a pest of Southern corn-growers. It is not much known at the North. The early corn grown for market in New Jersey is infested to some extent. We have frequently seen ears upon which one-quarter of the grains were destroyed. It is not a very inviting thing to a delicate appetite to find the first bite of a roasting ear has been taken by one of these worms.

Mr. Theodore Holt, who has spent several years among the freedmen on the islands of South Carolina, said that he took several bushels of corn from here, thinking to grow a better variety. He does not think an ear of it ever ripened. It was all destroyed by the worms mentioned in this letter. They generally commence at the end of a row and eat through to the other end of the cob. He says the worm is more like that known here as the spindle-worm than it is like the cut-worm. The only remedy that he has found is to use varieties that grow very thick husks well closed over the point of the ear. He thinks no Northern variety of corn will answer at the South.

Sour Plants—How to Get Rid of Them.

Mr C. G. Brown, Alnepee, Lenawa county, Wisconsin, propounds the following question to the Club: "What is the best method of ridding the soil of sour-grass, vinegar-plant or sorrel, as it is called by these names. There are many farmers troubled with it, and a great many ways and plans have been tried?"

Mr. Solon Robinson.—Have you tried dressing the land with caustic lime, at the rate of thirty bushels of the powdered lime, freshly slaked, to the acre, spread upon the surface with wheat seed, and harrowed in at the same time? Have you tried wood ashes, a pint upon each hill of corn or potatoes? Have you tried deep fall plowing, so as to turn up some of the strong clay of the subsoil, and letting that pulverize in winter, and then seeding it to timothy and clover in the spring? Afterward, top-dress the grass every autumn with manure, free from sorrel seed, or dress it with lime, ashes, or finely-powdered clay—the debris of an old brick-yard is good—and if some of these remedies won't cure your land, you may as well emigrate.

A Mistake in the Germ.

Mr. Daniel Curtis, Farmington, Wisconsin, gives a detailed account of a sprout that he found growing out of the dead body of a grub, which he appears to believe had produced this vegetable growth. He is undoubtedly mistaken, notwithstanding he could not find any seed. Similar mistakes are often made. The pest of flax growers, called dodder, appears to have sprouted out of the flax stalk, where it is impossible that a seed could have been concealed, and it has often seemed a mystery to those who have examined it. Investigation shows that the seed is in the earth, that it grows a fine fibre which inserts itself into the flax, and then the fibre dies, while the plant, in its natural form, grows and draws its sustenance from the flax. The growth of a plant out of the body of the grub is no more mysterious than the growth of the flax parasite.

Squirrels as Friends of the Farmer.

Mr. S. R. Duven, Woburn, Massachusetts, writes: "I wonder if farmers are aware that the little striped squirrel makes food of the chrysalis from the caterpillar's cocoon? I have seen him at it several times within the last two years, and also learned that he was a meat-eater, for food or mdicine. Walking over an elevated portion of a road one day last summer, I heard a rustling in the grass and shrubbery in the ravine beside me, and forth came the squirrel with a little brown snake eight or ten inches long, and perched himself on a flat stone in a wall near by, and I watched him until the snake was consumed."

Sorghum—Its Cultivation and Manufacture—It will Make Sugar.

Mr. S. L. Denney, Christiana, Lancaster county, Pennsylvania, claims that he has made a valuable improvement in sugar cane mills, by which the feeding is easily regulated.

Sorghum Culture.

Mr. D. Petit, Salem, New Jersey, writes of his experience in sorghum culture, as follows:

"In your discussions of December 13, Professor Mapes says: 'There is no doubt that sugar can be made from sorghum; that Mr. Jos. S. Lovering of Philadelphia, several years ago fully demonstrated the fact. He published a pamphlet detailing the whole process,' and adds: 'The trouble generally with farmers is, they do not conduct the process with sufficient rapidity. The exposure of the syrup to the atmosphere to a great extent destroys the power of crystalization All the manipulations of the syrup lessen that power. The more it is stirred the less sugar it will produce, &c. Now I apprehend the principal aim of your discussions is to elicit and publish the truth. The Professor says: 'Let it be the duty of this Club to send out light upon the subject.' My object in now writing is to elicit the truth, and with all due deference to the opinions of the Professor, I will offer a few *facts* in my experience, which '*are stubborn things*' where they come in contact with preconceived opinions.

"I received one of the first packages of sorghum seed sent out from the Patent Office, planted them, and before the seed was fully ripe, had some juice pressed out and placed in a small vessel which was placed in a vessel of boiling water to evoporate. Consequently it was a long time in evaporating, for it never boiled, and we did not get rid of the green matter; and yet that syrup on exposure to the air formed crystals—grained fully as well as any I ever had. In using Cook's evaporator much of the juice and syrup remains on thé pan only while passing from one end of the pan to the other, constantly moving. I used a No. 7 pan 15 feet long. The process cannot be performed in less time. If the current, being thin on the pan, is stopped running while boiling rapidly, it will burn. The running motion is therefore the great secret of rapid evaporation. We have run off fifteen gallons of good syrup within an hour, and evaporated, at the same time, ninety gallons of juice, with one pan and only one fire. When making syrup, in the Fall of 1863, the drippings on the outside of the vessels used soon became thick with sugar, which shows that exposure to the air is not detrimental to crystalization. I placed ten gallons in an open vessel in a warm room to crystalize, and not till after several weeks did the crystal show but slightly, and then those formed first were in the skum on the surface; but frequently stirring and mixing with the syrup seemed to accelerate the graining until it became a mass, called mush. But I have not seen any syrup made last Fall, no matter how rapidly, that has shown any signs of graining. I have a letter by me from Wm. Morris Davis, of Philadelphia, the late able member of Congress from that city, a practiced sugar refiner (who performed the experiments attributed to Jos. S. Lovering), giving me directions for converting sorghum juice into sugar through its various manipulations. He does not object to exposing the syrup to the atmosphere, nor to stirring it. The process is too complicated, requires too much science, to be practically carried out by farmers, if not too expensive to be profitable in the end. First neutralizing the acid with an alkali, then clarifying with blood or whites of eggs, or passing through a bag filter; then removing the gum which retards crystalization by the addition of an alkali at a high temperature; then test again to know if all the gum is removed, until the white scum ceases to rise, &c."

Iron as a Fertilizer.

Mr. D. Petit, Salem, N. J.—In your discussions of Jan. 17, sulphate of iron (copperas) a poison, is introduced from an exchange as a wonderful fertilizer, but is not recommended by your Club; but it is there confounded with oxide of iron, which is not a poison but is a fertilizer. Permit me to offer you a few examples in support of these assertions as regards vegetation. There was a ditch cut many years ago, ten feet wide by six feet deep, along the shore of a piece of meadow which bounds this county on the north-east. This was done to cut off the springs. The earth excavated was composed in part of a large portion of green sand marl, strongly impregnated with sulphate of iron. The ditch bank was spread on the meadow side. From that time until I accompanied Prof. George H. Cook to see it (who was making a geological survey of the marl district), and which was about eighteen years, there had not a spear of any kind of vegetation grown on it. An acre of a field to be planted with corn was covered with a part of the material. That so covered remained nearly as bare as the traveled road, the season out, while on the remainder of the field the corn was good. I have tried oxide of iron (scales from the blacksmith shop) on grape vines, with good success, as well as on garden vegetables. According to the analysis of my marl, the best vein contains 25 per cent. oxide of iron, which, with the practical applications I have made, prove that oxide of iron is not detrimental to vegetation.

Dr. Sylvester Lyons, Wayne county, N. Y.—I do not find sulphate of iron poisonous to plants when used in small quantity. I find it profitable to buy copperas at two cents a pound to use in the compost heap. It is one of the best and cheapest deodorizers.

Mr. P. T. Quinn thought plaster cheaper and better; it produces the same result.

Mr. Thomas Cavenach said he obtained from the blacksmith's shop a load of stuff composed principally of the sweepings, which he mixed in a compost heap, and the result was injury or death to nearly all the plants to which it was applied.

Blackberry Culture.

Dr. Isaac M. Ward —At our last meeting some remarks were made in relation to the cultivation of the blackberry. "The best way I have ever found for training the Lawton blackberries is to plant them in rows four feet apart, and three feet between plants, and then stretch a wire between posts at each end of the row, supporting the wire if necessary between, so as to keep it about four feet high. In autumn I cut out all the old stalks that have just done bearing; then I tie the new shoots in a bow over the wire. I prune the side shoots to spurs about six inches long. This brings nearly all the fruit in clusters along the wire, and the rows are so clear of straggling vines, that ladies can walk between them and gather the fruit. I think this method of training also improves the fruit, it certainly increases the quantity. It also occupies the surface sufficiently and yet leaves room to pass between the rows with a wheelbarrow to carry manure, which blackberry vines need in bountiful quantity to make them productive. It is no matter how long your vines may be, when trained in this way they are tied down to the wire, so that the top of the bow is not out of reach."

Dr. Trimble.—My blackberries in the garden stand in a row along a board fence, and I have drawn a wire along in front of it, over which I train the vines in a manner recommended by Dr. Ward. It is certainly the best way of training them for garden culture that I have ever seen.

Mr. A. A. Powell, Brooklyn, said that there was a practical difficulty in growing this variety of blackberries in some parts of the country on account of the severe cold in winter. He has seen this difficulty entirely obviated by pruning closely, and then digging the earth upon one side of the roots so as to lay the canes down and cover them slightly with earth. I was present at the last meeting, and heard the remarks against the Lawton blackberry. Some years since I purchased some hundreds of these plants and set them out on my place, one hundred miles north of this, and although I lost many of the plants, yet I must bear testimony of the value of this berry.

Mr. P. T. Quinn, Newark, said: Three years ago, I had a stool of this variety of blackberries, with five canes eight feet long. I cut the side shoots to one foot in length, and I plucked that season twenty-seven quarts of berries.

Pruning Pear Trees.

Mr. P. T. Quinn gave a discourse upon pruning pear trees, illustrated by figures upon the blackboard, instructive to those present, but impossible to report. He showed how the tree should be treated, from the bud, year by year, to produce a fine pyramidal tree. One of the great benefits of this form is that it induces fruit spurs to start near the ground, and close to the main stem of the tree. The reason why trees have been heretofore pruned with bare stems is to carry the tops high up in the air so as to allow room to plow and cultivate the ground. He does not believe that anything is gained in the long run by growing other crops in a pear orchard. The owner should rely solely upon the fruit as a remunerative crop. It is useless to plant a pear orchard until the ground is thoroughly pulverized eighteen to twenty inches deep, made rich with manure and dry by draining, if necessary. It is better to devote three years to the preparation of the soil, than to plant in one that is poor and not properly prepared. He would set dwarfs 8 by 10 feet and standards 12 by 15 feet apart. He would never think of growing pears of any kind in sod ground. He thought it a great advantage to mulch ground. It prevents weeds from growing, and preserves fruit that is blown from the trees.

Mr. John G. Bergen, Long Island.—I cannot speak for other places, but I am satisfied that dwarf pears are not as popular as formerly on the Island. I know they won't succeed in grass land. My trees are not dwarf, because I planted them below the junction, and roots have grown from the pear and made standards. There are some standard pear trees on the Island 200 years old, and it never would have answered to plant these only twelve or fifteen feet apart. I like the pyramidal form of pruning for the garden, but in the field that is to be cultivated trees must be pruned higher.

Mr. Dodge inquired the object of dwarfing trees, if the pear was afterward allowed to strike root to make a standard.

Mr. P. T. Quinn.—The object is to make them bear fruit sooner. A tree, after once having formed its fruit spurs, always retains them if they are not broken off by accident or carelessness in picking the fruit.

Dr. Ward thinks the present cost of labor too great to think of growing pears as an exclusive crop. We must combine some other with it, and plant the trees far enough apart to work between them with a team.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

February 21, 1865.

Mr. Nathan C. Ely in the chair.

SOUTHERN ILLINOIS.

Mr. Wm. K. Griffin, Equality, Gallatin Co., Illinois:

Since my name has appeared in the reports of the Farmers' Club, I have received letters of inquiry relative to this region from persons looking out for homes in the West. I will therefore condense such facts—in addition to what I have hitherto written—as are most sought for by the prospective emigrant.

I shall confine my remarks chiefly to the counties of Gallatin and Saline, which lie together at the junction of the Wabash and Ohio, a little south of the 38th parallel of latitude; my knowledge of these being more intimate than of other localities of Southern Illinois. Shawneetown is the port of entrance to this section of the State, and should be the place of destination of any one coming here from the North-East. It is not directly connected by railroad with the interior, but has daily steamboat communication with Evansville, 70 miles above, which is connected by railroad with the North and East. Shawneetown is an old place of between 1,000 and 2,000 inhabitants, and contains considerable wealth, intelligence and refinement, considering its locality. It gave a large majority for Lincoln. Several of the business men of this place have considerable quantities of land for sale in the counties under consideration, both wild and improved. The former is rated at about $10 per acre, the terms of payment usually being about one-fourth down, and the balance in small payments at yearly intervals. For cash in hand good wild land was offered, last spring, at $5 per acre.

In this portion of the State there is no prairie within 30 or 40 miles of the Ohio river. This circumstance, together with the comparative mildness of climate, gives it an important advantage over more timberless and northern localities. The face of the country and quality of the soil does not, I think, differ materially from the more northern portions of the State, except that in the vicinity of the Ohio it is usual to find hills of considerable magnitude. We lack water power, but have, as an offset, inexhaustible mines of excellent coal.

Wheat and corn are very sure crops, and are the principal kinds of grain raised. Oats are not a profitable crop. Timothy and clover do well. Irish potatoes have never had the rot here, though the yield is less than in a higher latitude. Sweet potatoes, melons, and garden vegetables generally, are seldom wanting in their season. We are not more subject to excessive droughts than localities four or five degrees to the northward. Apples seldom fail, though the late varieties, in old orchards, are in some seasons subject to the bitter rot. Peaches produce abundantly, as often, on the average, as every alternate year. Grapes, strawberries, and some varieties of plum, do well. Cherries and red currants are less prolific.

Cotton, though seldom raised for exportation, can be cultivated with success. During my seven years residence here I have known of its failure but once. At present prices it is undoubtedly the most profitable product of the farm. Tobacco is a sure crop, and is extensively cultivated by the middle and poorer classes. It is their chief dependence for money-making.

Frost seldom appears after the 1st of May, or before the 10th of October; and the time for successfully planting corn ranges from the middle of April to the 1st of June. The ground is rarely covered with snow to the depth of six inches, or remains covered a week. Sheep are healthy and hardy, and live under a system of neglect, exposure and starvation that would prove certainly fatal to the whole stock four degrees to the northward. Pigs not unfrequently run wild, and remain several years in the woods without being fed.

Springs are rare, but durable water of excellent quality, though usually hard, is found upon medium elevations, at a depth of from 15 to 20 feet. In the more elevated localities, wells of that depth are liable to failure. Small streams are numerous, but not being fed by springs, are usually dry, or supply water only in stagnant pools one-third of the year. These streams have mostly deep channels, which afford excellent outlets for the artificial draining of the extensive bottom lands that lay upon their borders.

No product of the farm is exported largely, except tobacco. Whatever the farmer has to spare he can commonly dispose of at his own house, and that, too, at a price often equal to what he could obtain in the markets of St. Louis or Cincinnati. There are always many among the numerous tobacco-growers who, from their eagerness to produce a large crop of that commodity, neglect to raise an adequate supply of the necessaries of life. These are the usual purchasers of the surplus hay, grain, meat, etc., of each neighborhood.

Agriculture is at a low ebb in southern Illinois. What would be called good farming in New England or New York is not to be met with. This circumstance, together with a prevailing indifference to rural taste and public improvement, gives a bad impression to the visitor from the North-East, and has a tendency to draw his attention from the intrinsic merits of the country. The land, when cleared, is kept constantly under the plow. Very little meadow and less pasture are to be seen, and manure is rarely applied. The black bottom lands bear this barbarous system very well; but many of the old stumpless upland farms are badly exhausted, and should be avoided by the emigrant. Many of the roads are narrow, crooked and poorly worked. The farm buildings are commonly cheap structures of logs, many of the dwellings being without glass windows. Large families of the poorer class often have but one room in which to cook, eat and sleep.

Southern Illinois would be greatly benefitted by a liberal intermixture of northeastern farmers among its present population; and many a Yankee who is toiling to repair and renovate the timberless worn out homestead of his ancestors might find it to his advantage, and especially to the advantage of his posterity, to emigrate to this snowless region, where can be procured at a very cheap rate all the facilities for successful farming. It requires some philosophy to forsake the scenes of our childhood and the graves of our ancestors; but it is according to the immutable order of things that men, like bees, must sometimes swarm. Nor in doing so can they always preserve their latitude.

We are greatly in need of establishments for converting wool and cotton into cloth, and hides into leather. Mills for cleaning clover seed are unknown; a wheel is never seen attached to a plow, and a plow suitable for turning turf is not to be found. All that is wanting to make this portion of Illinois as attractive to the farmer of moderate means as any locality upon the continent, is Yankee enterprise, industry and intelligence.

Bitter Rot in Apples.

In answer to the question of the Chair as to whether the bitter rot mentioned in Mr. Griffin's letter, prevails in this section of the country, Mr. Wm. S. Carpenter stated that it had been known here, for a long time. It affects particular varieties much more than it does others. The Pennock pippin is very subject to bitter rot. The Baldwin is sometimes affected. So are Virgalien pears. The worst bitter rot that prevails in Egypt, mentioned in the excellent letter we have just heard read, I think is likely to be soon cured by the infusion into that country of such men as the writer of that letter.

Mr. George Bartlett.—I am well acquainted with the inhabitants of that region; their prejudice against the negro is not any worse than we find it right here. They are ignorant, prejudiced and unimproving. Their greatest fault is improvidence. I never knew one of them to have a woodpile. A family never has anything cooked in advance of its immediate wants. They live literally from hand to mouth. They never in any respect provide for a rainy day. The people are mostly emigrants from the slave states, and a great many of them are of Irish origin. Though ignorant themselves they generally manifest a strong desire to educate their children. They are industrious in their way. One man and horse will tend twenty-five acres of corn, and a hoe is seldom used in a corn field in that part of the State. All that is bad among the inhabitants is of the bitter rot of slavery.

Dr. Snodgrass.—The bitter rot of apples is prevalent in Maryland and Virginia, in many of the seedling sorts. The idea prevails there that it arises from the neglect of pruning orchards.

Mr. Thomas Cavanach.—We need not go to Illinois to look for such people as are described. They can be found within forty miles of this city; there are plenty of them on Long Island.

Mr. Adrian Bergen said he would not attempt to defend the civilization of the west end of the Island because he lived there, but he would say that upon the east end the people were very far advanced over some other sections in one respect—they did not practice the ridiculous and expensive folly of letting cattle run at large in highways.

Apple Tree Suckers.

Mr. H. A. Sheldon, Middlebury, Vt, says: "I bought a village lot with several old apple trees, which I want to replace with better ones. From the bottom of some of them are large suckers from one to three inches in diameter. Had I better graft these suckers, or eradicate the whole and plant new trees ?"

Mr. Solon Robinson.—As a general thing grafting suckers is poor business. It should be done only as a last resort. An old apple tree if still vigorous may be profitably grafted, but one already in a decline will go still faster if its large limbs are cut away for grafting. In Mr. Sheldon's case, it would be the best course to dig up the old trees, root and branch, and depend upon new ones, and it would be better to plant them upon some other part of the lot.

Mr. Holt said that in no case would he graft old trees, unless they were in vigorous condition, and he did not believe it would pay to graft suckers.

Mr. Wm. S. Carpenter said that he would much prefer to plant young trees upon new ground.

Mr. Dodge inquired how it would do to let the old ones stand, and plant the young trees between, and afterwards cut away the old ones ?

Mr. Wm. S. Carpenter replied that he would prefer to dig up the old stumps and set the new trees in the same places

The Oporto Grape.

Dr. Ward said that Dr. Sylvester, of Lyons, N. Y., was present with a sample of his Oporto grape wine, which he wanted the Club to taste, and have the opportunity of saying something of the history of this grape.

Dr. Sylvester said that although it bore a foreign name, and had been said to have originated from a vine brought here by a ship captain, he believed it a native American, as it had all its characteristics, was entirely hardy, and grows as strong as the Isabella. At Ovid, N. Y., it has been unfailing in productiveness for twenty years. There is a vine in Michigan twenty years old, which produced one year forty gallons of wine. Near Lyons, N. Y., there is a vine which has grown rampant over tree tops, fallen to the ground, and rooted again. This vine produced last year 23½ bushels, 40 pounds to the bushel. In cultivation, the vine grows so rapidly that it will not bear manuring. It runs then to wood instead of fruit. Land that will produce twenty bushels of corn to the acre is rich enough. The berries are of medium size, nearer round than the Isabella, and give a rich, dark color to the wine. When grown in Central New York, the juice requires from one to three pounds of sugar to a gallon of must. I mix the sugar, and ferment it with the pulp from twelve to forty-eight hours. This prevents the vinegar taste which the wine would otherwise have. I ferment the wine in barrels by the use of a siphon, or else cover the bung hole with oiled silk and several folds of old newspaper, held down by a weight. We are in latitude 43 degrees, and must use sugar there with all grape juice, to give it sufficient strength to keep. The wine should stand two years before bottling, and should then contain about 12 per cent. of alcohol.

Dr. Ward observed that many persons condemned sugar, declaring that good wine can only be made where the climate is favorable to produce a sufficient quantity of the saccharine principle of the grape.

Dr. Sylvester contended that if sugar is added in exact quantity it always improves wine, and he read a variety of extracts from foreign authors to prove this position. To grapes grown in high latitudes it is necessary to add sugar, while in the South it is equally necessary to add tartaric acid. The quantity of saccharine matter in grapes varies from eight to thirty per cent. Potato syrup is recommended, the same that is used in this country extensively to adulterate honey. In England wine was made in the fourteenth and fifteenth centuries by mixing honey and spice with the grape juice. In France, sugar and water are both used, and in one case mentioned, the grape skins were washed eight times, and 5,000 gallons of wine were produced from a quantity of grapes sufficient to produce only 300 gallons of must. In an essay upon the art of doubling the product of a vineyard, the author contends that the addition of sugar is not an adulteration of the wine, but an improvement, and Dr. Sylvester thinks that where must is deficient in sugar, three pounds should always be added to a gallon.

Mr. George Bartlett.—If the object of adding sugar to the must is to give alcoholic strength, why not add pure alcohol? It is worth now about 40 cents a pound, and cane sugar about 20 cents. There is a large establishment in this city, manufacturing sugar from starch, and the starch of potatoes is as good as the starch of grain, and as this sugar must be cheaper, why not use that? But first, why not use the pure alcohol?

Dr. Sylvester replied that it had been tried to some extent in this country, and to a greater extent in Germany. It is found that alcohol cannot be reduced and amalgamated with the grape juice, so as to entirely lose its character as it does when produced from sugar combined with the must.

Sugar Corn—A New and Valuable Variety.

Mr. James B. Olcott, East Greenwich, Rhode Island, says: "I forward you by express a box of sweet corn, introduced in this neighborhood by Mr. Thomas Hill, said to be of Spanish origin. I hope it will be as widely disseminated as possible, both this year and the next. I have no doubt lovers of green corn will find it a treasure."

Mr. Solon Robinson.—This corn will be distributed by the Secretary in small parcels. Has anybody else got some more they would like to distribute in the same way?

Value of Leached Ashes for Manure.

Mr. Willard Griffin, West Granby, Ct., gives the following information why leached ashes are valuable for manure. He says: "Some one of your correspondents several months since inquired if there was saltpeter in leached ashes. There is not. Saltpeter is nitrate of potash. Nitric acid is obtained from a substance that wood does not furnish. If leached ashes are deposited near the house, where soap suds, urine and other slops containing animal matter are thrown upon them, they will after a while contain saltpeter, and from such it may have been extracted. Wood ashes contain potash, soda, magnesia and lime, beside sulphur, phosphorus, carbon and common salt; about one-half of ashes is lime. Leaching extracts the potash and soda mostly, and but little of other matters; but as potash and soda are only a small proportion of ashes, they are nearly as good for manure after leaching as before. I have seen plum trees growing near a house where leached ashes were thrown around them every year, that retained a vigorous condition and were loaded with fruit for several years, while other trees in the neighborhood were subject to the ravages of the curculio and black knot."

Adjourned. John W. Chambers, *Secretary.*

February 28, 1865.

Mr. Nathan C. Ely in the chair.

Varieties of the Oak.

Prof. David Christy, of this city, exhibited to the Club to-day a fine collection embracing nearly all of the oak leaves of the country, in different stages of their growth, very varied in shape, size and color. Each kind was neatly arranged upon a card, with its common and botanical name and number, to compare with the number upon acorns of each sort. Professor C. spoke particularly of the leaves of *Quercus Leeana,* which for a time was supposed to be a newly discovered species, but the botanists pronounced it a hybrid of the common black oak and laurel oak. The leaves from a tree grown from the acorns of Leeana now show almost identical with the leaves of black oak. It is earnestly recommended to ladies in the country who have leisure, to make collections of various kinds of forest leaves, placed in neat portfolios, which be ornaments for their own center tables, or very acceptable presents to city friends.

Mr. Wm. S. Carpenter.—I have been highly delighted by this exhibition of the trees of our country; this exhibition does great credit to the labors of Prof. Christy, and he hoped this would be followed by others of other varieties of trees.

Trimble Sweet Corn.

Dr. Trimble.—I have just received from Mr. David B. Dickinson, of Livingston, Essex county, N. J., several bushels of corn from seed that has been spoken of in the Club. I wish to present it to the American Institnte Farmers' Club for distribution.

The favorable notice given of this sweet corn two years ago, in the reports of the Club published in the New York Tribune, brought me so many letters requesting a few grains of the seed, that my little supply was soon exhausted; but still the letters came, giving me a very troublesome correspondence. Most of these letters contained money, and as it had to be returned, I had to write an explanation.

A year ago last summer, I resolutely reserved for seed about one-fourth of all I had planted in the garden for the family, much to the annoyance of some of the members; and after supplying a great number of correspondents, friends and neighbors, I gave Mr. Dickinson enough to plant about an acre.

That acre was well managed, and produced between thirty and forty bushels, but unfortunately, the greater part of it was spoiled by the weather. The ground had been so wet in the spring that it could not be planted till very late. We had six weeks of such parching drought in the summer, that it did not come to its growth till too late to glaze or ripen, and then the fall was very wet, almost no sunshine. Seed containing so much mucilage or sugar, requires much care in such weather, and the farmer not knowing this, managed it as he did other corn, and found after one of the long continued rains that it was sadly moulded; but by great care he has managed to save enough to supply a good many thousand people if they will be satisfied with ten grains each.

This corn was sent anonymously to my wife's father about forty years ago, he supposed by some client who probably knew how much interest he took in his garden. He distributed freely among his friends and neighbors. I received it abont twenty years ago from his brother-in-law, the late Gov. Pennington, and by always selecting for seed from that planting that seemed to be the best, I think it has been improved.

I plant in rows four feet apart, and one foot apart in the row; beginning as soon as the ground is warm in April; and as soon as that is fairly up, planting again, and so on till the fourth of July. We usually have it on the table from early in August till the first of November, and would have it three times a day if the garden was large enough to produce such a supply.

I do not suppose this variety will be cultivated for the market; the ears are too short, but as it produces two or three ears to the stalk, it is about as productive as other kinds of sweet corn; but those who grow their own vegetables will find this as much superior to that found on the tables of hotels and eating houses, as the Marrowfats and Champions fresh from his own garden, are to the peas bought in the markets.

This is often called a thankless world. I have not found it so. Thanks come to me from friends and neighbors constantly. I am receiving letters all the time, full of thanks, for corn. Sometimes I get more than thanks—some send me insects. One gentlemen sent me specimens of the grasshoppers of the west; another the beetles of his part of Massachusetts. Some send me Ichneumon flies; one some Katy-dids; another the seventeen year locusts, &c., &c.

I like to receive all these letters, but I do want to be relieved from the labor of answering them.

Several members confirmed the statement as to the quality of this corn, including John G. Bergen, William S. Carpenter, Nathan C. Ely, Solon Robinson and Mr. Dodge, who stated that although the ears were short, the productiveness per acre was very large, as every stalk bore two or three ears.

On motion of Mr. Wm. S. Carpenter, the corn was named "Trimble Sweet Corn."

Help for the Bees.

Mr. Steele, of Jersey city, exhibited a Swiss invention, used in Switzerland, to aid bees in the formation of their comb. Narrow sheets of wax are imprinted by machinery so as exactly to represent the dividing wall of comb between the cells. These strips are attached to the top of the empty hive, before the new swarm is put in, thus enabling the bees to go on immediately to work, and also guiding them in making the sheets of comb in the proper direction.

Pruning of Pear Trees.

Dr. Ward cautioned those who read theories about pruning dwarf pear trees not to apply them to orchards, and to remember that there is a vast difference in the natural habit of growth between the varieties of pears; that a system suited to one sort would ruin another, so that no rule of pruning can be fixed. The place for dwarf pears is in the garden, not the orchard, and whoever tries to grow an orchard of dwarfs in New Jersey will be disappointed in the results. And he thought they would also be disappointed in trying to grow winter pears for profit, as he had tried for fifteen years, and never had a dozen fit for the table of those strictly winter pears. The Lawrence and some other sorts that are good in early winter are really autumn varieties. The Vicar is only fit for cooking, though at Boston that and some other sorts are good that are not worth growing here.

Mr. Wm. S. Carpenter contended for several winter sorts as being profitable with him, and he has kept Glout Morceau till the middle of April. He also recommends pruning all trees with open heads. At the fruit exhibition of Western New York, held this month, there were 105 varieties of winter pears, many of them unknown to him.

Mr. John G. Bergen said his greatest success had come from not pruning pears at all, except by cutting off such limbs as were in the way. He had nearly come to the conclusion to let nature take its course. We find it hard to make a tree take a new form. It will answer well enough to experiment in a small way upon dwarf trees in the garden, but for the orchard the least pruning is the best.

Dr. Ward condemns any system of pruning that necessitates much hand labor in cultivating the ground, or that does not admit the free passage of horse and cart through the orchard to gather the fruit.

Dr. Sylvester says that dwarf pear orchards are not a failure in Western New York, nor are winter pears. He particularly recommends the "Beurre Gris D'Hiver Noveau." We assure our readers that all that name belongs to one pear.

Rats—An Effective Trap.

Mr. William McKelby, Mansfield, Ohio, says: "I set a barrel with some bran or meal in the bottom, and let the rats work at that for a few nights until they all find it out and become accustomed to climb in and out, then remove that barrel and put one in its place that has been used for soft soap, the sides and bottom being covered. Set a dish of bran in the barrel, and let the rats come again and they will stay. I caught fifteen that way."

Grafting Grapevines.

Mr. James Hartley, Alliance, Ohio, says he is successful in grafting grape vines in the roots, both by split and splice grafting, but never above ground. Time, after hard freezing is over.

Cabbage Culture.

Mr. Horace Thayer, Blackstone, Mass., says: Always grow your seed from whole heads, not stumps. Do not use hog manure. We have a variety of cabbage, which we have grown extensively for some years past, which we consider far superior to any and all kinds in use among farmers and gardeners; very uniform in heading—large, firm heads, free from stump foot. We have distributed hundreds of packages in years past, which invariably have given the best of satisfaction. If any member of the Club would be disposed to give it a trial, we will willingly forward a package in season for planting."

Corn Harvester Wanted.

Mr. Joseph Dysart, Lodi, Tama county, Iowa, says: "Our great want here is a corn harvester. With the aid of Brown's or Elder's corn planter a man and a boy 15 years of age can plant in good season on the prairie soil of Iowa 50 acres of corn; by using Stafford's, Waterman's or any of a half score of sulky cultivators everywhere exposed for sale, either can cultivate it properly. But where is the corresponding machinery to aid in saving this crop in autumn? The inventor of such a labor saving machine would wake and find himself more famous than Whitney, McCormick or Manny."

Sheep Marks.

Mr. Aaron Smith, Pottersville, N. H., sends specimens of the invention of C. H. Dana, West Lebanon, N. H., for marking sheep, by inserting flat metal rings in the ears, upon which numbers are stamped to correspond with the same in a register.

Coal Ashes.

Mr. Isaac B. Rumford, Kennet Square, Chester county, Penn., says: "I would like you to bring before the Farmers' Club the question, what effect do stone coal ashes have on wood ashes? We find that if a handful of stone coal ashes gets in with the wood ashes the lye will not make any soap. Why is this so? and will it also destroy the value of wood ash as a fertilizer?

Professor Christie said he had heard of this difficulty twenty years ago.

Professor Nash said that if the coal ashes contained any appreciable quantity of sulphuric acid, it would destroy the value of wood ashes, unless quicklime is added to the leach to absorb the acid. As to the value of coal ashes as a fertilizer, all experiments have been too indefinite to give any trustworthy results.

Mr. Thomas Cavanach said that he spread a garden bed several inches thick with coal ashes, which were mixed with the soil, and they rendered it for that season almost barren. His experience is that the are of no sort of benefit to land, except as a divisor.

The Chairman said that he found last summer a tomato plant growing out of a bed of coal ashes, about as large as an ordinary hay cock flattened down; so far as he knew there was nothing but coal ashes in the pile. He found them exactly suited to the growth of the tomato. He had no plant in the richest garden soil that was more thrifty and prolific. True, it was but a single experiment, yet the Club might take it for what it was worth.

Adjourned. John W. Chambers, *Secretary.*

March 7, 1865.

Mr. Nathan C. Ely in the chair.

Culture of Silk.

Mr. Frederick Baare.—By three years unceasing labors I have succeeded to transplant a branch of the much neglected silk industry from the city of New York into the much neglected valley of the Schoharie. There are about one hundred American farmers' and mechanics' daughters around here who have learned from me the art of weaving broad silks, and forty of them are now busily engaged by me in this occupation.

Insurmountable difficulties have not deterred me, and from the firm foothold now gained, I can now reach another branch cast away and trampled down, which is shooting fresh sprouts from the dirt into which it was buried, a fresh green branch of hope rising modestly and unobserved by our cast down looks from thistles and thorns, ready to spread its delightful verdure which a nation may recover from exhatstion.

A man who has, starting from nothing, built up since 1852 his silk manufacturing establishment in New York, and carried it up to the highest standard reached in our country—who passed the dry goods panic of 1854, the crisis of 1857 unhurt—who lost all he had, but his life and that of one child in 1860—who passed the ordeal of a conflagration in 1863, and still feels sure of his craft and maintins credit, is no enthusiast.

I think, gentlemen, that the hour has struck when the culture of the Mulberry tree should be revived. It should not be done by the sound of the trumpet, but quietly, in distant valleys, by the few men to whom this objhct legitimately belongs, and who alone can set a lasting example.

Raw silk in 1843, good No. 1 Tsatlee was worth in the New York market $4.50 to $5 per lb. Wages to *competent* hands was no less than $3.50 to $5 per week; about $2 for apprentices. At these rates silk culture was to *some* remunerative. To-day No. 2 Tsatlee, (No. 1 is inaccessible,) is worth in New York market $7.50 in gold, or $15 currency. Wages to-day are in *currency*, $2 for apprentices; $3.50 to $5 per week to expert hands. (This is what will pay a girl at work, higher rates make them go visiting.) Raw silk, duty free, taking *strict* No. 1 Tsatlee at about $9 to $10, has gone up 100 per cent., while wages have gone down 50 per cent. since 1843. The amendments to the tariff act now before Congress will tax raw silk 10 per cent duty. To all that, thousands of bales are now annually consumed by us. Hands eager to plant and to reel are not abundant but in sufficient number.

I want to gratify the wishes of my neighbors to furnish them cuttings of Multicaulis and White Italian Mulberry trees or shrubs; also the eggs of the silk moth.

Flower Seed Distribution.

The Secretary has already received and answered 2,500 letters, by returning the envelopes with seeds inclosed, to the ladies who have applied for seed sent in for distribution.

Peat for Locomotives.

The Chairman read an account of an experiment made at Syracuse, N. Y., in running a locomotive with peat, which proved highly successful. It is stated that one ton of coal for twenty miles is the usual allowance, and that half a ton of peat did the same work. Farmers who have peat swamps are advised of their value.

Where is the Best Place for a Sheep Farm?

Mr. Burton L. Kingsbury, Alton, Ill., answers the above question of a correspondent in favor of the Neosho Valley, Kansas:

"The valley consists of high rolling prairie cut up by numerous well timbered streams. There is an abundance of feed for all the sheep in Pennsylvania, free of charge. The winters are short and mild. Sheep and cattle will live the year around from what they can get from the prairie and timber; but it is more profitable to feed in the winter. Hay can be cut and put up close to where it is wanted to feed out. The prairies will turn off from one to four tons per acre. The climate appears to be particularly adapted to sheep. I was a resident of the Valley nearly eight years, and never heard of sheep being attacked with any of the diseases peculiar to sheep in other States. To winter large flocks there, it would be best to get on the creek bottom in the timber, to break off the wind. The best carding mill in the State is on the Neosho, at Burlington."

To Prevent Sheep Losing their Wool.

Mr. John William Myers, Dover, Lenawee county, Mich., says all that is necessary is to take the flock into winter quarters in good condition, and keep them so through the winter.

Cultivation of Onions.

Mr. H. M. Hoffman, Andover, Mo., wants information about onion culture. He says: "We do not succeed here on account of the maggot. Is there anything that will kill it, or (what would be better) that will keep the fly away? I have seen sulphur recommended. What is the best fertilizer for an onion crop?"

The best manure, and, perhaps, the best remedy for the maggot, is a liberal dressing of wood ashes. A compost made of hen manure is also excellent. Sulphur has not proved a preventive, nor has any certain remedy yet been discovered.

An Inquiry About Stone Wall.

Mr. Seth Pettit, Northeast, Erie county, Pa., says: "I wish to make a piece of stone wall upon a piece of land that is low and apt to heave by the frost, so bad that in a few years it is as good as no fence."

Mr. Solon Robinson.—If there is a solid foundation low down, you must dig to it; if there is no such foundation, you must make one by digging a ditch three feet deep, and filling it with cobble stones, or else place flat stones or timber—the latter will answer if the ground is always wet. Upon this build your wall, and it will withstand abundant heaving.

Osage Orange.

Mr. R. R. Ray, Vermillion Co., Ill., "wants to know if Osage orange can be grown from cuttings." We think not; certainly not without more trouble than would suit ordinary farmers.

The Damask Rose.

Rev. Mr. Weaver speaks highly in favor of this old fashioned rose; says that it is difficult to obtain it since the nurserymen seem to have taken to newer sorts.

The Isothermal Line of Peaches.

Mr. George Bartlett says that he believes it was first discovered by Mr. R. Southwick, of Rhode Island, that the destruction of fruit buds upon peach trees took place in winter, and not from Spring frosts. Mr. John Osborn, a neighbor of his, then set about finding what degree of cold produced that destruction. He found they were never killed except the thermometer was 18 deg. Fah. below zero. Mr. Bartlett then ascertained by a series of meteorological tables published in the American Almanac, that the isothermal line of 18 deg. below zero is based upon latitude 41 deg., and that a line based upon latitude 43 deg. with its natural deflections is the northern limit to which peach culture can be carried with success, as the temperature north of that line is liable to fall 18 deg. below zero every winter. To discover when your buds are killed, cut them open with a sharp knife, and you will find the center black. Those which are alive are green and fresh.

Mr. W. S. Carpenter illustrated that the fruit-buds of the peach would always be found upon wood of the present year's growth, and unless the trees are thrifty enough to produce a good growth of new wood, they will fail to be fruitful. Generally speaking, there are more fruit-buds than can be perfected; he therefore recommends a system of summer-pruning by clipping one-third to one-half of all the new branches. In planting new trees, use them only one year old from the bud, and cut back severely; afterward shorten the branches every year, and the trees will continue to be productive. It is poverty of growth or over-bearing that produces the *yellows*.

Mr. John G. Bergen.—I dispute this theory, for it is nothing but theory; it has no foundation in fact. What we want, and what should be sent out as the opinions of the Club, are facts, and not baseless theories. I like opinions, and I wish those that attend here would give theirs more freely. We have every week a great many persons attending here, but very few speakers. I wish others could be encouraged to give us their experience and facts in farming. A few years ago I planted a peach orchard upon land that certainly was not troubled with poverty. The trees made a luxuriant growth, bore very little fruit, and died of the yellows. There's one fact to offset a good deal of theory.

Mr. W. S. Carpenter contended that the trees must have died from borers instead of yellows.

Mr. Solon Robinson disputed this theory as ridiculous, because peach trees that are touched with borers sufficiently to produce death, never have a thrifty appearance.

Mr. George Bartlett recommended planting peach orchards upon hills instead of valleys, wherever the buds are liable to winter-kill.

Mr. John G. Bergen said that poverty of soil did not kill peach trees, because some of the finest peach orchards of New Jersey were planted upon poor, light, sandy land. A gentleman from Burlington Co., N. J., said that the style of pruning them was entirely different from the one recommended by Mr. Carpenter. The young trees, when taken from the nursery to the orchard, are pruned as smooth as walking-sticks.

A member said he had found upon one of the mountains of this State two belts of fruitful trees about half a mile wide upon the eastern slope, one near the top, and the other at the foot of the mountain. On the western slope of the same mountain peach trees did not succeed at all.

Mr. R. H. Williams gave as a reason why buds kill in valleys rather than on hills, that it is because they swell more in autumn. Whenever the buds are killed by cold weather in winter, it will be found owing to the condition of the weather in autumn. The Lake region of New York has an advantage of at least three degrees of latitude over other sections for fruit-growing.

Mr. P. T. Quinn, of New Jersey, stated that he was in the practice of planting about 600 peach trees per year, and pruning them to a mere stick. They make one year's growth, and are then cut back. The ground is kept well plowed; the trees planted 12 by 15 feet. They are well examined for worms, and yet with all the care given, they die regularly at four years old.

The Law of Phyllotaxis.

Prof. S. D. Tillman gave a very interesting dissertation upon the law which regulates the arrangement of leaves upon the stem of a plant. Without attempting to assign causes for the remarkable development, he proceeded to show the several positions which leaves may assume with reference to the circumference of the stem. To obtain a clear conception of the law it is only necessary for one to imagine that the vital force of the plant ascends spirally beneath its bark, so that on rising a certain distance it will have passed once around the wood of the stem. Now within the distance of one turn there will be either two or three leaves at equal distances from each other, which may be measured by the usual division of a circle, into 360 degrees. If in the first case there are two leaves in one turn, they will be 180 degrees apart. If there are three leaves, they will be 120 degrees apart. The next order contains five leaves in two turns; the next eight leaves in three turns, the next thirteen leaves in five turns and so on. If we represent this arrangement by fractions in which the numerator expresses the number of turns, and the denominator the number of leaves in such turns, we have the following series:

$$\tfrac{1}{2}, \tfrac{1}{3}, \tfrac{2}{5}, \tfrac{3}{8}, \tfrac{5}{13}, \tfrac{8}{21}, \text{\&c.}$$

Starting with the first two terms, it will be perceived that the sum of two denominators form the new denominator of the next succeeding term, and the sum of the two numerators form the next numerator. For example $\frac{1}{3}+\frac{2}{5}=\frac{3}{8}$, and to find how far around the stem each leaf of the last order measures, we must multiply 360 degrees by three and divide by eight; the result shows that these leaves are 135 degrees apart, measuring around the stem and not lengthwise. Lovers of flowers who watch with great interest the development of beauty in form and color, will have their pleasures heightened by a realization of the fact that for the arrangement of leaves there is a fixed and immutable law. The design of the Creator, in the countless forms and colors of flowers, cannot yet be so comprehended as to express, by formula, the successive steps of development; but of this we may be assured, that all changes, whether according to the regular course of nature, as far as known to us, or in apparent contradiction to it, are the direct result of physical causes, and that Order reigns supreme while beauty pervades the endless variety of the vegetable kingdom.

Clean Culture.

The Chairman read the following communication to the Massachusetts Ploughman, by S. P. Maybury, Cape Elizabeth, Maine:

Clean culture is a term that most of farmers either do not understand the import of or do not care to practice. To such I write this as of importance. They will see if they practice.

On my tour to the White Mountains, in August, I paid particular attention to the treatment which was bestowed upon apple trees. In most of the towns which I passed through they paid little heed except to trim them, which in some cases was done with an axe, leaving the tree to recover from the rough clipping the best it could. The general result was a light crop of apples. In two towns they adopted what I term clean culture, viz: The second year after they were transplanted, and each year afterwards, they ploughed both ways amongst the trees, thoroughly manured, and kept down the weeds. By that means the root shot down below the plough, and the ground under the trees was in good condition. This year their trees bore full and the apples large. On inquiry amongst the apple dealers at what locality they received their best fruit from, they all without exception named this locality. To those who need further proof they need not go further than the pine forest to see that the God of nature practices the same or arrives at the same mode, only in a different way. The foliage of the pine is shed and drops to its roots, covers them and rots; no weeds finds place there, and if you will take pains to dig through that covering you will find the soil thoroughly pulverized and lighter than any means which art has found as yet. But, the reader will say, mulching with straw would answer the same purpose. I have no doubt it would, but perhaps it might serve to harbor the mice.

One orchard attracted my attention by the smooth and thrifty appearance of the bark. On inquiry of the owner he partly attributed it, besides clean culture, to a practice of his of putting a cow dung in the crotch of the tree every spring. The same principle acts on my own grounds. In regard to the other crops this last observation may seem to be needless to the mere reader; but if he will stroll amongst the farmers, or those who pretend to that honorable title, but whom I designate as plodders of the soil, he will find that every acre they till is covered with weeds left to scatter their seeds.

Pruning Grape Vines.

Mr. P. T. Quinn at the request of a number of members, explained his manner of pruning grape vines, and gave an illustration upon the blackboard of pruning grape vines from the first to the third year, when they are supposed to have their fixed form. Cut back the vines the first year to three buds, and grow two canes from the two upper buds, rubbing off the lower one. Lay three canes down upon a trellis bar fifteen inches above the ground, and cut them off four feet long. Next year, if the eyes are too close for growing the upright cane, cut out those on the under side of the arm. The canes should be twelve or fifteen inches apart. The first four eyes of these canes will produce fruit. Upon young vines only one bunch to each cane should be allowed to grow. Stop the growth of the cane about four leaves above the fruit, and stop the laterals that will start at two eyes. It will be necessary to go over the vines about three times. The next year cut these canes back to two eyes, and you may grow four bunches to each cane: and you will continue to cut back these arms in the same way every year, and never later than the middle of March. It would be better not to make it later than the middle of February. If the stump upon the arms from which you grow your canes should eventually become so long as to be unsightly, you may generally start a new bud lower down so as to cut away the old stump at the next pruning.

Freezing and Thawing Kills Plants.

Mr. Benjamin Garvey wants farmers to institute a series of experiments to prove what degree of heat and cold plants and vegetables will bear. He thinks if potatoes were gradually frozen, and the frost gradually extracted in the Spring, that it would not injure their vitality.

Mr. John G. Bergen thought it would utterly destroy them. Turnips will freeze solid and thaw without any perceptible change, but this repeated several times the turnips will be destroyed. As to the potato, I doubt if the tuber should be frozen whether it will germinate. I have dug up potatoes in the Spring that have remained in the ground all Winter. I should be sorry to see it go out as the opinion of this Club that it does not injure potatoes to freeze them.

Mr. Wm. S. Carpenter thought not if left in the earth. He has known apples frozen quite solid. Care must be taken not to move them in the least, not even so much as rolling them once over in a barrel while frozen.

Mr. P. T. Quinn said he had a barrel of turnips frozen through quite solid. He buried them in the earth, mixing it through and through with the roots, and they came out fresh in the Spring.

Mr. Robinson said that the plan of improving potatoes devised by Mr. Roberts, of Michigan, was to allow them to remain in the hills where they grew, and cover the ground so as to prevent frequent thawing and freezing, which was the cause of injury, and not a single freezing.

Mr. John G. Bergen contended that the covering must have prevented their freezing at all.

Mr. Robinson could not understand how that could be possible, since Michigan is colder than this city, and the frost is now three and a half feet deep within a hundred feet of where Mr. Bergen stands.

Mr. P. T. Quinn corroborated this statement by personal examination of the depth of frost in New Jersey within a day or two.

Farming in Minnesota.

Mr. E. Evans, Rochester, Minnesota, thinks "those in pursuit of new homes should not all be sent to Jersey, Delaware, Maryland, Missouri and Nebraska, each of which have been recommended by the Club." He wants a good word said for Minnesota, as all places have their advantages, and those of his locality he proves, by his experience, as follows:

"Cost of 160 acres smooth prairie, $800; breaking 110 acres, $220; fencing two sides of 160 acres, $260; house, $400; well and pump, $60; grain bins and sheds, $100; seed, $160; sowing, dragging, &c., $110; cutting, binding, stacking, &c., $400; threshing and putting in bin, $425; conveying to market, $450; whole cost of first crop, $3,385. I raised wheat, 2,820 bushels; barley, 257 bushels; oats, 650 bushels. I realized for 2,000 bushels wheat, $3,140; can sell balance of wheat to-day, $850; sold the barley for ($2 per bushel) $515; oats worth 50 cents, $325; corn, potatoes, beans, rutabagas, carrots, &c., $60; amount realized from farm, $4,890; cost of farm, $3,385: difference, $1,505.

"You will see according to this figuring I have paid for my farm and have $1,500 left, besides being paid for my labor. Land has advanced some since then, but I can still buy the best land from $7 to $10 an acre. I have been a resident of this State nearly nine years, and am very well satisfied with this climate. It is true that our Winters are long and sometimes cold, but they are dry, and Summers delightful and healthy."

Michigan for Sheep Farms.

Mr. Samuel Wilson, Pinckney, Livingston county, Michigan, thinks that State admirably suited to the wants of those who have written to the Club for information where is the best place to establish sheep farms:

"Farms and flocks can be paid for in two or three years out of the proceeds. There are no better sheep lands in the West than the rolling oak openings of Michigan. Our sheep are very healthy, and shear heavy fleeces of excellent wool. The Winters I think better for sheep than further south, being clear and dry, and always free from mud. Farms of the class I have been speaking of—soil good, large improvements, comfortable buildings, good orchards, &c., and located convenient to villages, mills, schools and churches, and not over ten miles from the Michigan Central Railroad—can be bought at from $10 to $20 per acre. We say, then, to Mr. Atwater and all others, don't wait on Missouri quieting down, but come to Michigan at once, and I think you will be satisfied with the result."

A Cheap Substitute Hot-Bed.

A resident of Salem, Ind., says he obtains early tomato-plants in the following way: "Make a double box, without a bottom, four feet by five, and eighteen inches deep. The space between the double case, four inches, is to be filled with earth. Set this box slightly in the ground on the south side of a fence, sinking the south end five or six inches deeper than the other. In this put four or five inches of fresh manure, and on it good soil, covered with a sash protected cold nights by covering. I sow tomato seed early in March (lat. 39 deg.), and thin the plants to get a good growth, and when ready to transplant take them up carefully with the adhering earth, and set them in place without checking the growth. Protect from frost afterward with cloth, boards, or paper. In one season from twenty-two tomato plants we had more than double what a family of seven persons needed. They grew five feet high, supported on a frame of slats running horizontally the whole length of the bed, fastened to stakes leaning outward. The box, slats and posts, with care, will last many years, and this cheap hot-bed would soon pay for itself if I sold the plants instead of giving them away. I use the seed of large fleshy varieties, and always save the earliest and best for seed."

Apple Tree Borers—How to Kill Them.

James Anton, Lebanon, Warren county, Ohio, recommends a portable steaming apparatus for killing fruit-tree borers. A small copper boiler, attached to a sheet iron fire pan, is made so portable that it is easily moved from place to place, or even carried in the hands while performing the work. The boiler is provided with a stop cock orifice to admit the water, and another for the discharge of steam. To the latter a flexible tube is attached, having a pointed mettle nozzle which can be inserted into every wormhole found in the tree. The cock being opened and a jet of steam thrown in, effectually cooks the worm. There is no difficulty about the steam penetrating through the mass of wormdust to where the animal is lodged, even if it is at a great distance from the outside of the tree. It requires but a few minutes to explore a tree and apply the remedy to each hole, and consequently the whole orchard may be gone over in a short time. The same apparatus is the most effectual ever tried for killing bugs secreted in bedsteads or inaccessible cracks of the walls of a room.

Cure for Bee Stings.

Dr. Andrew Bush, Setzier's Store, Chester county, Pa., says that "one drop of strong spirits of hartshorn will in an instant remove the pain caused by the sting of a bee, wasp or hornet. It should be at hand in every family where there are children. Smiles of gratitude, shining through tears of distress will often repay the thoughtful mind that provides and the quick hand that applies the remedy." He also recommends the same article for the removal of grease spots.

Hardiness of the Hawthorn.

A. Law, Nicolet county, Min., says that English hawthorn will stand on the open prairie uninjured through a winter in which the thermometer goes thirty degrees below zero.

Adjourned. John W. Chambers, *Secretary.*

March 14, 1865.

Mr. Nathan C. Ely in the chair.

Blackberry Wine.

A bottle of blackberry wine manufactured by Mr. Wm. G. Randall, Hammondton, N. J., made by mixing two quarts of the juice of Lawton blackberry with two quarts of water and three pounds of refined sugar, was presented to the Club to get an opinion as to its quality.

Mr. Pardee, Dr. Ward, Mr. Solon Robinson, and some others, expressed an opinion that this was like all beverages of the same class, made from fruits other than grapes. When well manufactured, as this appears to be, it makes a very palatable cordial, which is agreeable to the taste of the majority of people. It is very different from grape wine in its effect upon the system, and is undoubtedly more intoxicating.

The Chairman expressed an opinion highly in favor of this wine.

Mr. R. G. Pardee said the best fruit wine he ever saw, and which was esteemed by many good judges equal to the best Madeira, was made by adding three pounds of refined sugar to one gallon of currant juice. This was fermented in a cask where it stood nearly a year, and was then bottled. He does not think it makes much difference what fruit is used, if the wine is made by adding such a large proportion of sugar.

Dr. Ward said he had a good deal of experience in the manufacture of currant wine, some of which had been pronounced unusually excellent, and at other times, after the same process, it had proved a complete failure.

This rule is to mix one part currant juice, two parts water, two parts sugar. He has found by experiment that two pounds per gallon is sufficient to preserve the mixture from acetous fermentation. The currants should not be picked when heated by the sun, and the juice should be expressed as soon as possible, and the whole operation conducted rapidly to a conclusion.

Mr. Solon Robinson said there was no difficulty about the manufacture of domestic wine sufficient to prevent any family who desired it having an abundance of just such a pleasant beverage as this now before us, but he doubted the wholesomeness of everything but the pure juice of the grape.

Mr. George Bartlett thought we had better not undertake to discuss the wholesomeness, as it was a difficult question to settle. The gentleman from Hammondton who presented the wine said it was not difficult to settle the question of profitableness of blackberry culture for making such wine as this, as one of his neighbors had sold $1,300 worth this year from two acres and a quarter.

Southdown Sheep.

The Chairman read an article stating why Southdown sheep are so called. The name comes from a range of chalky hills in Sussex County, England, five or six miles wide by eighty long, upon which this breed of sheep originated.

Professor Nyce's Fruit Preservatory.

Mr. Asher L. Smith, Lebanon, Conn.—During my visit to the West, I visited the establishment of Professor Nyce at Cleveland, Ohio, and found several varieties of grapes in perfect condition; also apples as good as when stored in the fall. A large quantity of butter was stored in one of the departments, put in in the fall, when butter was cheap.

On motion of Mr. Carpenter, the Secretary was directed to invite Prof. B. M. Nyce to visit this city and give an address before the Club upon his mode of preserving fruits.

Chicory.

Mr. William J Spence presented a very fine specimen of chicory root grown upon what are called the barren lands of Long Island, at the rate of 500 bushels per acre, at the cost of $7 for manure for one half acre and $7 value of labor. At a salable price, the product would be worth $800 per acre. The land is worth $10 to $25 per acre.

Mr. R. H. Williams regarded the deleterious effects of the use of chicory as an adulterator of coffee.

Mr. Solon Robinson contended that coffee was not adulterated by an addition of one-fourth its weight of the dried and roasted root of chicory. He said he had grown it and used it in his family for several years without any deleterious effects, but on the contrary those who had been injured by the use of pure coffee found themselves benefited by the use of that "adulterated" by the addition of chicory. And he earnestly recommends, as he has often done before, that every farmer in the country should grow and use chicory in connection with coffee, as a positive improvement of the article, and without any fear of injury, no matter what old fogies may say to the contrary.

Mr. Williams desired the gentleman to explain why, if one-fourth chicory added to coffee improved it, he does not use all chicory?

Sandwich Island Sugar Cane.

Mr. J. Q. A. Warren, San Francisco, Cal., says there are only seven or eight sorts of cane in the Sandwich Islands, though the natives have about three times as many names for their varieties, suited to all soils and situations. That mostly grown on the flat lands, near the coast, is called *Ko-kea;* also, a sort called *Opu-kea* is the color of polished white wax, and, having a tender rind, is much used to eat out of hand. The *Lankona* is another lowland sort. On the drier and upland parts of the islands the red cane is grown; the leading canes are: *Honvaula, Opiaa* and *Papa,* and red striped sorts called *Palespua, Manulele* and *Raole.*

The first sugar plantation at *Hawaii* was started by a Chinaman, over 60 years ago, on the small island of Lanai. The land was prepared and planted by natives, with a hardwood implement shaped like a lance, and called *Oo,* and the cane was crushed between two dressed stones, somewhat thicker than a grindstone, and three feet in diameter, and the juice boiled in China iron pots, after the method pursued in the days of Confucius. The Chinamen still use the *Oo,* but it is now made of steel. English and Yankees use plows and spades. The Chinamen produce large crops without the aid of plow, harrow or cultivation, simply with the *Oo,* which is evidence of their skill is one sense as agriculturists. In very strong or rooty land there is, perhaps, no better tool in the world than the *Oo.*

The cane is not produced from seed, but cuttings of the stalks. Two sticks of cane, cut one or two feet long, according to number and healthfulness of buds, are put in each hill (or rather hole) ten or twelve inches apart, and covered very lightly in wet, and deeper in dry weather. In the drills, the sticks are laid continuous, sometimes one, but oftener two rows, six or eight inches apart. The tops of the old canes which are unfit to grind are generally used for planting.

On the lowlands the season for planting is from June to November, and the high land they plant any time when it is wet enough.

After the cane is started so that the rows can be seen well, the plows, cultivators and hoes are put to work among it; and these kept working until the cane is large enough to take possession of the ground and keep grass and weeds down itself. All cattle are fond of young cane, and, therefore, have to be muzzled, much against their will and Scriptural teaching, while working among it. After the joints aro formed and matured to a certain degree, the leaves then die, and, in some varieties of cane, fall off of themselves, but most have to be stripped off by force. This is called "trashing," and is best done in wet weather.

Opinions vary in regard to age or size, when the cane ought to be thrashed; but doubtless they are all right, for different varieties and localities require different treatment, and this, like a thousand other special modes in agricultural operations, must be left to individual experience.

At the islands, the cane blossoms invariably within the *isogloral* line (if we may coin a word applicable to cane), in the month of November, and seldom an arrow shoots forth in any other month. As soon as the arrow withers, the cane is fit for the mill, in all warm and dry localities, and must be ground as soon as possible; but where it is moist and cool, there is no necessity for haste, as the canes will not deteriorate for several months.

Some of the Sandwich Islands sugar planters are provided with all of the most approved appliances for the business known in any country, and cane planting is extending rapidly. The crop of 1863–4 will reach ten million pounds, and the incoming one will exceed that probably one-third. With sufficient labor and capital, there is nothing to hinder the islands from producing at once all the raw sugars required on the Pacific coast.

Currant Bushes—Do they need Renewing ?

Mr. L. H. Warren, Augusta, Oneida county, N. Y., says: "I have a row of bushes of the common red currant, sixty years old, which has never failed to produce a full crop, except in the cold season of 1816, and once since when the blossoms were killed by frost. Last season they were as thrifty and as prolific, as ever. During all this time the roots of these bushes have not been disturbed in any manner, nor have they been manured except by the application of a quantity of leached ashes about once in five years, or had any tillage whatever; and during the last twelve years a parallel row of maple trees on the south side, and not more than eight feet distant, have grown to a height of twenty feet, shading them completely from five to six hours in the middle of the day; yet there is no perceptible difference in the size or quality of the fruit. A picket fence is near the bushes on the south side, and a garden which has been plowed within three feet of the bushes every year for the same sixty years, and but moderately manured, is on the other side. The soil is a naturally strong clay loam. But although there has been no tilling or resetting of these bushes, the oldest wood has died out at a certain age, and new shoots have come from the roots, as is the nature of this shrub, leaving no perceptible diminution or increase of growth from the stands.

"Now, sir, from this evidence of the age, vitality and fruitfulness of currant bushes, and from other experience and experimenting not necessary to note here, I deduce as follows: That the currant is not only one of the most healthful and economical of the small fruits, but the very hardiest, longest lived and most trustworthy; and that one has only to set the slips in a soil ordinarily good, till immediately around them two or three years, and then *let them alone* (except to keep off the vermin), to insure a never-failing supply for a lifetime. They may be planted close to a fence, or stone wall, or building, and need not interfere with anything; and as they cost next to nothing it ought to be held a misdemeanor for the owner of land to be found without a fair supply for his own family, and for at least one family more that is near by, poor and landless."

Tar and Turpentine.—How it is Produced in Maine and New Hampshire.

Mr. Solon Robinson.—We have had a number of letters of inquiry before the Club, asking whether tar and turpentine could not be made from the pines of New England. Lake, Hills & Co., Welchville, Oxford county, Maine, have settled that question. They are manufacturing turpentine from the waste product of pine stumps, which abound in that country; also from the heart-wood of tops of trees which have been cut long enough for the sap to have rotted away. The *Oxford Democrat* says, speaking of the operations of this Company:

"In their building they have four large brick retorts, into which the pitch wood is put, after being cut up fine, and turpentine extracted. In this process tar is produced, while the volatile portions are carried off and by the condenser are converted into spirits of turpentine; from thence it is carried into a small outbuilding and prepared for use. The pitch wood, after having the pitch extracted in the retort, is converted into a fine article of charcoal, and is then used to heat the retort. Aside from the charcoal thus made, but little fuel is needed for the heating process. One cord of pitch wood will make three barrels of tar and about eighteen gallons of spirits. When their works are in full operation, they will make between thirty and forty barrels of tar, and six or seven barrels of spirits per week. At the present prices of these articles it is a very profitable business. There are pitch pine stumps enough in the vicinity of their factory to last them for years to come, which the owners are very glad to get pulled up and carried out of the way. This is the only factory of the kind in the State. Its owners are energetic, enterprising young men, genuine 'Yankees,' who understand their business, and understand how to make money out of so forbidding an article as a pitch pine stump."

The *Boston Cultivator* says: "From Effingham, N. H., along the north-eastern shore of Ossipee Lake (or the Great Pond, as it is locally called), and stretching away toward Conway, there are thousands of acres of pine plains, the timber on some portions having been cut. It is from the roots or stumps that tar is extracted by a company locally organized for the purpose. At a place near the village of Freedom, the company set their stump-pullers at work, pulling from 50 to 100 stumps each, daily, according to the difficulties encountered. These stumps are hauled to Freedom village, where they are cut and split into pieces about the size of very fine stove wood, and placed in what is called a basket. The basket is a wrought iron cylinder, punched full of holes of about three-fourths of an inch in diameter, and holding half a cord. This basket is taken by a crane and placed in a retort made to receive it. A round-top cast iron cover is then fitted on tight, with a pipe from the center, which connects with a coil of pipe in a condenser. The gas and steam passing off from the top of the retort, and through the condenser, comes forth from a barrel in the shape of an acid (which is worth 10 cents a gallon among the calico printers, but is here thrown away), and a red oil. The red oil is then passed through a still, and gives about half its bulk in spirits of turpentine. The other half is thin tar, which is mixed with that which comes from the retort. From the bottom of the retort the pitch, which is "tried out" of the pitch wood by the heat applied to it, comes forth in the shape of thick tar. There are eight or ten retorts, which bring forty barrels of tar a week, and seven or eight barrels of spirits of turpentine. A cord of pitch wood gives about three barrels of tar and eighteen gallons of spirits, besides twice that amount of acid. The company have stumps enough dug to keep the factory running until they can dig again in the Spring; and it is said that there are stumps enough left on the plains to last the company for three or four years. The tar is worth about $14 per barrel, and the turpentine about $250. Who but Yankees would have brought down the price of tar and turpentine by digging pitch wood stumps for its manufacture?"

Sheep Shedding Wool.

Mr. Albert Pease, Salem, Franklin county, Maine, says: "If you do not want your sheep to shed wool, do not keep them too warm. Here in Franklin county, Maine, latitude about 46 degrees, we are careful not to shut up our sheep in a close pen, except in the very severest weather. We feed mostly under cover, but have a yard connected with the sheep pen, into which they are allowed to go at pleasure, except in a few instances of very cold weather. We do not mind their getting wet, if they have a tight shelter to go under when they choose. And I have observed that in moderate storms, either of rain or snow, they seem to choose to be out. They should have water in the yard to go to at pleasure. It may be that exposure without shelter would induce the shedding of wool, but it would do it by producing emaciation. If sheep get very poor, and are suddenly made to thrive by better feed, they will shed their wool. Turnips are an excellent feed for sheep, preventing many diseases, especially the stretches. I feed mine a few every day."

Adjourned. John W. Chambers, *Secretary*.

March 21, 1865.

Mr. Nathan C. Ely in the chair.

State of the Weather.

Mr. Solon Robinson.—It is worthy of record that it was so warm to-day that we sit with open windows, and that winter clothing was burdensome. Several members reported the thermometer at 65 deg. to 70 deg. in the shade. The frost, which has been 3½ feet deep, is nearly all out of the earth, and the hot sun of to-day will melt the little that remains. The surface is already dry enough for the plow in well drained soil.

Potatoes not Hurt by Freezing.

Mrs. W. L. P. Herr, Brooklyn, L. I., says she has been in the habit of raising some 8,000 or 9,000 bags of potatoes (1¾ bushels each) yearly. Part of these potatoes were put into pits covered with earth. These pits were only opened to withdraw potatoes for kitchen or distilling purposes. Those lying uppermost were frozen so hard that with great difficulty they could be removed in order to reach those underneath.

These pits were, of course, again properly covered, and on being opened again in spring these very potatoes were found sprouting and otherwise in good condition for all purposes. This, I suppose, will clearly show that frost, if gradually thawed out, will not deteriorate potatoes in any respect.

Dr. Trimble.—It depends altogether upon the rapidity of thawing whether potatoes will be injured or not. They may be thawed for use in cold water.

I have restored fish to life, which were frozen solid, by putting them into cold water, the temperature of which was raised very gradually. Frozen hands, feet or ears should be treated in the same way.

Mr. Dodge said he had noticed that potatoes which had been frozen always had a sweet taste when cooked.

Mr. George Bartlett said it was because the starch was converted into sugar.

Improved Curser Corn.

Mr. John Van Antwerp presented specimens of ears of the improved Curser corn, growing upon his farm at Throgg's Neck, N. Y., 1,470 bushels of sound corn upon 10 acres. It is eight rowed, and ears are about 15 inches long.

Cloths from a New Fibre.

Dr. Guernsey, of this city, exhibited a variety of specimens of cloth, some plain colored and some dyed, made from the lint of the common milk weed (Asclepias Syriaca). Some of the specimens were of the pure fibre, some mixed with six per cent. of cotton, and others with a small amount of silk and wool. The cloths are very soft and strong, and the milk-weed fibre takes color just as well as wool or silk. "These specimens were all carded, spun and woven by hand from about twenty-five pounds of fiber, gathered from the stalks, which had previously been twice mown the same season for the purpose of destroying them. The secret in this successful manufacture of this fibre, which has before been frequently attempted and abandoned, lies in the discovery by James P. McClean, the patentee, of a mode of treating it with vegetable oil. It is well known that wool cannot be manufactured without oiling it, and that none but animal oil will answer. Cotton is naturally oily. Asclepias fibre, when viewed through the microscope, appears like rods of glass. It cannot be worked without oiling. In all previous attempts animal oil has been used. Now, by the use of vegetable oil, the manufacture of the fibre is likely to prove completely successful. A patent has been applied for, and fifty cents a pound is offered for the fibre. It has been estimated that it can be grown at the rate of 500 pounds per acre, and that one pound will go as far as one and three-fourths of cotton. And while cotton does not mix well with silk and woolen, on account of the difficulty of dyeing, this fibre agrees exactly with both of these substances."

Prof. Tillman said he had made a good many experiments with this fibre, but the objections of manufacturers to it were its glassy smoothness and want of strength.

Dr. Guernsey said that was just the difficulty that he had overcome. He is aware that it has been many times tried and failed, and he has now fully proved that by the preparation that he has given the fibre, it can be as easily worked as flax or wool, and these fabrics now presented show its great strength. The fibre is naturally very light. The preparation gives it a dingy color, like unbleached cotton, the yellow color of which is given it by the natural oil. But this cloth can be bleached as white as cotton, only it will require more time, or a stronger preparation of chlorine. There is one important fact which he has discovered in bleaching some of this cloth, woven with cotton warp and asclepias filling. The cotton was entirely burnt out and destroyed by chlorine, which did not injure the other fiber, and it was subsequently re-worked.

Coal Ashes—Do they Prevent Wood Ashes from Making Soap?

Mr. Geo. Bartlett, practical chemist of this city, proved by analysis and experiments conducted before the Club that there is nothing in coal ashes which has any natural tendency to prevent wood ashes from making soap. He said it was possible that the ashes of English bituminous coal might contain sufficient sulphuric acid when mixed in considerable quantities to prevent the ley from making soap; but he does not believe any such result possible from an admixture of anthracite coal ashes. Mr. Bartlett's experiments and processes were witnessed with great satisfaction, and members obtained much valuable information. One instructive experiment showed how colors changed by the addition of other substances. For instance, a glass of water colored deep red with beet juice, having a little solution of potash added to it, becomes of a bright orange yellow. Then by the addition of a few drops of sulphuric acid, the alkali is neutralized and the color restored. By similar means stains are sometimes removed from garments when it is known what has produced the discoloration.

Baling Uncured Hay in the Beater Press.

Mr. E. W. Stewart, North Evans, N. Y., asks the following questions: "Can the Club tell me whether hay only partially cured may be baled by the Beater press into the solid 500 pound bale with safety? It has been asserted that grass quite green may be pressed into these solid bales and keep in good condition. If this is a safe process it will greatly cheapen the preparation of hay for market and add 20 per cent. in weight of hay, besides being in a more succulent and palatable state for cattle. Then it can be stored in a small space and save much barn room."

Mr. Solon Robinson.—This question I am happily able to answer. Experiments have been tried, on hay fit to go in barn, with satisfactory results. It will undergo the sweating process, in the bale, the same as in the mow, and for a short time look, from the outside view, as if it had "been done for"—but when the sweat is over with, the color becomes restored, and when the bale is opened it is found to be as green and fragrant as it was on the day it was pressed, and it will then, of course, remain thus for ages—for aught we can tell.

Still I would not advise farmers as a general thing to put up uncured hay, but I do earnestly advise them to try experiments with this press because I fully believe the value of hay may be increased twenty-five per cent. by packing it before it has been sun dried in the usual manner, until much of its value has been dissipated. The compactness of these bales is so great that the air is mostly excluded from the interior, so that the hay, although it might turn black during the sweating process, will remain so sweet that it is eaten with the greatest avidity by cattle, and we have no doubt it is vastly more nutritious than hay from which all the natural juices have been evaporated. I have no doubt that grass can be cut when tolerably ripe in the middle of a hot day and baled immediately and piled up under a shed or even in the open air, and come out in mid-winter in better condition than most of the hay cured in the ordinary way. Such hay will lose very little of its original weight. A great portion of the best hay grass in this country is rendered by errors in curing of no more value than rye straw. I hope to see experiments extensively made during the next summer to test the value of this new press for preserving hay in better condition than it is possible to keep it when thoroughly sun-dried and packed in the barn. It is one of the greatest mistakes of haymakers to suppose that grass can be injured by undergoing the sweating process when curing. It has been my determined practice for years, to put up the grass from the swath almost directly into large cocks, where it undergoes the sweating process. An Irishman or an Englishman invariably cocks his hay about a small forkfull in a bunch, because they were instructed to do so in the moist climate of England. A great many American farmers are guilty of the same folly. Some of them, I hope, will live long enough to learn that sweet grass can be packed into a bale as solid as a bass-wood log, and that it can be preserved in this way better than in any other.

Mr. Smith, Lebanon, Ct.—I bale large quantities of hay for market every year. I have sometimes put it up when it was so green that it turned dark colored and injured the sale of it, as it is thought not to be so good for horses. I am sure it is not injured for horned cattle. I believe Mr. Robinson is right in what he says about putting up hay green and curing it in the cock. If grass is not wet when it is put up, I have never found any difficulty in curing it. I also believe what he says about curing grass in a mow, by placing it between alternate layers of dry straw or old hay. I have put up rowen or aftermath in this way with old straw, when it was only a little wilted in the field, and it kept perfectly sweet.

The Flower Seed Distribution.

The Secretary reported the supply of seeds insufficient to fill half the orders now on hand. He announces the receipt of packages of seed for distribution from the following persons:

Mrs. C. J. Pennoyer, Sharon Station, Dutchess county, N. Y.
Rev. Samuel Griswold, Saybrook, Conn.
Miss Susan Leonard, Buckfield, Mass.
Hubbard & Davis, Detroit, Michigan.
Jacob Hammond, Stillwater.
Miss Susan G. Briggs, Crum Elbow, Dutchess county, N. Y.
Mrs. H. Messenger, Mooers, Clinton county, N. Y.

I hope others who have flower seeds to spare will put them up in close packages of less than four ounces' weight, marked "seeds only," and affix a two cent stamp, directing the packages J. W. Chambers, American Institute, New York, and entrust them to Uncle Sam's mail.

The Rev. Samuel Griswold, Saybrook, Conn., says that during several years of ill-health he has devoted his attention to the cultivation of flowers, and has annually distributed from 1,000 to 1,800 papers of seeds. He now forwards his whole stock to this Club for distribution, including the following:

"Delphinium—flore pl. varieg., blue and purple; Delphinium—flore pl., pale red; Dianthus Barbatus—var.; Diantus Barbatus—fl. pl. var., selfs.; Dianthus Chinensis Hedèwegii—var.; Dianthus Chinensis Breddèwegii—varieg., fine; Helichrysum monstrosum—yellow; Ipomopsis—scar., orange dots; Lythrum superbum roseum; Lychnis Chalcedonia—scarlet; Nolana atriplicifolia—for hanging baskets; Viola tricolor—fine pansies; Gamphrona globosa—raised 1863; Zinnia, elegans, fl. pl. var.—raised 1863; which would be desirable if they retain their vitality two years." On the papers I have generally given the vulgar name, as most acceptable to the ladies generally.

Mrs. M. A. H. Slade, Acushnet, Mass., in a letter, says she finds health and happiness in the cultivation of her flower beds with her own hands. And she finds happiness in multiplying them for distribution among her neighbors, and has often felt, while engaged in the cultivation of flowers, that she was an humble co-worker with God in the production of the beautiful, and feels that she is not only healthier and happier for such labor, but better. And she is glad to see a growing love among her sex for outdoor labor.

The Flax Crop.

Mr. Harry Allen, Grass River, St. Lawrence county, New York, wants to know what the Club think about making flax growing an exclusive business, somewhat as cotton growing is or was at the South. Is there any probability that cotton for the next two or three years will be grown to such an extent as to make flax culture unprofitable?

Mr. Solon Robinson.—The Club would not recommend any Northern farmer to make flax growing an exclusive business, but with the improved machinery of Sanford & Mallory, we think the flax crop likely to be for many years one of the best that will be cultivated, and that its culture will continue to increase largely in spite of all that can be done with cotton.

Turnips as a Manure Crop.

Mr. Allen has seen it recommended to plow in turnips for manure, and wants to know what kinds and when to sow them for that purpose.

Mr. Solon Robinson.—The most thrifty-growing kind of common flat turnips known as "strap-leaf," are what we should recommend, and the seed may be sown upon well prepared and manured ground any time afte the middle of June. They should be plowed under when at the strongest growth.

Sorrel—How to Keep It Out of Land.

Mr. Charles Betts, Burr Oak, St. Joseph county, Michigan, says: "Tell your correspondent from Wisconsin, who is troubled with sorrel, that stable manure is death to it. Apply the manure to corn and cultivate thoroughly. The next year summer fallow, sow to wheat, and seed thickly to grass, with red and white clover added, one-third the quantity of seed being clover, and I'll pay him $50 a ton for all the sorrel he raises on a field so treated. I know of sorrel farms, and also know of farms by the side of them where sorrel dare not grow. The owner of the one is thorough-going, the other shiftless. And invariably the farmer who com-plains of sorrel is not a good farmer—is not thorough; his tools are bungling and out of order, and he is never ready to begin work when he ought to be. Consequently, weeds grow and go to seed, and the winds scatter them, and he becomes a curse to the neighborhood. Manuring is the starting-post of all good farming, then thorough culture, and success is certain. Keep traveling threshing machines off the premises, and you are pretty safe from sorrel, dock, red-root, and all annoyances of the slothful farmer."

Mr. Wm. S. Carpenter.—I think that this writer must be in error in regard to manure being an antidote to sorrel. Some of the best manured farms in my neighborhood are just as much infested with sorrel as those which are never manured, and as for traveling threshing machines, they are unknown. It is regarded as a fact by all farmers near the sea-coast that all fields manured with fish are infested with sorrel. The only manure that I know of that will prevent it is lime used freely.

Mr. Solon Robinson.—I believe salt equally efficacious. I believe the salt and lime mixture would be still more valuable. This is made by slaking lime with water saturated with salt. The lime should then be exposed to the atmosphere until the surface of the heap becomes a light, dry powder, which may be applied to the soil, to muck or manure, to assist its decomposition.

Cultivating Prairies without Fences.

Mr. Daniel F. Rogers, Watham, La Salle county, Illinois.—I wish the Club would continue to keep it before the people and the people before the Club, that farm fences are one remnant of barbarism, and a man who runs his cattle, hogs, or other stock upon the highways or commons without herdsmen, is another. I have no faith in legislating reforms, but the press and other agencies that can reach the ear and influence the action of public sentiment, are the tools to work with. The periodical minutes of the Club are more welcome and are read with a deeper interest than any farming paper in the land, and their enormous circulation gives them a power second to none. Through their means we hope to some day rid this prairie of the two nuisances mentioned, peculiarly troublesome here where lumber is so high and farm labor so scarce and at present so worthless.

It costs to-day $5,000 to surround and cross-fence into 80 acre lots a Section (640 acres) of land, saying nothing about dividing into lots for pasturing, &c., enough to build a good, yes, a fine house and barn upon every quarter, and nine-tenths of this expense of fencing is a useless waste of lumber and time, as far as the owner is concerned: only if he don't build this barrier—this Chinese wall—his Tartar neighbors will turn their cattle and hogs upon him, and eat up his crops, trample his meadows, rub down his fruit trees, and howl at his front door for the little he may have inside the house. And this in a country to which we are proudly inviting those who are seeking homes—cheap homes—to come, and find peace and plenty. Some counties in the State have, by common consent, adopted the rule of no fences—no law about it, except that sternest of laws—public opinion. Livingston county is just now the poor man's paradise; for though he may be fifty miles from wood, coal, stone, lumber, lime, tree, bush, or stream of water, and have to burn rosin wood for fuel, he can ride all day of a summer through miles of stalwart corn, its tassels almost brushing him on either side, or when the road is but a dividing of the waters of a sea of wheat, and all perfectly defenceless, a great peace shall come over him, and he shall realize that millennium when the cattle, and the hogs, and the corn shall lie down together, and a small boy shall tend them. The subject is exhaustless. But I have written too much already.

Mr. Solon Robinson.—We don't think so. The subject can never be written about too much. We wish a hundred men would each write a hundred letters, just such letters, every day, until the very weight of their arguments would overwhelm the barbarians who turn their cattle loose to prey upon honest men who are disposed to dispense with the foolish fashion of fencing such a country as the Illinois prairie.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

March 28, 1865.

Mr. Nathan C. Ely in the chair.

NYCE'S FRUIT PRESERVING HOUSE.

At the request of the Club, Prof. Benj. M. Nyce, Cleveland, Ohio, gave a description of his Fruit Preserving House. He also brought with him a quantity of Catawba grapes as fresh and good as when they were stored last autumn. Also, several varieties of apples quite out of season. These are samples of large quantities which will not be opened for sale until next June or July.

The house at Cleveland is the sixth which has been built, all of which were experiments, and each an improvement upon others. This one has proved entirely successful, and, of course, profitable to the builders.

This house consists of two apartments, one above the other. The upper one contains ice, put in every winter, in depth usually five to six feet. This is separated from the fruit room below it by a floor of galvanized iron, the sheets of which are closely riveted and soldered, so as to be perfectly water tight. The walls are made of two casings of sheet iron, $3\frac{1}{2}$ feet apart. The edges of these sheets are painted and closely nailed to upright studding, the intervening space being filled with chaff, sawdust, or short shavings, or other non-conducting substances. The floor of the fruit room is also made of galvanized iron. Below this are placed shavings, three feet thick, on a coating of tar and pitch, spread one inch thick upon the ground, to prevent the entrance of moisture. One or more wind-wheels are placed above the roof, geared to fans in the fruit rooms. On the floor of the fruit room was spread formerly, in its dry state, the chloride of calcium, a substance which has great power of absorbing moisture; but now the waste bittern from salt works (absolutely costless,) after being dried, is found to be equally as efficient as the former chloride.

The elements of a complete preserving atmosphere are coldness, dryness, purity, equality of temperature at all times and in every part, absence of light, and if possible the exclusion of the great agent of decomposition, the oxygen of the air. This plan secures all these elements in great perfection. The thermometer shows a uniform temperature of 34 deg. in all parts of the room, and is found not to vary a single degree from 34° even from April till October.

Dryness is its leading patentable feature. Vapor is constantly given off from different kinds of fruit, amounting usually to at least half a gallon of water from one hundred bushels, per week. This vapor is taken up by the absorbent, which is spread over the floor of the fruit room. It is made to run out in tubes to the outside, once in about every month. It is then dried in large pans of sheet iron, and returned to the house in the dried state as before. The same substance is thus used twenty or thirty times. The air in a room so completely confined, after the fruit is chilled down to 34 deg., becomes very still. The fans are needed to give circulation to the air, and bring the moisture arising from the fruit in contact with the absorbent, to be taken up by it.

The air is pure, because every source of impurity is excluded.

In the gradual ripening of fruit, hydrogen and carbon are constantly given off; the former unites with the oxygen of the air, and forms water; the latter, carbonic acid.

This process in any confined vessel filled with fruit, consumes all the oxygen, especially if the fruit be ripe and the air warm, in about 48 hours. The rooms of this house are gas tight, and when filled with fruit, if closed up for two days, a candle goes out in them almost instantly.

The fruit is then surrounded by an atmosphere composed of the nitrogen of the air and carbonic acid. The former is destitute of all active properties, good or bad. The latter is not sufficiently acid, unless under heavy pressure, to produce any action on fruits immersed in it. Hydrogen and carbon then cease to be evolved from the fruit, as there is now no agent to unite with them, in the same way that they cease to be evolved from a burning candle when the air is removed. Decomposition ceases in both cases, and for the same reason. The principle is thus stated by Liebig:—"Decay is much retarded in the absence of moisture, and by the substance being surrounded with an atmosphere of carbonic acid, which prevents the air from coming in contact with decaying matter."

The sources of profit are pears and grapes, kept during the fall and winter months; apples until the months of May, June and July; lemons, oranges, pine-apples, through the summer season; canned fruit, put up in six or ten gallon cans, and retailed out by measure ; the fruit when taken from the cans, which are used successively for a number of years is kept fresh in the house in the open vessel for a number of weeks. Hence this fruit may be sold by measure without loss in the summer months. Oysters, butter and eggs, are also sources of profit.

All fruit should be in the house when tree-ripe, that is as soon as it has received all the virtue the tree or the vine can impart to it. "Rub an unripe or green apple or pear on a grater to a pulp, wash this with cold water on a fine sieve, the turbid liquor which passes through deposits a fine flour of starch, of which not even a trace can be detected in the ripe fruit. This after-ripening, as it is called, is purely a chemical process. It is the starch being transformed into sugar; the more starch the unripe fruit contains, the sweeter does it become when ripe."—*Liebig.*

Although after the saccharine change, putrefaction may go on slowly at 34 degrees, yet starch is much more slowly changed into sugar at that temperature. In strict accordance with this principle, it is found that the most tender fruits, if put in immediately when made, keep better than the more hardy sorts, if not put in till full ripe. One bushel of apples if fully ripe, throws off more hydrogen and forms more water than three bushels, if put in in the proper season.

Mr. Wm. S. Carpenter wished to know what success Mr. Nyce has had with strawberries and peaches.

Prof. Nyce.—No fruit can be preserved by any process to an indefinite period. Its decay can only be retarded. The law of change is inexorable. I have kept strawberries sound seven weeks. Peaches I cannot preserve. Up to the period that delicate pears remain perfectly sound, peaches were wholly decayed. I can keep any fruit that has a good smooth skin. The more perfect the better. Any fruit with a downy skin cannot be preserved for any considerable length of time. Neither can sweet potatoes, pumpkins, melons, peas, nor green corn, unless previously prepared as for canning. Then there seems to be no period beyond which any substance can be kept. No person can live a minute in the fruit room when it is in its best condition as a preservatory. Hence it is necessary to have three or more apartments to open at different periods, and after the fruit is emptied it may be refilled; for instance, the grape-room emptied in April or May, can be filled with oranges, lemons, pineapples, bananas, &c.

Prof. Tillman said many similar houses have been built, one in Brooklyn, but were not successful. Mr. Nyce appears to prevent all action by oxygen, yet in some fruit skins, the peach for instance, the osmose action cannot be arrested. He has accomplished an important step.

Mr. Nyce stated that the burning of charcoal in a close room does not make an atmosphere so destructive to life as it is in his fruit room after being closed two days, for a lamp is instantly extinguished. Yet the carbonic acid gas in which the fruit is immersed has no effect upon its flavor.

Dr. Percy said that he had tried several experiments successfully in preserving fruit in nitrogin gas, and the gas in Prof. Nyce's room can be easily changed to that by putting phosphorus in the room.

Mr. Nyce answered the question of cost, that a house to hold 1,000 bushels would cost $2,500, but one of a large size from 50 cents to $1 per bushel of capacity. The one at Cincinnati, built of highest cost materials for $9,000, has a capacity of 10,000 bushels. The company stored last fall 2,000 barrels of apples, at $3.50 each, for which they have been offered $7, but expect to realize $10. This is only part of the profits of a single season, and however profitable such a house may be to the company, it is far more profitable to the community. I have tried to keep meat, but not with good success.

On motion of Mr. W. S. Carpenter, a vote of thanks was given to Prof. Nyce for his interesting exposition of this new method of prolonging the season of various fruits.

Yeast and Bread Making.

Mrs. C. C. Barrett, Brewer, Maine, says: "Pare and grate eight good sized potatoes, make two quarts hop tea, using a small handful of hops and boiling a few moments, strain on the grated potatoes, set it over the fire, and one cup fine salt, one cup brown sugar and six large spoonsful flour, stirred up smoothly in a little cold water; boil, pour into a stone jar, when cooled to blood-heat add half a pint sweet yeast; when the whole mass is light and opening, cover the jar closely and keep it in a cool, dry cellar."

My receipt for making bread is as follows: Take two quarts tepid water; mash through a fine cullender into the bread pan six or eight good sized potatoes, using part of the water to aid the process; melt and add a large bread-spoonful of sweet lard and half a pint of yeast; use flour enough to make a thick batter. Do this at noon, and keep in a room of moderate temperature. At night the batter will be thoroughly light, when add sufficient flour to make a dough just stiff enough to admit of molding when risen. In the morning divide into loaves, mold thoroughly and let them stand in the baking pans in a warmer place than before, until the dough feels soft and spongy when pressed with the finger. In baking maintain an oven at moderate heat for one hour or more, according to the size of the loaf. Great care must be taken that the dough be not too stiff, nor the oven too hot, nor the room too warm in which the process of rising is going on. Very nice biscuit may be made of this dough, and it may be kept in a *very cold* place several days for this purpose; but if something a little extra be desired proceed as follows: To one pint of the well raised dough add one pint new milk, one table-spoonful lard or butter, a little salt if the lard be used, and flour enough to make a dough sufficiently stiff for bread; let it rise in a moderate temperature till the whole mass is light—that is full of air-holes—set in a cold place till about an hour before baking. Mold, roll, and cut into biscuits, and let them remain in the baking pan near the stove till well risen: bake about fifteen or twenty minutes. Some persons object to the use of lard in bread. It is not necessary with the finest quality of flour, but in my opinion is a great improvement when the medium qualities are used. I have used yeast made as above five or six years, and have never found any difficulty in keeping it sweet except for a few months one season when I lived in a house that had a damp, moldy cellar. As soon as the latter was properly *drained*, sour yeast disappeared from my premises.

Mrs. H. A. W. Marston, Lunenburg, Mass., gives directions similar to the above, except in the use of ginger instead of hops. She adds "to four potatoes after the mash is cool, not cold, one cup of sugar, one of flour, one of yeast, one table-spoonful of salt, one of ginger; butter, and keep in a cool place. This yeast has kept sweet for months."

The Reports of the Club.

Mr. John B. Wood, Great Falls, N. H., thinks the reports of this Club are doing more good to this country than the Agricultural Department at Washington. He says: "I think that every farmer should have the discussions of the Farmers' Club to read. It is amusing to see the farmer's wife glance hastily over the discussions of the Club till she comes to the flower department; then she reads slow and careful. This shows that she feels a deep interest in the subject. There are now but few farmers' houses where flowers are cultivated. But this state of things is soon to be changed. Women are ambitious, and do not do work up at the halves like most men, and the time is not far distant when flowers around the cottage of the farmer will be the general rule, and not the exception. And a farmer's wife will feel as much mortified to have a gentleman pass her house in summer and not have a bed of flowers for him to look at, as she would to go to church with a visible hole in the heel of her stocking. Next after the flowers will come the strawberry bed, then the small garden, and by and by we may hope throughout the whole country to see a paradise of fruits and flowers, shelters and shades—all brought about by the discussions of the Farmers' Club."

Sweet Brier Seeds.

Mrs. J. A. S. Gaskill, Reo, Wisconsin, says: "It is not entirely necessary that the seeds of sweet brier should be kept moist until planted. I have some fine bushes grown from seeds, which were kept in a bureau drawer eighteen months, before they were planted. In the spring of 1862 I put them dry, around an old stump. I watched anxiously for them to appear above ground, until late in the season, but in vain, and finally concluded that I was doomed to disappointment; but early the next spring I was agreeably surprised to find them up and growing finely.

Adjourned. John W. Chambers, *Secretary*.

April 4, 1865.

Mr. Nathan C. Ely in the chair.

Seeds from Peru.

The Hon. E. G. Squier sent to the Club for distribution a package of seeds, which he brought from Peru, comprising four varieties of corn, some Lima beans and some *quinau*, which is the great bread grain of the Indians, growing seeds not much larger than millet. The leaves are also used as greens, as we do spinach; also seeds of a Lupin, which bears a beautiful flower.

Mr. F. W. Collins presented a sample of his Cheddar cheese, made to imitate English Cheddar, and which has proved a perfect success, and much more profitable than the old style cheese, as he gets 40 cents per pound wholesale, and the cost of making is but little more. A full account of the process of manufacture is published in the Transactions of the New York State Agricultural Society.

Evergreens—How to Grow from Seeds.

Mr. L. Herrick, Blue Grass Grove, Minn., wants to know how to grow evergreens from seed, as he has tried several times and failed. "Will red cedar berries grow the first year if taken from the tree and planted like other seeds in the spring?"

Mr. Solon Robinson read an article from *The Gardener's Monthly* for April, in answer to this. It says that one of the good fruits of this war and gold speculation is that people have learned that they can grow their own seedling evergreens better than to import them. Many individuals, as well as nurserymen, grow their own supply, and the consequence will be cheap adornment of many a prairie home.

The supposed difficulty in raising them was thought to be the drying out of the soil in summer; but this is now obviated by early sowing, which allows of the roots penetrating to the cool subsoil before the hot weather sets in; they will, however, do very well sown in July, or any of the summer months, if sown in a cool moist place.

The mode I have seen practiced for early sowing was to have a row of frames, with sash, and well banked up around to throw off the snow and rain the soil inside raked, and the seed sown in drills two inches apart, which will admit of their being weeded—which cannot be easily done when they are sown broadcast. The frame and sash are used more for protection from birds, cats, chickens, etc., during germination than from any actual need for them, although in cases of heavy rains they are useful.

As soon as the seedlings have made a few leaves, the sash is left off altogether. A great advantage of the sash is, it enables one to thaw out the soil in the first place, thus getting the seeds sown several weeks earlier than could be done without them.

For sowing in large quantities, where frames would be thought inconvenient, a long narrow border, with a slight slope northward, or the north side of a hedge, to break the sun's rays, would be the most suitable place for them—sowing the seed as early as possible. They would be strong enough to stand out the winter if covered with some small litter and boughs. If the dry season should set in before the plants have made much root, they should receive a thorough watering in the evening, with the soil stirred up around them the next morning. Some kinds, among them the Taxus and Pinus cembra, cedar, and other kinds, do not always grow the first year; they should be sown in a place where they can remain two years without being disturbed. They are usually allowed two years in the seed beds before planting out.

I, last March, saw a large quantity of seeds sown in frames, in the way described; and I believe, with few exceptions, the whole of them germinated. Some Norway spruce were afterward lost in the hot season, from excessive dryness; the ground, I think, had too much slope, causing the rain to run off easily. Some Austrian and Scotch Pines, sown two years ago, are perfect models, and will be planted out in the nursery rows this spring, six inches between the plants, and two feet in the rows.

Sugar Maple—How to Preserve.

Mr. N. Smith, Delphi, Carroll county, Indiana, says experiments this year have proved that two tin tubes made over No. 7 wire, and inserted in gimlet holes, which do not injure the tree in the least, affords as much sap as the spile of the half-inch auger hole. Some tubes were inserted in trees too young to tap in the ordinary way, and in old trees four or five tubes were inserted. Such tubes cost but a trifle and will last for many years, and as they do no injury, maple trees may be thus preserved.

Stumps—Destroying with Vitriol.

Mr. S. R. Duren, Woburn, Mass., wants to know if destroying stumps with vitriol has been tried on such an extensive scale as to warrant his applying it to two acres of them, and how much is necesssry to put in a stump two feet across?

Mr. Solon Robinson.—I would not recommend trying it upon an extensive scale until its efficiency has been satisfactorily tried upon one or two stumps. Bore an auger hole in a green stump and put in from one to two gills, and plug up. It would be well to try the experiment upon standing trees. If it kills them it will loosen the roots so that by a little work in digging around, the tree can be made to pull out its own stump.

Leaves—How to Preserve Colors.

Mr. Notwotting, Akron, Ohio, wants to know "how to preserve the color of forest leaves."

Mr. Solon Robinson.—They should be placed immediately between folds of paper and pressed. Some persons dip them in a solution of gum Arabic. Glycerine is also recommended.

Mr. Dodge said that the best plan he had ever seen adopted for preserving leaves was to keep them in the shade until wilted, and then press them with a pretty hot flat-iron.

Bones—How to Dissolve in Sulphuric Acid.

Mr. L. C. Halleck. Miller's Place, Suffolk county, L. I., "wants to know how much acid it will take to dissolve a ton, and what is the price per gallon; also, if tubs or barrels will hold it, and if it should be covered during the process of dissolving. I have heard of bones being placed in a heap of muck and leaves, in order to receive the acid, but whether it answered the end sought for was not stated."

Mr. Solon Robinson.—Mix one gallon of acid with five gallons of water. If this does not prove strong enough add more acid. One of the members says 340 pounds of acid to twenty-five bushels of fine bones, wet with eighteen gallons boiling water; after two days mix with two cartloads of light mold; turn the heap several times, as it will take seven or eight weeks for the bones to decompose. Another says 500 pounds acid, 300 pounds guano, one ton of bones; each pound of acid requires nine pounds of water. Wooden vessels will not answer. Use a large iron kettle painted thickly with clay dissolved in skim-milk. Bones may be dissolved in a heap of anything that will give a hot fermentation.

Dr. Ward.—What is the comparative value of guano and bones? Peruvian guano at over $100 a ton, is so high that many people doubt the policy of using it, yet we must have something. Shall we buy superphosphate or bone dust at $50 a ton?

Mr. Solon Robinson.—For immediate effect, guano is best. For lasting effects, bone dust is worth as much or more per ton than guano.

Mr. George Bartlett.—For durability it is not necessary that bones should be converted into superphosphate; that is dissolved in acid. The best vessel to use for acid is a leaden one. But bones can be easily reduced by the hammer and fermentation to an economical shape for manure.

Mr. Wm. S. Carpenter.—I would prefer a ton of bone dust to a ton of guano, the guano only lasts one season, while bone dust lasts many years.

Onion Worms—How to Kill Them.

Mr. Benjamin Eastman, De Peyster, N. Y., tells how to kill the onion maggot. He says:

"Steep or soak the seed twelve to twenty hours before planting in a strong decoction of tobacco at a temperature of 100 degrees to 120 degrees Fahrenheit; I tried it last year and others in town two or three years, without a failure."

Frozen Potatoes.

Mr. C. H. Bowen, Yankee Springs, Barry county, Mich., gives the following fact about potatoes being injured by freezing: "On the 8th day of March I noticed in the garden some hills of potatoes. In the first hill I opened, I found some fifteen as fresh potatoes as I ever saw; yet under the potatoes the ground was frozen hard. In other hills I found the potatoes bedded in the frozen earth, but no frost in the potatoes; in others, the potatoes would be all soft like any other frozen potato; and in some hills, half of them would be soft and the other half sound; yet there was frost in the ground under all. These potatoes were a little sweetish when cooked, but I have no doubt about their vitality."

Coal Ashes.

Mr. Bowen says he reclaimed a piece of yellowish white clay, which was almost barren, by a liberal use of bituminous coal ashes.

Sugar Corn Preserved for Table Use.

Mr. E. Cronkhite, Marshfield, Warren county, Ind., says he keeps sweet corn the year round in good condition for the table, in the following manner: "Cut the raw corn from the cob with a sharp knife, and pack it in a stone jar, a layer of corn and a layer of fine salt, as you would pork. It keeps this way much better than drying it, and it is not half the work. If it is too salt when wanted to be cooked, soak it in cold water, or sweet milk, which is better."

Prairie Flowers.

Mrs. Levicy Croy, New Philadelphia, Story county, Iowa, says: "Our prairies furnish many rare and beautiful flowers, and if any of the members of the Club will furnish me with slips of shrubs or flower seed, either of which are unattainable here, I will be glad to return some of their wild but not less beautiful sisters. It is a great deprivation to me to be without those blessed gifts of our Creator, the 'stars of earth,' for I so love them, and home hardly seems home without their sweet presence."

Receipts of Flower Seeds.

The Secretary reports that he has received flower seeds from the following persons: Mrs. L. P. Seaver, Stowe, Lamoille county, Vt.; Mrs. H. A. Piper, Monroe, Me.; Mrs. C. O. French, Duffield, Me.; Mrs. E. D. Willey, Corunna, Me.; Mrs. Jennie A Remington, Chester, Mass.; Mrs. D. M. Adams, East Brookfield, Mass.; Mrs. M. A. Waterhouse, Salisbury, Vt., Mrs. S. H. Symonds, Reading; Mrs. Mary A. Fisher, Waltham, Mass.; Mr. Daniel

Williams, Fly Creek, Otsego county, N. Y.; Miss Mary Meatyard, East Hamburg, N. Y.; Mrs. Mary W. Williams, Palmyra, Wis.; Mrs. A. R. S., Picture Rocks, Lycoming county, Pennsylvania; Mrs. M. P. Kennedy, Perry, Pike county, Pa.; Miss Carrie Barber, Summer Hill, Cayuga county, N. Y.; Miss Anna Stuart, Dracut, Mass.; Mrs. Mary Treat, Blairstown, Iowa; Mrs. S. A. Seaman, Bowmansville, N. Y.; Rev. Samuel Griswold, Saybrook, Conn.; Mrs. S. E. Waters, Smith Mills; Mrs. Jane Adams, Weelaunee, Winnebago county, Wis.; Miss E. C. Dixon, Canandaigua, Ontario county, N. Y.. Horace Thayer, Blackstone, Mass.; Miss C. L. Peck, Panama, N. Y.; Mrs. Dr. Wm. Green, Marion, Wayne county, N. Y.; Mrs. E. J. Ely, Leroy, N. Y.; Mrs. C. W. Craig, Black Jack, Kansas; Miss Sarah L. Colby, Warner, Merrimac county, N. H.

Culture of Small Fruits.

STRAWBERRY.

Mr. Walter Sigarson, St. Louis, Mo., says: The success attending the cultivation of this delicious fruit has been varied in the different localities where it has been grown, influenced more or less by climate and soil, and, perhaps, in a greater degree by a superior cultivation, together with the judicious selection of varieties well adapted to the particular location. While only a few have been eminently successful in producing fine fruit, I believe that it will be admitted that the many have failed; hence our markets have been poorly supplied, at least so far as my observation extends. It is to be regretted that such a state of things, as I have just indicated, should exist in this age of activity and enlightened progressive improvements. We have depended, perhaps, too much on what superficial observers have been pleased to call our rich, inexhaustible land. Unfortunately, however, both the fertility and inexhaustibility of our country has been made to take the place and subserve the purpose of thorough culture, therefore meagre crops have been the result. There is nothing intricate involved in the cultivation of the fruit now under consideration. A few plain, practical hints and directions, if followed, will remove every difficulty, and render what has proved a failure a complete success. To insure large fruit, with remunerative crops, a previous preparation of the land must be had commensurate with the results to be anticipated. Superficial agriculture and horticulture is the bane of this country. The time has now arrived when some positive improvement will or must be developed. The first prerequisite for a good crop is fertile land well prepared. If the land is not rich enough, then such fertilizers as are required must be added. I propose to prepare one or more acres of suitable land as follows: Trench three feet deep, set out healthy, well grown plants in June or September, eighteen inches between the rows and eight inches in the rows. There must be no failure; every plant must be there. The ground must be kept clean and in the most complete condition until fall, so that these plants will be strong and healthy. Before winter sets in the ground must be mulched all over four inches deep. This mulching answers several important purposes, all indispensable in their several places and relations. The complete protection of the plant against the rigors of our severe and changeable winters is secured, and, second, mulching protects the plant against our severe periodical drouths, and dry, parching atmosphere; it also prevents the rains from carrying away our light surface soil, and making a deposit of our fertilizers in the true delta of the Mississippi. Further, and a very important consideration to the cultivation is, that this mulching prevents the growth of weeds, when the plant begins to start in the spring. If the mulching is too much of an obstacle for the buds to force their way through, then it will be important to remove the material from off the center of the plant, in order to let the buds grow free from obstruction. All the runners must be cut off. Each bunch or separate plant will produce a full crop of large fruit. If all the suggestions be attended to as here proposed, and you plant the best known variety for market, you can grow $2,000 worth on one acre. The material for mulching is abundant in our country, and, therefore, there can be no valid excuse for neglecting what is of vital importance in consummating the object contemplated. Partially decomposed wheat straw will answer the purpose, or if you are in close proximity to the city, you can procure all the old spent tan, and all the spent manure from the white lead manufactory. Either of these kinds of mulching will be free from seeds. Our forests furnish ample resources in tree leaves; therefore, as I have stated, there can be no excuse for want of material to mulch with. If profit is the primary object, then adopt my plan, as the preparation of the land will only be a small proportion of the expense compared with the value of the product. You will realize double as much, and frequently four-fold for large or small fruit.

CURRANT, RASPBERRY, GOOSEBERRY AND BLACKBERRY.

All other small fruit grown or indigenous to this climate, will succeed equally as well as the favorite fruit of which we have been treating, provided the soil has been prepared as proposed for the first named fruit. The currant requires a moist soil; this we can only have by deep cultivation and thorough manuring, with occasional irrigation during the dry season. The raspberry, gooseberry, and several varieties of the blackberry ripen in succession and prolong the fruit season for months, thus not only making the business immensely remunerative to the producer, but also a source of infinite pleasure and happiness to the consumer.

GRAPE.

The grape has received the fostering care and attention of the Horticultural Society, and must continue to share largely in its enlightened deliberation. The grape as a table fruit has no superior, if equal, and can be kept in great perfection through the winter. The pure juice of the grape might take the place of coffee and tea on our tables much to the promotion of health, and as a beverage more pleasant to drink. The use of our native wines would ultimately be instrumental in promoting temperance, as the people would dispense with the abominable habit of drinking strong alcoholic stimulants.

The large production of an article, if it contains any merit worthy of consideration, does inaugurate consumption commensurate with the amount produced, therefore no fears need be entertained of overstocking the markets with small fruits. Our cities and towns have increased in population so fast that we find the price of fruits enhanced beyond anything current at a former period in the history of our country. Fruit growing offers ample remuneration to those who will engage in it. Money invested in the business, either by an individual, or in the form of associated capital will yield larger dividends than any of the numerous visionary schemes now presented to the public, under the oil and mining mania that has seized the public mind. It can be easily demonstrated that not less than fifty per cent. can be made clear of all expenses, with an additional value given to the stock in consequence of the enhanced value of the land. The business proposed is susceptible of easy demonstration, and what constitutes a valuable feature is that all products of the soil are sold for cash. The credit system is not known when farm, orchard or garden products are offered for sale in this market. The country immediately contiguous to St. Louis is one of the best fruit regions in the United States. The country north of this offers an indefinite market for all small as well as large fruit, especially those varieties which mature early. The home market is one of the best and has never been fully supplied.

Mr. Wm. S. Carpenter.—I think it entirely useless to mulch strawberry vines for the purpose of keeping them from the frost. As to trenching, I think two feet is enough. I have tried some buds three feet deep, but did not see any advantage from it. I manure on the surface of the soil.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

April 11, 1865.

Mr. Nathan C. Ely in the chair.

AUTUMNAL LEAVES.

The Chairman presented a large collection of leaves. Many of these were arranged in frames, making really ornamental pictures, and in the center of one of the pictures, was placed the photograph of the lady who made the collection. This work of gathering and arranging beautifully colored autumn leaves was highly commended to all who have leisure as an innocent, useful, pleasant amusement.

DRY PRESSED BRICK.

Mr. Ellis P. Horner, Denver, Colorado, wants to know how the brick made at Vineland, N. Y., of lime, sand and gravel, are compounded? Will the manufacturer tell him?

Another wants to know more about the dry-pressed brick spoken of some time since in the Club, "which will not crack in burning, and what is the reason they will not?"

Mr. Solon Robinson.—I will answer him. Here are specimens of these bricks, sound and perfect, made of various kinds of clay, and various mixtures of clay, gravel, iron-clay, etc., and also fire-brick. There is no difficulty about cracking, no matter what the material is. Look at these and you will see the reason. One side of every brick is filled with holes, fourteen in number, nearly half inch diameter, and extending almost through to the other face. These are made in moulding the brick, which is done by machinery very rapidly, with great pressure. These holes are thorough ventilators, which let out the compressed air, and which in all other attempts to make dry clay brick, have caused them to crack, or explode during the process of burning. As the bricks can go directly from the press to the kiln, the saving in cost of manufacture will be immense, and the bricks when finished are almost as true and solid as dressed marble. I understand a machine and right to use it will cost $1,000, and require two horses' power to operate, making 6,000 bricks a day, with the labor of four men.

These bricks are made in Buffalo, N. Y.; the President of the company is Mr. L. C. Woodruff.

A New Forage Plant.

Mr. Solon Robinson.—I have lately heard a good deal said about a new forage plant, said to have been taken from this country to France. Mr. Ludovic Léchant, Monsey, Rockland county, N. Y., has furnished me with the following translation from the *Bulletin de la Societé d'Agriculture de Pontoise* (France,) which I will read to the Club.

"I sincerely thank you for the kind reception you gave to my letter of January last about beet culture, and ask leave to submit to you or the American Farmers' Institute the following encomium upon a new grass, which I find in a French historical journal, with an earnest prayer for your or their opinion. If half what is said in that paper in regard to that wonderful grass is true, it would, I think, be very important for the American farmers to know it, and I feel pretty certain that you would not be backward in commending that new hay to the agricultural community. But, if instead of being 'a great conquest' it proves only to be 'a grand humbug' I would feel grateful to you to tell us frankly so, for I think I see an effort to puff that herb on the other side of the ocean (and may be on this side too), and if it is not worthy of a test, we had better know it, and try to save brother farmers from being duped and shaved. However, here is the article referred to:

" 'The Schrader Brôme *(Bromus Schraderi, Kunth)*.

" 'That grassy plant has been almost unknown until now in Europe, and although it is originally of North America, viz., the Carolinas, even there it is seldom used or cultivated.

" 'M. Alphonse Lavallée has made on this gramineous during six years, several essays, and he has succeeded marvelously.

" 'The Brôme of Schrader is a perennial, quite hardy, vegetating vigorously, capable of yielding four and even five crops (when mowed green) of an excellent forage, peculiarly adapted to milch cows.

" 'The first mowing takes place as early as the month of March, if the last mowing of the preceding year has been done early, and in all cases not later than the 20th of April, generally before rye is ready to be cut as green fodder. When dried (cured ?), that Brôme makes an excellent hay, to which horses and cows get used very soon, and what is more astonishing is that, according to M. Lavallée's statement, pigs eat it with relish. Though it is a little tough (coarse ?), it is always eaten without chopping by those animals, that always prefer it to wheat or oat straw.

" 'The cows find in that grass a food specially favorable to the production of milk, which augments sensibly and becomes of a superior quality.'

"Says M. Lavallée:

"'The milk of cows for a whole month on good *regain de Luzerne* (second mowing of Luzerne) was accurately measured, and the quantity of cream per cent. taken with a galactometer. Three consecutive days did I take the figures, which were identically the same. Then we put the cows to the Brôme diet. I found the very first day of the change an augmentation of eighteen per cent., but the following days that went down to ten per cent. It must be borne in mind that the rations of Luzerne and the rations of Brôme were of the same weight. I have had no sensible difference in the quantity of cream, but with the *dese-lait* (milk weigher) I found that the density of the milk was greater.

"'It seems, too, that the butter made out of the milk of cows fed on Brôme is firmer, finer, better looking, of a better taste, and that it is made quicker.

"'This grass does not cost much to cultivate. It covers well the ground, tallying so thick that no other culture can be so admirably clean. It accommodates itself with almost any soil that is not absolutely dry, and can live several years, perhaps six or eight. After being five years on the same field, M. Lavalée did not see any diminution in the yield.

"'A peculiarity of the Brôme of Schrader is that it presents at every morning and on every bunch several *epis* (heads ?) where the grain although not quite ripe is well formed and already consistent, offering the very rare example of a plant perfectly green, bearing grain almost ripe. Mr. Lavallée believes that this is one of the chief causes if the nutritious value of this plant.

"'The yield in grain is very large, and gives at the first mowing a number of hectolitres superior to that of the handsomest oats.

"'The Brôme of Schrader yielded at the first mowing 17,300 kilos to the hectare (about sixteen thousand six hundred pounds to the acre) in a field where a previous seeding to grass had not succeeded; the yield of the three subsequent mowings has been 18,970 kilos, that is to say, the hectare has yielded a total weight of 36,200 kilos. That product is the result of fifteen months' culture, as the Brôme keeps growing in autumn, and even in winter.

"'An hectare (about two and a half acres) has yielded, at the second mowing, sixty-five hectrolites (about 200 bushels, or eighty bushels per acre !!! Rather heavy crop !—Tr.) Supposing the first yield as heavy, it would make one hundred and thirty hectolitres harvested in one year on the same soil.

"'To keep that crop in order requires very little trouble; one rolling in the spring, and that is all. To areate it is very simple; a good plowing, preferably deep, then sow, harrow and roll over strongly twelve or fifteen days after, it grows up, and from that vegetates quite rapidly. One can harvest a first crop in two months, if sown in March or April. As soon as that Brôme has been mowed, one can see disappear all the other plants, either annual or perennial, that had grown up with it. It is an essentially choking plant, leaving after it no thistles, no *jottes*, no *chiendent* (please, sir, excuse my ignorance, but I don't know the English names of these two latter herbs,) nor any other invading plant, hence its green appearance is splendid, owing to its great compactness and uniformity.'"

Professor Mapes.—There is one remark in that paper which conveys an error in regard to milk. It is not the heaviest milk which is most valuable for butter-makers, whatever it may be to those who sell it in the city. This has been proved in a series of experiments with the hydrometer and lactometer. The lightest milk gave the greatest yield of cream. The more watery the feed given to cows, the heavier will be the milk.

Maple Sugar.

Mr. Jona. Martin, Candia, N. H., sends us a beautiful "sample of rock maple sugar, which we made from the sap of a tree that stands in our dooryard. The sap was caught in a pine bucket, and boiled in an iron boiler over the stove, down to sugar; there was no process of cleaning or draining or whitening whatever."

Professor Mapes.—The secret of this is that the sugar was boiled at what is called low proof. The same result takes place when cane sugar is boiled in a vacuum. The quicker sap can be boiled and the less it is exposed to the atmosphere the better. That is what is requisite in all sugar-boiling, great rapidity of action from the time the juice is expressed until the boiling is finished.

The Cankerworm in Iowa.

Mr. J. H. Hilton, Batavia, Jefferson county, Iowa, sends specimens of insects which are infesting their apple trees.

Dr. Trimble.—These worms have the same characteristics, as those which are now crawling up the apple trees of New England, and will produce the cankerworm. The only remedy is to keep them from crawling up, as the females have no wings.

Black Knot.

Mr. Levi Clark, De Peyster, St. Lawrence county, N. Y., sends specimens of the black knot from plum trees, which is making its appearance in that section.

Dr. Trimble.—It is produced by an insect, but not the curculio. The only remedy for it is excision as fast as it makes its appearance.

Carbonized Shingles.

Messrs. Tenny & Bennett, Hubbardston, Mass., present specimens of shingles which are carbonized by passing them between red hot iron rollers, which, it is said, protects them from decay.

Professor Mapes.—These shingles will last longer than the ordinary shingle, or even painted shingles. I understand the cost of carbonizing is about one dollar per thousand.

A New Hay Press.

Mr. J. D. Wilbur, Pleasant Plains, Dutchess county, N. Y., presented a working model of a horizontal hay press lately invented by him. It is double acting, the hay being placed in the center and a follower constantly working carries the forkfulls back and forth to bales forming at each end.

The plan has not been tried upon a full sized press, but the inventor is very sanguine of success. If so, it will be a very valuable machine for farmers.

Receipts of Flower Seeds.

The Secretary reports a further receipt of flower seeds from the following persons: Mrs. Elizabeth P. Foote, North Franklin, N. Y.; Mr. Lyman Mayhen, Worthington, Mass.; Miss Emma Bakers, Standish, Me.; Mr. A. W. Pratt, Fairfield, Mich.; Mr. C. C. Barrett, Cedar Spring, Me.; Mrs. M. Finch, Jackson, Mich.; Mrs. Dell A. Bradford, Crown Point Center, N. Y.; Mrs. Dr. Wm. S. Bassett, Mount Vernon, Otsego county, N. Y.; Mr. Edward K. Sperry, Fleming, Cayuga county, N. Y.; Mr. James Barnett, East DeKalb, St. Lawrence county, N. Y.; Miss Maria D. White, Kent, Portage county, Ohio, and a quantity from others, names not given. These seeds will continue to be distributed in the envelopes already received as fast as it is possible to put them up.

Dr. Trimble has also sent in a further supply of his sweet corn, which will be furnished to applicants in larger quantities than heretofore.

Adjourned. JOHN W. CHAMBERR, *Secretary.*

In consequence of the great National bereavement in the death of ABRAHAM LINCOLN, President of the United States, and of the funeral ceremonies extending through the following week, The Farmers' Club did not meet on the 18th and 25th of April.

PROCEEDINGS OF THE POLYTECHNIC ASSOCIATION.

ORGANIZED UNDER THE NAME OF THE MECHANICS' CLUB, MARCH 2, 1854, WHICH NAME WAS CHANGED TO THE POLYTECHNIC ASSOCIATION, MARCH 16, 1859.

RULES ESTABLISHED FOR ITS GOVERNMENT BY THE BOARD OF SCIENCE AND ART.

1. A Club for the promotion of manufactures, arts, and for the discussion of mechanical subjects, is created under the name of the Polytechnic Association.

2. The Polytechnic Association is an agent of the committee of arts and sciences, and is under its entire control, in the same manner as the Farmers' Club is of the committee of agriculture. The transactions of the Association are in the name of the American Institute.

3. The committee of arts and sciences appoint, annually, the chairman and secretary of the Polytechnic Association. In the absence of the chairman and secretary, persons to supply their places will be chosen at the meetings of the Club.

4. Every member of the American Institute shall become a member of the Polytechnic Association, by signifying his intention to the chairman thereof.

5. The name of any person eminent in practical mechanics, engineering, mathematics, astronomy, chemistry, natural philosophy, social philosophy, geology, mineralogy, practical mining, meteorology, natural history, manufactures or the arts, may be proposed by the members of the Association (by ballot, five-sixths of those present voting affirmatively) to be an honorary member of the Polytechnic Association of the American Institute; and when so proposed, if approved by the committee of manufactures, science and arts, of the American Institute, a certificate of membership shall be issued by said committee.

6. The chairman of the Polytechnic Association is authorized to arrange sections, or standing committees, embracing all the physical and exact sciences, particularly those named in section second of those rules, and to appoint a committee for each section, who shall report the doings of the sections to the Association, Members, and honorary members, shall be entitled to seats in those sections.

7. Such papers read at the Polytechnic Association as are accepted for that purpose, will be printed under the direction, and at the expense of the American Institute, which also provides a place of meeting, lights and fires. No other expenses are to be incurred, except by special appropriation of the American Institute, according to the rules and by-laws; nor any liability incurred by the Institute, except on special resolution.

8. The meetings of the Polytechnic Association are free of all expense to those who attend them.

9. The Polytechnic Association shall select, in advance, a subject for discussion at each of its meetings, which subject shall be announced in the call of the meetings.

10. Written communications to the Association are to be read by the secretary, unless objection is made; and if objected to, will be read if it be ordered by a majority of the members present.

11. The Polytechnic Association will recommend what papers read before them, or what part of other transactions they judge worthy of publication, to the committee of arts and sciences, by which the publ cations may be ordered in its discretion.

12. No person attending the meetings of the Association shall speak more than once on any one subject, nor shall occupy, in such speech, more than fifteen minutes, except by permission of the Association.

13. The chairman may invite any person to address the meeting or to participate in the deliberations, but such person not a member, shall be announced as a visitor.

14. Topics presented for consideration, or the announcement of a discovery or invention, improvement or novelty, or the exhibition of any machine or part thereof, or any manufacture or article, must be preceded by a statement setting forth the point, in writing, to be deliberated upon.

15. Any person desiring to put on record any supposed or real discovery in science, manufacture, or arts, may address a communication to the chairman of the Association, under seal and properly indorsed, which shall be preserved in the archives of the American Institute as evidence for the party depositing the same.

16. In all cases not provided for by the rules, Jefferson's Manual shall be taken as a standard.

17. The official reports of the meetings of the Association shall lie upon the desk of the recording secretary until 11 o'clock of the day following the meetings, for the inspection of members, and such corrections as are necessary before going to the public press.

18. The minutes of the previous meeting shall be read at the opening in order for correction, unless otherwise directed by the meeting.

19. No argument is allowed between members. Facts alone are to be stated.

20. All questions of order are decided without appeal by the presiding officer.

OPENING ADDRESS BEFORE THE POLYTECHNIC ASSOCIATION.

By the Chairman, Prof. Samuel D. Tillman.

[Delivered at the commencement of the Fall Session, September 8, 1864.]

ADDRESS.

Gentlemen: It gives me great pleasure to greet you at our first autumnal meeting. Our time is again to be agreeably occupied in listening to accounts of new discoveries, examining new inventions and comparing opinions respecting their merits. It should be widely known that this branch of the Institute is especially designed for the benefit of all who are interested in the progress of Science and Art; that our Platform is free to all who have anything of importance, relating to these subjects, to communicate, and that no fee or formal initiation is required from those who come to listen or to speak. This plan of proceeding has been successfully followed for several years. One of its beneficial results is the collection for publication of interesting facts, experiments, and suggestions which otherwise might escape general attention. Another is the means here afforded to persons who desire scientific assistance in some new branch of art, of communicating with those who are capable of giving it.

TECHNOLOGY.

Few are aware of the vast amount of labor lost from ignorance of experiments and demonstrations previously made. A single incident between two late members of the Institute will illustrate this point. Henry Fitz, the celebrated optician, when a young man, stated to Prof. Renwick some of the difficulties he had encountered in manufacturing lenses. The Professor lent him a work relating to the modifications of light in passing through different media, and on returning it Fitz remarked "the early reading of that book would have saved me years of toil."

The importance of Technology in developing the resources of a comparatively new country is now beginning to be appreciated. The march of improvement has often been retarded for want of competent pioneers. While on the one hand visionary schemes have been pursued with recklessness, on the other, enterprises of great promise have been abandoned for want of scientific knowledge. Thus everywhere throughout our vast territory, in projects of melioration, conception outruns performance. It is hoped that in future our colleges and higher seminaries of learning will furnish scholars who are thoroughly versed in the application of science to the arts. Formerly the course of studies in these institutions was specially adapted to those who intend to follow the professions which aid but indirectly in material progress. On questions relating to Motors, Mechanics, Civil Engineering, Architecture, Navigation, Agriculture, Botany, Chemistry, Mineralogy and Mining, the scholars of so called liberal education were not expected to throw much light. Yet such questions were constantly presented for solution. At an early day in the history of this country self-educated men met the emergency and were often rewarded by fortune and reputation.

In order to show the kind of knowledge required, it will be interesting briefly to review the progress of material improvements on this Continent which, from the wonderful changes effected, must be regarded as forming the most remarkable era in the history of civilization. With the exception of the trapper and fowler, Surveyors were the first white men who penetrated in every direction the primeval forest. In general these pioneers performed their arduous tasks with fidelity and accuracy, yet their errors—owing chiefly to the want of correct measuring instruments—have been the source of illimitable litigation. The history of the location of the pre-emption line in Western New York, running North to Sodus Bay on Lake Ontario, illustrates how wide a gore may arise by the slightest deviation from an original direction.

By the labors of these men territory greater in extent than all Europe, excluding Russia, has been divided into towns and sections, and represented by maps; yet the work thus far does not embrace more than one half of the lands within the limits of the United States. The hardy settlers at first followed in the wake of the theodolite; latterly the tide of emigration has been more rapid, and the squatter is now far in advance of the surveyor.

ROADS AND MAIL ROUTES.

Among the early wants of the settler were means of intercommunication Although to facilitate their meetings Indian trails were widened into wagon ways, and swamps were made passable by means of log foundations, commonly called corduroy roads, the services of the Civil Engineer were soon required to lay out highways and construct bridges. Subsequently, turnpike companies were chartered in every State. Permanent roads, having a stone substructure reaching below the point affected by frost, were first commenced by the General Government, upon the admission of the State of Ohio in the Union. The Great National road leading from both Washington and Baltimore westward is more than 600 miles in extent, and cost $3,500,000. The amount expended by the Government in public improvements up to the time of General Jackson's Administration was $30,000,000. In most cases the work was accomplished under the direction of the War Department, the roads in the new States being constructed by the army.

Owing to improvements in locomotion, which will be noticed presently, the means of intercommunication by mail have been increased beyond precedent. In 1791, there were in the United States but 89 postoffices; in 1860, the number exceeded 28,000. During this interval post roads were extended more than 258,000 miles. The total distance over which mails were transported during the last mentioned year exceeded 258 millions of miles.

MOTORS.

In reverting to the history of the early settlement of the Eastern States, it will be found that a vast amount of work was accomplished by the use of water power, derived from the numerous rapid streams. The constructing of dams and water courses, the erecting of mills, and the improvement of water-wheels, required the exercise of more than ordinary skill and ingenuity. Disastrous consequences not unfrequently followed a want of knowledge of the laws of hydrodynamics. The sawmill greatly expedited the conversion of forests into materials for immediate use; and after the invention of an American machine which could cut, from a wrought-iron plate, a nail, and head it at one operation, by which nails were supplied in abundance, buildings of all kinds were erected with great rapidity and at comparatively small expense.

The next important use to which water-power was applied, was in the grinding of grain. By the ingenious improvements of Oliver Evans, invented about the close of the Revolution, the flourmill was made automatic; thus dispensing with the labor of every man except one in the ordinary Gristmill. The saving effected by this single invention in this country during the last fifty years, will be admitted to be immense, when we take into consideration the statement in the last census report, that the value of the product of flour and grist mills for the year 1860 exceeded 223 millions of dollars.

The world is indebted to the genius of the same Oliver Evans for the plan of using the direct pressure of steam as a motor; steam having been previously used in the Scotch Engine to produce a vacuum beneath a piston, in order to render effective the pressure of the atmosphere above it. The High Pressure Steam Engine was invented by Evans in 1780, but was not brought into practical use until 1801. He constructed his locomotive in 1804.

The history of these two grand Motors, Water power and High Pressure steam, in their numerous applications for the development of every branch of manufactures in this country, are daily and nightly performing work which would require the manual power of millions of men, cannot now be given. Neither will any description be attempted of the many mechanical devices which, originating here, have attained world-wide celebrity.

STEAM-VESSELS.

The plans of Evans for locomotion upon land made no impression on the public, after its attention had been arrested by the brilliant achievements of Fulton upon water. After a long series of attempts to propel vessels by steam power, first made by John Fitch in 1784, and continued by various inventors for twenty years, Robert Fulton launched his successful steamboat, the "Clermont," in 1807, and the problem was solved. *From that time and for five years, the Hudson River was the only river in the world on which steamboats were used.* In 1811, Fulton built at Pittsburgh the first steamboat which floated on the waters of the Ohio. In 1860 the tonnage of the steamboats on the waters flowing in the valley of the Mississippi was 250,000 tons. It is needless to add more than the fact, that the number of steamboats navigating the rivers of the United States far exceeds those found within all Europe.

The successful voyage of the first steamship, the "Savannah," across the Atlantic, in 1819, directed attention to the feasibility of navigating the ocean by steam. Some years afterwards, it was demonstrated that a steamer could carry coal sufficient to cross the Atlantic, without the use of sails; and from that time Commerce was greatly facilitated by the expedition, regularity, and safety of steamships. It would be interesting to trace the action of individual enterprise in this country, from the opening of the Panama Route, up to the time when the investments of a single American, Cornelius Vanderbilt, in ocean steamers vastly exceeded those of any other man in either hemisphere.

CANALS.

The subject of inland navigation very early occupied the attention of Gen. Washington. Just after the close of the War for Independence, in 1784, he presided at a commission which met for the purpose of taking into consideration the best means of improving the navigation of the Potomac River. This was the preliminary step which resulted in the construction of a canal from the Potomac to the Ohio at Pittsburgh. The Western Navigation Company, chartered by the State of New York in 1796, constructed a series of locks and short canals, uniting the headwaters of the Mohawk with Oneida Lake, Oswego and Seneca rivers, also with Cayuga and Seneca lakes; thus allowing boats to pass from Schenectady 250 miles westward, into the interior of the State. The success of this project, and the peculiar formation of the land bordering on Lake Ontario, induced the Legislature of this State to pass an Act for the construction of a canal from the navigable headwaters of the Hudson River to Lake Erie. The excavation was commenced in 1819, and the canal was completed in 1825.

In the meantime, and soon after, similar works were completed in other States, amounting in the aggregate to about two thousand miles. The Grand Erie Canal was subsequently enlarged to about twice its original capacity. Its numerous aqueducts, double locks, viaducts, and bridges, of cut stone, have never been equalled by any similar structures. This magnificent work, with its branches forming a water communication for boats extending within this State over 1,000 miles, must be regarded as one of the modern wonders of the world.

RAILROADS.

The excitement which followed the first opening of the Erie Canal had scarcely subsided, when public attention was directed to a more expeditious mode of transportation.

Railroad companies were chartered in several States in 1828; two years before the English railway from Manchester to Liverpool was opened, twelve miles of the Baltimore and Ohio Railroad was completed and in use. In 1831 the railway between Albany and Schenectady was in successful operation. The tide of public sentiment was by this time strongly in favor of the new mode of travelling. Railways were projected in every direction, and completed with astonishing rapidity. The invention of the T rail by Robert L. Stevens, of Hoboken, who devised the form of rollers for making it, and the adoption of the American plan of cross-ties, gave the railway the essential qualities of stability, smoothness, and security. In 1860 the railroads of the United States exceeded in extent the combined roads of the Old World. The demand for Civil Engineers, in the prosecution of the works already mentioned, has been incessant from the beginning. It is needless to add that our Colleges have furnished but a small portion of the supply. Some of the most eminent of this profession were educated at West Point; but, in general, the Engineers who have acquired the greatest celebrity in planning and superintending important works, attained their skill while acting previously as assistants on similar structures.

THE ELECTRIC TELEGRAPH.

By the side of nearly all railways, and on many common roads, may be seen the wires of either the writing telegraph of *Morse*, or the printing telegraph of *House*, making an aggregate length far exceeding in extent the combined telegraphic lines of Europe and Asia.

COAL MINES.

The development of the natural resources of our country, forms another interesting chapter in the history of the period under consideration. The supply of wood from the native forests had scarcely began to diminish, when it was discovered that hard coal could be used as a fuel, by means of fire places and stoves especially adapted for it. The first cargo of coal 365 tons, was sent to Philadelphia in 1820; the amount consumed in 1856 was 3,000,000 of tons. A survey of the coal fields of the United States has revealed the astonishing fact, that in extent they far exceed the sum total of all other coal formations, as far as known, on the face of the globe.

METALLIC ORES.

Not less remarkable are the metalliferous deposits thus far discovered. Iron ores of superior quality are widely diffused, especially on the eastern slope of the Appalachian Range. Minerals containing Lead, Zinc, Copper, and other metals of minor importance, are found in numerous localities and in abundance. The southern shore of Lake Superior presents the anomaly of lodes of pure copper. For many valuable mineral discoveries we are indebted to Geologists, by whose early explorations the position and relation of the metal-bearing strata were determined. The opening of the numerous ore beds, and the establishing of furnaces and smelting works, have been facilitated by the scientific services of the mineralogist, the chemist, and the mining engineer.

The discovery of Gold in California marks a new epoch, and has already resulted in peopling the shores of the Pacific. Concerning this auriferous region nothing need be stated, except that the value of the precious metal annually produced exceeds fifty millions of dollars.

Mercurial ore is found in abundance not far from San Francisco, and silver ore of remarkable richness in Nevada. Revelations of hidden wealth are now too frequent to excite surprise. They are not made, however, without the labor of those experienced miners who have had their perceptions quickened by many failures.

PETROLEUM.

The discovery that the means of illumination could be supplied by the distillation of rosin and of cannel coal, promised to lead to important results; but the very recent disclosure of immense reservoirs of oil, distilled by Nature, has thwarted previous plans for manufacturing oleaginous fluids. In the purification of petroleum, another product is obtained, which is found to be a substitute for turpentine in the preparation of paints. The immense yield of the oil wells is now attracting the attention of large capitalists. Already the amount exported entitles Petroleum to a place among the principal products exchanged for foreign manufactures. The composition of the crude material is not yet accurately ascertained. Doubtless, many new uses will be found for the various hydro-carbons into which it may be separated. The subject affords the chemist a rare opportunity for experimental research.

NEED OF MEN OF SCIENCE.

From the brief review of progress thus presented, it will be apparent that in the development of the resources of this country, and in the advancement of the peaceful arts, there has been a constant need of more scientific men. Fortunately for us, our Government has taken the precaution to educate men in the art of war, at the public expense. The great interests at stake in the present Rebellion have not been left to the guardianship of undisciplined soldiers. Those in highest command have received a military education. The same principle, applied to our seminaries of learning, would require that every scholar sent forth should be thoroughly versed in science and its application to the arts, because, whatever may be his future position or occupation, there will necessarily be emergencies when such knowledge only can extricate him from difficulties.

NEED FOR COLLEGE REFORMS.

It is proper, therefore, to encourage a habit for such studies, and to favorably notice every innovation that tends to adapt the system of education to the wants of a progressive age. The example set by Prof. Joy in addressing the Chemical Society of Union College, at its last anniversary, should be followed by other scientific teachers. If societies devoted to Chemistry, Botany, Zoology, Geology and Astronomy, could be addressed by those who are competent to present a digest of all the prominent discoveries made during the year, a new interest would be given to College Commencements, not only by lending the charm of variety to the proceedings, but also by enlightening in science a large class of annual visitors, who would appreciate its importance. The rapid strides of discovery are not realized by those who ought to be most benefited. A college graduate of twenty years' standing, who has failed to inform himself of the forward movements in science, will be found to-day, in practical knowledge, behind some of the scholars of our Common Schools. The absence of evidence of genuine preparation for the duties of life has occasionally raised doubts regarding the beneficial tendency of College Commencements. Amid all the glitter and show of these anniversaries, there is no assurance, in some cases, that the acquirements of the graduate about to assume the responsibilities of citizenship are of the practical kind fitting him to fill the post to which duty may assign hi . It is with satisfaction conceded that our leading universities have provided a special course of scientific study, and that many who have taken advantage of it have already acquired distinction and wealth. Still, the scientific course is regarded as rather subordinate, than superior, to the classical. It is confidently hoped that the dominating influence of Science will soon effect the improvements suggested, and that as an incentive to those who are making observations in fields which promise no lucrative return, our universities will confer on them high degrees of honor, for enlarging the domain of Physics and Chemistry, thus distinguishing them from those who have acquired literary distinction.

SCIENCE ESSENTIALLY MODERN.

We cannot, however, consistently complain that the claims of Science are not fully recognized, when we reflect upon its comparatively recent origin. Since the invention of the telescope, the microscope, the thermometer, the barometer, and many delicate measuring instruments, Nature has been faithfully interrogated by thousands of observers, and their reports have been properly classified and arranged. Thus order has arisen out of seeming conflict and confusion, and every new law announced has confirmed the general belief in a unity of Power and Design The Science of to-day therefore differs radically from the meager and unsystematized knowledge possessed by the ancients. The principal discoveries relating to the position and composition of matter, and the demonstration of the absolute fixity of its properties, under like conditions, have all been made within a comparatively recent period. We shall be more fully impressed with the truth of this statement by a brief allusion to scientific revelations since the formation of our Republic.

Chemistry, as a science, had its origin with the discovery, in 1774, of Oxygen, the element of which more than one-half of the earth, by weight, is composed. Its discoverer, Dr. Priestly, died in this country in 1804. Lavoisier, his cotemporary, who first comprehended its properties, and gave to Chemistry its nomenclature, died by the guillotine during the French Revolution. A large majority of the chemical elements were discovered during the present century. The list of eminent experimental chemists is too long to be repeated here. In Inorganic Chemistry the name of Berzelius stands most prominent; in Organic, that of Liebig.

The history of Electricity commences with the discoveries of Benjamin Franklin. The law of electric force was demonstrated by Coulomb in 1785. The same philosopher investigated the forces of magnetism. In 1824, Poisson found the formulas for expressing the attractions and repulsions of bodies of any form magnetized by influence on a given point. Galvanism originated in 1791. Volta discovered, in 1794, that the force manifested in Galvani's celebrated experiment was not animal electricity. In 1800 he constructed the Voltaic pile.

The sciences of Electro-Magnetism had its origin with the discovery of Oersted of Copenhagen, in 1820; and in the same year Ampere solved the general problem of electro-dynamic action. Diamagnetic action was discovered by M. le Baillie in 1829. The brilliant experiments of Henry, Saxton, and Faraday, of our own time, are well known.

To Acoustics Laplace made the most important addition in 1816, by the true solution of the problem of the propagation of sound.

In 1808, Malus discovered the polarization of light. In 1821, Fresnel confirmed the undulatory theory first propounded by Huygens, but went further and demonstrated that light is produced by the transverse vibrations of an ethereal medium. The emission theory of Newton was finally disproved by the experiments of Fizeau and Foucault, in 1850.

Benjamin Thompson, an American, better known as Count Rumford, proved by experiments at Munich, towards the close of the last century, that heat was the result of motion. In 1817, Dulong and Petit corrected the assumption of Newton, by discovering the true law of cooling. They afterwards made known the relation between the specific heat of elements and their equivalent weight. In 1830, Melloni and Nobilli constructed the thermomultiplier, by means of which the refraction and polarization of heat were demonstrated. The mechanical equivalent of heat was correctly ascertained and announced in 1842, by Dr. J. R. Meyer.

In Zoology, the methods of Cuvier and Bichat have been followed with brilliant results. The most remarkable discovery, after the commencement of the present century, was that of Oken in 1807—the resolution of the skull into vertebræ. Thirty years later, Agassiz, by a study of tissues, made valuable contributions to the department of Ichthyology.

In Botany, a very important generalization was made by Jusseieu, in 1789, connecting the cotyledon with the endogenous and exogenous growth of a plant, and its fruit and leaves. A year later Goethe announced the discovery of the law relating the flower to the leaf by arrested development. At the time of Linnæus, only 8,000 species were known. In 1849, Balfour states the number then known at about 100,000. During the latter part of the last century, Hauy established the doctrine of decrements in Crystallography. In 1822, the law of Isomorphism was demonstrated by Mitscherlich.

The most important contribution to Meteorology was made in 1831, by Redfield, of New York, in his theory of storms.

The world is indebted to Werner for first giving systematic form to Descriptive Geology. His arrangement of strata has, however, been greatly modified by the discoveries of the present century. The laborers in this vast field of observation are too numerous to be specially noted. Great advances were made in Palæontology by Cuvier. Among the more recent valuable additions to it are those of Owen and Agassiz, made between 1835 and 1845. It should be acknowledged here that American Geologists, by minute and extended observations in a connected series, have contributed their full portion to these branches of knowledge.

This cursory view is sufficient to show that Science has made greatest progress within a comparatively short period; and that *recency* of discovery is the principal reason for its not commanding general credence. Another impediment is found in its copiousness. It is quite impossible for any individual to master all the minutiæ of every branch of science. This will be made apparent by alluding to a single work, "The Natural History of New York," in twenty-one quarto volumes, acknowledged by European savans to be the most valuable contribution to science made by any Government. How many teachers even are familiar with all its details? Yet this work opens to view quite an inconsiderable portion of our planet. It is not, however essential that every man should comprehend the details of discovery, but only those grand deductions and generalizations to which master spirits are led by proper methods of observation and experiment. You, gentlemen, are well aware of the importance of inventions to the material well being of our race; and of their dependence upon the immutable laws by which the Creator governs all forms and forces. Invention is the handmaid of Science and of Art. She furnishes both with the implements by which they achieve success. The circle of knowledge is not and never will be complete. Chemistry has thus far determined no law for the movements of either end of the material chain. The mute mineral has a secret, and is as much a mystery as man. But while we admit that Science has not yet found the Rosetta stone which is the key to the earliest records of the globe, let us not fail to acknowledge our great indebtedness to her for what she has already vouchsafed, and to bear in mind that her gifts are the richest legacy which can be left to future generations. Amid all the fluctuations of time they will remain to enlighten and guide the countless hosts who are to follow us.

American Institute Polytechnic Association,
May 12, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Thallium.

Dr. D. D. Parmelee presented for inspection a specimen of the new metal, Thallium. It is a bluish white metal, very soft, easily tarnished, resembling slightly both lead and silver. Its specific gravity is 11.8.

Prof. Joy, of Columbia College, expressed the opinion that thallium would be prepared shortly in sufficient quantities for ordinary purposes. It is found in crude sulphur, pyrites, and in mineral waters. There are two oxyds of thallium, the protoxyd and teroxyd. He had prepared eight ounces of the chloryd for the purpose of spectral analysis. Thallium is readily detected when in combination with other elements by its characteristic, single, bright green line, coincident with B, a, delta. Its position among the chemical elements is not definitely determined. A thallium-alum has been made which would seem to indicate that it should be classed among the metals forming alkalies. The brilliant color produced by thallium may be of service in making combinations of colored lights and for signal purposes.

Mr. Ryan addressed the meeting on the Theory of Parallels, which has long been a vexed question among geometers, and, with the aid of diagrams, attempted to deduce the properties which it is admitted Euclid assumed in his thirty-second proposition under the guise of an axiom.

Mr. Garvey briefly presented grave objections to Mr. R.'s positions, and as the subject was one involving only abstractions which have long baffled the logical power of the most profound thinkers, the further discussion of it was indefinitely postponed.

The following interesting summary of scientific intelligence was presented by the Chairman.

Oxygen Gas as a Medicine.

The use of oxygen gas as a medicine has been generally condemned by the medical profession, on account of its affinities which often produce internal inflammation; but MM. Demarquay and Leconte advocated, before the Academy of Science, Paris, its use in diphtheritis, diabetes, and other exhausting maladies, when counter indications are absent. In some cases the appetite returns with great intensity, the circulation is improved, lips reddened and nervous affections disappear. Still no absolute cures were announced by these gentlemen. The gas should be absolutely pure, and administered only by those who understand all its effects.

Influence of Ozone and other Gases on Vegetation.

Recent experiments made by M. Carey Lee, of Philadelphia, prove that the presence of ozone in the atmosphere has the effect of retarding the growth of plants. The germination of seeds under the ordinary bell-glass was not retarded by the removal of the carbonic acid from the inclosed atmosphere; while in an atmosphere composed entirely of carbonic acid, or containing ether or nitrate of methyle, germination was entirely prevented.

The Mont Cenis Tunnel.

This tunnel, which is to connect the railways of France with those of Italy, will be about $7\frac{1}{2}$ miles long. At Modane, on the French side of the mountains, the tunnel is of the following dimensions: 25 feet $3\frac{1}{2}$ inches wide at the base, 26 feet $2\frac{3}{4}$ inches wide in the broadest part, and 24 feet 7 inches in height in the middle, the arch being nearly a semi-circle. At Bardonnèche, on the Italian side, the height is 24 feet $10\frac{3}{4}$ inches, and the base is 434 feet above that at Modane. From the middle, toward Modane, the gradient will be 1 in $45\frac{1}{2}$, and toward Bardonnèche, 1 in 2,000, sufficient to allow the water to escape. At Modane, the entrance to the tunnel is 328 feet above the valley, and the walls of the tunnel are entirely of stone. At Bardonnèche, the side walls are of stone, and the remainder of brick.

The boring machines are driven by compressed air, used at 75 inches pressure per square inch, which is conveyed to the "forehead" of the advanced gallery by a pipe $7\frac{7}{8}$ inches in diameter. Two machines are used for compressing the air; one on the hydraulic ram principle, has an air vessel 14 feet high, and 2 feet in diameter. Into this, water, from a column 85 feet high, is admitted; the air thus compressed is forced through a valve into a reservoir. When this valve closes, the water is discharged, air admitted into the air chamber, and the operation of compression is repeated. The machine makes about five strokes in two minutes. The other machine resembles a pump. On one side of the piston, the water presses, and on the other side, the air is compressed.

To complete the tunnel by hand labor it would require twenty-five years. In June last the advance at Modane was at the rate of 47 meters per day. M. Sommeiller expects by his system to advance the tunnel three meters at each end per day. At this rate the work would be completed in the year 1868.

Vapor of Water with Fuel.

The selected subject was the same as discussed at the last meeting. To show that this combination was not of recent origin, a communication from Mr. Joseph Dixon, of Jersey City, was read, from which it appeared that as early as 1826, when anthracite coal was but little used, he put up, in a woolen factory at Canton, Mass., a boiler and attachments for heating purposes. Supposing a flame would be more effective for making steam, he tapped the boiler head near the top and inserted one end of a pipe having in it a regulating cock; the other end entered the ash pit, so that the steam discharged would pass through the grate bars, be decomposed on contact contact with anthracite and thus increase the flame; but the great inconvenience from the sulphide of hydrogen which escaped into the factory from a want of draft in the stack, caused it to be discontinued. Again in 1845 or 1846, he tried the burning of steam for melting iron in a cupola furnace, erected at the expense of I. Savary & Son, in Jersey City, at their foundery, but the boiler being sixty feet from the cupola it was after the first melting laid aside, until a boiler could be made expressly for the purpose and placed near by; that was never done. The idea of the burning of the vapor of water is a very old one, as will be seen on examining the following dates of patents granted in this country: The American water-burner was patented by Capt. Samuel Morey, of Oxford, N. H., December 11, 1817. An improvement on Morey's water-burner was patented by L. L. Sullivan, of Boston, Mass., December 10, 1818, and another by him December 19, 1818.

Mr. Stetson remarked that in the presence of the vapor of water, during combustion, there may be a catalytic action, by which a more perfect union of the burning elements is effected. If this is so, there can be no doubt of its utility. In the ordinary combustion of fuel, it is ascertained that a large proportion of the oxygen of the air escapes uncombined. If the use of steam will facilitate the utilizing of this oxygen, it would be a decided advantage. This was the only light in which he could view any benefit arising from the use of the vapor of water in connection with fuel.

Mr. Dibben thought the amount of uncombined oxygen which escaped up the chimney was not great; according to chemical tests made with the waste products of melting-furnaces, it is shown that only five or six per cent. of the oxygen thus escapes.

Mr. Root remarked that the escape of uncombined oxygen is much greater from the fires which heat boilers than from furnaces.

Dr. Rowell drew a diagram of the furnaces used for burning wet tan-bark, which he had seen in operation during the last week. When the furnaces were first put up iron grate bars were used; but they were soon warped so as to be useless. The grates are now made of fire-brick. The ovens are about four feet wide and eight feet long; the fire is first started with wood, and the whole interior is made nearly red hot before the spent tan is putin . The flame is conducted from this oven through a passage-way under the boiler. There seemed to be no great draft, as proved by holding the hand before the damper, but he accounted for this by a condensation of vapor in the chimney. There is probably two or three per cent. of the tan that is not burned. The same quantity of fire made of coal would have produced a great draft.

Mr. Bartlett said the vocation of water in combination with fuel was to expose a fresh surface of coal to the action of oxygen; there was no chemical action whatever. We find that dry tan, through which the air very slowly permeates, makes a smoldering fire, but not a bright one. In burning tar, at Old City, the furnaces are two feet long and one foot wide, but the smooth surface of the tar prevents it from burning fast; therefore water is put into it, which causes the tar to bubble, and in this way a greater surface is exposed to the action of oxygen in the process of combustion. So when a jet of steam is let into a mass of coal in a furnace it loosens the pellicles of the coal and agitates the mass generally; but in all these cases there is a greater quantity of fuel consumed, and therefore a greater heat is produced in the same furnace than there would be without the use of steam.

Mr. Stetson read from Prof. Renwick's work on the Steam Engine in relation to the advantages claimed by water in the ash-pan of a boiler furnace.

Mr. Mather remarked that in some potteries in England it was the invariable rule to use a certain quantity of water along with the coal, while in Vermont, where wood is burned in potteries, they went to the other extreme and would never use green wood.

Prof. Joy stated that some sixty patents had been issued within the last forty years for burning water and decomposing water for the purpose of making illuminating gas—an able pamphlet on the subject had been prepared for the Manhattan Gas Company of this city by Mr. Henry Watts.

The subject was further discussed by Messrs. Seeley, Roosevelt and Enos Stevens.

A desire having been expressed to examine the question of combustion in all its bearings, the subject of "Fuel" was selected for the next meeting.

Adjourned to Thursday, May 19.

American Institute Polytechnic Association,
May 19th, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Prizes for Roof Constructions of Wood and Iron.

The Secretary read a communication from the Austrian Engineers' Union, at Vienna, containing an offer of prizes for the best and second best treatise on the most useful "roof constructions of wood and iron," to be illustrated with the necessary drawings, all on the same scale. For estimating the stability of each structure, under varied contingent weights, all the requisite scientific rules and formulas are to be set forth. There should also be given the results of calculations and comparisons, in convenient tables, so placed together that the architect or engineer can find the necessary data for making the estimates for each roof construction separately. The competitors will have until September 30, 1865, to send in their works. The successful authors, in addition to the prizes, will be entitled to the copyright of their works, provided they publish them within six months. After that time, should they decline to publish, the Austrian Engineers' Union charges itself with the publication of the two treatises in a suitable manner. Further information concerning this offer of prizes may be obtained by applying to the Secretary of the American Institute.

The presiding officer presented the following interesting summary of scientific experiments and discoveries:

Megass a Disinfectant.

Dr. H. G. Dalton, of Demerara, has proved by experiment that megass or begassé—the dried stem of the sugar-cane after its saccharine juice has been extracted by pressure—has the property of absorbing or destroying the noxious effluvia arising from animal decomposition. He has used it as a disinfectant in a hospital where, except in the immediate neighborhood of the worst cases of ulcers, there was no unpleasant odor, and even there the disagreeable smell was greatly modified.

The Most Volatile Constituents of Petroleum.

Mr. Edmund Ronolds lately stated before the Royal Society of Edinburgh that the gases dissolved in Pennsylvania petroleum, and which give it such a high degree of inflammability, were composed of the lower members of the marsh gas series. Gases taken from the surface of the liquid, as imported in casks from America, were shown by endiometrical analysis to contain a mixture of nearly equal proportions of the hydrides of ethyl and propyl. The same compounds were found in the gases evolved on warming the volatile liquid; after these succeeded the hydrides of propyl and butyl, and finally there was evolved nearly pure hydride of butyl. This liquid has a spec. gr. of 0.600 at the melting point of ice, and is consequently the lightest liquid known. Its vapor density is 2.11. It is colorless, and has a sweet, agreeable odor. Alcohol at 98 p. c. dissolves between 11 and 12 times its volume of this vapor. It is not perceptibly affected by sulphuric or nitric acid, nor by bromine. With twice its volume of chlorine, mixed in diffused daylight, the liquid chloride of butyl is formed.

Alloys of Silver and Zinc.

The French Government is about to lower the standard of the silver coinage, in consequence of the increasing scarcity of silver money, by an addition of about seven per cent. more of copper, thus making the per cent. of copper 165. M. Peligot, chemist to the French mint, has made experiments to ascertain how the introduction of some zinc, or the complete substitution of zinc for the copper, would affect the alloy. He reports to the Academy of Sciences that the substitution of zinc for the copper forms an alloy remarkably malleable and perfectly homogeneous. Equal equivalents of silver and zinc, or two equivalents of silver to one of zinc, gave malleable alloys, while one equivalent of silver with two equivalents of zinc, also two of silver with three of zinc, form compounds too brittle to be rolled. The present price of zinc is only one-fifth that of copper, and as a matter of economy the Government should use zinc. The fact that the zinc alloy is less discolored by sulphuretted hydrogen than the copper compound is in its favor. An alloy of 800 parts of silver to 200 of zinc will keep its whiteness in a polysulphide which would rapidly blacken the legal alloy of silver and copper. The absence of verdigris, under the action of acid liquors, is another advantage. The French copper money contains one per cent. of zinc; the small Swiss coins are alloys of zinc, silver and nickel.

Effects of Light on Honey.

M. Scheibler has proved that sirupy honey, exposed to light, crystallizes and ultimately becomes a solid mass of sugar, while that kept in the dark remains perfectly liquid. This may account for the fact that bees cover with wax that part of their hive made of glass, so as to exclude the light. The existence of their young depends on the liquidity of their saccharine food.

Respiration of Fruits.

At a late meeting of the Academy of Sciences, Paris, M. Cahours read a paper on this subject, from which it appears that apples, oranges, and lemons, in a state of perfect maturity, when placed under bell glasses containing either pure oxygen, or a mixture of oxygen and nitrogen, or common air, respire by consuming a portion of the oxygen and giving off carbonic acid gas—the proportion of the latter compound being greater in diffused light than in obscurity. He proposed to continue his investigations regarding changes in fruit from development to maturity.

M. Fremy then made some remarks on the maturation of fruits, and referred to experiments made by him and M. De Caisne some time ago.

They found that fruit passed through three stages. In the first stage the fruit is green, and behaves to the atmosphere like a leaf, in decomposing carbonic acid and giving off oxygen In the second stage, that of ripening, this action is reversed—oxygen is absorbed and carbonic acid exhaled from the cellules of the pericarp, in consequence of a series of slow combustion, in which the immediate soluble principles disappear. Tannin goes first, then acids, and afterwards sugar. In the third stage, that of decomposition, the effect of which is the liberation of the seed, air enters the cellules, sets up alcoholic fermentation, and the acids of the fruit give birth to true ethers. Finally, it not only decomposes the cellules, but oxidizes certain constituents which have resisted the changes in ripening; thus certain fruits, like the medlar, very acid and astringent, only become eatable when they are mellow.

Condensation on the Surface of all Solids.

Prof. Magnus describes in *Peggendorf's Annalen* a series of delicate experiments made by him, from which he concludes that all substances, however different they may be, are raised in temperature when air comes in contact with them which is moister than that surrounding them; and that they are depressed in temperature when they are exposed to air which is drier than that by which they are surrounded. The most various vapors condense on the surface of solid bodies in such quantity as to cause an appreciable elevation of temperature; and from this it follows that at all times there is at the surface of bodies a layer of condensed vapor, which is larger or smaller according to the hygrometric state of the atmosphere.

A Bridge over the Straits of Messina.

The Italian journals announce that it is in contemplation to unite Sicily with Italy by a bridge, to be constructed on a new system. The chains will be made of cast steel, and strong enough to support the weight of several railway trains.

New Maritime Sounding Apparatus.

M. Gonezel has invented an apparatus in which the suspension line is dispensed with. It consists of a rod of iron, furnished with nippers at the extremity, which supports cylindrical weight capable of being detached from the rod; above the weight a float of hollow metal is fixed, which contains a small clock so arranged as to stop by concussion; a bell is also attached, and above the whole a signal. The time of dropping the apparatus is noted; on striking the bottom the clock is stopped, and the float is detached and rises to the surface; the depth is calculated from the time of the descent. The objection to long lines in deep-sea-soundings, which are bent by under-currents, seems to be obviated by this invention.

Silk-Worms.

M. Onesti has found that wood-soot, if sprinkled over diseased silk-worms, effects an almost certain cure, or at all events prolongs their lives until the cocoons are finished. The Minister of Agriculture of France has requested that a commission be formed to report on the value of this discovery.

M. Simon, commissioned to bring from China to France the best breed of silk-worms, has sent home a box of eggs to be distributed. Some of these are now being experimented upon at the Imperial farm at Vincennes.

Fuel.

Mr. J. A. Miller made some remarks preliminary to the regular discussion, on the economical use of fuel. The subject of combustion was second to no other, because it was the mainspring of both animal and mechanical power, when such power is derived from heat. It is admitted that the principles governing combustion are understood by scientific men; at the same time it will not be denied that the proper application of these principles is seldom made. Coal is the source of most of the power used in manufactures and locomotion as well as our chief defense against cold. We should always aim to produce the best results with a given amount of material, yet in no department of the useful arts is waste so disastrous as in combustion. Nearly all other waste products are or can be utilized, but the unconsumed gases when they escape from the chimney are beyond the reach of man. The annual consumption of coal in this country is more than 15,000,000 tons, which, at an average of $5 per ton, is worth $75,000,000. If, of this amount, 20 per cent. can be saved, the sum added to the wealth of the country is $15,000,000--the interest at 6 per cent. on a capital of $250,000,000.

The resultants of the perfect combustion of carbon and hydrogen by combining with the oxygen of the air are carbonic acid and water. Perfect combustion can only be obtained by insuring to the fuel a full supply of oxygen, and the most economical use of the heat is made when only the amount required for draft escapes from the chimney. The speaker illustrated by diagrams some improvements he had introduced for economizing the heat under boilers, relating to the size and form of the furnace, grate bars, and bridges—the latter, instead of allowing the heat to pass over them, were brought into contact with the boiler, and contained a number of openings, having a slight descent from the front to the back; there should be at least two of these bridges under an ordinary horizontal boiler. The object of these bridges, designated as lungs, is to facilitate perfect combustion, to abstract the heat from the passing gaseous products, and to give it to the boiler by conduction through the parts in contact and by radiation. Mr. Miller was convinced that in the few furnaces built on this plan there was a saving of heat, but he was not then prepared to furnish any comparative statements. According to experiments made in England, in regard to the regulation of the admission of air to feed the fire, it had been shown that there was a saving of about three per cent. of fuel by the use of self-regulating dampers.

Mr. T. D. Stetson said he believed most of the automatic arrangements for regulating the draft under boilers have been abandoned. There is, doubtless, in the ordinary construction of furnaces, much heat wasted. We know that, in theory, the greatest possible evaporation of water, by a given quantity of coal, is nearly double that usually realized by the common pro. cesses. The flame is allowed to pass to the chimney too rapidly ; if more time was given for the gases to be intermingled and reverberated, the products of combustion could be secured, and very few would be allowed to escape up the chimney. The smoke which escapes is mostly carbon oxide and fine particles of coal. If these could be consumed, there would be much additional heat. To consume the smoke, it is essential that oxygen should be supplied very freely, and that the heat should be intense enough for proper ignition. Accordiag to Beurne, Prideaux, and other anthors, nearly half of the oxygen passes through our common furnaces without being combined with the fuel. This is owing to the rapid draft.

The Chairman remarked that no subject had been discussed before this Association of more importance than the disengaging of heat by chemical combination. Heat as a motor, as a chemical agent, and as the source of artificial temperature, is indispensable, and every person is directly or indirectly benefited by the most economical generation of it. It is not essential to speak of all the combinations which will produce heat, for it is settled, beyond all question, that of the sixty-odd elements, only three can be used with safety, economy and convenience. These are Oxygen, Carbon and Hydrogen. The chemical change which produces heat is the combination of oxygen with carbon or with hydrogen. About one-fifth of the common air, by measure, is oxygen. This element always presents itself at our bidding in any desired quantity ; the actual cost of the fire, therefore, is the cost of the carbon or hydrogen consumed. In some kinds of fuel—in wood, for example—we find a certain portion of oxygen already combined with these elements. This portion has already done its heat-work, and is of no service during the process of burning such fuel. Now the plain but most important question to be settled is, what is the exact quantity of heat generated by substances composed chiefly of carbon and hydrogen? The experiments of MM. Fabre and Silbermann, conducted with great care and accuracy, and corresponding in the main with those made by Dulong and Petit, will furnish us the desired answer. The tables of these experimenters include a great range of combinations, but only those relating to the union of oxygen with substances containing carbon or hydrogen are selected. Taking as the thermal unit the quantity of heat required to raise the temperature of one pound of water from 0° to 1° C., we have in the following table the uniis of heat generated from the union of one pound of the several substances mentioned with all the oxygen required for perfect combustion.

Hydrogen	34,462
Marsh Gas	13,063
Olefiant Gas	11,858
Amylene	11,491
Oil or Turpentine	10,852
Olive Oil	9,860
Ether	9,030
Anthracite Coal	8,460
Charcoal	8,080
Bituminous Coal	8,000
Tallow	8,000
Diamond	7,700
Absolute Alcohol	7,180
Coke	7,000

Wood Spirit	5,307
Dry Wood	4,025
Moist Wood	3,100
Carbonic Oxide	2,400

The gases and oils mentioned are too expensive to be used. It will be noticed that at the same price per ton, anthracite would be a cheaper fuel than charcoal, bituminous coal, or coke. It is very compact, brilliant, and comparatively clean. Fortunately for us, it is the most abundant fuel in our market. These experiments were made before the discovery of American petroleum Judging from analogy, its place in the table would probably be next to the oil of turpentine.

Mr. L. B. Page presented the report of Chief-Engineers Wood, Whipple and Stimers to the Secretary of the Navy, of experiments they had made in burning crude petroleum, in an apparatus invented for the purpose, consisting of a series of corrugated recesses upon a vertical cone of cast-iron placed in the furnace of the boiler, the base of which formed a semicircular disc or annular reservoir, and the depth of which in section was about half its diameter, and served to contain such heavier and less inflammable portions of the oils as were not consumed or vaporized in passing over these smaller corrugated recesses. The results gave for crude petróleum an evaporation of 10.36 pounds of water for one pound of oil, and for anthracite 5.1 pounds of water per pound of coal.

Mr. W. Sewell said a ton of anthracite coal ought to evaporate from 8 to 9 tons of water. Some reports have been made giving the amount of water evaporated by one pound of coal as high as 11.062 lbs. Several members coincided with the opinion expressed by Mr. Sewell.

Mr. Dibben inquired why, in the table presented, coal containing both carbon and hydrogen was shown to have less heating effect than carbon alone, when the effect of hydrogen alone is given at more than three times that of anthracite?

Mr. Geo. Bartlett explained this apparent anomaly. Hydrogen, as a gas, has great heating power when uniting with eight times its weight of oxygen, and forming water; but hydrogen in a solid form, which it takes in combination with carbon, has scarcely any heating power. This is fully accounted for by D. K. Clarke, of England, in his work on railway machinery. His deductions from experiments were that the bituminous coal which contained the least gas—that is, contained the most carbon and the least flame, was the most effective. In the locomotive boiler, he found that soft coal is capable of about two-thirds, or sixty-six per cent., of the duty of an equal weight of coke. This conclusion is not affected by the very superior heating power of hydrogen gas, when burnt with oxygen, amounting to several times that of carbon, and the apparent value of an excess of hydrogen in coal. The hydrogen in coal being in a solid form, it must be brought to the state of gas before combustion. This conversion absorbs more heat than in the case of carbon, because two volumes of hydrogen gas are required to unite with one volume of oxygen.

The Chairman alluded to the erroneous view of those who hoped to increase the quantity of heat by dividing the process of combustion into two stages: that is, by first uniting carbon with one atom of oxygen, forming carbonic oxide gas, and then by combining the carbonic oxide with another atom of oxygen, forming carbonic acid gas. According to the experiments of Dulong, Despretz, and Hess, the quantity of heat developed is precisely the same, whether the carbon is converted into carbonic acid at once, or by the intervention of carbonic oxide. In the table given, the heat developed by burning carbonic oxide is apparently too low, but it must be borne in mind that the amount of carbon employed is only six-fourteenths of the weight of this fuel.

Mr. Garvey spoke of the consumption of fuel in marine boilers, and the waste resulting from the excessive stirring of the fires, by which valuable uncombined products are carried off by the strong draft.

In the course of the evening, J. Wyatt Reid called attention to some calculations he had made in relation to the use of steam expansively. As the subject is one of general interest, it was decided to discuss it at the next meeting.

Adjourned to May 26.

American Institute Polytechnic Association,
May 26, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Screw-Threads and Bolts.

It is now the practice of each manufactory in this country to follow its own patterns without any reference to those of other establishments. The evils growing out of a want of uniform system are numerous. The most serious attend the repairing of machinery when the original patterns of the screws used cannot be obtained. The following extracts from an able communication lately made to the Franklin Institute, of Philadelphia, by Wm. Sellers, were read:

"The importance of a uniform system of screw-threads and nuts is so generally acknowledged by the engineering profession, that it needs no arguments to set forth its advantages; and in offering any plan for their acceptance it remains only to demonstrate its practicability and its superiority over any of the numerous proportions now used by the different manufacturers. In this country, no organized attempt has yet been made to establish any system, each manufacturer having adopted whatever his judgment may have dictated as the best, or the most convenient for himself; but the importance of the works now in progress, and the extent to which manufacturing has attained, admonish us that so radical a defect should be allowed to exist no longer. The importance of this subject was long ago recognized in England, and the engineers of that country, by mutual agreement, adopted the proportions now in universal use there. Our standard of length being the same as theirs, it would seem desirable that the system which they have adopted should also be employed by us, unless grave objections can be urged against it, and a better one substituted. The form of curve adopted by the English engineers is one with flat sides at an angle with each other of 55 deg., with a rounded top and bottom. The proportions for the rounded top and bottom are obtained by dividing the depth of a sharp thread having sides at an angle of 55 deg., into six parts, and within the lines formed by the sides of the thread and the top and bottom dividing lines, inscribing a circle which determines the form of top and bottom of thread. Judging from the practice in this country, the English form of thread has not met with the same favor that has been accorded to their pitches. Its advantages over the sharp thread are increased strength to the screw from the absence of acute corners, and the greater security from accidental injury which the rounded top possesses. Its objectionable features are, first, that the angle of 55 deg. is a difficult one to verify; it is probable, no gauges to this angle, made independently of each other and without special tools, would correspond with sufficient accuracy. Secondly, the curve at the top and bottom of the thread of the screw will not fit the corresponding curve in the nut, and the wearing surface on the thread will be thus reduced to the straight sides merely. It is not to be inferred from this that these curves cannot be made to fit, but only that the difficulties in producing contact are so much increased by the peculiar form, that in practice it will not be accomplished. Thirdly, the increased cost and complication of cutting tools required to form this kind of thread in a lathe, it being requisite that this tool shall have at least three cutting sides, in order to form the round top between the two of them. The English practice for small work, is to rough out in a slide-lathe with a single point tool having sides of the proper angle, and finish in a hard lathe with a comb-chaser, which has been dressed to the proper form upon a hob kept for that purpose, requiring three kinds of cutters and two lathes to perform what with our practice requires but one cutter and one lathe. On large work, the screw is finished in the slide lathe, with a chasing tool dressed to the proper form upon a hob; and as these hobs are necessarily the standards of form until worn out, it is fair to suppose the shape must be undergoing a continual change. The necessity of guarding the edge of the thread from accidental injury, becomes more and more apparent as the size of the bolt is increased, and we have recognized this by finishing such bolts with a small flat upon the top of the thread; but no plan has been proposed for general adoption upon all screws, nor have any proportions been suggested where a flat is desired, or where from the size of the bolt it would seem to be necessary. As it is very desirable that some uniform rule should be observed in the formation of all threads, and as the sharp top is objectionable upon large screws, this form must be abandoned if we would accomplish our object. It being conceded that the flat angular sides are necessary, we have only to choose between the rounded and flat top; and having examined the former, it only remains to notice whether the flat will be found free from the objections urged againsr the round. As the sides of the thread are the only parts required to be fitted, and as these are of the same shape as the sharp thread, the one will be as easily made as the other. The width of the flat top will be determined by the depth to which the thread is cut, so that the same tool can be used in both cases. The flat on the top of the thread being required to protect it from injury, it is evident a similar shape at the bottom would give increased strength to the bolt as well as improve its appearance. To give this form requires only that the point of the cutting tool shall be taken off, and then it is evident this thread can be cut in a lathe with the same tool and in the same manner as the sharp thread. The width of the flat in the bottom of thread being dependent upon the amount taken off the point of the tool, it becomes necessary not only to determine what amount this shall be, but also provide a means of measuring it. The angle of the proposed thread is fixed at 60 deg., the same as the sharp thread, it being more readily obtained than 55 deg. and more in accordance with the general practice of the country. Divide the pitch, or, which is the same thing, the side of the thread, into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread; then the flat top and bottom will equal one-eighth of the pitch, and the wearing surface will be three-quarters of the pitch. These proportions will give the depth of the thread almost precisely the same as the English; and as the wearing surface on all screws will be confined practically to the flat sides, we shall see that upon the proposed plan this will be 36 per cent. greater than on the English."

Mr. Seller's article contains all the formulas and diagrams essential to a complete comprehension of the subject. He also proposes a system of uniform dimensions for bolt-heads and nuts, and gives the formula and tables requisite to secure this desirable end.

The proposition of Mr. Sellers seemed to meet the cordial approval of the members generally.

Mr. J. Wyatt Reid said some idea of the evil now sought to be avoided might be had, when he stated that at his establishment there were used six different taps for the same sized bolts.

Natural Weather Indicator.

Mr. L. B. Page exhibited a very sensitive hygrometer, made by connecting a rotating index hand with a curious and beautiful exotic, which grows in the Desert of Arabia, and is called by the Arab the talisman or prognosticator. A mercurial thermometer is attached to the hygrometer, and the whole does not exceed ten inches in length. The plant used is very susceptible to weather changes, and coils or uncoils according to the dampness of the atmosphere. It was found that the moisture in the human breath was sufficient to give instantaneous motion to the index.

The Chairman remarked that the Association have not tested the accuracy of this instrument, but, from the number of certificates shown from scientific gentlemen, there seems to be no question as to its practical value in the hands of the farmer or gardener. Prof. Henry, of the Smithsonian Institute, says, in a letter written several years since: "It appears to be peculiarly sensitive, and gives a greater range of motion than either the animated oat or ordinary catgut." The wet bulb and hair hygrometers are too delicate instruments for general use. This little instrument requires no attention after it has once been properly adjusted; and, as it is said to indicate a change in the weather several hours before the change will take place, the farmer will have less difficulty in anticipating rain or sunshine than with the ordinary barometer.

The following interesting items of scientific progress were presented by the Chairman:

Rain Water.

M. Bobierre reports to the French Academy of Sciences his researches on the chemical composition of rain water, collected at different heights, made at the Observatory of Nantes; from which it appears that more ammonia was found in the water which fell to the ground than in that collected on the tower of the Observatory; on the other hand, more nitric acid was found in the water caught on the tower than in that gathered below. The chemical examination of rain water is an easy method of proving the vitiation of the atmosphere.

New Anæsthetic.

Dr. Georges reports to the French Academy of Sciences his experiments proving that purified kerosene, obtained from petroleum, when inhaled produces insensibility to pain, but the aid of heat is required. He recommends the brom-hydric ether as a safer anæsthetic than chloriform. It has an exquisite odor, and is not easily inflamed.

Ozone.

M. C. Sainspierre informs the French Academy that ozone is developed by blowing-machines or by ventilators producing str ng currents. This fact may be one of the causes producing the healthy action of winds.

Oxide of Silver.

M. Boettger states that this compound yields its oxygen quite readily to combustible matter. A dry mixture of two parts of oxide of silver with one of sulphur will ignite by friction in a mortar, or even between folds of paper. A drop of phenic acid or creosote poured on to the dry oxide causes instantaneous flame.

French Cement.

This cement, for glass, &c., very convenient in the laboratory, is made by melting India rubber scraps and adding thereto, from time to time, small quantities of lime. The mixture is well stirred, and, when moderately thick, it is removed from the fire and moulded by the hand to about the consistency of putty. Coloring matter may be added.

Coating for Stone.

Various preparations are now being applied to different portions of the Parliament buildings, London, for the purpose of arresting the decomposition of the calcareous stone of which they are built.

Births in Cuba.

It appears, by a communication to the French Academy, that the climate of Cuba is exceedingly favorable to fecundity. Very often twelve, and sometimes more than double that number of children, are found in one family. Many Cuban beauties become mothers at thirteen, and reappear in that character up to the age of fifty.

Hearing Hairs in Crustacea.

M. Hensen states that, in the Decapod class of shell-fish, different sounds cause different hairs connected with the auditory cavity to vibrate. One hair will vibrate while all its neighbors remain quiet. The sense of hearing in these creatures is very acute.

The Desert of Sahara.

According to M. Martin, this desert embraces three distinct kinds—1st, the desert of the polateaux, consisting of large surfaces covered with gypsum or plaster of paris; 2d, that of erosion; 3d, that of sand, resembling waves of the sea rendered suddenly immovable. These waves are covered in some places with a thin vegetation of shrubs and grass, which often rapidly disappears under the drifting sands. The oasis is a plantation of palms. The number of oases have greatly increased since the introduction of Artesian wells.

Geological.

Dr. R. Stevens said the recent explorations in the Desert of Sahara by M. Desor would lead us to infer that its geological age was about the same as that of the sands of the Atlantic coast, beginning at the east end of Long Island and extending to the capes of Florida. This has been ascertained by recent discoveries in the desert of edible shell-fish, like the clam, muscles, etc., such as are now found in the Mediterranean Sea, and this settles the question among those acquainted with conchology. The doctor then directed attention to the primitive rocks, such as granite; some thirty years ago it was supposed that these rocks were not truly primitive, but that they had undergone a change. The cause of this change was a question very much mooted. Before that time it was supposed that these rocks had been thrown up by fire; afterward, that the change was of a purely chemical nature. The query was as to the cause of the heat. Was it the result of chemical action or from internal fires. A very prominent school of geologists now aver that it was spontaneous, and that in fact the sedimentary rocks were changed by action that took place within themselves. Dr. Emmons, who made the geological survey of the north-eastern part of the State of New York, expressed the opinion several years ago that the primitive rocks of that period held fossils; and, in the Canadian survey, similar indications were soon discovered. Within the past year it has been shown these were true fossils; these rocks which were termed "primitive" are now regarded as sedimentary rocks, which have undergone a change such as may be instanced in the quartz. He would boldly assert that there is not a cabinet in the world which contains a specimen of quartz that has been acted upon by fire. Such would show an entirely different density. The specific gravity of heated quartz is much lighter than any native quartz we now have. The fossils alluded to are the same as those discovered in the Adirondac mountains, and are known as infusoria, or, more commonly, as rhizapods, a name given to that class which throw out from the shell feet resembling rootlets; these are so small that they can hardly be seen by the naked eye in the present seas. The speaker then illustrated upon the black-board the form of the rhizapod, and proceeded to say that this animal is found in many of our waters. The fossil is found in the palæozoic rocks on the Mississippi, and is as large as one foot in diameter. In the tertiary formation of the valley of the Nile, and at Thebes, it sometimes attains the size of a twenty-five cent piece. But the rhizapods of the primitive rock formations are from two to three feet in diameter. He had seen them of that size. It is the law of the lower animal kingdom that they begin life, at the minimum points, both as to size and as to number; that they go on increasing in successive ages until they arrive at their maximum Having attained their greatest extent all over the world, they begin to decrease, and ultimately disappear from among the animals known to man. This is the case with the rhizapods, which are now a mere microscopical infusoria; and, in following out this general law, we are carried back in our imagination to that period in the earth's history, anterior to the formation of rocks, when these animals were but a mere speck, and forward to the time when they attained the size of those he had represented on the black-board.

The Best Mode of Using Steam Expansively.

This question, discussed quite thoroughly not long since, was again brought up, mainly for the purpose of hearing Mr. J. Wyatt Reid, who took the floor, and, with the aid of figures and diagrams, attempted to prove that there was a great advantage gained by first using the steam at high pressure in one cylinder, and using it again in a more expanded state in another cylinder of greatly increased diameter. In conclusion, he stated that he had presented these views to several practical engineers, and they can present no valid objections to his views.

The Chair observed that the plan of Mr Reid was that of Hornblower and of Wolf, who first practically applied the principle of expansion about the year 1782.

Mr. D. Blanchard remarked that he failed to see the benefit of using two cylinders when the whole gain by expansion could be secured in one cylinder by using a cut-off. When the cylinder is properly clothed with non-conductors the cut-off may be very short. There was an engine running in Waterbury, Conn., in which the steam was cut off at one-eighth of the stroke, —the piston being carried the other seven-eighths by the expansive power of the steam which at first filled only one-eighth.

Mr. John B. Root said the late Mr. Barrow, a well known inventor of this city, had used a large and small cylinder, and the only benefit he had found was that the stroke was more even throughout, but there was no economy whatever. Mr. Root gave several instances where two cylinders had been used, and afterward one had been removed, and the remaining one was found to do all the work which had been done by two previously.

Mr. Watson alluded to several constructions which had lately been made embracing this double cylinder idea, and the extravagant claims made regarding saving of fuel.

Dr. W. Rowell gave the argument against short cut-off which has already been reported in the volume of transactions of the Institute. He concluded ng some novel experiments are now being made in the Metropolitan

Flouring Mills, at the expense of the owner, Mr. Hecker, in which steam is used in a steel cylinder which is kept hot by a steam jacket—the gain by the cut-off thus far is 25 per cent; he would not then enter into details, as the members of this association were to be invited to witness the practical operation of this engine.

Dr. R. S. Newton, after giving an account of some experiments made with double cylinders on Western waters, which were all unsuccessful, directed attention to the cause of explosions of boilers, and alluded to the disaster on the United States steamer Chenango.

Mr. Watson made a diagram on the black-board illustrating the manner in which the boilers on the Chenango were braced, as adduced from the evidence before the Coroner's Jury. It was very evident that explosion was caused by a deficiency in the bracing. A strain of nearly ten tons was brought upon each iron strap, having only five-eighths of an inch sectional area, to which the braces between the arches of the fire-box and the flat shell of the boiler were connected, and they naturally gave way in consequence. There were but 32 of these straps instead of 64; just half the number called for in the specifications, and the disaster which occurred is the result of the omission. By the acceptance of the boilers by the Government agent, the contractors are relieved from all responsibility in the matter.

After some further desultory debate upon boiler explosions, on motion of Mr. Bartlett, "The best mode of producing heat" was selected for discussion at the next meeting. Adjourned to June 2.

American Institute Polytechnic Association,
June 2d, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Improvement of Broadway.

The Chairman offered some considerations on the feasibility of improving the grade of Broadway. The steepest grade on this great thoroughfare, after leaving Bowling Green, is between Leonard and Canal streets. It was considered unsafe to put down the Russ pavement over this portion of the street, and the smaller trap-rock block known as the Belgian was substituted. These small stones, about six inches square on the surface, give the horse a better foothold, but they do not prevent his slipping and falling. Such blocks are objectionable, because they cannot resist the pounding they receive from heavy vehicles; they are thrown out of place; their edges are chipped off, and the surface is as rounded as that of a cobblestone. The poorest pavement on Broadway is, without doubt, the Belgian, but it is used because larger blocks cannot be made safe on so steep a grade.

To the query now presented. Can this evil be obviated? this reply may be made. From Leonard street to Duane there is a descent of several feet. Let this summit on either side of Leonard street be cut down so that there shall be no higher line than Duane street, or let the grade be a gradual descent from Duane to Canal street, and an obvious defect on the great thoroughfare will be remedied. The proposed improvement can be made without injury to private rights, for it is a remarkable fact that high basements on Broadway command in many instances almost as high rent as the next story above. The demand for high basements has of late been so great that fine brown stone buildings built in the old style have been taken down during the past year, and edifices have been erected in their places which have two floors equally accessible from the street. It seems that the increased rent received from such basements will more than pay the interest on the cost of a new building. The lowering of the grade as now proposed, will secure to the buildings on either side of the street, and on either side of the cross-streets for the distance of one block from Broadway, high basements which can be finished in the usual style without altering the main structure. Thus all the desired benefits will be gained and the necessity of rebuilding obviated. The increased rents from the high basements would pay the interest on $2,000,000; this sum may therefore express the increased value of the real estate in the vicinity of the proposed improvement.

Mr. J. Bull observed that however advantageous a change in the grade of Broadway, so far as regards the more general introduction of high basements to the buildings already erected is concerned, there appeared to him some strong objections to the proposition. No one who is at all familiar with the present style of new buildings on the lower part of Broadway can for a moment doubt that high basements are regarded with great favor, especially by the landlords, influenced perhaps in some degree by the fabulous prices which those basements now command. In illustration of his ideas, he referred to that beautiful structure erected, somewhat recently, by Dr. Parmley, at the corner of Maiden lane, and others in that vicinity now in the process of erection. But the widening of Worth street and the establishment of a grade in that street east of Broadway, based upon the present established grade of that over-crowded thoroughfare, presented practical objections to the proposition that seemed to him insurmountable, for the present at least.

The subject elicited some further discussion, after which the following notes on recent scientific observations and experiments were read by the Chairman, in which we have added some of the comments made by members:

Conical Hailstones.

Hailstones fell at Paris on the 29th of March last, having an absolutely conical form. The base of the cone was slightly concave, and the sides were roughened by minute six-sided transparent pyramids inclined toward the base. Some pyramids also emerged from the base. The weight of these cones varied from 180 to 250 milligrams. The diameter of the base varied from 8 to 10 millimeters, and the hight from 10 to 13 millimeters. The minimum temperature of the day was 32° Fah. Rain, hail and snow had fallen during the morning, and at three o'clock P. M. fell the cone-formed hailstones.

Mr. Maynard spoke of a severe hail storm which occurred at this city in August, 1862; it extended as far south as Grand street; he picked up half a dozen stones in the form of a boy's marble, and he distinctly recollected that others gathered by him had a conical shape.

Dr. W. Rowell remembered the storm alluded to; the shape of some of the hailstones which fell in Bleecker street was peculiar, resembling somewhat a rough oyster shell.

Mr. J. M. Root remarked that he had witnessed the most severe hail-storm probably on record. It occurred about the 10th of June, 1849, on the great plains, some 50 miles east of Fort Laramie, Nebraska Territory. Some of the stones which fell measured fourteen inches in circumference. They were composed of solid ice, about the size of a hen's egg, with smaller portions adhering to them. He noticed that some of these hail-stones were of conical form and only about three inches in circumference. Several persons in this party were injured in this storm. One man had his skull fractured, another his arm broken. The skins of animals exposed were cut through. The covers of their wagons, sustained by hickory frame-work two inches thick, could not resist the force. The hail-storm lasted from ten to fifteen minutes.

It would be inferred from the further debate, that hailstones of a conical form were not a novelty in this country.

Cooling of Solids by Tension.

Mr. James Croell, in the May number of *The Philosophical Magazine*, directs attention to the experiments of Dr. Joule, which proved that the quantity of cold produced by the application of tension to solids was sensibly equal to the heat evolved by its removal; and further, that the thermal effects were proportional to the weight employed. The probable explanation given by Mr. Croell is this: If the molecules of a body are held together by any force, of whatever nature it may be, which prevents any further separation taking place, then the entire heat of such a body will appear as temperature; but if this binding force become lessened, so as to allow further expansion, then a portion of the heat will be lost in producing expansion. All solids, at any given temperature, expand until the expansive force of their heat exactly balances the cohesive force of their molecules; after which no further expansion at the same temperature can possibly take place while the cohesive force remains unchanged. But if by some means or other the cohesive force of the molecules becomes reduced, then instantly the body will expand under the heat which it possesses, and of course a portion of the heat will be consumed in expansion, and a cooling effect will result.

Actinism from Different Parts of the Sun's Disc.

Secchi having shown that the heat radiated from the center of the sun is nearly double that from its borders, and that the equatorial regions are somewhat hotter than the polar, and various observers having noticed a great difference in luminosity between the center and the edge of the disc, Mr. H. E. Roscoe now reports to the Royal Society some experiments made by means of photographic paper relative to the chemical action of rays from various parts of the sun's disc. From the results of one day, it appears that the chemically active rays at the center have from three to five times the intensity of those at the edge. This difference, being greater than the difference in heat from the same portions, is accounted for by the greater absorption effected by the solar atmosphere on the more refrangible rays. It also appeared that the chemical brightness of the south polar regions was considerubly greater than that of the north polar region, while about the equator the brightness was between that of the poles. Mr. Roscoe, in connection with Mr. Baxendell, proposes to carry out, upon the same methods a series of observations relative to the amount of chemical brightness of the sun's disc, and hopes before long to furnish further details to the Society.

Indium.

Prof. Roscoe, in his lecture before the Royal Institution, London, on the 6th of May, said the new metal, indium, is distinguished by two splendid indigo-blue lines in its spectrum. In its chemical relations it resembles zinc. It was first found in the Freiberg zincblende. It can be reduced by the blowpipe to a malleable bead. It is detected in its compounds by the deep purple it imparts to the flames.

New Use of the Spectroscope.

Prof. Roscoe alluded in the same lecture to the remarkable application of the spectroscope to the exact and very important moment when the blowing of cold air into the molten iron should cease in the Bessamer process, by which, in about fifteen minutes, the iron is said to be converted into steel. In relation to this item, Prof. Joy remarked that in Europe, the workmen having charge of the furnace department of the steel manufactories are very expert in determining the proper length of exposure to heat; they have a quick eye for distinguishing the peculiar color of the flame required for making good iron. This art is only acquired after long practice. With the spectroscope, sulphur and all other substances which would render the steel impure would be readily detected by the characteristic color belonging to each.

Dr. Rowell inquired whether the lines of color could all be distinguished at once.

Prof. Joy replied that this would depend on the number of prisms employed, and the time in which they were turned.

Production of Monsters.

M. Barthelemy has been experimenting on artificial and natural monstrosities among the butterfly and moth order of insects. He endeavored to cause modifications in the chrysalis similar to those obtained by covering the eggs of birds with varnish. The use of oil was fatal, but on covering the head, throat, and abdomen with wax, the development of these parts was much retarded. The nervous system of other portions seemed to be developed as usual, yet the power of reproduction was destroyed.

Vigor of Pollen.

According to experiments by M. Belhomme, reported to the Academy of Sciences at Faris, it is proved that the pollen of flowers will retain its fecundating power for at least three years.

Benzole.

M. E. Kopp, having converted the heavy tar oils into lighting gas and volatile oils rich in benzole by means of the superheating process, and separated the gas and lighter products by the ordinary refrigerator, takes advantage of the fact that benzole solidifies in the form of flakes, grouped like fern leaves, or in crystalline masses like camphor, which melt at 8°.5 above 0 centigrade, and for the purpose of purification he cools the rough benzole or benzine down to —15° in Carré's refrigerator, then strongly and rapidly presses the crystals, still impregnated with other hydrocarbides. The crystalized benzine thus obtained is again melted, and once more submitted to the same treatment, and the product is benzole almost chemically pure.

Mr. L. B. Page said this item on benzole reminded him that recently at a petroleum refinery in Williamsburgh, he noticed in one place where there were about fifty barrels of benzole that the barrels were partly covered with a frost-work which he supposed was frozen benzole. This was during hottest weather in the latter part of last month. He took a portion in his hand and it immediately melted. It was cold to the touch.

Prof. Joy had noticed similar crystals on the ground in the establishment at Hunter's Point, and had supposed they were napthaline or paraffine, which is a white solid.

Mr. Page said that paraffine would not melt in his hand as the substance from the outside of naptha barrels did.

Dr. Parmelee expressed the opinion that the snow found by Mr. Page was produced by the rapid evaporation of the bisulphide of carbon. This snow or ice is largely impregnated with the odor of benzine. If benzine is passed through the chloride of calcium considerable water may be obtained.

The Chairman remarked that the benzine or benzole spoken of is a mixture of several hydrocarbon compounds; but the pure benzine of the books consists of 12 equivalents of carbon and 6 of hydrogen: or, doubling the equivalent of carbon as recommended by Gerhardt, the compound would contain an equal number of atoms of carbon and hydrogen.

Motion of Musical Reeds.

Mr. Watson said his attention had been attracted to the velocity of musical reeds in the melodeon and common accordeon. The vibrations of air required to produce the pitch of the middle C of the musical scale is 512; this number is doubled for every octave C above it. By calculation he has found that some reeds move at the rate of 480 feet per second. These reeds of brass are now made so accurately that when planned and finished by machinery they are nearly in proper tune before being touched by the file.

Dr. Rowell said that it makes no difference about the width of the musical tongue of brass—the thickness and length determines its pitch.

The Chairman added that for strings and pipes the law is the same. When homogeneous and of the same diameter, the pitch of octaves is directly the same as the length. A string of a given pitch, if halved, will give a sound an octave higher—or if doubled in length a sound an octave lower.

The Best Mode of Producing Heat.

The discussion of this subject was opened by Mr. Bartlett. There were many ways of producing heat, by friction, compression, percussion, &c., but there is only one approved mode, and that is by burning carbon and hydrogen. After giving the comparative amount of heat from various combustibles, corresponding with tables we have already published, he proceeded to speak of the advantage of Sieman's furnace, particularly as used in the manufacture of steel. He takes bituminous coal and sets fire to it with a limited supply of air, which drives off a great amount of gas in the form of hydrocarbons and carbonic oxide, which are carried away in a heated state, and afterward brought into contact with air that has been heated by its passage over hot brick work.

The Chairman said, in burning anthracite coal (the best known fuel), there was no gain in the round-about process of Sieman, provided there was at first such a supply of air as to form carbonic acid gas. The saving of the waste heat which would escape through the chimney has been effected by a variety of apparatus. Mr. S. may have succeeded in securing a greater intensity of heat at a given point, but he has not increased the amount produced by ordinary combustion.

Mr. Hagan desired to present the advantages derived by using the vapor of water, as practiced by him. He did not claim that there was any greater amount of heat produced with than without steam, but he claimed that the intervening of steam between the particles of air made it a rapid conductor as well as generator of heat. He repeated several statements regarding water burning, which have already been reported in the previous examination of this subject.

The debate was continued by Prof. Joy, Dr. Rowell, Mr. Watson, Mr. Disturnell, and Dr. Richards, but the most interesting views elicited were almost identical with those presented at a previous meeting.

The subject presented for the next discussion is "The utilization of waste products." Adjourned to June 9.

American Institute Polytechnic Association,
June 9th, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Colorado Gold Ores.

A communication was read from Mr. Henry Garbanati, a member of the Institute, now residing in Central City, Colorado Territory. Accompanying the letter were twelve interesting mineral specimens.

Dr. R. P. Stevens remarked that the particular locality from which these specimens were taken is not stated. They are a portion of the gold bearing ores of Colorado. The ores of this territory differ from those of California, inasmuch as these are pyritous ores, that is, ores formed by the mixture of sulphur, either chemically or mechanically, with copper, iron, and gold. The ores of California are native gold in veins of quartz. The first specimen now presented is pyrites without any gold in sight, although the ore is of yellow color, and might be mistaken for the precious metal. The next specimen is crystallized quartz, having pyrites inclosed in the quartz, showing that the gold was formed first, and was afterward enveloped by quartz. Some of these crystals are very beautiful. Another specimen is what is known as porous quartz, or quartz in which the pyrites have been decomposed, and have disappeared, leaving behind the gold that was in combination with it. Sometimes the gold in this variety of ore is visible to the naked eye, and sometimes it exists as a thin film, staining the surface, which can only be seen with a magnifying glass. This variety, when in sufficient abundance, is very profitable to work, because a part of the process, that is, the decomposition of the pyrites, has already been performed by nature. The third variety—and it may be remarked here that the twelve specimens shown are all included in three varieties—is quartz ore having pyrites and a portion of the wall rock of the vein attached. There were, undoubtedly, many in the audience who had never seen a quartz vein. If they have any curiosity in this direction, they can be gratified without leaving Manhattan Island. In the deep cut on First avenue, which is now being graded at about Forty-second street, may be seen the gneiss rock cut by a vein of quartz about a foot wide, descending at an angle of about seventy degrees. The pure quartz is attached to the walls of gneiss on either side; approaching the center are seen crystals of mica; still nearer the center are garnets, hornblenda and felspar. In some instances the center is left open, in others it is closed, showing that *the crystallization proceeded from the walls toward the center*, it being understood that this deposit was made in a vent in the gneiss. To return to the Colorado specimens, some were evidently formed in the same way. The veins of the Colorado resemble the veins of the Atlantic slope. The same kind of pyrites veins are found in the gold bearing rocks of the Apalachian range.

A few words may be added regarding the economy of mining or winning gold. The question to be solved is, how shall we separate the gold from the iron, copper, sulphur and quartz? The sulphur may be driven off to a certain extent by heat, that element being volatile. The quartz requires crushing and grinding, after which it can be washed from the pyrites. The gold is obtained from the quartz and all the other metals by means of quicksilver, with which it amalgamates very readily. The quicksilver is afterward distilled, and the gold is left as a solid. All this is easy to describe, but, in practice, there stands your quartz, hard enough to cut glass, and there your pyrites, harder than the quartz, and gold with the whole in a variable quantity; sometimes rich enough to repay you for your great labor, alas! more often only in such appreciable quantities as to lure the infatuated miner to greater expenditures of labor, time and money.

The Law of Mariotte.

Dr. W. Rowell read a paper on this law and its application in the steam engine, from which the following important extracts are taken:

"The well-known law of pneumatics is simply this: If you take a vessel holding one cubic foot of air, and with sufficient pressure you diminish the volume of air to one-half a cubic foot, you have two quantities of air in one space; or, as it is usually expressed, you have a pressure of two atmospheres, if you take the mercury column in a barometer as the measure of pressure. The atmosphere supports a column thirty inches high, and two atmospheres occupying one space will support a column of mercury sixty inches high, and so on for three, four, or more quantities. Hence the axiom, 'double the pressure is half the volume;' but, should the air be quickly compressed, there would be an increase of temperature from the compression of the heat (or molecular action) contained in one volume of air, and, consequently, that would be a little more than one-half the volume for double the pressure until the temperature was the same as the original volume that was compressed. Now take this quantity of compressed air and suddenly remove the pressure, and it would not quite be double the volume; but, after the temperature had been acquired of the original quantity, it would be exactly double the volume.

"The foregoing statement is the complete definition of the much-talked-of 'Mariotte law.' The only plausible way that this law can be applied to steam is as follows: One cubic inch of water will make one cubic foot of steam at the pressure of one atmosphere, or it will make one-half a cubic foot of steam at the pressure of two atmospheres—and so on, by doubling the pressure it will make half the volume nearly.

"The actual proportions of volume and pressure, according to the tables published by Pambour, Lardner, Brande, and others, are one cubic inch of water at one atmosphere pressure makes 1,669 cubic inches steam; two atmosphere pressures make 881 cubic inches steam; four atmosphere pressures make 467 cubic inches steam; eight atmosphere pressures make 249 cubic inches of steam. Whereas, if the Mariotte law perfectly applied to steam the volumes would be for one cubic inch of water at one atmosphere 1,669 cubic inches steam; two atmosphere 834.5 cubic inches steam; four atmosphere 417.25 cubic inches steam; eight atmosphere 208.125 cubic inches steam. So that 417 cubic inches steam at four atmosphere pressures does not have water enough to make 1,669 cubic inches of steam at one atmosphere by 12½ per cent., nor 208 cubic inches steam at eight atmosphere by nearly 25 per cent.

"That 457 cubic inches steam, at four atmosphere pressures would, on gradually removing the pressure to one atmosphere, enlarge itself to 1,669 cubic inches, had not, as far as it was possible to learn, been determined experimentally up to the year 1860. During that year it was tried in an apparatus suggested by myself, the tables of which I may furnish in a future paper."

After quoting from Bourne's Treatise on the Steam Engine, on the application of this law to the use of steam expansively, and the statements of Regnault of the motive power of elastic vapors, Dr. Rowell continued:

"Herein is the difference between air and steam: If a cubic foot of air at two atmospheres pressure, be contained in a tight vessel for a thousand years, it will give out its elastic force on removing the pressure, while a cubic foot of steam must give out its force in a few seconds, or else its force is entirely lost. Also the relative volume of air at different pressures, of which the Mariotte law is the exponent, depends on the same temperature; whereas the different pressures of steam depends wholly on different temperatures; for instance, steam at the pressure of one atmosphere is 212° F.; two atmospheres, 250° F.; three atmospheres, 274° F.

"Now, the slightest increase of pressure at these temperatures, or slightest decrease of temperature at these pressures, will turn the whole of the steam to water; while an increase of pressure on the air will only diminish its volume to the amount due to that pressure.

"The modern received opinion promulgated by Joule, that heat is converted into force in the steam engine, is in accordance with the statement made by Regnault, that the amount of power developed by the expansion of any elastic fluid is always in proportion to the loss of heat undergone by this fluid in the part of the machine where the power is produced. The quantity of heat, or, as it is expressed, the 'total heat,' as ascertained by M. Regnault from actual experiment, in a cubic inch of water in steam at one atmosphere pressure is 1,178° F.; two atmospheres pressure, 1,190° F.; four atmospheres pressure, 1,203° F.; eight atmospheres pressure, 1,218° F.

"If the force is all a heat force, and it is properly applied in moving the piston of a steam engine, and as it is not possible to increase this heat by expanding the steam, it would seem as if some of the modern theorists are endeavoring to make out that the steam can work three or four times over, or, as some of the most enthusiastic say, 'expand a thousand times.' The experiments of Regnault, to determine the theoretical motive power of expansion, being 'extremely delicate and difficult, are not applicable to so rude a machine as a steam engine;' they of course furnish no rule to calculate the motive power produced by expansion in a steam engine.

"We are finally left to recent experiments on the steam engine itself, and these, so far as they have seen them fairly tried, show that the 'notorious' multiplying of its performances by expansion is founded upon 'hypothesis' of no great probability."

The following interesting scientific intelligence was presented from the Chair:

Glasses for Viewing the Sun.

Sir John Herschel, in a late number of the Quarterly Journal of Science, says: "To use the full aperture of the telescope is of paramount necessity, either in viewing the sun or the planets. If the extinction of light is effected by colored glasses, the best combinations I yet have found are, first, that of two plane glasses, of a shade between brown and violet, with one of grass green hue interposed; or, second, that of two green glasses with a blue one colored with cobalt between them. They allow scarcely any rays of the spectrum to pass but the yellow and less refrangible green; and they cut off about all the heat. The perfection of vision is obtained by using only the extreme red rays; but glasses which transmit these cannot be used, on account of the heat which they allow to pass. Whatever combination of glasses be used, they are, however, apt to crack and fly to pieces, through the heat they intercept.

China Grass.

The report of M. Cordier, of the Chamber of Commerce, first brought this article into notice, and the manufacturers of Rouen, France, are turning their attention to its use. Specimens in all stages of its preparation are shown, and recently samples of its tissue mixed with wool and cotton have been exhibited.

Mr. Bartlett stated that the grass alluded to had been manufactured into cloth in Massachusetts more than a year ago.

Explosive Compounds.

Mr. Scott Russell has repeated before the Royal Institution, London, the opinions expressed by him at the last meeting of the British Association for the Advancement of Science, regarding the force, cleanliness, and comparative safety of Baron Lenk's gun cotton. He spoke also of the uncertainty, as a chemical composition, of gunpowder, and expressed his conviction that 68 per cent (solid matter) of its ingredients were useless, and encumbered the action of the remaining 32 gaseous parts.

In relation to this item, Mr. Samuel H. Maynard remarked that the experiments with gun cotton in this country had not been as successful as was expected. Baron Lenk's compound is woven into ropes or fine threads in order that the whole product will be isochronal in its explosion, but this regularity in the time of explosion does not seem to have been accomplished. If gun-cotton is rammed down into a gun it may at first work well, but if, again, it is rammed down too hard it will explode and burst the gun. The difficulty is that, in getting the ball down it may often be necessary to give the ball an extra ram, and this will cause a premature explosion. Gun-cotton possesses many good qualities; one of the best is that it does not absorb moisture; it is also very light. Perhaps the danger of premature explosions might be avoided by making it into cartridges. For blasting purposes it is valuable, but for guns it is too quick in its action. Dr. Doremus, of this city, was the first to make two charges of gunpowder into one, and have them burn the same length of time as one charge.

Mr. Bartlett said that the chemical peculiarity of Baron Lenk's gun-cotton was that it contained more oxygen than the ordinary kind. He inquired whether Dr. Doremus' gunpowder was still used in the army.

Mr. Maynard knew it had been very largely used in the six-pound batteries. Officers connected with them have expressed a preference for it, as it leaves nothing in the gun that requires swabbing out. Therefore it is not necessary to cover the touchhole with the finger while re-loading. This pressed or cake powder, invented by Doremus, is highly prized in France and Austria.

Mr. Page said that the 68 per cent of gunpowder, the solid part spoken of as useless, was a large amount to be transported, but is not the solid matter really essential to hold the gases resulting from the explosion in a solid form before they are used?

Mr. Maynard stated that interesting experiments are now being made regarding the feasibility of dispensing with some of the solid constituents, by parties in this country.

Mr. Enos Stevens desired to correct an impression made regarding the value of gun-cotton in blasting. Its action is violent, and it crumbles the stone in its immediate vicinity. Where it is desirable to separate rock in regular sizes, it is better to use gunpowder in the series of holes drilled in the same right line.

Diamonds.

Dr. Percy, in a lecture reported at length in the London Chemical News, describes the various localities where diamonds have been found, and the chief rocks constituting such districts. The quartzite is a silicious rock to which the name of itacolumnite has been given, from Itacolumni, the name of a town. It is found in some cases to be flexible; this is owing to the interposition of little micaceous scales. Geologists state that it is, beyond doubt, a metamorphic rock; that is, a rock which has been changed materially subsequent to its deposition. No fossils have been found in it. The itacolumnite alternates with metamorphic schist. The latter is very easily disintegrated or softened to a great depth. It is said the softening is due to heavy rains, reported to contain nitric acid after storms. In the products of disintegration of these rocks, numerous rare minerals, besides the diamond, were found.

In the Ural district, diamonds have been found since Humboldt's visit in 1829. He suggested the probable existence of diamonds there from the geological similarity of the district to that of Brazil. A few diamonds have been found in the itacolumnite, occurring in North Carolina and Georgia.

Now comes the question, and it is a question which has not yet received solution—if this itacolumnite be, as there is no doubt it is, a rock of sedimentary origin, have the diamonds been developed in this rock subsequent to its deposition; or derived from the preëxisting rock, out of which this sedimentary rock has been made?

With regard to the possibility of making diamonds, scarcely a chemist is to be found who doubts that, one day or other, diamonds will be made. Various attempts have been made with the bisulphide of carbon. We were informed, a good many years ago, that some French chemist had succeeded in making diamonds by plunging phosphorus into this liquid, composed of sulphur and carbon, which has a high refractive power. It was said that in this way the diamond might be produced, the sulphur being taken away from the compound by the phosphorus and the carbon being set free in a crystalline form. Then again it has been attempted to decompose the sulphide of carbon by means of silver. He, the lecturer, had kept a piece of silver in that liquid for ten or twelve years. The silver became blackened on the surface, which seemed to be an indication of decomposition, as though the sulphur were taken away so as to allow the gradual elimination of the carbon. Unfortunately, it happened that this bisulphide of carbon operated upon had not been entirely free from sulphur, and all that the silver did was to take out the sulphur which had been contained in a state of solution in the sulphide. At present, truth compelled him to say that we have no clue whatever, so far as he knew, as to the mode in which diamonds have been produced by nature. Most certain it is that a high temperature has not been employed, because it loses its character at a high temperature. There are many unstable compounds of carbon not known, which may possibly be reduced one day by electrolytic action, and then we may be able to generate the precious mineral—the diamond.

Labels for Poison Bottles.

To prevent accidents arising from careless or sleepy nurses giving medicines out of wrong bottles, Mr. Thonger proposes using a label having a sand paper border, thus appealing strongly to the sense of touch, which it is presumed will warn the holder that danger is near.

Fine Earthenware in France.

The French Government are about establishing a school at Nevers for instruction in modeling, drawing, and painting cereous and terreous materials.

Fatty Acids for Soap and Candles.

M. Mouries, in a memoir to the French Academy of Sciences, suggests a cheap and easy method of separating stearic and oleic acids and glycerine. In the ordinary state tallow is saponified with difficulty. By melting the tallow in water, containing a little soap in solution, the tallow assumes a globular state, and is then readily attacked by a small quantity of alkali. When the mixture is raised to 60° C, the alkali and glycerine quickly separate. The fatty acids are separated by placing the soap in water acidulated with sulphuric acid. The stearic acid will then crystalize, and the oleic acid can be obtained, almost colorless, with the sulphate of soda, and can then be made into soap. M. Chevreul commended this process, before the Academy, as ingenious and simple.

Dangerous Lightning Rods.

A defective lightning rod is dangerous, because it draws toward the house a force which it cannot conduct away from it. A death occurred on the 17th of last month at Rensselaer, Indiana, by lightning, in a house two and a half stories high, situated in a grove of tall timber. The lightning rod designed to protect the building was made of two kinds of metal—the first three upper sections were of octagonal copper, the remainder was an iron rod. Copper is a much better conductor of electricity than iron. The copper rod received more than the iron rod could instantly carry away, and the consequence was that a portion sought its path to the ground through the house. A human body was the bridge by which it crossed a bed, and a life was swept off in its passage. Touching this item,

Mr. Page said he formerly had considerable practical experience in the arrangement of lightning rods, and thought most of the accidents from lightning were the result of imperfect insulation. The rods are not properly fastened with non-conductors, and do not always enter into the ground far enough to reach the moisture.

Dr. Rowell spoke of an instance where a house was struck, and the whole was instantly one mass of flame.

Mr. Bartlett thought it singular that cases occur every season when a person is struck while in the street, the lightning not seeking the roofs of the surrounding high buildings, but going directly to the ground.

Mr. E. Stevens was of opinion that insurance companies had no faith in lightning-rods, as he never knew them to make any deduction in their rates of insurance on houses which were supplied with rods.

The Chairman remarked that this greatest invention of Dr. Benjamin Franklin was not designed to draw the lightning from a great distance. The bolt, when discharged, takes its direction, which is changed somewhat by good conductors. A house in its path is saved, if it has upon it a good metallic conductor of electricity, extending into the earth to a point where it is *always moist*, because the fluid, so called, takes the route which will allow it to reach the earth in the shortest possible time, and thus restore the equilibrium. That portion of a roof which is regarded as absolutely protected is a circle whose radius is equal to the height to which the rod extends above the roof; hence it is a common practice to have several terminations or branches of the main rod, projecting from the highest part of the roof and from the corners of the building.

Mr. Maynard said that houses having metallic roofs, with gutters and leaders running to the ground, when wet, are perfect conductors.

Mr. Bull inquired whether any one present remembered an instance of a steamboat being struck with lightning. He had never heard of such an occurrence.

The Chairman said accounts of sailing vessels being struck are not uncommon. He was not aware that steamboats have been; but he believed locomotives were not as lucky. Hardware stores, although filled with metal, are seldom, if ever, injured by lightning. The current does not always descend from the sky to the earth. The earth is generally negative and the cloud positive; but, if the earth was positive and the cloud negative, the direction of the electric force would be reversed.

Utilization of Waste Products.

Prof. Joy, of Columbia College, opened the discussion of the subject by saying this vast subject embraces almost every material employed by man. There are more things wasted than used in many departments of manufactures. A few of the more remarkable instances where methods have been lately introduced for utilizing the waste materials will be mentioned—first:

Soup from Brine.

The brine in which flesh has been preserved contains, according to Leibig, the most nutritive portion of the meat. The brine containing the extract has usually been thrown away. Mr. Whitelaw of Glascow had applied the action known as Dialysis to the separation of the salt from those containing sustenance. He says when fresh meat has been sprinkled for a few days with salt, it was found swimming in brine. Fresh meat contained more than three-fourths of its weight of water, which was retained in it as in a sponge. But the flesh had not the power to retain the brine to that extent, and in similar circumstances it absorbed only about one-half as much saturated brine as water, so that under the action of salt flesh allowed a portion of its water to flow out. This expelled water as might naturally be expected, was saturated with the soluble ingredients of the flesh; it was in fact juice of the flesh; soup, with all its valuable and restorative properties. The brine is filtered to free it from any particles of meat or mechanical impurities, and then poured into bladders, or into boxes made of skins or parchment paper, which are suspended in fresh water in a suitable tank. The water in the tank must be changed every 24 hours. All salt and saltpeter will pass by what is called osmetic force, through the pores of the bladder or other septum in the course of two or three days, and the pure juice of the flesh, fresh and wholesome, will be retained. This can be concentrated by evaporation, and prepared for use.

Prof. Joy then exhibited several specimens of parchment paper, which is a cheap material for accomplishing the separation by dyalisis. It is made by subjecting common paper to the action of sulphuric acid of a certain density. All substances are now classified as crystalloids and colloids, which are separated by this process of dialysis. In the application made by Whittelaw, the crystalloid, common salt, passes through the membrane, and the colloids, containing animal extract, remain behind. It was Liebig's opinion that the scurvy and other diseases afflicting those whose principal diet is salt meat, arise from the absence of these animal extracts which are retained in the brine.

Mr. Nash remarked that the exposition now made was a strong argument against preserving meat by means of salt.

Waste Sewerage.

Prof. Joy said when he was last in Europe he had frequent conversations with Liebig on an excursion to Lake Geneva, Switzerland. Liebig has contributed more than any other man to the utilization of waste products; it has been the principal labor of his life; he has invented many processes himself, and has directed the attention of the world to the subject. His great grief is the waste of fertilizing material in the sewers. He spoke repeatedly of the loss of this material which is going on in the city of New York.

Waste Bones.

Bones are not now as much wasted as heretofore; they are made into handles and buttons; and when bone is decomposed, its phosphate of lime is a valuable manure, and it is also the source of the phosphorus used in our matches.

Waste Vulcanized Rubber.

There seems to be a want of some ready method of devulcanizing old India rubber. Several patents have been issued for this purpose, but the fact that there is no demand for worn-out articles of rubber, would lead us to conclude that this material is not utilized to any great extent.

Slag in Iron Furnaces.

Prof. Joy also visited Mantsel, where Luther went to school 300 years ago, and saw the iron mines in which Luther's father worked. At this place the slag has accumulated in mountains. People are constantly at work, you may be sure, at plans for extracting something of value from the waste slags. At Mantsel the slag is now run into molds of about a cubic foot each, and distributed to workmen. Each man takes his share of the blocks in an iron wheelbarrow and wheels them home, when they still contain heat enough to cook the meal for the family. After they are cooled these rectangular blocks are an excellent material for building walls.

Zinc Wasted in Galvanizing Iron.

A large portion of the zinc used for coating iron is evaporated and lost. Plans for preventing this loss are worthy of the attention of inventors. The whole history of zinc is that of a waste product. It was first found in chimneys where ores of other metals were being smelted, and people were thus led to seek for it in its own ores.

Waste from Gas-Works.

Constant progress has been made in the utilization of the waste substances produced in the manufacture of illuminating gas. At one time the companies paid persons for carting away the lime used for purifying the gas. The lime absorbs bisulphide of carbon, sulphuretted hydrogen and sulphur, coming from the distillation of the coal, and when exposed for a long time to the atmosphere it absorbs oxygen and becomes the sulphate of lime or plaster. This is now understood by a sufficient number of farmers to make a demand for the waste lime at a moderate price.

Mr. Cleland, the Director of the Liverpool Gas Works, states that he has largely reduced the cost of purifying gas by using oxide of iron, and saving the sulphur and ammonia. The material from the purifiers is heated to about 1,000 deg. Fah. in a close iron retort. A portion of the sulphur combines chemically with the iron, while the balance is distilled over. As soon as the sulphur ceases to come over, the contents of the retort are drawn and moistened, and in this state exposed to the action of the atmosphere. The oxidation is rapid, and the mass glows until frequently wet and stirred. In a few weeks a sulphate of iron is produced, containing 30 to 40 per cent. sulphuric acid. The salt is decomposed by passing the vapor of ammonia from the waste waters of the hydraulic mains through it. In this way sulphate of ammonia and an oxide of iron are obtained. The oxide of iron can be used again. The sulphate of ammonia is purified by crystallization. Mr. Clelland says that he has obtained 100 tons of sulphur in this way.

Preparation of Sal Ammoniac.

About two per cent. of ammoniacal gas water goes over with the tarry products and is collected at the end of the hydraulic main in cisterns. This was formerly a waste product; it is now saved and the greater portion of sal ammoniac of commerce is prepared from it. In London alone 840,000 tons of coal are consumed every year in the manufacture of gas. This yields about 37,000,000 pounds of gas water. The water is subjected to distillation in two retorts, the first of which is heated directly by the fire, and the second by the latent heat of the steam from the first. The steam and gas are passed through a worm to be condensed, and flow into a large leaden tank containing muriatic acid. Uncondensable gases pass out of the tank and are conducted through the fire, where the sulphureted hydrogen is consumed, into the chimney. The muriatic acid is saturated to neutrality, and requires very little further treatment for the formation of beautiful white crystals of sal ammoniac. This sal ammoniac is the starting point in the manufacture of the salts of ammonia, and can now be obtained in great abundance by the above method.

Oil and Fat from Refuse Cotton, Glue, &c.

Edward Toynbee digests the refuse material in about half its weight of concentrated sulphuric acid contained in leaden vessels and warmed by steam. They are thus dissolved and the fat separated. After standing, the fatty acids collect on the top, and can be removed and further purified by distillation. To the residual solution sufficient finely-divided phosphate of lime is added to neutralize the sulphuric acid, and a valuable compost containing phosphates and nitrogenous matter obtained.

Oil of Wool Wasted.

There is a great waste in our woolen manufactories of a valuable substance; that is, the oil of the wool. When wool has been thoroughly cleansed, it is found to have lost thirty, forty, or in some cases as high as sixty per cent. of its weight, and the most of this is oil—an excellent oil for some purposes, and especially for soap. There is an establishment in England that takes wool to cleanse for the oil, making no other charge for the work.

The oil can be extracted by means of the bisulphide of carbon, which is a cheap article. It is also used for extracting oil from the rape seed instead of pressing the seed. It is also used for extracting the alkaloids and the essential oils of plants. It has been stated that it leaves no odor.

Hydrochloric Acid.

This acid, commonly known as muriatic acid, was formerly wasted in immense quantities in the manufacture of soda compounds. At one time it was a nuisance to the neighborhood of such factories.

Muspratt, the father of the chemist of that name, built at his soda works near Liverpool a chimney of great hight, at a cost of $200,000, to carry off the hydrochloric acid fumes, but this had the effect of distributing it over a greater extent of country, and it was soon abandoned. The acid, being valuable, is now condensed by means of towers filled with pebbles and rounded flints, but usually coke is preferred. A stream of water is made to flow in at the top and percolate the mass. The acid fumes pass up through the towers and meeting with the water it is condensed and flows out of an aperture at the bottom.

Prof. Joy made some further remarks on glycerine, straw, and shavings, for paper, and petroleum. After pertinent remarks from Messrs. Nash, Bartlett, and E. Stevens, it was decided to continue the discussion of the utilization of waste products at the next meeting.

Adjourned.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION, *June 16th* 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

HYDRAULICS.

Mr. J. B. Root explained, with the aid of diagrams an experiment made by him in relation to the flow of water through irregular tubes. He constructed a tube of tin 30 inches long, and 2½ inches in diameter. Within this tube were soldered 11 diaphragms or discs, at regular distances from each other. In each circular disc there was a hole five-eighths of an inch in diameter, the center of which was the center of the disc. Half way from each disc the tube was perforated on the upper side by a very small hole. One end of this tube was inserted into a bulkhead about nine feet below the surface of the water. The object of this apparatus was to measure the retardation of the water, in passing through the discs, by means of the hight of the jets sent through the small holes on the top of the tube. The jet from the first hole was about two feet high; the next jet was lower, and so on to the last hole, from which the water barely oozed out. The rate in decrease in hight was directly as the number of discs inserted—that is, the water after passing ten discs gave a jet only one-ninth as high as after passing one.

HOW CHANGE IN DIRECTION AFFECTS THE FLOW OF WATER.

The Chairman remarked that the principle of retardation, here illustrated, had been applied to the pistons of pumps, by cutting around the piston a series of grooves, close to each other, thus forming what is called a water packing. It was said, however, not to work as well as was at first expected. There is need of more light on the action of water in tubes. The old experiments of Venturi reappear in all new works on hydraulics, with but little additional information in the same direction. Not long since, a case occurred at the Jersey City Water Works relating to the subject now under discussion. It became necessary to lay down, under the Hackensack river, for the distance of 1,000 feet, another main pipe of 36 inches internal diameter. Mayor Cleveland of Jersey City, then a Water Commissioner, made some important experiments to prove that water was greatly retarded whenever turned from a right line, even if the pipe be enlarged on the curves. Doubtless the member from Jersey now present could enlighten the association on this subject.

Mr. Dixon said the proposition was to lay under the river a pipe which would adjust itself to the bottom by means of from 14 to 18 movable joints. The position of the pipes, on either side of a joint, may be illustrated by supposing two common clay smoking pipes to be laid down in opposite directions, so that the mouths of their bowls would come together; these being fastened by a collar, they would be free to move up or down, and thus such pipes would adjust themselves to the bed of the river. Mr. Cleveland objected to this plan on the ground that the pipes so laid would not deliver the quantity required, because the curves would impede the flow of the water. In order to remedy this, the contractor proposed to enlarge the pipe at the curves, from 36 to 46 inches in diameter, the pipe being brought down to its original size between each curve. This proposition was approved by several prominent engineers. Mr. Cleveland objected to these enlargements; he believed they would increase rather than diminish the evil complained of In order to demonstrate his statement, he made the following experiments: First, he constructed a straight pipe of lead, 36 inches long and one and a half inches internal diameter; second, he made another pipe extending the same distance, and containing two curves, so as to carry the water in a direction perpendicular to its first course, then again in first course thus turning two right angles. The diameter of the ends of the pipe was 1½ inches, and that of the curved part was 1 11-12 inches. Parallel lines drawn through the centre of the two ends were just 2½ inches apart. Third, he constructed another pipe containing four curves, the two curves additional to those in the second pipe, were to bring the water back, so that its entrance and discharge were in the same right line. The curves, in the third pipe, were of the same diameter with those in the second pipe. The pipe between each two curves, as well as at each end, was 1½ inches in diameter. These pipes were constructed with the greatest care; the curves were fitted in halves over wooden forms, and soldered on the outside, the inside being made so smooth as to leave no crease at the joints. A tank of water was prepared 5 feet 2⅝ inches in diameter at the top, and two feet deep. A hole was made on the side at the bottom, into which each of the pipes was in turn fitted. The object being to discharge precisely the same quantity of water through each pipe, two marks were made on the inside of the tank, the upper one being the height of the water at the commencement of the discharge, and the lower one the hight at the close. The pipe on being inserted was closed at the end, by clay placed on the hand, which could be instantly removed on the signal being given; and instantly restored when the surface of the water in the tank had reached the lower mark. The experiments of discharging through the several tubes were made with great care, and afterward repeated, to verify their accuracy, and the following is the result:

The same quantity of water passed through the straight pipe in 218 seconds; through the one joint pipe in 314 seconds; through the two joint pipe in 371 seconds.

From this it appears that the increased time required for the flow through the second pipe was over 40 per cent. through the third pipe over 70 per cent. These experiments decided the question and the proposed plan was abandoned.

A New Loom.

Mr. Overton stated that a new loom was in operation in this city in which the ordinary beater was dispensed with. A motion is produced in which the shuttle is carried backward and forward by a circular beater placed between each thread, so that the transverse thread, forming the woof or filling, is pressed up by a spring as fast as the shuttle moves. The objection to the ordinary loom is the concussion made by the beater. These concussions are so great that where many looms are placed in one building they have the effect of a concentrated blow, thus shaking the whole structure. Buildings containing weaving apparatus must therefore be made with unusually strong foundations and heavy walls. The object of the new invention is to remedy the effect of the beater, which presses the filling only after the shuttle has passed beyond the warp, by a beater which operates continuously with the shuttle, thus accomplishing by a series of pressures what was formerly done by a blow. The new machine seemed to operate with great precision. The speaker invited the members to inspect the loom in practical operation. If it has the merits claimed for it, an entire change in the system of weaving will be effected.

New Steam Experiments.

Dr. Rowell exhibited some indicator cards, made by the new experimental steam engine, at the Metropolitan Mills, and said the members of the Association would soon be invited to witness its practical operation.

The following interesting items of scientific intelligence were read by the Chairman:

On Vegetation in Darkness.

M. Boussingault, in a communication to the French Academy of Sciences, read on May 18, gives an account of experiments which prove that the growth of a plant in the dark is supported entirely at the expense of the seed.

Phosphorus and Sulphur.

M. Lemoine, in a memoir to the French Academy, gives the chemical characteristics of a compound made by heating phosphorus and sulphur, and dissolving them in the bisulphide of carbon. The compound separated has the formula of 2 P 3 S, which is invariably produced, whatever may be the quantity of each element employed.

Bromide of Potassium.

Henry Behrend gives, in *The London Lancet*, several cases in which the Bromide of Potassium was used, as first recommended to him by Dr. Brown Séquard, for the purpose of producing drowsiness. It seems to be beneficial in those cases in which the nervous element predominates, and where opium and its preparations fail to produce any good results.

Imphee.

This Northern sugar cane has been cultivated in Cayuga county, in this State The yield per acre was from 121 to 180 gallons of sirup.

Ratan Splints

These splints have been invented and used in England for the treatment of fractures, and other injuries where the use of such appliances are indicated. They are constructed of from four to seven pieces of cane cut of equal length and fixed parallel to each other by means of copper wires passing through the sides at given distances. The advantages of these splints are their lightness and flexibility, admitting air between the rods, and thus favoring the functions of the skin.

Coal in Minnesota.

Cannel coal has been found on the Cottonwood river, about 100 miles from St. Paul. The vein is 88 feet below the surface, and is six feet in thickness. This discovery is of very great importance to the manufacturing interests of Minnesota.

A Movable Island.

A party of English scientists are stationed in the Mediterranean Sea, near the coast of Italy, to watch the movements of an island supposed to be of volcanic origin, which rises almost to the surface, and again sinks out of sight.

Rescue of the Apparently Drowned.

The person taken from the water should be immediately placed horizontally, with the face downward, and one arm brought up so that the forehead may rest on it. The tongue should be drawn out so as to leave a free entrance to the windpipe. If breathing is not soon perceptible the body should be gently rolled from the position, with the face downward, until it rests on one side, then back again, this may be repeated once in four or five seconds. Dr. Sylvester's method of imitating breathing may then be tried, viz., place the patient on the back on a flat surface, inclined a little downward; raise and support the head by a folded dress; let the tongue be kept out by bringing the teeth of the under jaw against it; stand at the patient's head, grasp the arms above the elbows, and draw them gently above the head; keep them there for two or three seconds; by this means air is drawn into the lungs; then turn the arms down against the chest for the same time; thus the air will be pressed out of the lungs. This should be repeated about fifteen times in a minute, until a spontaneous effort to respire is perceived, immediately upon which cease to imitate the movements of breathing, and proceed to induce circulation and warmth. Rub the limbs upward, so as to send the blood in the veins to the heart. Avoid rough usage. Do not allow the body to remain on the back unless the tongue is out. Never hold the body by the feet. As soon as the power of swallowing has returned, small quantities of wine, brandy and water, or coffee may be administered.

Shooting Stars.

Mr. Alexander Herschel, in his first lecture on shooting stars before the Royal Institution of London on the 21st ult., stated that ancient philosophers attributed them to inflamed vapors rising from the earth. This opinion prevailed until the rise of chemistry. In 1762 Muschenbrook ascribed them to exhalations of sulphur. In 1784 Dr. Blagden said a meteor, which resembled Mars, was produced by the discharge of electricity. Chiadni was the first to describe these falling stars as cosmical dust existing in the stellar and solar spaces, and coming occasionally in contact with the planets. In 1798, Brandes and Brenzenburg, two students of Gottingen, began the accurate determination of the hight of meteors, which was found to vary from 20 to 100 miles above the earth's surface. The limits of velocity were from 15 to 20 seconds. These measurements coincide with those of more recent observers. By diagrams and apparatus the lecturer illustrated the light, color, duration, length, position and direction of shooting stars.

New Mode of Moving Organ Keys.

In the organ for the Church of St. Augustin, Paris, a substitute is to be used for the present cumbrous mechanism, which communicates motion from the keys to the pipes. Electricity is to be employed, and probably in a manner somewhat similar to that applied in looms for weaving.

Coal.

Prof. Henry D. Rogers, now of the University of Glasgow, has lately published a paper on coal and coal mining, from which it appears that the extent of the coal fields of the United States is fifty times that of the coal fields of Great Britain. According to Mr. E. Hull, about one-half of the amount in the British coal fields has already been consumed. That which remains is the most inaccessible. Prof. Rogers, after quoting the statement of Sir William Arstrong, that at the present rate of increase in the annual consumption of coal, the entire quantity of available coal existing in the British Islands will only last 212 years; and alluding to the fact that the temperature of the earth increases 1° Fahrenheit for every 60 feet of progress downward, while for every 300 feet there is an increase in the heat of the air of 1° he proceeds to show that it is possible to work mines even to the depth of 4,000 feet by forcing into them condensed air, which on expansion will absorb heat and pass rapidly upward through the shafts. A modification of the French boring machine, which is operated by atmospheric pressure, has been introduced into the mines. By this means the compressed air forced into the mine is first made to perform the duty of cutting coal, before it is used for ventilating purposes. Many of the veins hardly exceed three feet in thickness. They are worked by the miner when lying on his side in a very cramped position. In such veins this coal-cutting machine will be of great service. But Prof. Roger's hopeful statement does not relieve apprehensions with regard to the fate of England. In his estimates of the present resources, coal to the depth of 4,000 feet is included, yet at half that depth there is an increase of 40° in the temperature, and labor could not be performed there without a supply of colder air. Add to this the increased cost of pumping water from the mine, the increased danger of fire-damp, and we see obstacles sufficient to prevent the working of coal mines below 2,000 feet.

Mr. Joseph Dixon remarked, in relation to the feasibility of using atmospheric power at great depths, that he remembered reading an account of an attempt to work a cylinder-bellows at an iron furnace in Wales, by means of a powerful waterfall one mile and a half distant. The conducting pipe was of great diameter, air-tight, and smooth within, yet the air forced through it would hardly blow out a candle. An account of this experiment may be found in the *Franklin Journal*, Vol. IX., p. 147.

THE UTILIZATION OF WASTE PRODUCTS.

The discussion of this subject was resumed this evening by Mr. Watson, who presented a number of specimens of writing, drawing, and printing paper manufactured from the husks of Indian corn at the Imperial paper mills, near Vienna. The specimens came directly from the Austrian Consul in this city, Chas. F. Loosey, Esq., and all the facts relating to the process of the manufacture were furnished by him. Paper had been made from the corn plant as early as 1772, but from its cost it could not compete with paper made from rags. The process now employed at the Imperial mills is claimed to be near perfection. For some purposes this paper is superior to that made from rags. Specimens of cloth were also exhibited, manufactured from the fibre of the corn husks. It is coarse, but of remarkable strength. The enameled oil cloth made from this material appeared to be well adapted to a variety of purposes.

He, Mr. Watson, had seen rolls of a thousand yards in length. The whole product of the husk is utilized by the Austrian process; that not used in paper and cloth is fed to cattle. The gluten and starch is pressed into brick-like cakes which have the desirable property of keeping fresh for a long time. They are sometimes used in making bread. Thus we see there are three distinct articles of use made from the corn husk.

To return to the paper, the first query would be with regard to its cost. It is cheaper than rag paper, and is constantly sold in competition even at the great rag depot at Trieste. It has been manufactured at the Imperial mills since 1860, and is a source of revenue to the Austrian Government. This fact is sufficient evidence that its manufacture is profitable. The speaker saw no reason why this paper should not be made in this country as well as in Austria. As the raw material is here much cheaper and more abundant, while the price of paper is much higher than in Europe, there would seem to be no great risk in the experiment. This raw material can be worked in an ordinary paper mill.

Mr. A. Nash remarked that the strength of the husk was greatest before the corn was ripe, and in proportion as the corn ripened the strength of the husk was reduced.

Mr. Blanchard said that the strength of flax was diminished in the same way. The best linen was made from unripe flax. So, too, the best tow cloth is made from unripe hemp.

It was stated in reply that machinery had been perfected for utilizing the flax, after the seed had been gathered.

Professor Joy remarked that the best evidence of the use of the husk, after the corn had ripened, is the fact that corn is now the principal food of the people where the paper is manufactured. He was impressed with the vast extent of its cultivation during his recent visit to Europe. The moment you cross the boundary line into Switzerland you will find immense corn fields. He had noticed in passing, that the morning, noon and evening repast of the peasants was a preparation of cornmeal, and he had eaten it himself, when in fact nothing else could be obtained. Of course, they allow it to grow until it is perfectly ripe. It would be absurd to think otherwise, and the question whether this paper is made from the green husk is hardly worthy of consideration. Indian corn was sent from this country into the south of Europe in the 16th century. It is now known there as the American corn. There was at first the same prejudice against it that prevailed in England against oatmeal. It will be remembered that Dr. Johnson, in giving the definition of oatmeal, said "it was food for *men* in Scotland and *horses* in England." Such prejudices have, however, long since disappeared. The true home of the American corn is between 20° south and 35° north latitude, but it will grow in some places as far north as 40°, the climate being modified by the ocean and by altitude. In the United States the amount of Indian corn raised in 1859 was over 830,000,000 bushels. Of course, connected with all this, there must be a vast quantity of refuse matter, which could doubtless be utilized if paper was manufactured from the husks. The expense of erecting an establishment as extensive as the Imperial mills at Vienna would be about $300,000. Prof. Joy closed by alluding to the use made in this country of straw and shavings in the manufacture of paper.

Mr. Bartlett said—At present it is found profitable to mix a portion of straw and wood with the rag stock. He had seen some beautiful specimens of this kind of paper.

Dr Parmelee said he had lately visited a paper mill which supplied leading daily newspapers in this city; a large portion of the stock there used was obtained from straw.

The Chairman remarked that there was no danger of overestimating the importance of improvements in the manufacture of paper. To the American the newspaper was a necessity. There were many among us who could forego a morning meal, but not a morning paper.

Dr. Richards gave some interesting reminiscences of the late Dr. Samuel Mitchell of this city. One of his sayings was that the evidence of a nation's advancement in civilization was to be found in the number of rags consumed by it. In this country the demand for rags is far greater than the home supply; we are obliged to import them from Europe in large quantities. When Dr. Mitchell was in Congress, many years since, he labored diligently for the repeal of the duty on foreign rags, and was successful. Afterward he alluded to this as the most important act of his life.

The Association being about to take its usual summer vacation, Prof. Joy moved a vote of thanks to the Chairman for the faithful manner in which he had performed his duties, which was seconded by Mr. Bull, the Secretary of the Institute, with complimentary remarks. The motion was put by Mr. Dixon, and carried unanimously.

Mr. Nash spoke of the importance of the complete reports which had latterly been made of the meetings of this Association. It was stated that full reports had appeared in *The New York Tribune*. As the Daily, Semi-Weekly, and Weekly have a combined circulation of over 200,000 copies, it was fair to conclude that all the scientific intelligence of general interest, in both the Old and New World, for some months past read before this Association, has thus been presented to nearly a million of readers.

On motion of Mr. Adriance, the Association adjourned to the second Thursday of September next, at 7½ o'clock P. M.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
Thursday evening, *Sept. 8th*, 1864.

Prof. S. D. Tillman in the chair; Benjamin Garvey, Secretary.

MISCELLANEOUS BUSINESS.

Mr. J. Bull exhibited a series of photographic Views of prominent places in Central City, Colorado Territory, made by Mr. Henry Garbanati, of that place, and presented to the American Institute. These views give us a better idea of that city than could be obtained from any written description. Mr. B. alluded to other gifts from Mr. Garbanati, and to his letters, which describe in glowing terms the mineral richness of the country and its future prospects.

Dr. Rowell exhibited a curiosity in the shape of what might be called a bogus California nugget. It was an artificial composition well calculated to deceive. It had formerly a place in the office of a dealer in mining stocks.

The following items of scientific news were then read and elucidated by the Chairman:

IMPROVEMENT OF THE DANIEL BATTERY.

Father Secchi advises the use of fine sand or powdered sulphur in the porous cell; its constancy is thus increased by preventing the liability to local action taking place on the zinc. When large porous cells cannot be easily obtained, he proposes as a substitute bags made of coarse linen cloth well anointed with a luting of flour and lime.

A MINERAL CONTAINING CŒSIUM.

M. Pisani has discovered that the Elban mineral Pollux contains about 34 per cent. of the new metal Cœsium. It was previously supposed to contain either potassium or sodium.

NEW CHROMIC SALT.

M. E. Kopp announces the discovery of the double chromate of potash and ammonia, which promises, from the facility with which it is decomposed by light, to be of service in photography.

IMPROVEMENT OF MINING POWDER.

M. Nobel says, by damping mining powder with nitroglycerin its explosive power is trebled, and the noise of explosion is much less than when ordinary powder is used.

Substitute for Lucifer Matches.

M. Peltzer proposes, as a substitute for compounds containing phosphorus, a violet powder, made by mixing a solution of sulphate of copper saturated with ammonia and an equal volume of the solution of sulphate of copper saturated with hyposulphate of soda. This powder mixed with the chlorate of potash will take fire by percussion or rubbing.

Preservation of Chloroform.

M. Boettger finds that fragments of caustic soda in a bottle containing chloroform will prevent its decomposition by exposure to sunlight.

New European Railway.

The railway connecting the capitals of France and Spain has just been completed. The distance between Paris and Madrid is 840 miles; the time of passage is 35 hours; the price in a first-class car 165 francs, or about $32.

The Maximum Pressure on Car Wheels Changed by Direction.

Mr. G. Bartlett asked a question regarding the relative power of the crank directly above and below the axle in the locomotive, which led to the discussion of another interesting point by the Chairman, proving that the driving wheels of a locomotive would have the greatest adhesion to the rail, when under motion, if they were placed forward, so as to sustain the entire weight of the front end of the locomotive. To further explain his position, the Chairman drew a diagram on the blackboard, illustrating a car-brake patented a few years ago; there was an action about it mysterious at first to the inventor, which he would explain. The brake consists of two similar cone-wheels, which are pressed into the two wheels of the truck on the same side. When pressed in far enough the friction will make the cone-wheels revolve with the truck wheels. These two cone-wheels if geared together, would run in opposite direction; but as they are as far from each other as the two truck wheels, two intermediate wheels were placed between, gearing into the main cone-wheels, so as to compel them to move in opposite directions; thus arranged they are pressed against the truck-wheels, and one or the other wheel would be reversed instantly. Running in either direction the hind wheel would always reverse. To explain this he drew a parallelogram—the line A B representing the lower side, and the line *ab* the upper. Let the line A B represent the rail and the point of contact between the rail and the two wheels of the truck by A and B respectively. Draw the diagonal lines A*b* and B*a*; if *ab* represent the momentum of the truck going in either direction, and the perpendicular line A*a* the weight sustained, the diagonal line represents the sum of these two forces. When the truck moves in the direction A, the diagonal A*b* represents the direction of the united forces; there is, therefore, a greater pressure on A than B, and when the direction is from A to B, then the diagonal *a* B represents direction of the forces, and the pressure is greatest at the point B. When the brake is applied sufficiently strong to cause a reversal, it is evident if the truck-wheels are both of the same size and weight, that the wheel which would reverse must sustain the least weight, or, in other words, be held to the track by the least friction.—Therefore, in the direction *a*, the wheel at B would reverse, and in the direction *b*, the wheel at A would reverse. This brake was found to be useless in practice on account of its violent action, but it illustrates very aptly the change in the distribution of force with each change of direction.

Oil Wells.

Mr. Overton said he had just returned from the oil region of Pennsylvania, and among the various contrivances used there for raising the oil, one was novel to him. It consisted of a small iron tube which is passed down the wells beside another larger tube, and has its lower end bent up and inserted in the open end of the large tube, leaving a space between the tubes. Air is forced down the small tube, and rises into the large tube, the end of which is in the oil. As it rises, it carries with it to the surface the oil or water. This contrivance was being extensively used; he would be glad to know whether it was a practical and economical plan

The Chairman said there was a great loss of power in this apparatus; first, in the power required to condense the air so as to overcome the pressure, increasing with every 30 feet in descent about 15 lbs., this loss is principally by friction ; second, in the use of this compressed air on the principle of exciting motion by parallel currents. Numerous experiments on record show how much power is wasted by this application of this principle of parallel currents. There may be cases where the contrivance spoken of would be convenient ; and if the cost of power was small, convenience might be consulted.

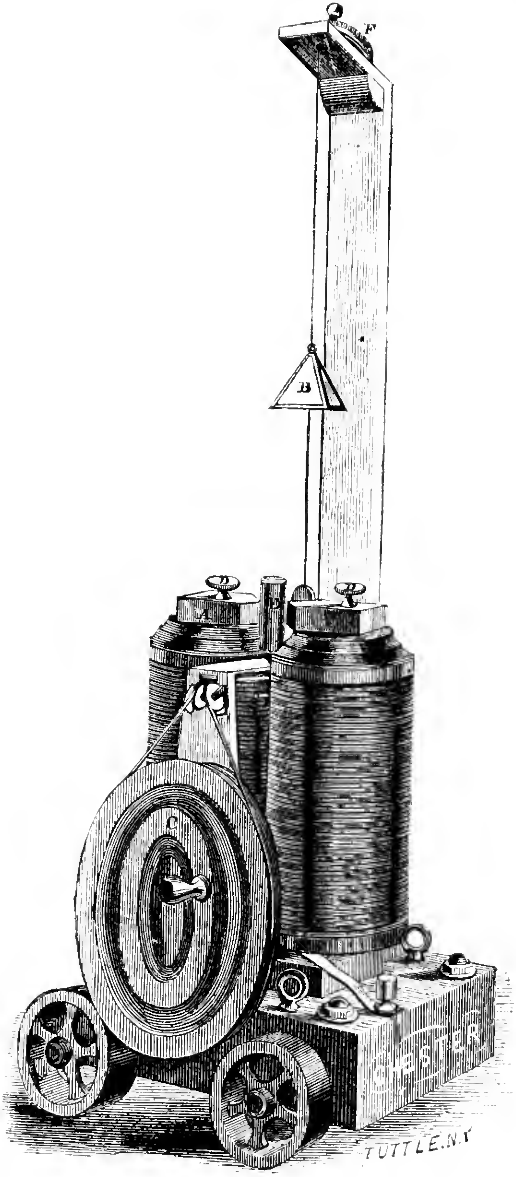
Mr. Bartlett agreed with the chairman in the opinion that there was a a loss of power in this blowing apparatus.

Mr. Parmalee said that beside the ordinary pump, he has noticed in his visit to the oil region, a kind of bucket about five feet long, which was used to raise oil in wells when the flow was slow and never quite to the surface.

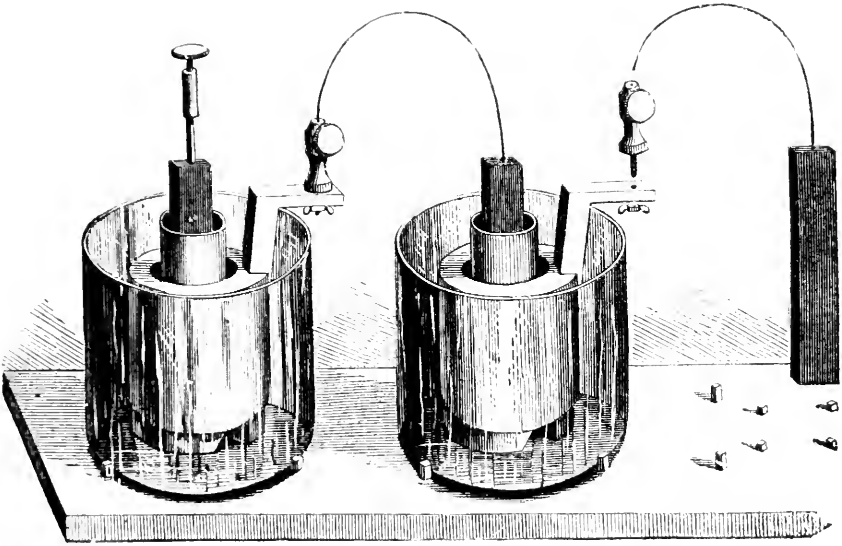
Mr. Overton stated that on the first opening of some of the wells the flow of gas was very violent; in some cases the water around the surface was frozen by the rapid absorption of heat by the liberated gas. Another singular phenomenon is the reverse of this: the suction sometimes is violently downwards.

Mr. Garvey was not disposed to believe that the action of the oil wells was due entirely to gas. The same principle that produced the flow of water in the artesian well must operate here. The pressure of gas must be immense to raise water to the height described.

The time for adjournment having arrived, it was agreed to select the subject of "Petroleum Wells" for the next discussion. Adjourned.



Electro-Magnet.



Electro-poion Battery.

Great Electro-Magnet.

The Chairman illustrated on the blackboard this magnet of which the following is a description:

The engraving represents a large magnet constructed for the Free Academy of this city, by Charles T. and J. W. Chester. Connected with it are attachments for exhibiting diamagnetic effects, but the magnet itself can be easily removed from these attachments, and its moveable base, and can be suspended by a ring, so as to exhibit its enormous lifting capacity. The magnet is built in the same manner as small electro-magnets, by securing straight round bars into a cross flat bar, and if constructed by simply bending a round bar into the horse-shoe form, it would measure five feet in length. The core is of the purest soft iron four inches in diameter, and is covered with a winding of insulated copper wire, eight number thirteen wires, being carefully wound on at once. Two hundred pounds were used to complete the magnet. The armature weighs 80 pounds, and no weight applied to this, thus far, has been able to detach it during a charge of the magnet.

In the engraving, the magnet is placed upright, and two blocks of iron (A. A.) are placed upon the magnet faces, and adjusted in position by the screws (D. D.) so that the magnet poles can at pleasure be placed at any required separation, and assume either a flat or pointed shape. The turn table (C.) is made to drive the copper tube (E.) with great speed. By diamagnetic laws, copper placed between the magnetic poles, during a strong magnetic charge, resists motion and acts as if placed in a demi medium.

The copper tube (E.), rotating freely while the magnet is inactive, becomes suddenly fixed upon charging the magnet, and if in defiance to the resistance to motion thus occasioned, sufficient force is applied to rotate the tube it becomes gradually warmer, and finally so hot as to boil water and blow out a cork used to close the end of the tube. To demonstrate this diamagnetic influence, in another way, the tube is now removed and the copper disk, shown just behind it, is brought into the same magnetic influence. By the wheels (F.) the cord suspending the pyramidal system of mirrors 13 is twisted, and recovering itself from this torsion imparts rotation to 13 and at the same time to the copper disk. A beam of light thrown upon the mirrors is, during their rapid rotation, reflected upon the walls of the lecture room in an apparent circle. But the instant that the magnetic influence arrests the rotation of the copper disk, the mirror stops as if served by the hand, and the arc of light is as suddenly converted into a stationary spot.

Chester's Electropoin Battery.

This battery consists of gas carbon, artificially prepared, in rods, and connected with platina wires or platina buttons, and zinc, for the metalic elements. Chromic acid and sulphuric acid dilute, compose the fluid elements. It was introduced by Charles T. and J. N. Chester, first experimentally, in Canada, January, 1861, and afterwards in this country, where it has been almost universally adopted. About 3,000 cups are in use in this city for telegraph purposes, at a saving of at least one-half the price for batteries formerly expended. The following is from the report of the Engineer of the American Telegraph Company, of trials made of this battery:

"It was subjected to a competition with three other powerful battery combinations, during 60 days, alternating it by using on different lines, each about 250 miles. Estimate of amount of labor, weights of acid, zinc and mercury consumed, and galvanometric tests were daily made to establish uniformity of power.

The experiments, embracing altogether the use of about 320 cells, and thoroughly carried out under the direction of the engineer of the American Telegraph Co., resulted in the following figures:

BATTERIES.	Consumption of—									
	Mercury.		Zinc.		Sulph. acid.		Nitric acid.		Elec. fluid.	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
Electropoion	2	9	1	8	27	8	......	......	52	$6\frac{1}{3}$
Groves	11	$8\frac{1}{2}$	54	8	73	6	146	$11\frac{3}{4}$	......	......

The original form of the battery is still preserved, the only change being in the mode of making the platina connections. Imitators have endeavored to make up the battery by driving copper wires into the carbon, or by using a clamp covered with lead, but these connections all became oxidized and worthless, and have been abandoned. Besides the saving of expense, the abandonment of nitric acid has preserved the health of operators, and prevented the fatal corrosion of connecting wires.

On motion adjourned to Thursday evening next.

American Institute Polytechnic Association,
September 15, 1864.

Chairman, Prof. S. D. Tillman; Secretary, B. Garvey.

During the hour devoted to the examination of new inventions and discoveries, the Chairman presented the following interesting items of scientific news:

Elongation of Electro-Magnets.

A bar of pure wrought iron, within a helix of insulated copper wire, is very slightly elongated while a current of electricity is passing through the wire. The instant the current is broken, the bar returns to its original length. The difference in the length of the bar is too small to be perceived by the eye, but is made apparent by connecting the bar with a system of levers. Prof. Tyndal, of the Royal Institution, London, has lately arranged an apparatus by which this singular phenomenon can be witnessed by a large assembly. To the end of the lever of greatest action he fastens a small mirror. A powerful light is so placed that a portion of it will be thrown by the mirror upon an elevated white surface some twenty feet in diameter. The motion of the light upon it indicates the action of the bar when the circuit is closed or broken.

Harmonies of the Solar System.

Prof. Kirkwood, of the Indiana State University, in a paper with this title, published in the *American Journal of Science and Art*, has given his latest deductions on the following subjects:

I. ROTATION OF THE PLANETS.

Under this head he presents views confirmatory of his celebrated "Analogy," announced in 1849, that the square of the number of days in each planet's year is as the cube of the diameter of its sphere of attraction, in the nebular hypothesis.

II. PLANETARY DISTANCES.

After showing that Bode's law, so called, fails to represent even approximately the relative distances of Mercury and Neptune, he repeats a statement previously made by him, that the primary planets are arranged in *pairs*, the members of which are nearly equal in diameter. Neptune and Uranus constitute the first pair; Saturn and Jupiter the second; the Asteroids and Mars the third; the Earth and Venus the fourth; finally Mercury is without a known companion. In each of the three complete pairs, the first, second and fourth, the densities of the members are very nearly as their volumes. These facts seem to indicate a similarity in the original constitution of the members of each pair, and an intimate mutual dependence or connection in their primitive condition. It appeared not improbable that in the first stages of their history, Neptune and Uranus constituted a system of closely associated rings; Saturn and Jupiter another, &c., and that the law of planetary distances might be found in the relative situations of the centers of gyration of those binary rings. In short, his researches on the subject led to the hypothesis that *the differences of the radii of gyration of the primitive rings form a geometrical series.*

After examining this hypothesis in relation to the planets, the author proceeds to apply it to the secondary systems, the satellites of Saturn and Jupiter.

Relation of the Periodic Comets to the Solar System.

After pointing out the relation of the mean distances of some of the comets with the planets, Prof. Kirkwood thus concludes: "May not the exterior secondary rings, thrown off by the planets, have been at too great a distance to form stable satellites? and in such case would not detached portions of the matter revolve around the sun in very eccentric orbits, the degree of eccentricity depending on the direction of their motion at the epochs of separation from the secondary system? If so, the approximate coincidence between the periods of planets and comets would follow as a consequence."

On the Distribution of the Dark Lines of the Spectrum.

Prof. Henricks, of the Iowa State University, has studied the distribution of these lines in elementary bodies, for the purpose of finding the laws regulating them. His investigations have led him to announce—

1. That the mutual distances of different lines in each separate group are the multiples of the smallest distance in such group.

II. The intervals in the different groups may be expressed in very simple numbers, as 1, 2, 3.

III. The difference in the wave-length between the corresponding lines in a group is the same throughout the whole spectrum.

IV. The principal corresponding lines or groups of lines are equi-distant in regard to the wave-lengths.

These lines can only have one of the two following sources. They are either produced by the dimensions of the solid particles, or by the intervals between them, *i. e.* their distances. The latter is impossible, for these lines remain absolutely the same under such different circumstances as cannot but, to some extent, change the mutual distances of particles. Hence the lines must be produced by the bulk of the particles or atoms themselves, and an exact knowledge of these laws and distances must lead us to a knowledge of the relative dimensions of atoms.

Absinthe.

Concerning this liquid—a decoction of wormwood—used more in Europe than this country, M. E. Decairne recently made the following statement before the Academy of Sciences at Paris:

1. In equal doses of the same degree of strength as brandy, absinthe produces more injurious effects on the animal economy.

2. It causes intoxication more rapidly, and its influence upon the nervous system resembles more that of an acrid narcotic poison than that of intoxication by alcohol.

Color of Emerald.

Several of the Paris Academicians have expressed the opinion that the color of the Emerald is due to the oxide of Chrome, and not to organic matter, as had been previously suggested.

Diathermic Compound.

Prof. Tyndall has found that a solution of iodine in the bisulphide of carbon entirely intercepts the light of the most brilliant flame, yet the heat of the ultra red ray of the spectrum passes freely through it.

The Electrical Valve.

This is the name of a new apparatus made by Mr. P. Reiss, for obtaining a deflection of the magnetic needle by the secondary current of the Leyden battery, which has never before been accomplished.

Petroleum Wells.

The discussion of the subject was opened by Dr. Rowell, who presented at length the views of Prof. E. W. Evans, of Marietta College, Ohio, regarding the various phenomena observed at petroleum wells in Western Ohio and Northern Virginia, published in *Silliman's Journal* for September, of which the following is an abridgement:

"The principal supplies of petroleum are not diffused between planes of stratification, but are collected in cavities where it is less liable to be carried away by running water. It is common to find large quantities in places where there are marks of disturbance and displacement of rocks. The cavities have probably been caused sometimes by uplifts, and sometimes by erosion and the dissolving action of water; but, whatever may be their origin, they are not usually of great horizontal extent.

The Wells Vary in Depth.

It is seldom that the neighboring wells strike oil at the same depth, whether the strata be horizontal or dipping. It is one chance out of many to strike oil at all, even in the neighborhoods where it exists in abundance. The drill, as it enters the cavity, sinks variously, from four or five inches to as many feet, sometimes sticking fast, as if between the oblique sides of a narrow fissure. But there are facts connected with the history of oil wells, particularly in their intermittent action, and their interference with one another which serve to show the existence, in many cases, of systems of cavities connected together by channels of communication more or less free, running sometimes along the strata and sometimes across them. The productiveness of a well depends on its entering either one of the main reservoirs, or some of its important connections.

Isolated Oil Cavities.

Let us begin with the most simple case, that of single or isolated oil cavity running obliquely upward. Every collection of oil is accompanied with varying quantities of gas and water, the gas occupying of course the top of the cavity, and the water the bottom, according to the order of specific gravities.

1. Suppose a well is bored to enter the top of the cavity. The gas being in a high state of tension escapes, sometimes with explosive violence, carrying out with it whatever water may be collected in the boring. If the water flows in rapidly, as is usually the case, the oil on its surface is driven into the lower end of the tube, and may be pumped out until the water reaches the tube, when mixed oil and water will be drawn. It often happens that the water rises faster than it can be thus exhausted, and the oil, driven into the very top of the cavity, is lost until the water can be reduced by machinery of great working power. But as it cannot be driven below the mouth of the tube, unmixed oil cannot be obtained from the well. In all wells from which the gas has escaped there is, ultimately, a saving of oil, if the oil is pumped out as rapidly as possible before the intrusion of water.

2. Suppose the boring enters the cavity at a lower point than where the gas is held, and enters the oil. In this case the oil enters first in the tube to a height depending on the tension of the gas above it, a mode of action which is illustrated by the familiar apparatus called the fountain with condensed air. Sometimes it is thrown into the air to the distance of thirty or forty feet, and large quantities are wasted. If the oil continues to be ejected till its surface in the cavity descends to the mouth of the tube, the fact first becomes known by a gurgling sound and a spurting action, and the gas, or a greater portion of it, escapes, after which the pump becomes necessary, and the same series of actions take place as in the first case.

But if the gas reaches its equilibrium with the hydrostatic pressure before the oil is reduced so low, we may then pump out oil till the water rises in the mouth of the tube, after which mixed oil and water will be obtained until the supply is exhausted, provided the pump is of sufficient power to paevent interruptions from the too rapid rise of the water.

3. Suppose the boring strikes the cavity at a still lower point and enters the water. If the gas has sufficient tension, water is raised until its level, in the cavity, is below the end of the tube; then mixed oil and water is obtained, and afterwards pure oil, when the same conditions follow as in the second case. Sometimes the pressure of the gas will raise the water only a part of the way up the boring, and yet the well will be found productive. The Shattuck well, on the Little Kanawha river, had to be drained of water, with a steam pump for two weeks before oil was obtained, but afterwards it yielded abundantly.

Some varieties of action are to be accounted for on the supposition that there are in the same cavity different collections of gas separated by a partition from the top.

Intermittent or Replenished Wells.

This class exhibit the same phenomena as the first, but as often as they are exhausted are replenished again and repeat a certain series of actions indefinitely, and with considerable regularity of time. This is to be explained by supposing they are connected with other reservoirs, by slight channels of communication whose capacity for replenishing is less than that of the tube for exhausting. The Newton well, on a branch of the Little Muskingum, a few miles from Marietta, belongs to this class. It repeats its process, at regular intervals of about a half an hour, expelling about a barrel of oil each time. When the well stops, it is necessary to pump out a little water, in order to start it again; then the oil rises spontaneously. A column of oil will be raised, by a given pressure, so much higher than the column of water as its specific gravity is less. In this case, the specific gravity of water being to that of oil as 1000 to 816, the column of oil will be about one-fourth higher than the column of water. This difference is sufficient to make it flow over the top of the tube.

Wells on Oil Creek, Pennsylvania.

Here the greatest quantity of oil is found in the same horizontal stratum of limestone. It would seem that this rock is very porous and penetrated, like a honey comb, with numerous cells and fissures containing petroleum. In most of the wells here there is an increase and diminishing of the force of gas at regular intervals, but without any cessation of force for a long time. These variations are called the "breathing of the earth." The regular alterations vary in different wells, from four or five times a day to as many times an hour. The intervals gradually increase in length as the supply of oil diminishes; unless, as sometimes happens, new communications are forced, and the well, deriving new supplies, starts off again with a new period. It often happens that some wells has two periods; one of variation in the flow, and another of cessation, consequent upon the escape of gas. It is not an uncommon thing for an intermittent well to throw out, at first, 300 or 400 barrels a day, or to yield in all 20,000 barrels.—They sometimes run two or three years before exhaustion. The productiveness of the Lewellyn well, on the Little Kanawha, greatly exceeded these figures.

Wells Connected by Free Channels.

In this class the passage from one cavity to another being free, where the equilibrium between them is disturbed, it is immediately restored.—Sometimes in the sinking of a new well, in the neighborhood of others, a fissure in the rock is met with, which carries a flow of water from the new well into the others. This evil is remedied by stopping up tightly the space outside of the tube by lowering a bag filled with dry seed to a point below where the current of water enters; as this water penetrates it, the seeds swell and close up the passage.

In the cases spoken of thus far, the quantity of gas is supposed to be considerable; but in many instances it is so slight as to require the constant use of the pump. Yet wells of this character are, to some extent, intermittent. As it is not usual to work these wells at night, they begin each day with a new accumulation, which gives them a certain regularity of daily action, often considered mysterious. There is a well a few miles from Marietta which yields oil only for a short time in the morning; when neglected till that time has passed, it is unproductive for the day. This is owing to the proximity of another well which drains its water in the daytime, but, by resting at night, allows it to be replenished. In wells of small supply the quanty of oil is not increased by extending the intervals of cessation of work beyond a certain time.

General Observations.

Oil wells commonly vary in depth from 100 to 800 feet. The deepest are as apt to raise water to the surface as the shallowest. This indicates a greater compression of gases at the greater depth ; owing, doubtless, to its connection with higher columns of water. The activity of some wells is increased by rains; that of others, with less gas, is thus retarded. It must not be assumed, however, that their connection with subterranean currents is immediate and unobstructed. Prof Evans knows of no instance where there is reason to suppose that the oil is raised to the surface by the direct pressure of a stream of water, whose head is higher than the issue, as the jets of the Artesian wells are said to be produced. In spouting wells, the pressure of the gas, as the immediate agent, becomes known not only from their variable action, but also from the actual escape of gas, and consequent cessation of flow whenever the oil is reduced to a certain level. If collections of oil had direct and free connection with strong currents of water, the mechanical agency of these currents would bear them rapidly away. As it is, minute quantities come to the surface with the springs, showing a very slow process of drainage. As an index of the location of oil cavities this sign is not reliable; for that which issues may have been carried by the streamlets, for miles from its source. Gas springs are less deceptive signs; for the gas, being more buoyant than the oil, and not liable to be carried along by the descending currents, is not likely to wander so far before it issues. But the "show of oil" increases in value, as a sign, with the depth at which it is found. Especially is the finding of large quantities of imprisoned gas, though no oil may be present, regarded as a good indication that there is oil near.

First Use of Petroleum.

Mr. L. B. Page thought the subject of petroleum of so much importance it might be well to preserve the history of its first introduction into New York. Up to 1861 the largest manufactories of coal oil were in the neighborhood of this city. During that year several thousand barrels of crude petroleum or rock oil arrived on the opposite side of the North river, consigned to Messrs. Schieffelin Brothers & Co. It was not then known what could be done with this article, but a member of that firm was very persevering in his endeavors to induce some of the manufacturers of coal oil to use petroleum in combination with coal in the distillation of oil. He succeeded in having a trial made with twenty-five per cent. of petroleum and seventy-five of coal. The result was so satisfactory that the manufacturers ventured to try a half and half mixture; then to use 75 per cent, of rock oil to 25 of coal, and finally to discard coal altogether, and distil only crude petroleum, from which an oil was obtained that answered all the purposes of coal oil. The products which came from petroleum differed in proportion from those of coal oil, and the first serious difficulty encountered was in obtaining an oil in the use of which there was no danger of explosion, by improper mixture of the more volatile portions. This oil, or any other giving off vapors, or the ordinary illuminating gas, will cause an explosion, when the vapors of the oil or when common burning gas is mixed with from eight to ten times its bulk of atmospheric air. As this vapor would pass off unseen into the air, many deplorable accidents followed the exposure of the oil to heat. But this evil was remedied by the dealers in oil requiring of the manufacturers a heavier oil, and now none is used for burning except it has been tested by the Baume scale, and found to be below a certain specific gravity. The low price of this oil at first induced many to try it, and now its use is very general, in places not supplied with illuminating gas.

The Germans should have the credit of being the first in Europe to recognize the economy of using this oil. The largest amount now exported goes to their country, although its use is being rapidly extended to all parts of the world. During the present year we have thus far exported twenty millions of gallons, worth about sixty-three cents per gallon. It will be seen that at the present rate of exchange this oil can be afforded so low in Europe as to drive every other oil, or source of light, except coal, out of their markets.

When it was first found to answer for burning, and that it gave a more brilliant light than any other fluid, there was great anxiety felt as to the prospect of a permanent supply; but it was soon demonstrated that this oil, which in its crude state had long been used as a medicine (that from Burmah under the name of British oil, that from the West as Seneca oil), could be obtained in any desired quantities, the only condition being to bore for it

In Canada he had seen wells which produced from three to four thousand barrels a day, but this oil was found to contain too much sulphur for our refining establishments. The only kind used for light is from the wells of Pennsylvania, Ohio and Virginia. New discoveries of it are being made almost daily. A well on the shores of Lake Erie gives already about ten barrels per hour. In some places very pure oil is found. There is a well called the "Smith Ferris," which produces an oil that can be burned without being subjected to the refining process. There are many uses to which the refuse products of the refiners are now put. The principal use of the naptha or benzine is for making paints and for dissolving India-rubber. An oil is prepared from petroleum which is employed by curriers in finishing leather, which is said to be superior to the fish and neat's-foot oil generally used. The naptha is also used for extracting grease from cloth, and in the process of annealing glass.

The variety of qualities of the oil from different wells is remarkable. He had in his possession a heavy oil of only about twenty-five degrees Baume scale, which has an aromatic odor; it cannot be used for burning, but would make a valuable lubricating oil. He had witnessed many of the singular changes in wells described by Prof. Evans. For instance, the Hammond well discharged five hundred barrels per day, but it soon began to give less and less proportion of water until it ceased to flow altogether.

In the State of Pennsylvania he had seen more than two thousand abandoned wells, but in some the pumps had been again put in operation. New wells were constantly being bored, and the supply was increasing. The business is now being conducted by a different class of men from those who commenced it. The great capitalists of the country are making large investments and buying up the interests of the small dealers.

Mr. G. Bartlett stated that one company were completing a building of eight hundred feet front, and everything connected with this refinery was to be on the most gigantic scale. The annual government tax which this concern will pay will be one million two hundred thousand dollars.

Dr. W. Rowell exhibited an arrangement of tubes to illustrate the method of raising oil described at the last meeting. It consisted of a glass tube opened at both ends, a smaller tube of glass beside it, had its lower end bent so as to enter the other tube quite loosely. On placing these tubes in the water and blowing into the upper end of the small tube, the air brought up with it the liquid. It seemed to work prettily on a small scale, but it did not determine the power required to raise a given quantity of water.

Mr. T. C. Smith remarked, in reference to the apparatus for raising liquids spoken of, that he had occasion to make inquiries about its cost, and found that after paying the fee required by the patentee, it would be far more expensive than the ordinary piston pump.

The comparative cost of working this pump was discussed at the last meeting

Mr. Page alluded to a singular phenomenon which occurred in Rich county, twenty-three miles from Parkersburg; an excavation a few feet deep was made, and the day after oil was found in it. Stones were thrown up from this opening and afterwards the surface soil in the immediate vicinity was found saturated with oil. From this statement it would be inferred that the upward force of the oil was nearly strong enough at that point to form a natural spring, and only required the removal of a certain quantity of the soil to set it in motion.

With regard to the process of distilling the oil, he wished to add that the specific gravity of crude petroleum is usually about 90 deg. Baume; the oil refined has not quite half that gravity. In addition to the lighter products expelled by heat, there is a heavy residuum which will, by re-distillation, produce paraffine, a white substance used in the manufacture of candles, which are harder than spermaceti and can be used in the warmest climates.

Mr. T. D. Stetson explained a method which had been recently patented for preventing the oil from evaporating through the pores of wooden casks. This is done by coating the inside of the barrel with an alkaline solution, such as hot soap suds; and to prevent the evaporation of this alkaline preparation, the outside of the barrel is covered with a fixed oil. This is said to remedy a very serious difficulty in the transportation of petroleum.

After remarks by Mr. Minthorne and several other gentlemen, the Association selected "Preservation of Fruits" as the subject for the next regular discussion, and adjourned to Thursday evening next.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
September 22*d*, 1864.

Chairman, Prof. S. D. Tillman; Secretary, B. Garvey.

The following interesting items of scientific news were read by the chairman:

ESCULENT NESTS.

Dr. Calvert, of London, in a recent lecture on "Chemistry applied to the Arts," says these curious gelatinous products are not only considered great delicacies in China and India, but even in Europe, where they realize from 'fifteen to thirty-five dollars per pound. It has long been considered a disputed question what is the chemical nature of the substances composing these nests, which are the product of a peculiar kind of swallow; but Mr. Payen, by his recent researches, has left no doubt in the minds of Chemists that it is animal, not vegetable, matter. In fact, it is a peculiar mucous substance secreted by the bird, and composed of carbon, hydrogen, oxygen, nitrogen, and sulphur. Further, it is insoluble in cold water, but soluble in boiling, and differs from gelatine and isinglass in that it does not gelatinize as it cools.

RESPIRATION OF FLOWERS.

M. Cahours gives in the *Comptes Rendus* the following summary of the results of his researches:

1. Every flower having odor or not, in a limited space of normal air, inhales oxygen and exhales carbonic acid gas in variable proportions.

2. Under like circumstances, the proportion of carbonic acid increases with the temperature.

3. Similar flowers generally produce somewhat more carbonic acid in the light than in the darkness; nevertheless, in certain cases, the amount is the same in each of these conditions.

4. When oxygen gas is substituted in place of normal air, the difference is more marked.

5. The proportion of carbonic acid is greatest when the development of the flower is commencing.

6. Every flower, left in an inert gas, disengages small quantities of carbonic acid.

7. Of the various elements constituting the flower, the parts in which the greatest vitality resides—the pistil and stamina—are those which consume the most oxygen and produce the greatest quantity of carbonic acid.

Magnus on the Sun.

From recent experiments, M. Magnus concludes that as solid bodies radiate much more heat than gaseous bodies, solar heat cannot reside in a photosphere composed of gas or vapors.

Action of Light on Santonin.

M. Sestini states that Santonin crystals, when reduced to powder and exposed to light, are changed to formic acid and an uncrystallizable substance, very soluble in alcohol and ether, also a red resinous substance.

Restoring Nerves.

M. Sangier reports in the *Comptes Rendus* the particulars of the successful suture of the median nerve of the hand. He believes the same operation may be performed on the nerves of considerable size.

Destruction of Tumors by Galvanic Action.

M. Nelaton, a surgeon of great celebrity, has reported to the Paris Academy of Sciences the cure of one of the most painful forms of disease which afflicts human nature. It has long been known that when two needles connected with the poles of a galvanic battery are placed in contact with the human body, a slight destruction of the tissue occurs; but little importance was attached to the fact. M. Nelaton, however, conceived the idea of attempting to destroy tumors by inserting needles in the parasitic mass and placing them in communication with a powerful voltaic pile. His first experiment was on a dog. His success led him to try his electro-puncture process, as he terms it, on a young man who was a tutor in his own family. A large vascular tumor, in the roof of the mouth, had resisted the usual appliances. The needles were first inserted for ten minutes, and a white frothiness soon made its appearance. The wire was afterwards applied daily from three to five minutes. The tumor began to diminish, and at the end of four months the patient was cured without the loss of blood.

A Cheap Carpet.

The *Cosmos* contains a letter from M. D. Thoreau, relating to a pattern taken from a large tapis entirely due to the work of a group of spiders.

in a state of captivity. He thinks it quite possible to produce, by such help and without expense, soft and warm carpets. To accomplish this a number of these working spiders should be confined over a space proportionate to the extent of the work desired.

Preservation of Fruits.

The discussion of this subject was commenced by reading the following communication to the *Polytechnic* from Prof. Mapes, "On Preserving and Ripening Fruits."

At from five to eight degrees Fahrenheit above the freezing point, fruits do not lose their peculiar aroma, taste, etc. Below that temperature they become neutral, turnip-like to the taste; and much above it they change flavor and mechanical structure, forming mealy instead of juicy flesh.

Every fruit, and each of its varieties, has a separate and distinct date at which they should be ripened, by being placed in a dark room or closet at 104° Fahrenheit of heat; when they will change color, varying in their kinds, being very juicy, sugary, and highly aromatic.

When ripened in the light, or in a partial light, they have less flavor; form less sugar—the starchy proximates remaining unaltered; have less color, no blush, and are hard at the core.

For dates in ripening, see the catalogues of Villmorin, Andreau & Co., Paris, and of Le Roy & Co., Angers, France; both, printed in English, are procurable in this city.

To illustrate the importance of dates in ripening, the following single example is given. The Duchess D'Angouleme pear, if ripened at the proper date, is tender-fleshed, luscious and highly aromatic; if at any other time, it is in a degree turnip-like and tasteless.

FRUITS FOR EXPORT.

Fruit must be gathered from the tree, wrapped in paper, and placed in the detention house by or before sunrise. If the sun shines on them for an hour in the morning, and they are then boxed, while raised in temperature one or two degrees by the sun's heat, some kinds will ripen at the core and others at the surface, thus engendering decay; whereas, if picked and taken care of, as above directed, the ripening will be even throughout the mass.

Fruit should be picked on the day the steamer sails by which they are to be sent, and should be kept in an ice-house until the hour before the steamer starts. The boxes in which they are packed should be peforated on all sides with holes, and, when carried to the vessel, should be covered with damp cloths, so that the evaporation of the upper surface will keep the lower side cold. Thus fruit can be safely carried four or five days, and be delivered sound, even in such markets as Bermuda.

FRUITS FOR DOMESTIC USE.

Apples, instead of being taken from the cellar for consumption, should be removed in small lots to a closet alongside of a chimney-stack, kept at 104 deg. of heat, and dark. In a few days they will turn to a bright yellow. Cool them before eating, and they have many times the value of those differently treated.

GATHERING FRUITS.

The shaking of apples and other fruits from trees renders them unfit for export, and indeed for any except immediate use. For long keeping and for export they should be gathered by hand; properly dried so as to part with six per cent of their water; separately moved by hand, in packing and unpacking, and never rolled over in barrels; but carefully handled so as not to cause the apex of contact to make slight bruises, as all fruit so bruised is sure to decay in degree if not entirely.

MODES OF PRESERVING.

Free circulation, dry air and low temperatures, such as referred to in the first part of this article, is the best mode of preserving fruits in their natural state. They will lessen slightly in weight, but not in bulk. The exosmose action is always periodically active, while the endosmose action is nearly or quite inactive. Thus an apple immersed in water, instead of receiving water through the skin, will actually lessen in weight by exosmose action. Some fruits, such as cranberries, are preserved by immersion in water. This is true of gooseberries and currants in a degree, particularly of the former.

Dessication.

Within the last few years large quantities of vegetables have been preserved for the use of armies and navies. This is done simply by drying under rapid hot blasts of air. Cabbage will lose 93 per cent of its weight by this drying process, and may be pressed into a very small space, where it will keep for years. If thrown into water over night each seven pounds will take up ninety-three pounds of water, and again become fit for cooking. The same operation may be applied to minced carrots, turnips, beets, parsnips, and other vegetables and fruits. With the vegetables the change is very slight. With fruits it is greater; although not as great as the change occurring in the slow sun-drying of apples and peaches.

Potatoes, while being dried during the passage over long belts, under hot blasts, also receive pressure occasionally from rollers, and when finished form fine flour which may be dusted into boiling water at any time, when it will take up seventeen times its weight in water, representing mashed potatoes of superior quality. This potato flour will keep longer,and in better condition than the ordinary flour from wheat.

Family Receipts for Preserving Fruits and Vegetables.

If the core of an apple is removed by a tin tube pushed through it, and the upper and lower ends cut off and re-used as stoppers, the space between them being filled with triple refined sugar, a number of these may be placed in a tin kettle, covered; this is immersed for half its depth in another kettle filled with boiling water, which must be placed on the fire and boiled actively for twenty-five minutes. Then place the apples in a jar, raise its temperature by immersion in boiling water, so as to drive out the atmosphere, leaving itself filled with vapor, and then seal. While so conditioned the fruit will keep well so long as the atmosphere is excluded, or, in other words, while the fruit remains *in vacuo*. This method is applicable to quinces, pears, lemons, limes, oranges, and many other kinds of fruit. The sugar will pervade all the fleshy portions of the fruits, and will not injure their flavor; and they will have more the taste of fruits freshly cut up in sugar.

All other modes of preserving are dependent upon one of two conditions; being cooked with large amounts of sugar like ordinary sweetmeats; or, being put up with very small portions of sugar, forming weak syrups, and simmered in jars, so as to enable their being sealed in a vacuum. These two constitute the entire category of methods, varying but slightly.

Preserving Vegetables for Winter Use.

String Beans.—String them, break them into short pieces, lay them into a barrel in alternate layers of half an inch thick, with Turk's island salt or any hard crystalline salt, such as is preferred for butter-making and free from bittern. Put on the top the head of a barrel covered with a flat stone. A liquid will exude from the beans, but no water must be added. During winter place these on a sieve, permit the fluid to run off, soak them over night in fresh water, and cook them the next day in the usual way. They cannot be told from freshly grown beans. This process will not do for Lima or other shell beans.

Green Corn.—For preserving, the Stowell's evergreen and the Buckland mammoth are the best. Suspend the ears in a net, immersed in boiling water, long enough to stiffen the milk of the corn—cooking the albumen; then take them out, husk them, shave the corn from the cob with a very sharp knife, and place it in cans or jars, immerse these jars to two-thirds their depth in boiling water, and seal while hot, so as to insure a vacuum.

Many vegetables may be preserved in this manner; indeed, almost all the entire line of kitchen vegetables, including shell beans, peas, etc. All vegetables for preserving should be young. The *petit pois* of France are imported here in cans, and are a good example of the superiority of younger vegetables.

Many vegetables, including mushrooms, may be preserved by placing them in cans with water and introducing a single crystal of citric acid, heating the mass slightly and sealing in a vacuum. When removed from the cans during winter, the water with the acid may be thrown away, and the slight quantity of citric acid remaining in the vegetable will be entirely removed by boiling.

All preserved fruit and vegetables should be kept where the temperature is most equable, not subject to sudden changes; hanging shelves in cellars are appropriate.

Alanson Nash, Esq., said that as far as his experience went he found the best way to preserve all kinds of fruit was to keep them at a very low temperature, but not low enough to destroy the crystalization of the fruit. The best plan for preserving is to keep them under the ground just below where the frost reaches. He had picked up apples from the ground after snow had fallen, and placed them in straw during freezing weather, and he found they made the best of cider.

Mr. Nathan C. Ely remarked, with regard to cider, he had observed that made from apples gathered in December partook of the character of crab-apple cider. He had practiced the methods recommended by Professor Mapes for ripening fruit: he placed them in a large room, having its blinds closed, in rows upon blankets on the floor, and gave them a covering of blankets. They are turned over once a week, and as they ripen are taken out. The instrument spoken of by Prof. Mapes for coring the apple is just large enough to take out all the seed, and can be bought for a trifle.

Mr. James Hogg, florist, gave some of the results of his large experience. The things he had labored to accomplish was to preserve the fruit in its natural state, with its fresh flavor unimpaired, but he had not succeeded, and he did not believe it ever would be done. Apples and pears we may have fresh by selecting varieties that will ripen at different periods, the latest kinds lasting till the earliest of the succeeding year begin to ripen. But the more perishable fruits, such as strawberries and cherries, can be can be kept only by methods which to a great extent destroy their flavor.

The plan of keeping fruits at the particular temperature spoken of by Prof. Mapes was patented some time ago, and the patent for this vicinity was sold for $6,000. The purchasers erected a large establishment on Brooklyn Heights, in which ice kept the temperature at a proper degree. The first season a cargo of pineapples was placed in the cellar; but they were so warm the ice melted and the fruit rotted The next season they cooled the fruit before depositing it in the cellars, and pineapples and lemons were kept in a sound state throughout the season. They lacked flavor, however and the plan was soon abandoned.

He had tried the air-tight can, but the flavor of the fresh fruit is not so retained, and the fruit becomes tough. Fermentation goes on slowly in the can—indeed, it commences while the fruit is on the tree. If currants become what we call over ripe they do not rot, but dry on the bushes without decaying; yet a fermentation takes place which converts the sugar into acid, and they become excessively sour. Grapes are frequently soured in the same way, from having their roots surrounded with stagnant water.—Many persons have noticed on boxes of imported grapes the word "Elixir;" it means they have been dipped in a preparation of lye for preserving them; they are the second quality of grapes. In France there is a pear called the Crassane, which they put on an iron disk and into an oven, and, when about half done, they are placed on a board and pressed, and afterwards dried. When these are thrown into hot water they swell up and make a very delicious dish. In Chicago an experiment is being tried on a large scale for preserving fruit in separate iron apartments, resembling boilers, into which the fruit is put through man-holes. The air is to be exhausted and the moisture absorbed by chemicals.

The difficulty in preserving fruit is that the essential oils which are the source of flavor act upon each other, and there is always oxygen enough left to start this action. When the oxygen is removed the change is less, but the fruit, although whole, will be tough and tasteless.

John M. Reed remarked, that potatoes are kept on board of a ship during a three years' whaling voyage by immersing them in molasses.

Mr. Hogg, said, in England they expose potatoes to the fumes of sulphur, and in this way they will keep two or three years. The object in placing potatoes in molasses is to keep them where they cannot be acted on by acids. In drying fruits they should never be exposed to the direct rays of the sun. In his opinion dried peaches were preferable to those preserved in cans.

Dr. Rowell stated that some time ago he purchased a bunch of dried peaches having the precise flavor of freshly picked fruit—they were pared, quartered, and strung on threads so as not to touch each other. He exhibited a self-sealing can which he had used for the past fourteen years—it was made of earthernware and lined with glass. The cover was ground to fit the top, and was tightened by turning it.

Mr. Watson exhibited a small jar of fruit which he said would keep for two years. He did not believe there was so great a change in the flavor of canned fruit as had been previously stated.

The Chairman said great improvement had been made in glass jars by casting a thread in the glass. Such jars are used for fruit. The pepper cruet of an ordinary table caster, having its cover held on by a glass thread, cannot discharge its whole contents at once on the dinner plate.

Mr. T. D. Stetson described minutely the manner of filling and sealing these cans for preserving fruit.

Dr. D. D. Parmelee gave an interesting account of experiments he had tried in covering fruit with a thin coating of India rubber; decay was not prevented by this process. If india rubber rings are used to keep cans air-tight, they should be made with as little sulphur as possible in the process of vulcanization.

After selecting "The Manufacture of Gloves" as the subject for the next discussion, the association adjourned to next Thursday evening.

American Institute Polytechnic Association,
October 6, 1864.

Chairman, Prof. S. D. Tillman; Secretary, B. Garvey.

The Chairman presented the following interesting scientific memoranda:

Revelations of the Spectrum.

Father Secchi, of Rome, in a memoir to the Paris Academy of Science gives the results of his observations on the atmosphere of the planet Jupiter by the spectrum apparatus. The lines differ from those found in our own atmosphere, and he infers that the two atmospheres are essentially different in their chemical constitution

Velocity of Electricity.

M. Felici, of Pisa, has measured with his new apparatus the velocity of electricity, and finds it to be 260,000 kilometers per second. A kilometer is .6213 of an American mile.

New Polarizing Prism.

This contrivance, made under the direction of Prof. Dove, consists of an isosceles right-angled prism of calc-spar, one of whose sides is perpendicular and the other parallel to the optic axis of the crystal, and therefore the hypothenuse side is at an angle of 45° with it. This rhombohedron surface occupies the axis of the polarizing apparatus instead of the Nicol prism. The light thus suffers two refractions at the equal surfaces, and one reflection at the hypothenuse surface.

This instrument is said to be well adapted for experiments in the polarization of heat as well as light.

Molecular Structure.

M. D. Gernez describes experiments made by him on the rotary polarizing power of the essences of turpentine and camphor, from which he concludes that when these liquids vaporize, their molecular structure undergoes no change.

Potash from the Jersey Green Sand.

Mr. G. J. Scattergood has described a process for extracting 10 or 12 per cent. of potash from the marl or green sand of New Jersey; but this source of potash is not as available as common wood ashes.

Saltpetre.

M. Boussingault, in describing before the Paris Academy of Sciences the Saltpetre works of Tacunga, remarks that nitrate of potash or saltpetre is spread throughout Nature with astonishing profusion. It is found in rain, snow, hail, dew, fog, and in fresh and salt water. Wherever a body is burnt in the atmosphere, the oxidation of nitrogen and the formation of a nitrate generally takes place. Nevertheless, Nitre is present everywhere only in very small quantities. The places where it is found in abundance are very rare, the only known spot where it attains the proportions of a mineral stratum being the Province of Zarapaca in Peru. Whenever it appears spontaneously, the diverse circumstances all denote the intervention of organic matters. A dry air and long periods with rain are indispensable to its formation, also the presence of decomposed feldspar, yielding the requisite potash.

Soda in Coal Gas.

Prof. Vogal, of Munich, has examined with the spectroscope the coal gas supplied in that city, and found in the spectrum the pale soda lime, which was not observed after the gas had been passed through sulphuric acid. On examining a copper burner which had been in use a year, he detected the sulphate of soda.

Action of Marsh Gas on Metallic Oxides.

M. Maller has submitted the oxides of Iron, Manganese, Cobalt and Lead to the action of a stream of marsh gas, which is a combination of two equivalents of carbon with three of hydrogen. He found the action of the gas was in all cases reducing. As carbon could not be detected in the substances formed, he concludes that at a red heat the affinity of the metals for the carbon of the gas is inconsiderable.

Ozone.

M. R. Bœttger has obtained a continuous source of ozone by combining in a capsule of porcelain at ordinary temperature, by means of a glass rod, two parts, troy weight, of perfectly dry permanganate of potash with three parts of hydrated sulphuric acid. When the mixture is introduced into a large flask with a glass stopper, Ozone is continuously produced by the decomposition of the permanganate of potash.

In reply to a query regarding the nature of ozone, the Chairman said it is now believed to be an allotropic condition of oxygen. It is much denser than ordinary oxygen, and is distinguished by a peculiar odor. Schonbein, its discoverer, supposes oxygen to exist in two forms, ozone and antozone, having opposite polarities.

Miscellaneous business being still in order, the following questions were discussed:

Paper Collars.

Mr. Jireh Bull stated that, during a recent visit to Ballston Spa, he was politely invited by Mr. I. M. Crane, an intelligent and enterprising citizen of that place, to visit a paper mill owned and operated by him. It is one of a great number which in manufacturing different fabrics utilize the hydraulic power of a stream or creek retaining the Indian name of Kayaderosseras. It takes its rise in the high lands of the town of Corinth, Saratoga county, about ten miles north of Ballston Spa, and empties into Saratoga Lake. Its length in a straight line is about twenty-five miles. On this stream are located eight paper mills, three of which manufacture printing paper, using principally as raw material straw, combined with other fibrous substances found in junk shops in this city, such as worn out cordage and decayed sails of vessels. These three mills make in the aggregate from five to six tons of paper daily, and from one of which the New York *Sun* is supplied. But the paper manufactured by Mr. Crane is for a very different purpose. Mr. Bull exhibited some specimens of collars for men and womens' wear made from the paper manufactured at this mill, which attracted considerable attention. It is made of the thickness of fine linen, and is a pure white. It leaves the mill in sheets of uniform size, and is sent to the city of Troy, where, by means of nicely adjusted machinery, it is manufactured into collars, with requisite button holes, and indentations resembling fine stitching well calculated to deceive all but critical eyes. It is not perhaps generally known that these collars are regarded with great favor by the economical classes, and are also greatly in use by our brave soldiers, and gallant sailors of the navy. Two of these collars frequently last a week. They are sold at retail in this market, under the present high price of paper at thirty cents a dozen. Mr. Crane's mill contains two engines, and he manufactures of this paper a half a ton per diem.

The Rachette Furnace.

Mr. A. L. Fleury illustrated on the black-board and described the Universal blast and Smelting furnace invented by Major General W. Rachette, of Russia. A number of these furnaces were built under the superintendence of the Mining Engineer, Mr. Charles Aubel, at the Iron and Copper Smelting Works of Prince Demidoff, in Nishne Tagilsk, at the foot of the Ural Mountains. After three years of successful practice, the same engineer introduced the furnace into Germany, where it has been highly approved. It has been patented in this country, as well as in the prominent kingdoms of Europe. It is called the "universal" furnace because with but slight modifications it can be successfully used in smelting iron, copper, nickel, tin, lead, silver, gold, and other ores. Also, for the direct production of caststeel, and the liquefaction of metals in general.

The tranverse section of this furnace is a parallelogram. The hearth is usually three feet by eighteen in extent, and the width of the chamber gradually increases to the top, where it is seven feet. The height is about thirty feet. There are twelve tuyeres, six on each side, alternating at regular intervals of about two feet. It is claimed that this arrangement gives a more perfect melting zone than is found in the ordinary furnace, and that there is a great saving of fuel and time in the reduction of ores, as well as expense, in erecting such a furnace.

Dr. D. D. Parmelee thought the material saved in not building the furnace so high as those now used, would not make up for the increased amount required to give the same capacity as the circular furnace, because of all figures of the same dimensions the circle includes the greatest area.

The Chairman remarked it would require more power to drive the same quantity of air through twelve tuyeres than through four, as is usually done; still this increase of power to produce the blast need not be taken into serious consideration if there is a saving of time and coal in the reduction of the ore. He hoped there would be soon such a practical application of the method in this country as would test its efficiency and economy.

New Gold Separater.

Mr. Fleury also presented illustrations of Dr. A. W. Hall's quartz-crushing and amalgamating machinery. After reducing the ore to an impalpable powder it is united in the trough with the quicksilver, but to complete the work, by gathering the invisible golden scales that accurately float in the water, the liquid is drawn out of the trough by means of a syphon, the bottom of which is bent upwards and contains mercury; the pressure on the column of water in the syphon causes it to pass through the mercury, which, it is claimed, will arrest the remaining particles of gold. Mr. Fleury illustrated, with a glass syphon, water, and mercury, this part of the apparatus.

In discussing its efficacy, the Chairman said there must be considerable difference between the height of the bottom of the trough and the place of final discharge to make it effective; and were it requisite to again lift the water, to discharge it from the building, it would be more economical to force the gold-bearing water, in fine jets, through the mercury, by other means than the syphon.

Mr. Clinton Rosevelt, Mr. Fleury, and others, offered suggestions touching the cause which allows water to suspend in it a metal having nineteen times its specific gravity.

The Manufacture of Gloves.

The discussion of this question was opened with the following remarks from the Chairman:

Gloves originated in comparatively modern times. The word Glove is from the Saxon, Glof. It has no synonym. Lexicons of dead languages contain no corresponding term; and on no relic of ancient art is found a representation of this article of dress. Among the Greeks of the Homerian age a covering to protect the hand while doing certain kinds of labor was used. A passage in the 24th book of the "Odyssey" contains an allusion to it in the description of the dress of the father of Ulysses, as he appeared in his garden. Cowper thus renders it:

> "In that umbrageous spot he found alone
> Laertes, with his hoe clearing a plant;
> Sordid his tunic was, with many a patch
> Mended unseemly; leathern were his greaves
> Thong-tied and also patched, a frail defence
> Against sharp thorns, while gloves secured his hands
> From brier-points, and on his head he bore
> A goat-skin casque; nourishing hopeless woe."

The glove of Laertes was similar to our mitten, and probably the Persians, whom Xenophon speaks of as effeminate, wore the same in winter.

The cestus, used by the boxers of Greece and Rome, consisted of thongs of ox-hide of leather, wound around the hand and arm, and extending to the elbow. Pliny the younger mentions *manicæ*—mittens—worn by the Romans to protect their hands against the cold. For the performance of certain manual operations these were made with *digitalia*—fingers.

It is not unlikely mittens came into general use in the colder climates of Northern Europe, and that the first improvement on them was a separate sheath for the forefinger as well as the thumb. Similar half-mittens are now sometimes worn by those engaged in out-door work which requires the quick action of a single finger.

The complete glove was worn by the dignitaries of the Church subsequent to the dark ages, and thereafter it played an important part in all notable events, from the coronation of a king to the offering of a challenge. It was used as a pledge in the conclusion of a contract, and in the transfer of land it implied full and undisputed possession.

In the days of chivalry, the lady gave the faithful knight her glove to wear in his helmet as a token of her favor. And ever since those times it has been an indispensable article of her dress.

The coverings for the hand now used may be classified as follows:

1. Mits, which cover only the palm and back of the hand, thus allowing the free use of the fingers in the most delicate manual operations.

2. Mittens, worn in the coldest weather, and then preferable because the direct contact of all the fingers tends to equalize the circulation of the blood.

3. Gloves, covering each finger and the hand to the wrist.

4. Half-gauntlets, covering the hand and wrist.

5. Gauntlets, covering the hands, wrists and a portion of the arm.

The materials used in the manufacture of these hand-coverings are leather, silk, cotton, wool, fur and India-rubber. The first step to be considered is

THE PREPARATION OF SKINS.

Skins for the glover's use are prepared by compounds quite different from those employed in the ordinary process of tanning. In the place of tannic acid a mixture of alum and common salt is substituted, and the skins thus prepared are said to be tawed. The old process for removing the hair from the skin, previous to tawing, was to use a solution of lime—by some manufacturers the sulphide of arsenic was added to the solution; but as the use of this poisonous compound, commonly known as orpiment, was only to form the sulphide of calcium, to which the rapid unhairing is due, the following substitute has been proposed, viz: three parts of sulphide of sodium, ten parts of slacked lime and ten parts of starch. The sulphide of lime may be used in place of the sodium compound. To remove any lime remaining on the skins after being subjected to this process, they are placed in a bran bath or in a weak solution of sulphuric acid, after which they are ready for the alum and salt solution. According to Berzelius, the chloride of aluminium, resulting from this solution, is the preservative agent. A similar solution, containing also rye flour and eggs, is subsequently used for a few hours, after which the skins are removed and dried. They are softened by means of an iron tool and whitened by rubbing them, while stretched on a frame, with pumice stone.

There is another process to which the Chamoise skin may be subjected for the purpose of preventing putrefaction. After the skins have been properly fulled they are placed on a table and covered with an animal oil—generally sperm--rolled together and again subjected to the action of the fulling mill. The whole process is again repeated, after which the skins are hung in a moderately heated room, when a slight fermentation takes place, and the organic matter, thus modified, unites more readily with the oil, and forms a permanent combination. It has been proposed to modify this process by mixing rye flour with the fatty matter which, after undergoing slight fermentation, seems to unite more readily with the gelatin than neutral fats.

To render this leather soft and fit for the glove-maker it is rubbed with a solution of soap and water, rape-seed oil and eggs, A pulp made of animals' brains may be advantageously substituted for the eggs. This wash imparts to the leather the peculiar properties belonging to this class alone. When dried it is subjected to the coloring process. The common process for bleaching skins for the glover's use was, until recently, to submit them to the fumes of burning sulphur. The object is more completely accomplished by placing them for two days in a weak solution of neutral hypochlorite of soda; after being cleaned and dryed, a wash of soap and oil is again applied.

Another method is to dip the skins into a solution of permanganate of potash; after being washed they are placed in a solution of sulphurous acid —sulphuric acid is formed, which unites with the oxide of manganese remaining in the skin, forming a soluble compound readily removed.

The goat and kid skins used for gloves are imported from South America

Mexico, the West Indies, India, and the Islands of the Pacific. The sheep of Cape of Good Hope furnish a skin nearly equal to the kid. The deer skins used here are mostly obtained on this continent.

CUTTING THE SKIN.

After the skin passes into the hands of the glove-maker, it is stretched on a piece of marble and rendered uniform with a blunt knife. The skin is then dampened and sounded with a view of discovering faults and blemishes, so that they may be avoided in cutting out, or placed in the least prominent parts of the glove. There are regular scales of sizes for men's and women's gloves, and for the width of the thumb pieces, which are cut out at the same time. When the skin is spread out to the utmost the cutting is commenced. The patterns are so placed that the width of the glove may be taken across the narrow part of the skin. The French workman is exceedingly expert in cutting skins to the best advantage. Obtaining even one pair extra, in a dozen skins by adroitly using the patterns, effects a great saving in the aggregate. For instance, in France, where the number of skins of all kinds used annually is about 400,000 dozen.

In cutting, not only the shape of the glove to be made, but the color of it, must be taken into consideration. The details of the cutting operation may be enumerated in the following steps:

1. To cut the skin longitudinally in two parts.

2. To divide each half into pieces of proper width and length for the hand.

3. To double the parts for the front and back of the glove; allowing a little more width to the back than the front.

4. To make the slits for the fingers.

5. To form the gussets to be used between the fingers.

6. To form the thumb piece.

7. To cut the hole into which the thumb piece is to be fitted. This requires great skill in order to prevent a fullness or puckering in this part of the glove. These holes vary in shape, in different manufactories, but they are all varieties of the rhomboid.

The sewing of the gloves is commenced by carefully inserting the thumb piece, after which the two parts are brought accurately together, and the long seam, running from the wrist to the tip of the little finger, is completed. The outside seam of each gusset is in turn then made, the whole being continuous to the forefinger, from which point, after properly shaping the fingers, the seam on the inside is made, and the little triangular pieces, which give greater freedom to the fingers, are inserted; the wrist is then hemmed and the button hole made, if required.

The French manufacturers of kid gloves use an ingenious machine in the sewing operation. It consists of a vice of iron, having the upper edges of each jaw lined with strips of brass, cut into teeth like a comb, which are of equal width and only one-twelfth of an inch in length. One of the jaws is stationary, and the other moves on a hinge at its base, and is so arranged that it is closed by springs, and opened when the foot of the sewer presses a lever. Into this vice the two parts of the glove are placed, and the sewer passes the needle rapidly between the teeth of the brass plate, and when the work is completed the stitches are found to be uniform. The top of the vice may be displaced and parts substituted conforming in outline with the direction of the seam to be made. After the sewing is finished the glove is stretched, then placed in a damp linen cloth and beaten, to render it soft. The final operation is pressing.

The gloves manufactured in this country are designed more for comfort than ornament. A large majority of them are made in Fulton county, in the State of New York, in several villages north of the Mohawk valley. There are also large glove establishments in Pennsylvania, Massachusetts and Connecticut. The sewing machine has been used to a considerable extent in this manufacture. Some of the glove makers of large capital, it is said, are about commencing the manufacture of fine kids, in competition with the French and Germans, who have thus far supplied our market.

On concluding his remarks, the Chairman asked for information as to the mode of making knit gloves.

Dr. Joseph W. Richards, in reply to the query whether there was a machine for knitting gloves whole, said a lady sitting at his side requested him to state there was such a machine, which she had seen working in Rensselaer county, in this State; and while on the floor he would add that he had investigated the subject of peltry, and had visited the large glove making establishments in Fulton county. The business is thoroughly understood there, and that is the secret of their success. Attempts have been made, in what seemed more favorable localities, to compete with them, but without success.

Glove making originated in Johnstown, and was owing to the fact that Sir William Johnson, the Indian Agent of the British Government, resided there before the Revolution. Skins of all kinds, particularly deer skins, were brought there by the Indians. The first article manufactured there was the deer skin mitten. From this small beginning arose the glove trade and several thriving villages devoted to it. The amount annually manufactured now exceeds a million of dollars. The sewing of the gloves is done in the families of farmers throughout the whole county. The cheap labor there, as well as in many other parts of our country, is owing to the fact that the work is done by a class who have already their support at home, and take up this to furnish themselves with what is technically called pin money.

The nature of the skin fit for gloves involves some interesting points. The best gloves are made from the skins of animals which are covered with *hair*, as distinguished from those covered with fur or wool. The deer skins used are mostly from this continent, and those preferred are from the northern part of it. All hairy skins are not fit for gloves; for instance, the skin of the hog, used in the manufacture of saddles, is not included among the class used by glove makers. On the other hand, the skin of the horse and the dog make a very fair article. A skin tanned with the hair on is more nearly water proof than when the hair has been removed. The best skins used by tanners are from the finest breed of cattle.

There are other features of the skin bearing upon its fitness for gloves besides its pilous covering. One of these is the relative thickness of the different portions of the same skin. Whole stocks of animals, whether wild or tame, are distinguished by this characteristic. The relative thickness of different parts of the skin will also vary in the different ages of the same animal. The immense stock of small animals in this country will doubtless be devoted to this branch of manufacture. Formerly, it was the custom in Fulton county to use the thicker portions of skins not suited for gloves in the manufacture of moccasins.

The use of gloves is one sign of civilization, and where they are most common, civilization is highest. There are more gloves used in this country than any other. There is a very prevalent opinion that they are mere articles of fashion, but it might be shown that during the greater part of the year they are of real service to all classes, and particularly to the medical profession, whose sense of touch cannot be too delicate.

Mr. Nieman, a glove manufacturer, said the skins of the animals which accompany civilization are preferred to those of wild animals; and the more domesticated the animal is, the better the skin. Those of greatest agility, as a general rule, have the toughest skin. There is a strict law connecting the age of the animal with the texture of the skin. The kid, after he has commenced eating grass, is not worth one-quarter as much as before for our purpose. This depreciation is instantly detected by dealers in skins. In regard to the prevailing idea that rat skins are used in the manufacture of fine gloves, he would say he had imported some, but could not dispose of them.

Mr. Nathan C. Ely stated he had read that a large sum of money had been paid to the authorities of Paris for the privilege of catching the rats in the great sewers of that city, and it was understood their skins are used by glove-makers. The finest kind of ladies' gloves is made from the skin of the unborn kid.

Dr. J. B. Rich remarked that he had, some years ago, visited some of the glove establishments in Paris. He did not learn that the rat skin was then used. To make a good glove the whole skin used should be equal in texture, and we know that of the rat does not possess this quality. When the skin is larger this evenness is more readily obtained. To make a glove to satisfy the fastidious taste of a Paris lady requires great skill and labor. Some establishments have such a reputation for making gloves of fashionable shape and color, they seldom supply the demand. The labor used for this work in Paris is very cheap, and he concluded it would be long before we would be able to compete with them in this particular branch of manufacture.

Mr. Garvey, the secretary, said the finest gloves he had ever seen were made in Limerick, Ireland. They were so thin and delicate that they were packed in walnut shells. They were always bought up rapidly, and he had never seen them in the Dublin market. The French government has made many experiments in utilizing refuse matter, and among the rest, rat skins; but he did not learn that they had been successful with them.

Dr. D. D. Parmelee exhibited some beautiful specimens of gloves of dog skin and of India rubber, manufactured in this country. The latter are used by chemists and others who wish to protect their hands in the use of certain fluids. Ladies also find them serviceable in performing household duties. The Doctor also spoke of the gloves used by chemists, made from the mineral asbestos. It has the appearance of a fibrous substance; it is woven with cotton thread, and after the glove is made the thread is burnt out and the fire-proof material remains.

Mr. G. Bartlett thought the impression that fine gloves were not made in this country should be corrected. He understood that a leading firm of this city manufactured all their own gloves, which are said to be equal to those made in Paris.

After selecting "The New Pneumatic Railway" as the subject for the next discussion, the Association adjourned to Thursday evening next.

American Institute Polytechnic Association,
October 13, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

The following interesting scientific items were presented by the Chairman:

Poisoning from Tobacco Leaves.

M. Gallavardin, in a paper "On poisoning by the application of tobacco leaves to the skin," recites several cases, not fatal, however, in which serious illness followed the carrying of large quantities of tobacco next to the skin This item gave rise to a warm discussion.

New Pyrometer.

Messrs. Deville and Troost have used, in recent experiments, a porcelain apparatus by which they measured a temperature as high as 2786 degrees Fahrenheit. At that point copper and silver seemed to be vaporized, and feldspar was fused, but wrought-iron showed no signs of fusion.

Influence of Alcohol on the Human System.

M. Perrin, in his experiments on the effect of alcohol taken in moderate quantities, finds that less carbonic acid was exhaled from the lungs when wine was taken. The amount of urea generated was about the same as when wine was not used. He believes, with other prominent chemists, that alcohol is not assimilated, but it affects nutrition by lessening the expenditure of material.

Chinese Wax.

This is a compact substance, imported from China, and said to be the product of an insect called *coccus pelasinensis*. It melts at 181 deg , while pure beeswax melts at 149 deg. Both contain cerotic acid.

Lactoproteine.

This is the provisional name given by Messrs. Milton and Commaille, of France, for a new albumenoid found in cow's milk. They separated the casein by means of acetic acid, filtered the liquor, heated it, and then obtained a substance having the characteristics of albumen, and containing the same quantity of nitrogen. The amount of this substance is small, but may be precipitated by the careful addition of acid nitrate of mercury.

Aniline, Green.

This compound was first made by M. Ensebe. It is now readily produced by dissolving 150 grames of crystallized sulphate of rosaniline in 450 grames of cold, diluted sulphuric acid (three parts acid to one of water). When the solution is complete, 225 grames of aldehyde are added. The mixture, after being stirred, is heated in a water bath. From time to time a drop of the mixture is taken up with a stirring-rod and dropped into slightly acidulated water, and as soon as a deep green solution is obtained the reaction is stopped. The solution is then poured into 30 litres of boiling water, and 450 grames of hyposulphite of soda dissolved in the smallest possible quantity of water, is gradually added, The whole is now boiled for some minutes. All the green remains in the solution, which may be applied to dye silk. The green is very beautiful, especially in artificial light, which distinguishes it from all other shades of the same color.

Variation and Transmutaton of Species.

Mr. A. R. Wallace read before the Anthropological Society a paper containing the following statements :

1. Peculiarities of every kind are more or less hereditary.
2. The offspring of every animal vary more or less in all parts of their organization.
3. The universe in which these animals live is not absolutely invariable.
4. The animals in any country (those at least which are not dying out) must at each successive period be brought into harmony with the surrounding conditions.

These are all the elements required for change of form and structure in animals, keeping in exact pace with changes of whatever nature in the surrounding universe. Such changes must be slow, for the changes in the universe must be very slow; but just as these slow changes become important, when we look at the results after long periods of action, as we do when we perceive the alteration of the earth's surface during geological epochs; so the parallel changes in the animal form become more and more striking, according as the time they have been going on is great, as we see when we compare our living animals with those which we disentomb from each successively older geological formation.

Relation of Periodic Times.

Mr. Finlayson, of Dover, has found that the period of the rotation of the earth on its axis is in the same proportion to the time of the revolution of the moon around it, as the rotation of the sun on its axis is to the year of the planet Mars.

Testing Chain Cables.

Mr. F. A. Paget, C. E., London, states that the average tenacity of those bars of which the links were made was twenty-four tons per square inch; of this, 28.75 per cent is lost in the finished link, owing to the form of the link, the stress on the inside of the crowns, the bending and the welds. The government hydraulic test is 11.46 tons per square inch, and the permanent set resulting thereof is from 1-22 to 1-15 its length This he believes does not injure the chain, but he deprecates any attempt to make the test more severe.

Welding Iron by Hydraulic Pressure.

Mr. Duportail, an engineer in the Western Railway Workshops, Paris, has successfully applied hydraulic pressure for welding of wrought iron. When two bars of iron are brought to a welding heat, the pressure is applied continuously, until they are reduced to the proper thickness, when the pressure is suspended, and the parts are found to be firmly knit together. To test it, one of the halves of the bar was placed under a hammer weighing 1,800 kilogrammes—about 3,971 pounds—and not until the third stroke was the welding discovered.

Mr G. Bartlett expressed doubts whether the welding process is ever completely done. He was informed that those targets made of welded iron, tried in the gun experiments at Washington, were always fractured at the welded parts.

Mr. J. K. Fisher said continuous pressure had been often applied—for instance, in the manufacture of large guns. In these instances, however, the hydraulic press was not applied. It is much better to use a slow and heavy pressure than a series of lighter blows. On small work, however, it is the practice of locomotive works to perform the welding by strokes of the hammer.

Mr. D. D. Parmelee said it was common to weld by means of rollers, and this plan was adopted by Mr. W. K. Marvin, in making his burglar-proof wrought iron for safes, which consists of emery between fluted plates welded together by rolling. By great pressure the emery is forced into the iron. No drill can penetrate this compound plate.

The Pneumatic Railway.

Mr. Secretary Garvey opened the discussion of the subject by reading the following description, from the *London Railway News*, of a tunnel constructed in the grounds of the Crystal Palace, rather more than a quarter of a mile in length, and the method of propelling cars through it by atmospheric pressure:

There is nothing new, of course, in the application of the mechanical action of air to locomotion. The atmospheric system which, in the early days of the railways, was adopted at Croydon, on the South Devon Railway, at Dalkey and other places, was founded upon well established laws of pneumatics, and it failed only in consequence of practical difficulties in the way of carrying it out.

A second step in the development of the atmospheric system is that which has been carried out by the Pneumatic Dispatch Company, and by which the mail bags are daily dispatched from the N. W. District Post Office to the Euston Station; but it remained to be shown by actual experiment that the principle may be most successfully applied for passenger traffic.

In the old atmospheric system the train of carriages was propelled by the ordinary pressure of atmospheric air acting upon a piston moving in a tube, the air before it being more or less exhausted. The tube was, however, laid upon the ground, and the carriages passed over it, a longitudinal or continuous valve opening at the top, along which a rod connecting the piston with the carriages passed, the valve closing as the rod moved forward. The area of this tube was necessarily small, and the pressure required to be exerted was proportionate. All the attempts to prevent the waste of power by leakage were useless, and the attempt has been universally abandoned on account of the great expense of working such lines of railway.

In the case of the pneumatic railway, the carriages themselves, and not the small piston, travel through the tube. The area upon which the atmosphere has to act is at least fifty times greater than that offered by the smaller tube, and leakage or waste of power is practically altogether obviated. The tunnel is large enough to admit the broad-gauge carriages of the Great Western Railway. The carriage, which is like an elongated omnibus, has at one end a framework of the same form and nearly the same dimensions as the sectional area of the tunnel. On the outer edge of this frame a fringe of bristles forming a thick brush is placed, and as the carriage passes on its way through the tunnel the brushes come nearly into contact with the brickwork and prevent, though of course not entirely, the passage of the air. The carriage, with its collar of bristles, forms in fact a loosely-fitting piston.

The power which propels the piston carriage proceeds from a rotary machine, or "ejector," concave in surface, and 22 feet in diameter. This is made to revolve by a small steam engine at such velocity as may be required, the pressure of air increasing, according to the greater or less velocity. Nothing can be more simple than this mode of accumulating power. To the engineer, accustomed to the complicated movements of a steam engine necessary to apply mechanical power to any given object, it appears almost ludicrously simple to see an enormous disc moving at high velocity on its axis, and producing all the force that is necessary to carry a heavy carriage, with some 30 or 40 passengers, up an incline more steep than that upon any railway in the kingdom. The "ejector" revolves in an iron case something like that of a huge paddle wheel above the ground, but there is no crank, or axle, or shaft to which it gives motion.

When driving the air into the tunnel there rise fresh breezes to the surface of the disc to supply the partial vacuum caused by the air sent below; on the other hand, when exhausting the tunnel and when the escape valves are opened the air rushes out in a gale, or a hurricane, according to the rate at which the disc is moving. When at full speed the gale of wind makes the branches of the trees near the engine house sway to and fro violently, and many an earnest searcher after scientific truth will see his hat spinning round in the whirlwind, and feel some difficulty in standing quietly upon his legs in the gale which suddenly springs up. A small amount of force is sufficient to set the disc in motion, and, when once moving, it rapidly accumulates power, so much so that its own unaided revolutions are sufficient to bring the carriage through a large portion of the tunnel.

The power thus obtained is applied in a very simple manner. The down train, the carriage from the higher to the lower station, is "blown" through the tunnel. When it is required to make the down journey the breaks are taken off the wheels, and the carriage passes by its momentum a few yards into the tunnel, where it travels over a vault or air-well covered with an open iron grating, from which, as soon as it has passed, a gale of wind rushes, and a pair of iron doors, hung like lock gates, close firmly over the mouth of the tunnel, and the train is lost to the sight of the outside spectator. With every revolution of the ejector—it makes from 120 to 150 a minute—the strength of the gale increases, and the carriage flies more quickly along its dark iron roadway.

Down the steep gradient no pressure behind the carriage is needed, as it travels by its own momentum, and it is brought up at the other end by the application of the ordinary break power.

The return voyage is made by the exhausting process, just as one would draw water through a straw. At a signal given by electric telegraph a valve is opened, the doors of the iron case are thrown back, and the air sucking discs are again in full swing. Near the upper end of the tunnel and in its side there is a vaulted passage, eight feet in height, built of brick, and which communicates with the well near the engine house. Through this side vault the throat of the tube, the air from the tube is inhaled, the iron doors at the upper end still remaining closed. Instantly the carriage, which is at the mouth of the tunnel at the lower end, feels the effect of the air rushing into this suction vault, the external atmosphere acts upon the carriage from behind with its ordinary pressure of some fourteen pounds to the inch, and being relieved of a portion of the pressure in front, the carriage is forced forward on its return journey. The iron doors at the upper station open as the pressure increases and the advancing carriage emerges into daylight.

There is this important point of difference between the pea-shoveller of our school days, and the pneumatic tube, that in the former the pea or pellet is projected violently from the mouth of the tube, while in the latter the carriage glides gently along, gradually slackening till the destroyed equilibrium of the atmosphere is restored. Compared with the old atmospheric principle, when a pressure of from seven to ten pounds was required, one cannot fail to be convinced of the many advantages which the present system possesses over its predecessor. With a view of making the experiment as complete as possible, and of testing the system under the disadvantages to which it would be subject in its more extended application, one portion of the tunnel has a gradient of one in fifteen, or one-sixth greater than that of Holborn-hill, while another is upon a curve of not more than eight chains radius. These difficulties are, however, overcome in a manner which proves that the system could be adopted upon any line, however crooked or steep in its ascent.

The tunnel is dark, it is true, as all tunnels must be, but the carriage is well lighted, and there is no reason why gas should not be employed, as is the case in the carriages of the Metropolitan Railway. There are luxuriously cushioned seats placed along each side of the carriage, as in an omnibus. There is a glass door at each end, and lamps are carried in front and behind the carriage, so that the tunnel is really illuminated as the train passes through. The motion of the carriage is so smooth and easy, there is such a complete absence of vibration, that it is totally unlike traveling upon any existing line, and is more like the motion of a well made brougham. Add to this that there is no suffocating smell of the sulphur and smoke from the locomotive, no escape of steam, no stagnant, polluted, and poisonous air to breathe, such as that of the ordinary tunnel. Every train which passes through must carry with it its own supply of fresh air, and must drive out before it any foul air. This purity of the atmosphere is still further secured by a constant stream of the external air which passes through openings at the bottom of the tunnel, so that the air in every part of the tunnel is as pure and sweet as in the sunshine above ground

Another of the advantages of the system is that collisions, and casualties arising from them, are impossible. No two trains can by any conceivable possibility be in the tube or tunnel at the same time. The worst that can possibly happen to the traveler is that the train may be set fast, or unable to move, owing to some accident to the machinery. In the event of such an occurrence the passengers have simply to open the door at either end of the carriage and walk out to the nearest mouth of the tunnel.

The question of working expense is one upon which we are at present unable to express any opinion, as we have no data to judge from. So much as this is, however, clear, that as the old atmospheric system failed entirely in consequence of the enormous leakage and the high pressure at which it was worked; and as the present plan works at a low pressure and avoids the waste of leakage, it would appear that in the matter of cost of working, the pneumatic principle must possess great advantages over its abandoned predecessor.

The directors of the Crystal Palace have established another claim on the gratitude of the public for the facilities which they have afforded for making this most interesting and important experiment. The carriage has continued to run upon the railway during the whole of this week, and visitors have had an opportunity of testing for themselves the new mode of traveling.

Mr. Clinton Rosevelt followed, strongly advocating the use of the proposed plan in passing under rivers.

Mr. Garvey explained the Croydon atmospheric railway and the causes of its failure. The only feasible way of using atmospheric pressure is to exhaust the air in front of the carriage, as now done at the Crystal Palace, which is in fact a system of sailing on land.

Mr. Fisher read the remarks of the London correspondent of the New York *Herald* in relation to this new railway, and the practicability of using it under Broadway. He (Mr. F.) believed the plan would again come before the Legislature of the State for tunneling Broadway, but he did not regard this atmospheric plan as feasible. The cost of running a train with a locomotive averages six cents per mile when coal is used. Frequent stoppages add materially to the expenses of running. On the Hudson River Railway the cost of stopping and starting a train is one dollar and twenty-five cents. The momentum of a train having a speed of sixty miles an hour is sufficient to carry it three miles after the locomotive is detached. The use of steam in tunnels is objectionable on account of carbonic acid gas generated by the burning fuel. Several substitutes had been proposed—such as springs, compressed air, hot water for making steam to be used on short routes.

It was stated that the greatest power yet obtained from a spring would not raise its own weight higher than sixty feet.

The Chairman desired to direct attention to the question now before the meeting. The average pressure derived from a partial exhaustion of the air in the tunnel is said to be two and a half ounces per square inch; the exact size of the tunnel is not given in the articles read, but supposing it to be ten feet high and ten wide, the area of the car and the surrounding ring, which is virtually a piston, would be one hundred square feet. A pressure of two ounces and a half on the inch would be about twenty-two pounds per square foot, or two thousand two hundred pounds for the total pressure on the piston. To obtain this pressure the whole column of air in the tunnel is partially rarified by means of a fan, which is not as economical as an air-pump having a reciprocating piston. The length of the tunnel is 1,800 feet, and the bulk of air within it is equal to 180,000 cubic feet; just in proportion to amount of air pumped out is the pressure on the car. The removal of half the air in the tunnel before the car is started would give it a pressure of seven and a half pounds per square inch; this would be about fifty times more than is said to be required for moving a single car. The pumping must be continued during the passage of the car, because it is constantly pressing the remaining air into a smaller space. If we take into consideration the friction of the air pump and of the whole column of air moving in the tunnel, as well as the friction and leakage of the car piston, it would appear that the proposed plan is far more expensive than the ordinary method of railway locomotion. The mode of packing the piston, by means of bristles, is doubtless quite effective where the pressure per square inch is so small.

Dr. D. D. Parmelee said the ball of the air-gun used in shooting galleries is packed by a fibrous appendage against which the air acts.

Dr. W. Rowell alluded to an article in the *London Mechanics' Magazine*, which states that the plan of locomotion now under discussion was proposed fifty-four years ago.

Mr. J. B. Root said he had made some calculations from the data given and found that the power required is far greater than by the ordinary locomotive. The friction becomes a very serious objection when the tunnel is several miles in length. Indeed, it may be safely averred that more than five times the usual power would be used in this new method of propulsion.

Mr. Fisher estimated the weight of the air to be removed in a tunnel one mile long, at 44,000 pounds, the whole of which must pass through the fan or pump before the car reaches its destination.

The Chairman added that where the power of stationary steam engines had been applied, in the most economical way, to moving cars, the practice was finally abandoned. Formerly the Albany and Schenectady Railway had an inclined plane at each end, one leading to the valley of the Hudson River, and the other to the valley of the Mohawk. Cars were drawn up by means of a stationary engine at the top of each plane. After years of trial, it was decided to make the road several miles longer by constructing such grades at each end as the ordinary locomotive could overcome.

The pneumatic tube for the conveyance of packages is the invention of Mr. Richardson, of Boston. It is now used in London for the transportation of mails over a short route, and is said to be a success. But when passengers are substituted for packages, and brick tunnels for iron tubes, the problem is so changed as to require a new solution.

After selecting "The Manufacture and Use of Furs," as the next topic for discussion, the Association adjourned to next Thursday evening.

American Institute Polytechnic Association,
October 20, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

The first subject presented was the

Steam Plow.

Mr. Anson P. Thayer, of Syracuse, exhibited a beautiful brass model of his patented steam plow, and explained its operation. The novel feature in this plow is the mode of turning the soil by means of spades placed obliquely across a cylinder, which, in entering the ground, tend to move the machine forward. The cylinder, by being elevated or lowered, regulates the depth of the cut. It makes several revolutions to one revolution of the driving wheels. The boiler is similar to that of the ordinary locomotive, its front end being inclined downward and resting between the steering wheels. The driving wheels are made very broad, and move slowly so as to carry the machine forward at the rate of about one mile an hour, while the pistons of the two steam cylinders move five or six hundred feet per minute. The inventor believes he has by this method remedied the difficulties which have attended other locomotive steam plows. Mr. J. K. Fisher thought this machine the best of the five or six which have been exhibited at this Institute. The Fawkes steam plow which was put in practical operation at Hamilton park, in this city, and received the great premium of the Institute, several years ago, was so geared that the piston moved considerably faster than the periphery of the driving wheels.

Plowing by Steam in England.

Mr. W. Lee remarked that he had spent the last year and a half in examining and witnessing the trials of steam plows in England. A great many experiments have been made in that country with locomotive plows, in which more than $500,000 have been expended. There are two difficulties to be met; one is the power required to move the machine over the soft ground, and the other is the pressure of the wheels on the soil owing to the great weight of the machine. The lightest he saw weighed ten tons, and the heaviest fifteen. He had seen a field plowed by steam four years before that retained the impression made by the wheels, and the crop was lightest on these tracks. The English method now used is traction—that is, the engine is stationary, and the plows are moved across the field by means of wire ropes passing around drums on opposite sides of the field. Sometimes two stationary engines are used, opposite each other, for the purpose of giving motion to the iron wire ropes to which are attached a gang of plows attended by one man. They often cut to the depth of eighteen inches. The ground there is, generally speaking, heavier than ours, and being clayey is more difficult to plow. It is found that, by using the stationary engine, between eight and nine bushels more of grain can be raised per acre. This more than pays for the plowing by steam

These stationary engines are arranged to be moved from one field to another. They are owned by companies of large capital devoted to this business alone. The price asked for plowing an acre is five English shillings. There is one company which charges as high as fifteen shillings. This plowing is done when the soil is in such condition that it could not be accomplished by horses. The deep cut, which turns up soil not before brought into use, is the cause of the increased crop. The cost of these stationary engines is from six hundred and fifty to fifteen hundred pounds; they are of about forty-five horse power. Mr. Lee did not wish to be understood as condemning the locomotive plow which was now presented in model. He was in favor of locomotion by steam whenever it can be made practicable.

New Method of Strengthening Cast Iron.

Mr. A. L. Fleury presented specimens of iron made by the patented process of Mr. Wm. M. Arnold, of this city, and remarked that the increase of strength in cast iron, is of great importance, and the invention of Mr. Arnold deserves our full attention. He has succeeded after many years of experiment, in obtaining the valuable alloy, samples of which are now shown. It has been tested at the Wiard Ordnance works Trenton, at the West Point Foundry and at the Morgan Iron Works. Acording to the certificate of Mr. P. P. Parrott of West Point Foundry, the tensile strength of one bar was 19,248 lbs., per square inch, and of another 15,443 lbs.—According to experiments made at Trenton and at the Brooklyn Navy Yard, the strength of ordinary Scotch Pig Iron was increased about one hundred per cent. by Mr. Arnold's process.

The strengthening of iron so as to reduce the weight or quantity required in the construction of locomotive carwheels, rail road machinery, bridges and ships, involves the question of safety as well as economy. All machine builders and workers in iron appreciate the importance of increasing the toughness of the principal material used by them.

The texture of the improved iron is uniform throughout the mass, and very different from ordinary cast iron, which is generally coarser grained and weaker near its centre. Another interesting feature of Mr. Arnold's iron, is that acids and salts have little action upon it. The metal receives a high polish and can be drilled and worked into any shape with facility.

The process of preparing the iron is very simple. It consists in adding a certain proportion of melted copper, zinc and tin to the iron, when in the liquid state and as it is poured into the mould. The arrangement of the flask for this purpose, constitutes one part of Mr. Arnold's invention. He states that the cost of strengthening iron according to his plan will not cost over fifty dollars per ton.

Mr. B. Garvey thought the inventor should state the reasons which led him to use the metals of his combination. He could not have fixed the proportions used, by accident or guess work.

Mr. Arnold replied that he was led to his discovery while attempting to make a metallic can for the preservation of fruit, that would be entirely impervious to air.

The Chairman remarked, that it was the practice of the association not to entertain any new plan or method that was not fully explained. The reason given, for not stating the proportions of the metals used in this alloy, are that the European patents have not yet been secured. Copper, zinc and tin, have been previously used in combination with iron. A member of the Institute was quite enthusiastic over experiments he made several years ago in which a small portion of copper was mixed with cast iron but for some good reason doubtless, the plan was abandoned. It will be remembered that Franklinite iron, containing both manganese and zinc, was highly recommended before this society on account of the increased strength accruing from this alloy. The iron of commerce is never pure. It may be strengthened in three ways, by removing certain impurities, by turning it into steel or by adding small proportions of other metals. We hope Mr. Arnold has made a real advance; but practice alone must determine the value of his invention.

Feed Water Heater.

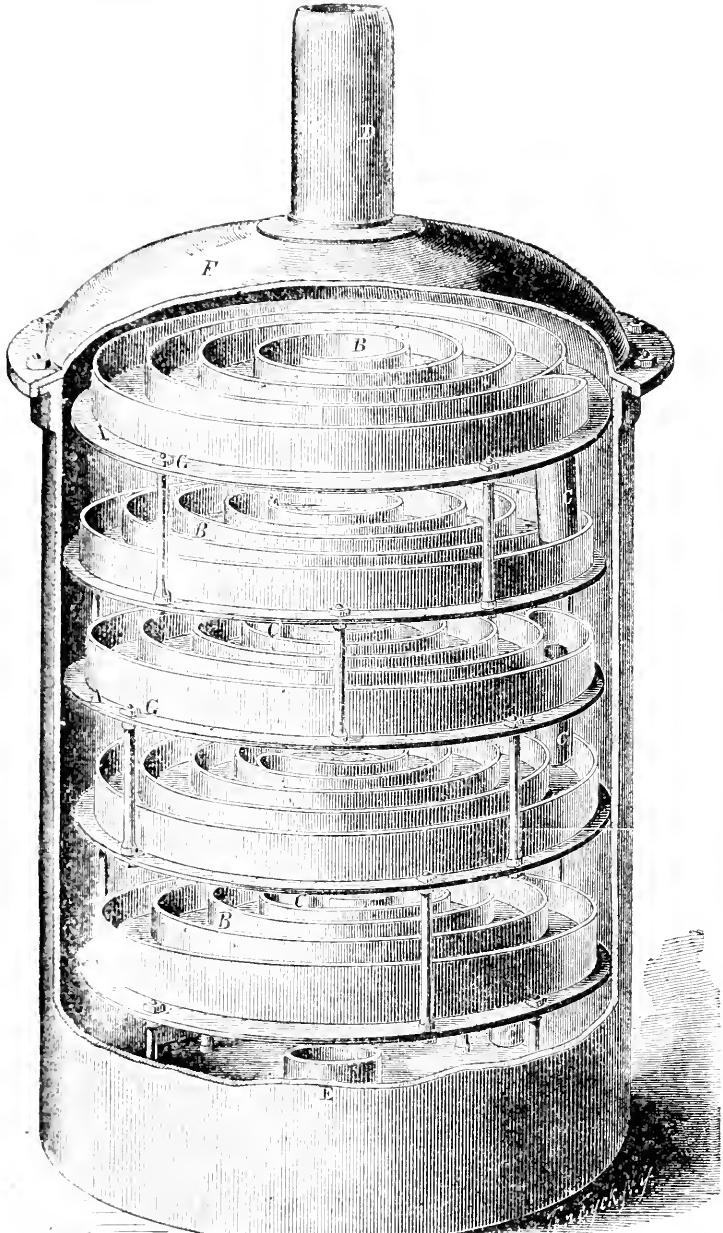
This heater, the invention of Lamon & Gaskill, is designed for keeping the supply water of the high pressure at or near the boiling point, and for saving a portion of the condensed steam. The model exhibited was taken apart to show its construction. It consists of a series of disks, the first having a pair of raised projections winding from the centre outwards, covered by a plate, and connected by a pipe with the second disk, which has projections winding from the outside to the centre. Several pairs of disks are thus connected by a pipe at the centre, so as to complete a passage from the top to the bottom. The whole is enclosed in a drum. The main advantage of heating the feed water is, that nearly all the mineral substances in the water are deposited in the heater instead of the boiler, from which the scale can be readily removed. Messrs Lee, Fisher and other gentlemen concurred in the opinion that the arrangement secures the object intended and is simple and cheap in construction.

The following is an explanation of the accompanying illustration:

The exhaust enters the pipe E at the bottom of the heater. The steam first acting upon the bottom of the lowest channel plate and the water below the plate, then passing upwards between the outer cylinder and the border of this channel plate, it next comes in contact with the water flowing through the channels of said plate and the bottom of the plate next above, then through an opening in the centre of this plate, and so on alternately until it finds its exit through the pipe D.

These steam passages being large no obstruction is offered to the passage of steam, consequently there is no back action.

The cold water enters through a pipe in the dome (not represented) and flowing through the channels to the circumference of the scroll, it passes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to the next plate below by the pipe C, and then flows to the centre of this plate, passing through a similar pipe to the next plate and so on to the bottom, and has its exit by a pipe (not represented) near the bottom of the heater and connected with the supply pump.

The lowest, third and top channel plates are of less diameter than the inside of the encasing cylinder, to allow the steam to pass around them. The second and fourth channel plates fit close so that the steam may pass through the tube in their centres.

The efficiency of this heater is due to the large surface of water exposed which being in rapid motion constantly brings new surfaces to the action of the steam.

Its efficiency, ease of detaching and cleansing, and the sediment and scale being deposited in it and saved from injuring the boiler, and economy attending its use, give it very great value.

It should be placed a foot or more higher than the pump, so that the pressure will raise the pump valve.

The Hermetical Barrel.

One of Robbins' non-leaking, non-evaporating barrels was exhibited, concerning which Dr. W. H. Dwinelle desired to say a few words. It is a well settled fact, that with all our improvements in the arts, we have not before had a wooden vessel constructed in which fluids could be transmitted from place to place, without a great loss by evaporation through the pores of the wood. The loss of all fluids thus kept is considerable, but of petroleum and naphtha, because of their permeating qualities, the annual loss is estimated by millions. There is an absolute leakage, distillation and sweating of these fluids through such barrels, of from eight to thirty per cent.

The idea of constructing a barrel that would prevent all this loss was suggested to Mr. Robbins by nature. Why is it that the trees, especially those of tropical climates, retain their volatile constituents? It is because the bark and the inner portion of the tree contain oily substances and that one of the constituents of the tree is potash. Mr. Robbins in experimenting found a barrel would take up a pint of ordinary water in twenty-four hours, while in the same time a similar barrel would absorb nineteen pints of a solution of potash. To restore to the wood some of its original power was the aim of Mr. Robbins, which resulted in the discovery and invention which he has patented. His process is to give the exterior of the barrel a coating of hot linseed oil, and the inside an alkaline covering, such as hot soap suds. A barrel thus prepared, forms a complete barrier to all evaporation or leakage through the pores of the wood, so that it might be said not a drop of petroleum confined in it can escape. Numerous barrels treated in this manner have been filled at the oil wells in Pennsylvania and transported to this city, where on examination it was found they had not lost the least of their contents, while other barrels filled and brought to the city at the same time had lost from three to four gallons each.

The chairman presented the following memoranda of science and art:

The Chinenti Pictures.

These pictures were made by I. Chinenti before the year 1640. Dr. A. C. Brown saw them in the Museum at Lille, in 1859, and first announced them to be stereoscopic. Sir David Brewster asserts that Baptista Porta published in 1593 the true principle of the stereoscope, and that Chinenti executed drawings from the binocular principle of Porta and was the inventor of stereoscopic pictures. Mr. Wheatsone obtained photographs of the Chinenti pictures and declared they were not stereoscopic. Prof. Emerson of Troy, published his conclusions from an investigation of the subject, which were controverted by Sir David Brewster in a letter to the Philosophical Magazine, for January, 1864. As the point in dispute could only be settled by the testimony of those persons skilled in stereoscopic investigations, at the request of Prof. Emerson, some pains has been taken to collect the opinions of several scientific gentlemen in this country. These are embraced in an article by Prof. Charles A. Joy, in the last number of *Silliman's Journal*, and are all opposed to the position taken by Sir David Brewster.

Inductive Electric Currents.

M. Soret has reported to the Paris Academy of Sciences the results of his researches in relation to the exterior action of an electric current. He finds that whether the inductive current is continuous, or is broken by the Ruhm-Korff coil, the electrolytic law is the same, and that the deposit of copper in the voltameter is directly as the intensity of the current.

New Process of Engraving.

A recent invention of M. Dulos is described in the *Moniteur Scientifique* as follows: A copper plate, on which a design has been traced, in lithographic ink, receives, by the action of galvanism, a deposit of iron on the parts untouched by the ink. The ink having been removed by benzine, the white portions of the design are represented by the layer of iron, and the black by the copper itself. The plate is then plunged into a bath of cyanide of silver under a galvanic current, and the silver is deposited on the copper only. In this condition mercury is poured over the plate, which attaches itself to the silver only, appearing in relief and taking the place of the lithographic ink. A plaster or wax mould is then taken, and by metalizing it by electrotyping, a matrix is obtained from which impressions on paper may be produced by the ordinary copper plate press. For typographic engraving, in which the design is in relief, the plate of copper should receive, on leaving the hands of the designer, a layer of silver, deposited only on the parts untouched by lithographic ink. The ink is removed by benzine, and those parts of the plate that were inked are iodized and the above treatment is continued. In this way the raised design is produced. Several improvements on the process are said to have been since made by M. Dulos, one of which is to substitute for mercury a fusible amalgam of copper.

Photographical.

M. Regnault states that a plate of copper dipped into a solution of bichloride of copper, perchloride of iron, dilute *aqua regia*, or any solution which parts easily with chlorine, becomes covered with a greyish layer of cuprous chloride, which is very sensitive to light. A negative placed on a plate so sensitivised gives a positive picture of great beauty.

Manufacture and Use of Furs.

The discussion of this subject was opened by Dr. D. D. Parmelee, who said:

In the prepared state the skins are called fur; but without preparation, they go by the commercial name of *peltry*.

In Russia, Poland, East Prussia, Hungary, Bohemia, and Saxony, lambs' skins constitute an essential part of the dress of thousands among the lower classes, and the skins of various other animals may be considered as articles of absolute necessity.

So early as the sixth century, the skins of sables formed an article of fashionable attire at Rome, and were brought from the confines of the Arctic Ocean, at great cost, to supply the demand of that wealthy capital.

The traders of Italy brought a considerable supply of furs to England in the time of Edward III., so much so that this monarch prohibited their use except among the wealthy classes.

The Canadian fur trade was commenced by the French, soon after their settlement on the St. Lawrence.

The company formed in London, and called the Hudson's Bay Company, was chartered by Charles II. in 1670. This prosperous company founded many establishments, and carried on its trade for more than a century, when it met with a powerful competitor in the form of a new company composed of wealthy and influential British settlers in Canada. This second company was called the Northwest Company, and its chief establishment was at Montreal, though trading upwards of 4,000 miles further to the northwest. After long dissention the two companies united into one, under the name of the Hudson's Bay Fur Company.

The Indian trade of the great lakes, upper Mississippi, etc., was enjoyed by the North American Fur Company,—having its chief establishment at New York.

Important as is the trade of these companies, yet the most costly and highly esteemed furs are furnished by the trade carried on by Russia: The ermine is one of these, a fur which is produced in many countries, but only in perfection in Russia, Sweden, and Norway.

The colder the climate, the finer and warmer is the fur of animals. The finest furs are therefore brought from the colder regions. The effect of cold on the Hudson's Bay lemming was made the subject of an experiment during Ross's voyage. The little creature was kept in a warm cabin during several months. It retained its summer fur. It was then exposed on deck at night, to a temperature of 30 degrees below zero. After one night's exposure, the fur on the cheeks, and a patch on each shoulder, had become perfectly white. On the second day those patches had extended, and the posterior part of the body and flanks had turned to a dirty white. During the next four days the changes continued, and at the end of a week the animal was entirely white. On examining the skin it was found that all the white parts of the fur were longer than the unchanged portion, and that the ends of the fur only were white so far as they exceeded in length the dark colored fur. By removing these white tips with a pair of scissors, the original dark summer dress appeared.

The fur of the ermine ranks first in value; and the older animals furnish the best. These little animals are caught either in snares and traps or by shooting with blunt arrows. The skins are sold in lots of 40, called the timber.

Next in value are Russian sables. The length of the animal is from 18 to 20 inches. The darkest in color are considered the most valuable. The produce of Russia in these skins is about 25,000 annually.

A great quantity of mink skins are sold to the inexperienced as real Russian sable.

There is also an inferior sable called Kolinski or Tartar sable, procured from Russia. This fur, when dyed, is sold among the cheaper sables.

Next to the sable in rarity and cost comes the fur of the silver fox, which is a native of the country below the falls of the Columbia river in Washington and Oregon, Territories.

The softest and most delicate fur is that of a little animal called the chinchilla, about the size of a small squirrel, which inhabits Peru and the northern parts of Chili.

The sea otter has a very fine, close, soft fur; jet black in winter, with a silken gloss. That of the young animal is a beautiful brown.

The Persian lamb-skins have a soft, compact and elastic wool, which is formed naturally into elegant curls or waves. When killed immediately after birth, or taken from the mother, they are still more beautiful and expensive. These skins have been considerably used in Europe, but not yet in this country. A few have been very recently imported. The most prized of these skins are the fine black.

The sloth has a beautiful fur of a high luster.

Mr. Lasak, of this city, an elderly and intelligent merchant in furs, informs us that the Germans excel all others in dressing and manufacturing furs, in a general regard. But furs, he adds, are put up in New York which are not excelled by any in Europe.

The Chinese possess arts connected with the dyeing of furs, as well as in the preparation of skins, which would command a large price if they could be transferred to European or American artizans.

The dyeing of furs may be considered the most difficult part of their preparation. It requires the most careful and skillful manipulation. Mr. Aphold, of London, England, has gained much repute for his skill in dyeing brown, which is a difficult shade to attain.

Otter fur has been dyed in New York better than in Europe.

Muskrat is dyed to imitate mink; also to imitate the German fitches. Opossum is likewise thus dyed.

Sable fur is frequently dyed to improve its shade.

The fur of the grey fox and of the wolf are difficult to dye.

An objection to the fur of the Norwegian and Lapland dog is a peculiar odor that always attends it.

The skins of hares and rabbits are used in common with beaver and many other skins for felting purposes. And this branch of the manufacture of furs is a very interesting one.

The introduction of silk plush hats as a substitute for beaver, has brought about some curious changes in the fur market; for example, in 1827, 1828, and 1829, mink skins were worth in New York from 37c. to 40c. each. Now these skins are worth from $8 to $9. Muskrat skins were then worth 50c. each, and are now worth about the same.

The first process in dressing furs for use belongs to the hunter, who, on capturing the animal, strips off the skin and hangs it up to dry in the open air without a fire. If it is well dried and carefully packed, it reaches its destination, however distant, in good condition; but if any moisture be left, or if it be packed with others imperfectly dried, so that the slightest putrefaction takes place, then the fur is unfit for use, so far as the furrier is concerned. A minute examination of the skin is therefore his first business. The next step is to cleanse them from greasiness. This is accomplished by the use of water, bran, alum and salt.

A kind of oil which is found in the fur itself is not wholly removed by the first treatment, so that it is necessary to afterwards wash it with a solution of soda and soap. Finally the skin is well washed in clear water and dried; the previous treatment having converted the skin into a kind of leather.

The cutting up of the skins requires much judgment to avoid waste. The refuse cuttings, if not cut to waste, are available for making articles of the less costly description. And it has been remarked that many a lady, on having her furs fresh-lined under her own superintendence, has viewed with surprise approaching to dismay, the elaborate patchwork which the skins present on their inner side.

Skins to be used in felting undergo a longer process; and by means of ingenious machinery the fur and hair is not only separated from the skin perfectly, but the hairs are separated from the lighter fur; and even the fur itself is assorted into quantities of like specific gravity.

The use of fur in an economical and sanitary point of view, is a subject on which there would probably be a great diversity of opinion.

It is remarkable that in some countries the custom respecting clothing differs materially from ours. We dress warmer when we go out than when we sit in doors; the Turks, who seldom have fires in their apartments, use warmer clothing than when they go out, considering the exercise of moving about as a source of warmth. The Chinese are said to practice the same custom.

The Chairman stated that the leading man in the fur trade in the country for many years was the late John Jacob Astor. He commenced the business in 1784. He had many stations for the purchase of furs on this side of the Rocky Mountains; on the other side the principal station was at Astoria, the history of which was given by Washington Irving, in a work bearing that title. Soon after the commencement of the war with Great Britain, in 1813, the interest of Mr. Astor, at that station, was sold to the Northwest Fur Company. Among those with whom Mr. Astor had business relations was Peter Smith, then of Schenectady, the father of Garret Smith of Peterboro. These two men invested a considerable portion of their surplus capital in land. Mr. Astor became the richest proprietor of real estate on Manhattan Island, and Mr. Smith the greatest landholder in the State of New York. There are many prominent names connected with the fur trade in this country. The extent of the trade here cannot be accurately stated, but some idea may be gained of its importance, in the Old World, by the following statement of the fur skins imported into Great Britain in the year 1851, which is given in detail to show variety of furs used and their relative abundance:

Sea otter, 100; otter, 17,500; seal, 15,000; lynx, 55,000; Kolinski, or Tartar sable, 53,000; beaver, 60,000; Chinchilla, 85,000; stone and pine martin, 120,000; minks, 245,000; rabbit, 120,000; red, cross, white, gray and silver fox, 77,000; ermine, 187,000; Racoon, 525,000; musquash, or muskrat, 1,000,000; squirrel, 3,000,000; fitch, or polecat, 66,200; wolf, 15,000; wolverine, 1,200. The whole number imported was about five million, of which one million were exported.

Mr. Emmet remarked that Leipsic was the European centre of the fur trade; to this point furs are brought from all quarters to be disposed of at the annual sale.

The hour for adjournment having arrived, it was decided to continue the discussion of this subject at the next meeting. Adjourned to Thursday evening next.

American Institute Polytechnic Association,
October 27th, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

The first subject discussed, during the hour devoted to miscellaneous subjects, was

Super-Heated Steam.

Mr. T. D Stetson wished to direct attention for a few moments to the use of super-heated steam in engines. It was generally admitted by engineers that there is no gain in heating steam beyond a certain point. The principal object in its use being to keep the proper temperature in the cylinder. In the best engines jackets enclose the cylinder and steam is let in between to prevent the cooling of the cylinder. Mr. Erastus W. Smith, a well known engineer of this city, took out a patent for providing the steam for heating the cylinder by means of a separate small boiler, such as is used with donkey engines. A gentleman now proposes to super-heat the steam to perhaps 150°, and then to convey this steam first into the jacket and then into the cylinder to be used upon the piston. His idea is, that the steam in its passage between the cylinder and jacket will lose its surplus heat, and will enter the cylinder at about the temperature of the steam in the boiler.

Dr. W. Rowell remarked, that Waterman tried this plan several years ago. He found the steam was reduced in temperature about twenty-five degrees below that in the boiler. His present plan was to make the cylinder of steel plate one-tenth of an inch thick; this is braced by another plate of the same thickness. Between the two plates are thin stays, about an inch apart, all around, to which the plates are riveted. The object of this arrangement is to allow the heat to pass inward more rapidly than it could through the ordinary thick cylinder. The cylinders used in the Metropolitan mills are thus constructed. None of the steam which goes into the casing is used in the cylinder. It passes into the jacket on the upper side and drips out in the form of water through a small hole on the under side.

The chairman remarked that the most effective way of using steam was through wide and straight channels leading from the boiler to the cylinder. Narrow and tortuous channels have the effect of throttling the steam. The plan explained by Mr. Stetson is open to this objection.

The Great Rodman Gun.

Mr. Secretary Garvey read, from a New York paper, an account of the first firing of this gun at Fort Hamilton on Wednesday. It was first charged with 50 pounds of powder and a blank cartridge. At the second and third discharges the gun was shotted. The amount of powder used was 100 lbs., and the weight of the ball nearly eleven hundred. This trial was satisfactory. Another is to take place in the course of a few weeks.

Mr. Stetson described the Rodman gun, and the peculiar mode of casting it, and of cooling the casting from the inside by means of a water tube in the core. The trial made, he did not regard as a test, for the amount of powder used was comparatively small. In the ordinary service charge, the weight of powder is one third of that of the shot.

Mr. Garvey thought it might be readily demonstrated that the larger the gun, the less would be the proportion of powder required. There have been many erroneous statements made with regard to the long range of guns. From calculations he had made he was convinced that to carry a ball ten miles was an utter impossibility.

The Chairman then read the following notes of scientific progress:

Electricity of Metals.

M. Gaugain stated before the Paris Academy of Sciences that he had experimented with metals to ascertain the order in which they are charged by friction with positive or negative electricity, and by means of sulphur with which nearly all the metals are negative, and gutta percha with which they are positive, he has succeeded in forming the following list where each metal is positive to those following it and negative to those which precede. Those enclosed in brackets behave in nearly the same manner.

Aluminum.—[Zinc, Cadmium, Lead], [Iron, Tin], [Copper, Bismuth], [Antimony, Silver], [Mercury, Gold, Palladium].

Analysis of the Human Breath.

A new and extremely delicate instrument has been made, under the direction of Prof. Tyndal, by Mr. Barrett, an assistant teacher in the Royal Institute, London, for determining the amount of carbonic acid gas exhaled by the lungs under different conditions. The contents of a bag, filled with human breath deprived of its moisture, enters an exhausted brass cylinder the ends of which are made air-tight by means of plates of rock salt which do not intercept rays of heat. More than one-half of the heat from a flame made by carbonic oxide is instantly cut off by the small quantity of carbonic acid in the expired air. The amount of heat thus intercepted is measured by a delicate thermo-multiplier. The air used in several experiments was afterwards analyzed by Dr. Frankland, and found to agree very nearly with the physical analysis, as will be seen by the following statement of the per cent of carbonic acid in the breath of a person under different conditions. The first column is the result of the physical, and the second of the chemical analysis :

Breath before breakfast	4.00	4.31
Breath after breakfast	4.66	4.56
Breath after severe exercise	5.33	5.22

Hot Springs.

The British Association for the Advancement of Science met at Bath on September 14th. The President, Sir Charles Lyell, in his admirable inaugural address, referred to the thermal springs which, from the time of the Romans, have made Bath so celebrated, and stated that such springs usually occur where volcanic agency has caused a "fault;" they are more frequent where volcanoes are either active or have been so at a late geological period. The quantity of solid matter in the hot springs alluded to, if solidified, would form in one year a square column not less than nine feet in diameter and 140 feet high. Although the waters of hot springs are, as a rule, destitute of the common metals, such as iron, &c., there is strong presumption that there exists some relationship between the action of thermal waters and the filling of rents with metallic ores. The component elements of metallic ores may, in the first instance, rise from great depths in a state of sublimation, or of solution in intensely heated water, and may then be precipitated in the water of a fissure as soon as the ascending vapors or fluids begin to part with some of their heat. It is possible that the metamorphism of sedimentary rocks may also be owing to the influence of hot springs. The thermal waters of Plombieres in the Vosges were conveyed by the Romans to baths through long aqueducts. In this case, hot water, percolating through masonry, has given rise to various zeolites—to calcareous spar, arragonite, fluor spar, and even opal. It is possible that the consolidation of granite may have taken place at a less high temperature than was formerly supposed; and the manner in which volcanoes have shifted their position throughout a vast series of geological epochs may, perhaps, explain the increase of heat as we descend to the interior of the earth, without the necessity of our appealing to an original central heat, or the igneous fluidity of the earth's nucleus.

The Delta of the Amazon.

This is the title of a paper read before the Geological Section of the British Association, by Mr. Bates. He states that the delta is of a vastness commensurate with the size of the river itself. It forms a triangle, each side of which is about 180 miles, the mouth of the river being thus 180 miles in width. Within this gulf the island Marajo (as large as Sicily) divides the river into two channels; the northern or Marie is 40 miles wide, studded with islands, and the southern or Para clear in its course and about 35 miles in width. The Amazon delta is not, as might be supposed, an unhealthy region of swamps. It consists mostly of a sandy soil with a rocky substratum. The mean temperature of three years observation is 81 deg. Fah., which is lower than that of portions of the country further from the equator. Singularly enough a district extending from the west end of Marajo, about 80 miles in length and in breadth, presents all the characteristics of a true delta, being composed of mud and sediment, intercepted by deep channels. This district, now 140 miles from the sea, was doubtless at no very distant period the true delta, and the seaward portion constituted a series of islands lying off the mouth of the river.

Mr. Stetson said that the amount of solid matter carried down by the Mississippi river has been estimated by taking the mean of a series of observations, and he had found that it was equal to a discharge at the mouth of four cart loads every second of time.

New Method of Extracting Gold.

Dr. C. Calvert read a paper before the Chemical Section of the British Association, in which he proposed to dispense with mercury in the extracting of gold from auriferous rocks, as many other inventors before him have proposed. The agent employed in his method is nascent chlorine gas, evolved from a mixture of common salt and the binoxide of manganese ground up with auriferous quartz, in the proportion of two or three per cent. When sulphuric acid is added the liberated chlorine will attack the gold, and upon allowing water to percolate through the mass it would dissolve out all the gold, as well as the copper and silver, which could be precipitated in the metallic state. The process is said to yield good results, even when working very poor quartz.

Fog Horn.

Mr. Daboll, the inventor of this instrument, designed to give warning to ships enveloped in fog, has received an order from the British Government for one to be used at Dungeness. It will consist of two twenty-four inch caloric engines, placed side by side on an iron bed plate, on which are also two iron air tanks or receivers, into which will be condensed the air for blowing. But one engine will be in use at a time, the other being a reserve in case of accident. The trumpet is intended to revolve half way around and back in about a minute, and blow its blasts as it moves around.

New Printing Process.

An invention has just been patented in Paris by means of which printing can be done without the employment of ink. The process consists in the introduction between the paper and the type of a sheet of some fabric, on which is deposited lampblack and glycerine.

Spectrum of Comet II, 1864.

Prof. Donati, of Florence, has furnished a sketch of the spectrum made by this comet. It resembles that produced by metals, the black bands being broader than the luminous.

Supposed Satellite of Jupiter.

M. De Gasparis, of Naples, saw on the 22d of July last, at 7:59 P. M., a black, well defined point on the planet's disk. In a quarter of an hour the point, moving in the direction of the planet's rotation, passed its margin and disappeared. M. Flammanon, in commenting on this phenomenon in the *Cosmos*, says it could not have been a little planet in conjunction with Jupiter, for in that case its motion would have been in an opposite direction, and as the four known moons of that planet were all visible at the time, he suggests that the new body may be a fifth satellite, very much smaller than its companions.

Uniformity in Screw Threads.

Mr. J. K. Fisher directed attention to the importance of having uniform standards for the sizes of screws, it being well known that at present in this country each manufacturer has his own peculiar dies. The Franklin Institute of Philadelphia had moved in this matter, and wished the co-operation of this Institute in endeavoring to introduce a uniform system.

The Chairman remarked that he had several months since read a communication on this subject, and then endeavored to show the importance of this reform. He was glad to find others now present agreeing with him.

On motion of Dr. Rich a committee was appointed to examine the subject. J. B. Rich, J. K. Fisher, and W. Rowell were named as such committee, and by general request the name of the Chairman was added to it.

The selected subject for discussion was then taken up.

The Manufacture and Use of Furs.

Dr. J. B. Rich opened the discussion of this subject by saying the mode of preparing furs for general use is very complex. One is really astonished to learn by what simple processes such beautiful results are obtained. The ordinary method of preparing fur skins is first to rid them of their fleshy matter. This is done by passing them over very sharp knives, which are set so as to shave close to the skin. They are next anointed with butter. After remaining in this condition long enough to allow the butter to penetrate, they are placed in a vessel having a bottom shaped like a reverted cone, and after receiving layers of sawdust are thoroughly worked together by treading. Afterwards they are placed in a smaller cone and worked over by mahogany sawdust, by which means the oily matter is abstracted from the fur, and the skin made soft and flexible. There is some deviation in this mode when applied to skins intended to imitate each other; in which case the preservative qualities are imparted to the skin by means of alum and salt. The sable, silver fox, ermine, and all the martins are prepared in this manner. Various persons have claimed to have peculiar methods of preparing skins. A manufacturer had informed him that thirty years ago there was a workman in this city who could produce more "life" in the fur, as it is termed, than others. His process was a secret, and he died without revealing it. By a strange coincidence he (the Doctor) knew this man, for he occupied an apartment in a building belonging to a relative.

In visiting this place his boyish curiosity had led him to observe that the grease was abstracted from the fur by means of calcined plaster of paris, placed in a large iron pan, under which was a flame which kept it at a certain point of heat. After the plaster was removed by shaking the skins, they were sent directly to the stores. The chinchilla furs were all done in this way.

Instead of the treading operation, sometimes the skins and sawdust are placed in a slowly revolving drum, which is claimed to be an improvement. All the little clippings from the skin are carefully gathered, and are sold at from three to four dollars a pound. They eventually are exported. The very smallest strips find their way to China, where they are sewed together so neatly as not to be distinguished on the fur side from a whole skin. The very low price of labor in that country enables the furrier to accomplish this at a profit.

The furs which are used for felting purposes, in hat making, are the beaver, otter, nutria, wolf, and muskrat.

The fur of the sable is now from five to six times more costly than the ermine, which derived its value from being used in the different courts of Europe and by the nobility. But the most valuable fur is the silver fox. So rare is it that only 471 skins of this animal were sold by the Hudson Bay Company during the past year. Three of these skins brought $170 each.

The skin of the Persian black lamb is coming into quite general use both here and in Europe. Its fine wool is black, but it is dyed the same color to give it a gloss. The mode of preparing it is the same as that described at a previous meeting, when speaking of the skins used by glove makers.

The Chairman remarked that but little was generally known concerning furs, even in this country, where they have been gathered in greatest quantities.

It would be gratifying to us to receive and publish all the information which can be obtained concerning fur producing animals.

The Russian sable has long been regarded as one of the most valuable of furs. About 25,000 are annually collected in Russian Possessions, and but few are sent from the country. The fur is very fine and beautiful; the color is brown, with some gray spots about the head. The average value is from $10 to $15, but the darker variety is the most valuable. A single skin will often command from $40 to $50. This sable resembles the Stone and Pine Martin and the Hudson Bay Sable, and some writers believe they are varieties of the same species.

The Pine Martin is distinguished from the Stone Martin by the yellow color of the throat. Other parts of the skin are brown, and are dyed by the furrier a dark color to suit the prevailing taste. As the French excel in dyeing this fur, it is sometimes called the French sable.

The skin of the little minx or mink has a fur resembling that of the sable in color, but it is shorter and more glossy.

The ermine somewhat resembles the weasel, and in Russia when he is found during winter he wears the whitest of all furs.

The fitch or pole-cat resembles the skunk, and has a fur which is much used. A skin of the latter will bring $1.

The Kolinski or Tartar Sable fur is of a bright yellow color, and is sometimes used on ladies' dresses in the natural state.

The beaver was formerly in general use for hats. It has a fine wool underneath its fur, which is in great demand for ladies' dresses.

The skin of the bear and the buffalo, or more properly the bison, are in very general use in colder climates as sleigh coverings.

The fur of the Sea Otter is very thick and soft, and is most highly prized by the Russians and Chinese. The annual production is about 1,000 skins. They are found on the western coast of the American continent, and on the Asiatic coast.

Underneath the coarse hair of the seal is found a very fine and silky fur. The roots of the coarse hair are very deeply seated, while the fur does not penetrate the skin half as far. By shaving down the skin on the inside to half its thickness, the long hairs can be readily removed without injury to the fur. It is generally dyed a deep brown, and then resembles a rich velvet.

The squirrels' fur is much used in Russia, where it is said 15,000,000 are killed annually. The Siberian squirrel is gray; the under part is white, and is used for coat linings. The tails are made into boas for the foreign markets. They are also used for artists' pencils.

Furs, for felting purposes, in the manufacture of hats, the principal skins used are those of the hare, rabbit, beaver, and the nutria. The latter is about half way between the muskrat and beaver, and its fur resembles both in some respects.

The skins are divided into seasoned and unseasoned. The seasoned are taken off in the winter, when the fur has its full growth, and is the finest. The unseasoned are obtained at other seasons of the year. It is coarse and short, and not worth more than one-third of the value of fur from the best seasoned skins.

The mechanical operation of taking the fur from skins is first to comb it, and after careful pressing to cut it from the skin. Two kinds of shears are used for this purpose; one resembling that used in clipping wool from sheep, and the other the tailors' shears, the bows of which are made large enough to admit the whole hand. The same operation is now done more rapidly by knives moved by mechanical power.

Mr. Nieman noticed several furs in the following order:

THE RUSSIAN SABLE.

The scarceness of this fur enhances its value; and the reason of its being so hard to obtain is, that the main source from whence it comes—Siberia—is controlled by the Emperor of Russia. The exiles to that region are obliged to furnish for the Czar a certain aggregate number of the best and finest specimens every year; they are to furnish so many and no more.—These are never sent to the fur-market unless obtained surreptitiously, but are distributed by the Court as gifts among the Courts of Europe and the *noblesse* generally.

HUDSON BAY SABLE.

These are prime, in all cases; for the reason that the company follow out the restriction of never taking any skins from the natives, but at the proper season of the year, when they are in the best condition, and when the least danger exists of interfering with due propagation of the species; the male being the best, the natives avoid catching the females; only about one skin of the latter to 500 of the former comes into the market.

THE MINK.

This fur greatly abounds in the United States, and, were it properly managed, would vie with that of the sable; there is want of due protection in the collection of the skins; no such regulations, as in the case of the sable, being made. The animal is *shot*, when it ought to be *trapped;* and not at the proper age. The evil of this will be, eventually, the animal will either become extinct or so initiated as to be no longer a marketable article.

THE FOX.

This fur is not appreciated in this country, where a great deal is collected; but it goes to the European market. The Greeks, Turks, Persians, &c., use it much, and give it the preference over others. There appears to be no reasonable idea for this depreciation here inasmuch as it is heavy and warm and just suitable to the climate of these regions.

THE BADGER SKIN.

This fur is used in Germany, or was in the olden time of stage and team travelling, for the collars of the animals thus employed; the best teamster and smartest driver, would invariably provide them for his horses.—The reason for the use, especially of the Badger skin, was that the rats worried the horses at the way-side tavern stables, where the teamsters put up for the night. The rat is partial to the Badger skin; and when the collar is hung up in the stable, the rats are attracted towards it and do not molest or annoy the animals when at rest. Now we see a misapplication of this ornament for the horse, in the prevalent use of Bear and other skins which tend to frighten passing horses, and have no beneficial effect as in the case of the Badger.

The sacred tabernacle of the wandering Israelites was covered with skin and fur, made from the Badger. The sheep skin should not be forgotten as one most used in various ways.

The English Rabbit is exported to this country for its fur, and the skin of the Ostend rabbit is used as a covering; the carcase being exported to the British Isles without the skin, where it is a favorite article of food.—Some people have started the idea that the use of furs could be dispensed with, and that on the other hand, an object in collecting the skins is to endeavor to render the various specimens that give the fur extinct as vermin; but who that knows the value of the article, for wearing apparel, would entertain this mistaken notion.

The required amount killed for human clothing is but a small minimum, compared with the amount that would be collected if needed. It provides a sufficiency of labor, in inclement seasons and in sterile regions, to those who would otherwise either want the necessities of life, or have to seek other employment in distant countries. And the research, arising from the hunt after skins, carries the white and civilized man far into the recesses of the forest and of those inhospitable tracts of country, which would otherwise remain unexplored; and as the Anglo Saxon, Celtic and Caucassian races invariably carry their faith and knowledge with them, so they likewise leave it behind them, in the far off regions they explore for the benefit of the benighted inhabitants who would otherwise die perhaps in ignorance of a great Creator, Christianity and its consequent civilization in all its various phases of Commerce, Trades and Agriculture. The Fur traders may therefore be classed among the chief pioneers of civilization.

Mr. Nieman stated that he had an improved process for combining felt with cloth.

After selecting "The Manufacture of Straw Goods" as the subject of the next discussion, the Association adjourned to Nov. 10th.

American Institute Polytechnic Association,
November 10, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Calcareous Spar.

Dr. D. D. Parmelee presented to the Institute two very large specimens of calcareous spar, and on exhibiting them to the members of the Polytechnic, made the following observations:

First specimen of Carbonate of Calcium, known as Iceland Spar, or Calcareous Spar, from Franklin, New Jersey.

Second specimen from near Mount Hecla, Iceland, recently brought here, a week ago, with a number of other specimens, by an American captain.

Specimens sufficiently clear for *Nichol's prisms* are quite valuable. The sample is a good one for this purpose. The former it will be observed is comparatively quite murky and its fibrous character quite marked.

The small *Nichol's prisms* are worth about $5 each—a half cubic inch in size. Others, clearer, are worth as much as $25 each.

A Hamburg merchant, about ten years since, hearing of the great value of Iceland Spar, was induced to import a whole ship load, but on its arrival it was found to be a murky lot, not only, but it was in a finely crushed state, and had been so exposed to the heat of the volcano that it was useful only as a caustic lime.

The composition of this spar, it will be remembered, is lime 56.15, carbonic acid 43.7.

The colored varieties contain traces of iron, silica, magnesia, alumina, bitumen, etc.

Fine transparent rhombohedrons, of two inches or more in each of their dimensions, have been found at Oxbow, St. Lawrence Co., N. Y., in connection with veins of lead.

Calcareous Spar is the principal source of our polished marble.

A peculiar fine grained, compact variety is employed in lithography. The best for this purpose occurs at Papperheim and Sohlenhofer, in Bavaria.

Artificial Leg.

Mr. Joshua Monroe exhibited several models of his invention recently patented. Its principal novelty is the material from which it is manufactured, raw hide, prepared and shaped like the human leg. It is very light and strong. The knee joint is a double lap joint. The whole leg weighs when finished, four pounds. The hide is first baked in an oven to take out the surplus animal matter, and then receives several coats of paint. The old way of fastening these limbs was by a strap over the shoulder, but with this appendage a person having only an inch of stump can have it fastened as firm as though the stump were six inches in length. It is not as heavy as a gutta percha limb; there is probably not over three quarters of a pound of wood in the whole. Instead of softening the skin, perspiration made it harder. Willow wood is dispensed with in this leg. The cost all complete is about one hundred dollars.

Paper from Wood.

Dr. W. Rowell presented specimens of paper from wood made by Mr. Antonio Meucci, of Staten Island, and explained the process of manufacture.

It was stated that the process would be referred to the standing committee of manufactures science and art of the Institute, for a report.

The Chairman presented the following interesting summary of scientific news:

A New Gas Engine.

The *Gazomoteur* of M. Belon is in successful operation near Paris, and has been favorably reported upon by the French Academy of Sciences. An economy equal to 60 or 70 per cent. is claimed for it. The principal parts are an air-pump, a smoke consuming furnace and a motive cylinder. The furnace, when the engine is at work, remains closed, except at the orifice by which the air-pump opens on it and at the one by which the heated air sets the cylinder in motion. It is so arranged that a quantity of combustible matter, equal to that which it consumes, falls constantly into it. A state of combustion is kept up by the air-pump. Part of the air passing from this rushes into the furnace, the rest combines with the coal-gas, forming a gaseous mixture, the volume of which is far greater than that of the air previous to its introduction into the furnace. This mixed air acts on the piston with a force proportionate to the increased volume produced by the temperature.

Water for Paris.

Paris, at last, is to have a reservoir capable of supplying 40,000 cubic feet of pure water every 24 hours. The water is to be brought from the Marne. The cost of the work will be forty millions of francs.

Specific Heat.

Dr. Kopp has communicated to the Royal Society his important investigations in this branch of science. An immense number of liquid and solid bodies had been experimented upon, he arrived at the conclusion that each element in the solid state, and at an adequate distance from its melting point, has one specific or atomic heat; and that for each element it is to be assumed that it has essentially the same specific or atomic heat in the free state and in compounds. The law of Dulong and Petit—that the specific heat of elements is directly proportional to their atomic weight—is not universally applicable.

Iodide of Silver.

That modification of Iodide of Silver, which is insensitive to the action of light, has been rendered sensitive by M. Kaiser of Leipzig, who submits the iodide to the action of the vapor of benzol, which develops ozone in the air. Ozonized air produced by electricity has the same action.

The Worthlytype.

This new photographic process recently invented in Germany, by Worthly, is exciting great interest. It substitutes a double salt of uranium for the nitrate of silver, and collodion for albumen in the preparation of the paper on which the picture is taken. The paper is so affected that the action of light penetrates entirely through it, and the picture is therefore unfading. Cheapness, precision, permanence, and ease in working, are the chief advantages of the new process.

The Emew.

Mr. W. Bennett has been making experiments at Surrey in breeding this species of large bird which cannot fly. The number of eggs laid by the female is large, but she takes no part in the incubation This duty is performed by the male who finds the eggs in various sheltered places and collects them. The normal period of incubation is about sixty days.

The Great Auk.

Mr. A. Newton has secured from Penguin Island, 170 miles north of St. Johns, Newfoundland, a natural mummy of this remarkable bird, which has excited as much interest among geologists as the Dodo. Although numerous skins are in the museums of natural history, this skeleton, now in the hands of Prof. Owen, with one other, are the only specimens now in Europe.

Light of the Cucuyos.

M. Pasteur, in a communication to the Paris Academy of Science, states that the Cucuyos, an insect having wings protected by a shell like the beetle, is very common in Mexico. It emits a phosphorescent light so intense as to enable a person to read by it at night. Its light, like that of the glow-worm, gives through the spectroscope merely a beautiful continuous spectrum, but without lines. Mexican ladies keep these insects by feeding them on sugar and giving them a bath once or twice a day. They are used as ornaments at evening parties.

Erosion of Lead by Insects.

The Chemical News cites a number of cases. In 1858 Marshal Vaillant exhibited to the French Academy leaden bullets brought back from the Crimea, in some of which the larvæ of insects had excavated circular passages three or four millimeters in diameter. The insects were from the wood of the cases in which the bullets were packed. In 1844 cartridges from the arsenal at Turin were found to be damaged in the same way. In 1833 Audonin exhibited sheet lead from the roof of a building which had been grooved by insects. In 1843 a case was reported in which it was shown they will attack stereotype metal. The insects live in the larva state in the interior of old trees, and after metamorphosis, quit their retreat for the purpose of reproduction. They do not eat the lead, but simply bore it out to make their escape from the wood with which it is in contact.

Billiard Balls.

It will be remembered that a large premium was offered in this country for an artificial substance having the properties of ivory required in billiard balls M. Dupre, of Paris, has produced a material from paper pulp, sulphate of baryta and gelatine, which is highly commended by some of the leading billiard players in that city.

The Dinornis.

The bones of this gigantic bird were exhibited to the Linnæan Society by Mr. Allis. The remains of one adult and a young brood of five were discovered lately in New Zealand. It is thought, on examining portions of feathers still remaining, that they died within ten years. If any of the species are still living, it is not strange that they should have eluded former searches for them. Explorations are now being made by Dr. Haast, through the center of New Zealand, to ascertain whether the animal is extinct.

Great Photographic Feat.

Dr. H. Draper, of this city, has succeeded in making a photograph of the moon more than four feet in diameter, by means of his glass reflector in his observatory at Hastings.

The selected subject for discussion,

The Manufacture of Straw Goods,

was then taken up, when Mr. B. Garvey made the following remarks:

Mr. President and Gentlemen—I shall not examine the subject of straw hat manufacture with regard to its historical interest, nor consider it as a source of national wealth. To give an idea of its importance, it will be enough to advert to the fact that straw hats are worn to some extent by men, women and children in every civilized country of the world; and, although the manufacture of the coarser kinds of hats is almost co-extensive with the market, yet for the finer kinds, which embody elegance of design with perfection of finish, there is an extensive market in which to compete with England, which now enjoys an almost exclusive monopoly of the markets of the world.

In the rude form of the manufacture, from the sowing of the seed to the trimming of the finished hat, the work was performed by the farmer or his family; but perfection of manufacture demands division of labor, and accordingly we find that this manufacture now gives employment to no less than ten different trades, each more or less independent of all the others, viz.: 1, the farmer; 2, the merchant; 3, the dyer; 4, the bleacher; 5, the braider or plaiter; 6, the straw sewer; 7, the stiffener and shaper; 8, the presser; 9, the wirer and trimmer; 10, the manufacturer—besides several others indirectly employed, as box-makers, &c.

The farmer grows, cures, cuts and bundles the straw.

The straw must be very pliant and thin; and, if white, must be free from spots, or if yellow, must be of a uniform tint, the pipes being small. To produce the white, thin, pliant straw, the farmer sows the white lamas wheat very thick, in a chalky soil, if possible, so that no wheat will be produced, but instead, long white straw. To produce the yellow straw, a peculiar kind of bearded wheat is used in Italy, and is sown also very close or thick upon light soils, so as to have the straws as small in diameter as possible. Great care is required in harvesting the straw so as not to break the pipes. It is cut down carefully. It is then divided at the joints and put into bundles, each bundle being composed of straws of uniform length, and of nearly uniform diameter. These bundles are of the average length of the joints when made of yellow straw or of that which is to be dyed; but for the white straw more care is required and all colored or spotted pieces are cut off, so that these bundles are much shorter than the yellow or colored ones. The first joint is used for coarse split straw braid, and for the whole-straw braid known as rough-and-ready. The second joint is the finest; it is used for the finest split straw, and is the choicest part of the straw. The third joint is used for very fine Dunstable braid. The last joint is the longest and the yellowest, and is used for Canton braid. The bundles of straw are boiled in clean water to extract all sap or vegetable coloring matter from them, after which they are carefully dried in the sun, and when perfectly dried, they are again tied up, boxed or packed in crates and sent to market.

The merchant buys the straw, gets it dyed for fancy braids, gives it out to be braided, buys the braid, gets it bleached or dyed, as the case may be, and then either sells the finished braid or gives it out to the manufacturers to be made into hats.

In this country there is but little braid manufactured, for labor is too expensive to compete with the cheap labor of England and Italy. Braid is principally imported from the two countries named, but particularly from England.

The braid may be classified according to the number of straws woven together to make each kind, the varieties depending on the peculiar weft of the braid, the size of the straw, its color, both natural and dyed.

2-Straw braid is used only for trimming.

3-Straw braid is used also for trimming.

4-Straw rustic, with scolloped edges, is made of either split straw or whole straw. It is used principally by the peasantry of England, hence its name.

5-Straw braid is called hair braid, being woven as ladies hair is sometimes braided. It is made of split straws.

6-Straw rustic is like the four straw, but is wider, of closer weft, and better looking.

7-Straw braid admits of many varieties.

Fine split straw has seven straws in the weft, the fifth side being out.

This braid is not more than one-eighth of an inch in width. It is made of the finest part of the straw, and is the most expensive in manufacture of any kind made in England. Devon and Suton braids are in every respect the same as split straw, but being wider and having peculiar qualities due to the kind of straw employed in the places from which the names are derived. Dunstable is a whole straw braid, having seven straws in the weft, and differing in the weft in no respect from Devon or Suton braid. Canton braid is also made of whole straws, but the straw being of the top joint it is yellow and harsh. Bird-eye braid is made by weaving two fine split straw braids together, like the two straw trimming. Purl edged braid is so called because of an edge formed upon it by the use of a knitting needle at one side of the braid while it is being braided, the knitting needle being withdrawn leaves an edge or purl of loops along the side.

9-Straw braid is called lustre because the lustrous or glossy side of the split straw is exposed along the middle of the braid. There are different kind and patterns of this braid made by showing the lustre side of the straw in different patterns and proportions.

10-Straw braid is generally fancy, being composed of colored and bleached straws woven into fancy patterns.

11-Straws are employed in Tuscan.

12-Straw braid is a kind of lustre.

14-Straw braid is either split straw or whole straw. Pedele braid is made of whole straw or of double straw, and is of various qualities. Rutland is also made of 14 straws used double, and is a finer and more costly braid than Pedele. Italian is a split straw braid, having fourteen straws, and showing alternately the pith side and lustre side of the straw.

16-Straw braid is known as mitred lustre, the lustrous side of the straw showing mitres along the edge.

18-Straw braid is called diamond lustre, as the lustrous sides of the straw show in diamonds along the weft.

BRAIDING OR PLAITING.

For braiding whole straw braids the pipes are assorted into sizes as only those of nearly uniform size can be used together.

For split straw or double straw braid the straws are also assorted in little lots in front of the braider. They are then split into slender splits by passing them one by one through a tube with a number of cutting points inside, the spaces between the cutting points corresponding to the size of the splints required, there being several cutters to give various sizes of splints. The straws are next scraped on the pith side to thin them and give a uniform surface. Another mode in general use is to split the pipe along one side with the thumb nail, open it out flat, scrape it thin, and then split it into splints on a comb splinter. There must be a cup of water always near to keep the straws moist, or they will become brittle and cannot be worked.

The number of straws to be woven together are grasped firmly in one hand, while the other hand begins the weft, and when a sufficient length is woven, both hands are employed in passing the straws one over the other. All discolored pieces of straw must be rejected, and the ends must not be worked too close in, as their color is not always pure white. The braid, as formed, is wound up, or reeled, until a score yards, or a piece of sixty yards is completed. The ends are then clipped off and the braid is washed, dried and bleached. The bleaching is generally effected with chloride of soda, followed by a fumigation with sulphur vapor for ten or twelve hours. This bleached braid must be kept perfectly dry until it is to be worked up. It is in this state when it is imported into this country.

The New York merchant generally contracts with the manufacturer for a certain number of hats of a given pattern and finish, and supplies him with the requisite braid in boxes and thread in packages, the manufacturer finding his own blocks, &c. The manufacturer generally employs from 200 to 300 straw sewers, who are usually set to work in poorly ventilated and lighted roooms. He pays them by the piece of braid, or by the hat for sewing. He knows how many hats of a given style he can get out of a piece of braid, and how much thread it will take; he accordingly gives to each girl braid and thread in proportion to the work she can perform. The thread used is either wire cotton, soft cotton, spool, or unbleached linen according to the style of work to be done. The sewing girls earn from three to five dollars a week when work is good. Occasionally one will earn seven or eight dollars a week. The needles employed are long and slender so that the puncture may be as small as possible. Each girl is provided with a tape measure to measure the round of the hat at every stage.

The first operation of the sewer is to mill the braid, that is to pass it between two wooden rollers, pressed tightly together by screws. She then begins at the crown of the hat, which she forms by making a button of the braid as a nucleus, around which she stitches row after row until she gets the crown large enough. She then bends down the outer row by moistening and pressing on it, until it forms an angle, when she proceeds with the side, crown, and so on to the rim. She must constantly apply the hat to the pattern block, to be sure that it fits and is correct in shape. There are two ways of getting the shape, but they must be employed together. One is to wet the braid and strain it into shape. This admits of only little modification of form. The other way is by inserting slopes or gores; that is, pieces of braid in lieu of whole rows. These two ways of modifying the shape are learned only by practice, but they enable the sewer to get all desired shapes for hats.

The straw-sewing season in New York begins in the latter part of November and lasts till the end of April. During the summer months nothing is done at this work. There is sometimes a little business in September.

The next process after sewing, in New York, is the bleaching of the finished hat, for washing is dispensed with, as the work must be done with scrupulously clean hands, and a hat will be ripped up if a single thread be dirty. The bleaching process is simply a steeping of the hat for a short time in a solution of chloride of soda, a drying and then a fumigating with sulphur for about ten hours in the smoke house or steam box as the apartment is called, where the hats are arranged on wooden pegs, no iron being used as it would stain the hats with iron-mould if allowed to touch them.

After bleaching, the hats are next stiffened by being dipped into a thin solution of fine white glue, and then dried. Formerly the white of eggs was employed as a stiffening, but it was too expensive and too easily acted upon by heat and moisture, so that hats soon became yellow and mouldy, even when kept with great care. The gelatine obtained from ivory dust or bone dust, by boiling in water, was long in vogue as a stiffening, but it was also found too expensive and to have no quality superior to those of good glue, which accordingly has become the general stiffening for straw hats.

The next process is that of shaping. To effect this the hat is moistened with water to make it pliant. It is then applied to a block of the pattern to which it was made, and by pulling and straining it is brought to its proper position, and is pinned there until it dries.

The hat is next pressed. This process is precisely analogous to the ironing of under-clothes. A wet cloth is laid upon the hat and by pressing with a hot iron the finished surface is given. Hats made of bird-eye or pearl braid are not pressed nor are those braids milled, as either operation would destroy the embossed appearance which these braids are intended to give.

There are several forms of pressing tables and of pressing irons employed together with many ingenious devices for enhancing the power of the presser and for altering the position of the hat while being pressed, but it would be useless to attempt to describe them. They must be seen to be understood.

To preserve the shape of ladies' hats they are wired at the rim and crown. Bonnet wire is covered with cotton thread to protect it from rust and take away the appearance of iron.

The wiring is done by girls who also trim the crowns of ladies hats with tissue paper to prevent their sticking together when packed for exportation. The girls do not wire men's hats, but on the other hand they trim them wi h a simple band, or with band and edge binding as they are to be worn ; so that men's hats leave their hands fit for wear.

In this hasty view of an interesting manufacture, I have purposely avoided any extended remarks upon the bleaching and drying of straw goods, as there are experienced chemists in our Association whose remarks on these branches must necessarily be more valuable than anything I could say. The manufacture of Leghorn and Panama hats too, though a branch of the subject, has been purposely omitted to give gentlemen who have seen the process of manufacture an opportunity of describing it ; for their information will be more correct and far more interesting than that which is got from reading or from hearsay.

Mr. Jireh Bull said : Doubtless there are those present who well remember that the women of this country were dependent upon foreign nations for their "straw bonnets." Italy and Switzerland furnished the raw material as well as the manufactured article. From the year 1820 and during a period of ten years thereafter, the port of Leghorn furnished the greater part of the bonnets made of straw worn in this country.

John Tappan, a high-minded merchant of Boston, now living, embarked largely in that trade, and the public for a time was almost entirely supplied by his importations. They yielded to him a large fortune which has been and still is used for benevolent purposes by this aged philanthropic citizen.

The idea which has been suggested that England monopolizes the straw business will hardly be accredited by those who are familiar with what the people of New England have done, and are still doing in that line of business. The masses of the American women were unable, by reason of the high prices which foreign manufactured straws commanded to possess themselves of a treasure however greatly coveted. To supply this class, the ingenuity of a New England woman was brought into requisition. It so far succeeded, that before the year 1830, a few boxes of American Manufactured straw bonnets, made from native growth straw, found their way into the New York market through the agency of Eastern itinerating merchants. These bonnets although neglected at first, gradually overcame the prejudice which at that time attached itself to most articles of American fabrication until their demand as an article of commerce was fully recognized, and the itinerant dealer was compelled to give place to the established merchant. As a consequence large fields in New England were appropriated for the exclusive culture of the raw material. Manufactories gradually came into existence, enriching entire communities by industrious labor.

Passing through my own native place, Milford Conn., lying on the shore of Long Island Sound, a few weeks ago, I found that a large straw factory had been established there employing seven hundred operatives. Upon enquiry I ascertained it had been in existence about ten years. The thrifty appearance of the town gave unmistakable evidence of the industry of the people. It has been stated by competent authority, that in the southern part of the State of Massachusetts alone, 12,000 persons are employed in straw bonnet factories, and nearly 8,000,000 of bonnets and hats are sent away annually. The Leghorn Bonnet now is as great a curiosity in this country as the American straw bonnet was, during the administration of John Quincy Adams.

Dr. W. Rowell gave an amusing account of the great Leghorn hats worn thirty years ago in this country

Dr. R. P. Stevens said he belonged to a family who had been connected with the business for more than sixty years. Latterly less was done because they could not compete with the foreign braid. The custom was for the boys and girls of the neighborhood to assemble in the evening and braid straw. Lights were not necessary, as all were expert to braid in the dark by the sense of touch. We used the oat straw. He remembered when the Leghorn hat was introduced. It was thought, on account of its peculiar sewing, that it could not be done in this country. But it is not sewed; it is laced together by a long thread. Mrs. Randall, of Cortland county, N. Y., had the credit of first discovering the manner of making this kind of hat. She had some Timothy seed sown for this purpose. The amount now manufactured in Massachusetts is very large. A sloop loaded with straw goods from one establishment departs with great regularity every week. The styles of next year's bonnets are all made up this fall. All large establishments have their "style clerks," whose business is to study and perfect the styles. These Clerks meet in convention once a year, and decide what shall be the fashion for the ensuing Spring. Their business is to arrange the general contour of the hat.

After further remarks from Messrs. Fisher, Bartlett and Johnson, it was decided to continue the discussion of this subject at the next meeting.—Adjourned.

American Institute, Polytechnic Association,
November 17, 1864.

Chairman, Professor S. D. Tillman; Secretary, Mr. Benj. Garvey.

The proceedings were opened by the Chairman, who read the following summary of recent progress in science and art.

Reduction of Silver Ores.

M. Plumerode, in a communication to the French Academy, considers that the loss complained of in reducing the rich ores of Mexico, is due to an imperfect chloridization of the silver and the consequent irregularity of action. If finely powdered quartz be mixed with one per cent of salt and heated for half an hour to redness in a covered crucible, all the silver will be found to have passed into the form of chloride soluble in ammonia. If the silver is in the form of a sulphide or any other compound, the result is the same. The conversion into chloride takes place also when instead of quartz, felspar is used, either with or without earthy carbonates, oxide of of iron or other constituents of the vein stone.

The Electric Discharge.

Experiments on the discharge of the Leyden jar have been made recently by Mr. Feddersen of Leipsic. For analyzing the light, he employed a revolving concave mirror silvered by Liebig's process having a radius of curvature of 500 millimeters. The rates of revolution are from 80 to 100 times per second. With a short conducting circuit he found the discharge was oscillatory—that is the current did not move in one direction but alternated to and fro. As the resistance was increased the oscillation was diminished and finally the current became continuous. If resistance was still increased from the point where the oscillations ceased, the duration of the discharge was increased to a second point when the equilibrium is restored by means of partial sparks. The resistance in the last case was effected by means of small tubes filled with distilled water. The discharge from a short metallic circuit he found lasted nearly one ten thousandth part of a second or about one hundred times longer than the estimation made by Wheatstone.

Light From the Fixed Stars.

Dr. Miller and Mr. Huggins have presented to the Royal Society the result of their examination of the light of some of the fixed stars by means of the spectroscope. They found lines corresponding with them in the spectrum of nine elementary bodies. They regard the difference in the colors of stars as the effect of the stellar atmosphere which absorbs different portions of light, originally of the same quality.

On the Temperature of the Sexes.

Dr. Davy, in a communication to the British association for the advancement of science, stated that by recent observation he found the temperature of the body in the case of men varied between 99 and $99\frac{1}{2}°$ that of women between $97\frac{3}{4}$ and 98°. The average showed the relative temperature of males and females was as 1058 to 1013.

Uniform System of Weights and Measures.

The British Association at their last meeting adopted unanimously the report of a committee in favor of adopting the metric system of France; and recommending that in scientific communications, and in books of education all statements of weights and measures be accompanied by their equivalents in the French system and that all scales of temperature be divided according to the Centigrade as well as Farenheit graduation.

China Grass.

The experiments with the fibre of this species of nettle-weed in France, already reported to this Association; are attracting great attention in that country. It is now declared without reservation that none of the qualities of cotton are wanting. The Minister of the Interior is furnishing seed, obtained from China, to Agriculturists, and the speculation will assume gigantic proportions.

This fibre had previously been used by manufacturers in our own country; but for some reasons unknown to us its use was not approved. Possibly new methods of preparation may have obviated the objections found to it in American Factories.

Casualties in British Coal Mines.

The following is a summary of the accidental deaths in coal mines of Great Britain for 1863:

By explosion of fire damp	163
By falls of roof and coals &c.,	407
By accidents in shafts	147
By miscellaneous accidents	190
Total	907

Machine for Sawing Ship Timber.

This ingenious arrangement of saws was explained by the inventor, Mr. Vance, who was introduced by Mr. Flury. The audience on learning that Mr. Vance had lost an arm in the service of his country, received him with great favor and listened with marked attention to his minute description of his apparatus. Its novelty consists in the method of changing the position of the saws even while running, so as to cut the timber which is stationary to the best advantage. Thus the enormous waste by chopping is saved, and the whole timber is utilized.

Stevens' New Carbine.

Mr. W. H. Stevens exhibited his new carbine, and spoke as follows:

Gentlemen, in accepting an invitation to appear before you, I did not anticipate meeting such a gathering as this; and I do not come with any expectation of profit to myself, but because I take some pride in showing my invention to scientific men, whose appreciative faces seem to offer a gleam of sympathy with my long and laborious struggle in perfecting this gun. My purpose was to make a gun that might be loaded and fired with one hand. Not with the intention of sending back to the war, the one armed heroes, such as our friend who has addressed you; but that the horseman may have one hand to control his animal and fire with the other. I commenced my study by laying down certain controlling principles as a guide to my course. The breech should be opened and cleared for another charge at one easy movement. After putting in a charge the gun should by securely closed by one opposite movement. The working parts to accomplish this should be as few as is compatible with present security and permanent durability in severe use. The breech-loading should not interfere with any improvements of bore, rifling or ammunition which may give long and accurate range. By much handling of a gun I find that the shortest route to the cartridge box for the hand, is to draw it back in a line parallel with the lock. I make use of the first inch of this motion to slide back a guard on which the middle finger rested at the time of firing. This guard is a part of a sliding rod which wedges down the breech block, containing the lock, then pulls by a single other piece of great power, the cartridge shell both at the same movement. After the cartridge is inserted the breech is securely closed by the forward slip of the hand, as the gun is brought up to the shoulder; or both movements may be made with one hand as the piece hangs at the side in the horseman's sling. By pressing in a certain stop-pin, the lock may be swung down and its side plate opened like a lid exposing the lock for cleaning, oiling or to be taken out, and this is done without screw-driver or other tool.

The sporting piece is furnished with a percussion cap cone so arranged as to fire the regular cartridge or loose powder loaded at the muzzle with a patched ball; or the frontiersman may refill the old cartridge shells with as much or little powder as he fancies, and fire with common caps, and this without altering his piece in any way. The simplicity, compactness and durability secured in this construction can only be appreciated by examination and use.

Arrangements are being made to manufacture this arm in cavalry, infantry and sporting form at Worcester, Mass.

Plumbago.

Mr. J. Johnson exhibited a large specimen of graphite from the State of Maine.

Grease Balls from Steam Exhaust Pipes.

Mr. Watson exhibited two black hard balls, nearly two inches in diameter. They were taken, with seventeen others, from the exhaust pipe of a steam engine. The dirt and sand accumulates with grease and particles of iron, and by the intermediate action of the exhaust, they are thrown into constant motion, and thus become perfectly round and hard.

Manufacture of Straw Goods.

The discussion of this subject was continued from the last meeting. Dr. D. D. Parmelee read the following paper:

HISTORY OF STRAW.

The native country of wheat is unknown, but is supposed to have been Central Asia.

The original locality of oats has not been satisfactorily ascertained. It grows wild in Sicily, and is said to have been seen by Anson in the island of Juan Fernandez, on the coast of Chili.

Syria, Armenia and the southern provinces of Russia have been severally indicated as the native country of rye.

The original country of the cultivated barley is unknown. It grows wild in Sicily.

There are a variety of species of each of these, which are interesting to the botanist, but not directly so in connection with the subject of this evening.

COMPOSITION OF STRAW.

In 1,000 lbs. of perfectly dry straw we have, by analysis, the following constituents:

Constituents.	Wheat straw.	Rye straw.	Barley straw.	Oat straw.
Organic substances	960	970	955	950
Nitrogen therein	4	3	3	3
Inorganic substances	40	30	45	50
Potash and soda	6	5½	12	14
Lime and magnesia	3	3½	5	5
Phosphoric acid	2	1¼	2	1½
Silica	27	18	23	25

The remaining minute inorganic constituents (for example, common salt, sulphuric acid, salts, etc.,) have not been specified, for the sake of simplicity.

Silica constitutes an important proportion of the constituents of straw. And there have been those of sufficient leisure who have made globules of glass from this silica.

In this connection it may be mentioned that silica is found in the joints of the bamboos, in the form of small round globules, which have received the name of *Tabashheer*, and are distinguished by their remarkable optical properties.

For industrial purposes we regard straw simply as Lignin, encased in an armor of Silica to protect it from destructive influences and give firmness to the stalk; while the other ingredients serve as a kind of cement, adding tenacity and flexibility to the whole.

Therefore what is true of lignin generally, as hemp, linen, cotton, etc., in respect to bleaching, in a chemical regard, is applicable to straw, due reference to their physical conditions being in mind, and hence some alterations in the mechanical parts of the processes.

BLEACHING.

The oldest mode of bleaching, which is technically termed *crofting*, consists in exposing the straw to the action of dew and light by spreading it out in meadows and frequently turning it while the process is going on.

It is next gathered, assorted and submitted to the action of steam for the purpose of extracting its color, and then a fumigation of sulphur to complete the bleaching. The straws are then in a condition to be plaited or woven.

Where and when the practice of bleaching first began, we have no account. But we know that it is of very ancient origin, mention being made of it in the oldest books extant.

And from the earliest description to the close of the last century it is quite clear that no other process was known, than what has already been alluded to; and in case of cloth, alternate boiling and exposure to the atmosphere—a process requiring many months to complete, but since the application of chlorine to this purpose the process is completed in a few days, and for most of dyeing operations in a few minutes.

Professor Graham observes of the application of chlorine to this purpose as one of the most valuable which chemistry has presented to the arts.

Chlorine was discovered by Scheele, in 1774, and was called by him *dephlogisticated* muriatic acid.

About eleven years after this, Berthollet considered that he had found it to be a compound of muriatic acid with oxygen, and hence called it oxygenized muriatic acid. This was afterwards contracted into oxymuriatic acid.

In 1811 Sir Humphrey Davy discovered it to be a simple or elementary substance, and gave it the name of chlorine, from the fact of its having a greenish yellow color.

Scheele described its peculiar property of destroying vegetable coloring matters; but Berthollet was the first to call the attention of the public to its value as a bleaching agent in 1785. About the time this chemist was investigating the nature of this substance, he was visited by the celebrated James Watt, to whom Berthollet related the results of his experiment upon bleaching, and from this circumstance the inventor of a steam engine became also the introducer of the new process of bleaching into Great Britain.

Some give this honor to Professor Copeland, of Aberdeen; but Professor Napier gives it as his opinion, from the evidence he has seen, that it belongs to Watt, although there was little difference of time.

The first method of using chlorine was by saturating cold water with the gas, the water taking up about twice its volume of it. The goods were put into this water, after which it was heated to drive off the chlorine or set it free, that it might act upon the coloring matter. But the goods were impaired by this process, and more diluted solutions were employed and found to bleach equally well, and the goods were preserved.

But a defect of the goods becoming yellow after a few days, suggested alternate boilings with alkaline lyes; and the difficulty of the workmen, being unable to endure the effects of the escaping gas, led to the discovery that alkalies not only absorb a greater quantity of chlorine than water, but that they hold it with greater affinity, not allowing the gas to escape and affect the atmosphere, at the same time parting with it more regularly and effectively to the goods. The alkalies used were soda and potash.

In 1798 Mr. Tennant, of Glasgow, patented a process for using a solution of lime for absorbing the chlorine.

Shortly after, the hydrate of lime (slacked lime) was substituted for lime water. And this is the preparation now used for bleaching, under the name of chloride of lime.

The best bleaching powder of commerce seldom contains over 30 per cent. of chlorine available in bleaching.

To prepare chloride of lime for bleaching, an aqueous solution is requisite. For this purpose a quantity is put into a large vessel filled with water, well stirred, and allowed to settle. This is called the stock liquor. There are no definite proportions. Every bleacher makes up his stock-vat to a certain strength indicated by his hydrometer.

Care is taken that this liquor is protected from the air as much as possible, as the lime absorbs carbonic acid, and the chlorine being set at liberty, occasions a loss.

The goods to be bleached are cleansed from adhering dirt or grease, in some cases by boiling in alkaline solutions, in others by simply washing. They are then laid loosely as possible in the bleaching liquor.

The vessels which contain this liquor are large, made either of wood or stone, and are termed bleaching-vats, or troughs. To prepare this liquor, these vats are filled with water, and a quantity of the stock liquor added until the required strength is attained, which is indicated by its action on sulphate of indigo, in what is called the test glass.

This is a cylindrical glass measure, with marks or gradations on its side. It is filled, for example, to the lowest mark with the sulphate of indigo; the liquor is added drop by drop until the color of the indigo is destroyed. The quantity taken to effect this is denoted by the graduations above; the weaker the liquor, the greater number of the graduations required. Each of these graduations is termed its degree.

The goods are allowed to steep in this liquor for several hours, varying according to the nature of the goods.

The bleaching properties of ozone have excited considerable attention during a few years, and enough is known of it to induce the opinion that when easy methods of producing and applying it are discovered, it will be of great value in the arts.

Next to bleaching comes dyeing. Straw is colored blue by a boiling hot solution of indigo in sulphuric acid, called *saxon blue*, diluted to the desired shade; yellow by decoction of tumeric; red by cochineal, salt of tin, and tartar. Brazil wood is also used for dyeing straw. And what may be said of dyeing fabrics generally will apply to straw.

Straw has been used to some extent as a material for white paper for many years; but the loss of material, from its brittle nature, during the processes of manufacture, and other circumstances, more than counterbalanced the advantage gained from the abundance of the supply, until quite recently, when the very high price of linen and cotton rags, and improvements in the modes of preparing the pulp, have brought about what seems to be, hereafter, a permanent manufacture.

There are two of three recent improvements which may engage our attention for a moment. Mr. R. H. Collyer patented in England an improved process which consisted essentially in first boiling the straw in water to render it soft, then subjecting it to a cutting action and also to a grinding machine. The straw is rubbed between grinding surfaces until every knot is crushed and made into an impalpable pulp. In this finely divided state the pulp is boiled in strong caustic alkali, which dissolves the silica and reduces the pulp to a finer condition. It is next bleached, and treated in the usual way. The grinding operation of this process seems to constitute the improved feature.

Another improvement for rendering the fibre of straw profitably available for the production of white paper, and which has attracted more general attention, consists in boiling the straw in an alkaline lye, in a rotary boiler, under steam pressure of from 100 lbs. to 140 lbs. per square inch. Under such a pressure and temperature, the silica and other constituents of the straw, which render its fibre brittle and difficult to bleach, entirely give way, and separate to such an extent that they can be almost entirely removed by simple washing, leaving its fibre soft and in condition to bleach most readily and economically. This has been regarded as a very important improvement, and one which will render the manufacture of white paper from straw a permanent business.

This Association has already been made aware to what extent straw fibre enters into the printing papers of this country.

The old yellow wrapping paper which is made almost wholly of straw, and the straw board for book binding and boxes, have constituted staple articles of manufacture for many years. The manufacturing of quality is carried on by smaller establishments in vicinities where the straw is more abundant and cheap.

The conditions of its manufacturing are so simple and generally understood that we need not, perhaps, dwell upon them here.

The following article from the *Wallingford Circular* may now be interesting:

Paper Buttons.

Everybody knows that buttons are made from metal, horn, shell, glass, whale-bone, jet, mother-of-pearl, india rubber and wood; but how many know that millions are yearly made from common pasteboard, or, as it is technically termed, "strawboard?" Thousands of vests, pants, undercoats and overcoats are to-day buttoned with paper; and in most instances the owners thereof no doubt fancy their buttons are made of horn, wood or india rubber, or some more aristocratic material.

ORIGIN OF PAPER BUTTONS.

Wallingford claims the honor, so far as this country is concerned, of having first successfully used paper in the manufacture of buttons. Chas. D. Yale, an Englishman, first essayed to make paper buttons here, but was not very successful, and soon sold out his interest in the project. He attempted to make an eye or shank button, and imported his ideas on the subject, it is said, from across the Atlantic. Though he partially failed, that kind of button is now successfully made at the two button factories located in this town. Several persons followed Mr. Yale with varied fortunes; but to Judge E. M. Pomeroy is awarded the praise of success in this department of industry. This man, recently deceased, is described as remarkable for originality, independence and persevering purpose. He would never throughout his life, his friends say, take advantage of other men's inventions; but depend for success on his own powers. Twenty-nine years ago he conceived the idea of making common suspender or four-hole buttons from paper; and the purpose then formed was successfully executed, although he encountered obstacles which would have discouraged most men. His experiments involved much loss of time and money—he was several times burnt out; but perseverance finally brought him complete success, and he was repaid for all his losses, and found himself at one time worth some forty thousand dollars. We are told what rude hand implements were used by him at first—how he invented improved power machines—how he wrought day and night—how his funds were exhausted in experiments; but his hope and courage never abated.

THE TWO FACTORIES AND WHAT THEY MAKE.

The first factory visited is carried on by Humiston & Pomeroy. They employ ordinarily not more than half a dozen hands. They make paper buttons varying from twenty line to forty line, or from vest button size to overcoat size. They make some small buttons with eyes or shanks, but mostly holed buttons. They also manufacture "nail heads" of different sizes, used in trimming carriages, trunks, etc.

The other factory is a much larger establishment, and is carried on by Hall, Miller & Co., whose goods are stamped "Pomeroy Manufacturing Co.," after the style of the original firm. Here are employed at present twenty-eight hands, of whom the greater portion are women and girls. Here are made a great variety of paper buttons, and also several kinds of metal faced buttons; also gun wadding. The sales of this establishment the present year are estimated at twenty-five thousand dollars. On an average one hundred great gross of paper buttons, twenty-five of metal face, and ten gross of gilt face are made daily. About fifty tons of strawboard will be used the present year; 150 gallons a month of linseed oil; and two barrels per month of benzine. Both establishments manufacture their own boxes.

HOW PAPER BUTTONS ARE MADE.

The buttons are first cut out of common coarse strawboard of the proper thickness by power punches, which do the work with surprising rapidity, each cutting from five to eight hundred per minute. The buttons thus simply cut are placed in the hopper of a power press, which is ingeniously contrived to feed itself; a pipe leads from the hopper perpendicularly—revolving fingers keep this pipe filled—a single button is taken from the bottom of the pipe ere it reaches the bed of the press, and carried under a punch which presses it into the desired form, punches the required number of holes, and if desired stamps it with the name of the manufacturing firm

By the same operation the fibrous substance of the button is so compressed as to render it quite hard. The button then rises a few inches to meet a spring which throws it on a little shovel, which shovels it out of the way. All this is done with great rapidity. A single person will fill the hoppers, and tend half a dozen of these machines. The buttons are now made, and yet they can scarcely be called buttons—they still strike the eye as little circular pasteboards. They then receive a dry "tumbling" or "tomming," which separates the dust and smooths the rough edges. They are then further hardened, and at the same time colored, by being tumbled in a compound, of which linseed oil, benzine and lamp black are the main ingredients. ("Tumbling" is simply the process of revolving in a horizontal cylinder.) After becoming thus well saturated with the compounds, they are placed in a baking room and subjected to a high degree of temperature for at least twenty-four hours. In this operation there is great liability to fire. Only a few months ago Humiston & Pomeroy had several hundred dollars worth of buttons burned with the dry house; and the other firm has suffered several times in a similar manner. The tumbling and baking processes are repeated again and again. At the last tumbling the buttons are put into a Japan compound and come out well varnished.

The buttons are now completed and are ready for boxing and the market; and as they now appear, in shining brown or lustrous black, few of the uninitiated would ever guess they were made of plebian strawboard.

One of the tumbling machines in the factory first visited I must not omit to mention. In the first process of punching the strawboard often splits. These split buttons were formerly picked out by hand—a tedious operation. A "tumbler" invented by Mr. Humiston is so contrived as to sift out the split buttons, leaving the complete buttons by themselves. The buttons sometimes adhere to each other; and the same machine is made to separate the compound buttons from the single ones. This "tumbler" is so contrived that the planks of which it is made may be separated at any required distance, thus letting pass out of the cylinder dust, split buttons or single buttons, at the pleasure of the operator.

These paper buttons are said to be quite durable. Boiling in hot water, the manufacturers said, only made them harder. The demand for them is good, and their manufacture remunerative. Some difficulty is however experienced at present in obtaining material, and on this account the first named factory has had to stop a short time the present season.

The metal face buttons are composed of paper and tin, paper and iron, paper and brass, and bring higher prices, as the process of their manufacture is somewhat more complicated. Most of these metal face buttons have one-half the surface of metal; but sometimes the entire surface is metal, while the interior portion is of paper.

The manufacturers had not accurate statistics on hand, but both firms agreed in estimating that a ton of strawboard will make about 750 great gross of 27 line or suspender buttons, and as one firm stated used about 50 tons of strawboard per year, and the other 25 tons, I conclude that if their buttons average 27 line, they would together turn out annually ninety-seven millions and two hundred thousand (97,200,000) of these indispensable articles.

. If we were to consider all the useful applications of straw, and enter into the details of the manufacture of each, although interesting it would consume more time than would be willingly given to the subject this evening.

Such would involve the manufacture of *papier mache.*

The substitution of grass for bristles in the manufacture of brushes to a limited extent.

Of straw mats for testing the chemist's retorts.

Paper box manufacture from straw boards.

And a variety of ornamental fancy articles constituting quite an important trade in the aggregate.

Simply to show the importance of some of those little things which are hardly ever noticed, considering them too insignificant in value to estimate commercially, it may be mentioned that a former superintendent of the bar saloon at the Astor House, estimated that during five months of the year, three bunches a week of straws are consumed. These bunches contain 100 each, and cost 25 cents each. For 22 weeks 66 bunches would amount to $16. One thousand dollars a year would be a small estimate for the city of New York expended in one year for these straws.

Some one more curious may estimate the number of gallons which pass through these straws, and the amount of physical force, in horse powers, required to operate these pneumatic contrivances so as to elevate such a quantity of fluid the required height.

Dr. R. P. Stevens gave an interesting description of the curiosities he had met with during a late trip in Pennsylvania. He saw three vessels made of straw which were used to wash dishes in, and straw pans used in mixing bread; straw mats at the doors and straw roof on dwellings and barns. He was forcibly struck with the fact that these manufactures of straw continue almost unchanged from one age to another. Our Saxon forefathers made the same things that are made to-day by the Germans of Pennsylvana.

The following interesting article from *Harper's Magazine* was then presented:

STRAW BONNETS.

Among the minor branches of New England industry, one of the most interesting is the manufacture of straw bonnets. A distinguishing feature of this is, that it is to a great extent a "domestic manufacture" in the strictest sense of the phrase, a large part of the work being done by families at their own homes, and only the finishing part performed in large factories.

Straw bonnets and hats were originally made in Italy. The Italian, or, as they are more commonly called, the "Leghorn" hats, are made of slender straws from a species of bearded wheat, which is grown expressly for the hat manufacture. The straw is prepared in a manner similiar to that which will be described further on in this article. The making of these Leghorn hats gives employment to large numbers of the Italian peasantry, and an old convent, now and then, has to suffer transformation into a straw-hat establishment. It was not long before the Italian hat was adopted by the French, and a little over a hundred years ago it was introduced into England. This hat consisted of nothing more than an enormous circle of straw with a central skull-cap of the same material. It was, therefore, better fitted to receive the changes in form through which it was destined to pass than would have been the case if it had consisted of a more elaborate design. Many a chase after a blown-away hat induced the ladies to put their wits to work in order that they might put an end to the vexations which were caused them by their broad and flapping hat-brims. These they soon learned to fasten down upon the side with ribbons, thus forming the so-called "gipsy hat," and making the first approach to a bonnet. Various successful attempts were made to modify the native ugliness of this form of hat, but no radical change took place until about the year 1796, when, the hinder part of the brim proving troublesome, some woman of fashion in a fit of spleen cut it off. Thus a second advance was made toward the modern bonnet. As if this had been a signal for the overthrow of the then reigning fashions, numerous new shapes of hats or bonnets began to appear. From all these changes the legitimate bonnet came out triumphant, and, notwithstanding its protean character, despite its numerous alterations in size and shape, has retained the same essential characteristics ever since.

Let us commence our investigations of the straw bonnet manufacture among us by taking a glance at the manner of preparing the straw. By the time that day dedicated to All-Fools arrives, the rye, which has been sown, and even commenced its growth the fall before, covers the hill slopes with its verdure, in place of the just departed whiteness of the snow, and in June, being nearly out of the blossom, its slender stalks are ready for the sickle. The reaper is very careful to cut his straw at just the right time, for he has learned that a too early gathering produces shrivelled stalks, and a tardy reaping, brittle ones. Having been cut, tied in small bundles, and the loose straws shaken out, the stalks are laid upon a block, and loose their heads by the axe. The largest boiler to be obtained, the one used for scalding hogs the year before maybe, is now brought into requisition, set up perhaps in the field, filled with water, and a hot fire built under it. To this boiler the headless trunks are now brought. After a thorough scalding has removed much of their green sap, the bundles are undone, and the stalks are laid upon a grassy slope to dry, the butts being placed uppermost, in order that the moisture may not collect under the husks that spring up from every joint. Now the straw-maker is called upon to exercise even more watchfulness than the maker of hay; he observes every shower-betoken cloud, and carefully shields his straw from a particle of the rain, which would destroy its much prized clearness. After having turned it several times, and allowed it to lie out for about forty-eight hours, the straw is for the last time bundled up and placed under cover.

When it is desired to braid the straw, children are employed to cut it at the joints, and to take off the easily removed hulls which grow up from these. The smooth lengths of straw between these joints, are put into a boiler, and a second time submitted to the action of hot water. Even now the tortures of the poor disjointed and scalding straw are by no means ended, but, passing from bad to worse, it has to be placed in a basket, and exposed to that suffocating ordeal of brimstone smoke, which again and again, even after having been made into bonnets, it is doomed to pass through. It comes from the barrel or cupboard in which it has been fumigated far whiter than it went in, and is now ready, so far as color is concerned, for the braiding. The above is the process used if it is wished that the straw should be white; but if, on account of having been damaged in the drying perhaps, it is wished to color it, a kettle of dye stuff is substituted for the hot water and the bleaching is dispensed with.

After having been dampened, slit from end to end, and flattened out by being drawn over the back of the scissors, each straw is ready for what is technically termed "machining." The "machine" is rather a primitive affair, but little deserving the dignified name which it has received. The essential part of it is a series of sharp steel teeth inserted at regular distances on a slip of wood, over which the flattened straw is drawn. These teeth split the straw into a series of "splints," wider or narrower according to the distance between the teeth. There is a separate machine for each "number."

Much of the work heretofore has been done by children, and in the planting of the straw they continue to find scope for their industry. In this pursuit they were more especially employed to advantage in the early days of straw braiding, when to have a large family was rather a blessing than otherwise, since, with the high prices then given for braid, the children could frequently show as the results of their labor, many of the comforts and luxuries of the farmer's house. The braid may be formed of either single straws or of double ones, i. e., of two with their inner surfaces laid together. In the first instance, the polished outer face of the straw will alternate with the dull inner surface, forming the so-called "split straw" braid, and in the second case the braid will have the uniform, glossy appearance which characterizes the "Patent English Dunstable." We are speaking of domestic braids. There are foreign braids, as the "Canton," "Panama" and "Leghorn," which are made up of unsplit straws. From the number of strands used, the braid receives the names "seven," "eleven," "fifteen," etc., being the finer of course, for any definite width, in proportion as the strands are more numerous.

The braid is by no means yet ready for the sewer, but, having been bought up in its rough state by the braid collectors, it is turned over to those whom we may call the finishers. Having been tied in bundles, the braid is placed in a barrel and thoroughly washed. After having been partially dried, it is reeled, in order to bring it into loose and open skeins convenient for bleaching. The skeins are hung up while yet damp, in the smoke-house, and allowed to remain there during one "smoke." On the floor of the smoke-cupboard is placed a shallow vessel filled with pulverized brimstone. This is set on fire, and the cupboard tightly closed. The fumes of the burning sulphur (sulphurous acid) ascend to where the straw is hung, and bleach it. The cupboard is kept closed for ten hours or so, the fire, either from lack of fuel or air, goes out, and the straw has passed through one "smoke." After having been smoked, the braid is hung in the air, in order that the action of the sun may "take the yellow out" to a further extent. In a few hours it arrives at the desired whiteness and is ready for the trimming. This process was formerly performed by hand, and the poor and unbraided ends of straw were tiresomely cut off with shears. A slight improvement was made upon this manner of doing the business when a razor was used in the same operation, the blade being fixed, and the braid drawn under it. Of late years, however, a machine has been perfected by which one man can trim nearly four thousand yards of medium quality braid in a single day—an amount of work which it formerly required a good share of a week to perform. The braid, in passing through the machine, has been measured, and is now ready for being tied into the long flattish bundles, in which it remains until ready for use. These bundles contain braid of uniform style; for thus early in bonnet-making has the system of numbering goods commenced, and during all the processes described, the different qualities of braid are kept entirely distinct. The braid is now ready for the sewing.

There was a time when the manufacture of bonnets was a purely domestic affair. The straw was grown, prepared, braided, and sewed by the same family, and the bonnet stiffened with common starch, and ironed with a common flat. But as the days of homespun have passed away, so have these days of home-made bonnets. Although no great invention has been produced to mark a progressive leap in the manufacture of straw bonnets—although the machinery now used is simple, and not large in quantity, yet improvements have been gradually taking place, until now every operation has been so systematized that we have bonnet factories as truly as cotton factories—factories containing a great living machine, each portion of which has peculiar functions, and is fitted for certain parts of the work. These factories have particular localities where they are most fully developed, or perhaps it would be better to say, have a particular locality; for, aside from two establishments in Connecticut, and two or three in New York city, they are all confined to South-eastern Massachusetts. Here we find a dozen towns relying upon not quite a score of bonnet factories for their principal means of support—towns in which straw is queen as truly as cotton is king in many other of our manufacturing villages. Twelve thousand persons would be a fair estimate of the number employed by these establishments, and from these are sent away annually nearly eight million bonnets and hats.

The manufacture of straw bonnets is confined to this section of New England, because it was here that the American branch of the business originated. In 1798, Miss Betsey Metcalf of Providence, Rhode Island, now Mrs. Baker of West Dedham, Massachusetts, saw an imported Dunstable bonnet in a Providence store, and straightway wished one like it. Taking some oat stubble from a field where her father's laborers had been reaping, she split the straws with her thumb-nail, and made her first attempts at plaiting. After several failures she succeeded in imitating the braid of the admired affair in the shop, and made herself a bonnet. Thus the ingenious girl, only twelve years of age, acquired the honor of being the first American manufacturer of straw bonnets. She is now an old lady of seventy-eight, and still braids, having presented us with a specimen of her handiwork, a beautiful straw ornament, on a late visit to her. Many persons urged her to get a patent on her process of braiding; but being then, as now, quite tenacious of her reputation as a christian, she said *her* name should never go to Congress. A *fac-simile* of Mrs. Baker's first bonnet is preserved in the rooms of the Rhode Island Society for the Encouragement of Domestic Industry.

After braiding was once commenced, it rapidly developed itself. Mrs. Baker taught her friends, and they taught theirs. The ladies were delighted that they had found an art by means of which they might further adorn themselves. Braiding was carried to the school-room; the meetings of church sewing circles were transformed into braiding bees; ladies had their little straw bundles with them almost every where, and straw plaiting became, as it were, the crochet work of the day. The new invention suffered the common lot of all improvements, and was not without its enemies. By some it was thought to induce pride, and by others to be the precursor of famine, because it occasioned the cutting of the straw before the grain was ripe. Even as late as 1825, a Dr. Stanley wrote an "Essay on the Manufacture of Straw Bonnets," in which he laid all kinds of evil results at the door of straw braid, closing with some "moral, political, miscellaneous and concluding remarks." Notwithstanding so great an opposition to it, the majority of the ladies were in favor of the new art, and, of course, straw braiding daily increased in importance as a branch of manufacture. At first Mrs. Baker was a monopolist in the business, having orders sent her from forty miles away; afterward it became customary for the straw braiders to take the bonnets they had made to the village along with butter, eggs, etc., and exchange them for the various articles to be obtained at a country store. As the business increased, straw bonnet merchants became an institution; later still "sewing halls" were established, and these last have gradually grown into the large establishments of to-day.

Among all the "straw towns" of Massachusetts is a not very large yet quite enterprising one, in which straw bonnets are made to a far greater extent than in any other. Foxborough is a beautiful town, situated on the highlands between Massachusetts and Narraganset bays, twenty-four miles from Boston, and less than twenty miles from the original seat of the straw bonnet manufacture. There were formerly several bonnet factories here, but they are now all united in the "Union Straw Works," which were established by the Messrs. O. & E. P. Carpenter in 1853, and which constitute the largest manufactory of the kind in either this country or Europe. Some idea of its magnitude may be formed, when it is stated that the number employed in it (exclusive of braiders), is more than 3,000 (800 within and 2,500 outside the factory building), and that the value of its goods annually manufactured is two million dollars. Inasmuch as the immense business done here requires that every operation should be strictly systematized, we cannot better get an idea of the processes through which the braid goes in order to become a bonnet than by tracing its progress through this establishment.

Consider the writer as your guide, if you please—for it would not be easy to traverse this three and four story acre of rooms without one—and he will endeavor to answer all questions. The numerous "No Admittances" placed upon the doors of the establishment are not in this case meaningless, but with a permit from the office we may safely begin our perambulations without fear of ejectment.

We will commence our tour at the stock room. The counters along its sides are covered with piles of braid, nineteen-twentieths of which is imported. Here is some from Italy, here a lot from Switzerland, and near it some from Germany; France and England have their straw delegates here; South America sends her representatives to this congress of straws; and even the Chinaman introduces his member from the celestial empire. We hear the workmen who are arranging the braid use a mixture of geographical and other names as they talk of "Pedale," "Fancy Hair," "Manilla Split," "Patent," "Luton," "Argovia," "Florence," "Canton," "Milan," etc., and conjecture rightly that they are speaking of the members of this international assemblage of straws. A portion of the Canton braid is imported from China in the shape of large, ungainly hats, the flat sides of the braid being sewed together, and each hat containing material enough for several bonnets.

We will then pass to the next, the manufacturer's room. Here we are confronted by a long row of latticed bins, in which the braid is arranged, ready for the use of the "manufacturer;" or, in other words, the one who carries out the stock. In order to understand what is meant by "carrying out" as here used, it must be noticed that the building in which we have supposed ourselves to be is used for hardly anything else save the finishing up of the work, which is made ready for the finishing process in many a family throughout the region within twenty miles of the factory. To these families the braid is carried out, and after a week or so brought back in the shape of bonnets. Each "manufacturer" or stock-deliverer has in the room we are visiting his bin of braid; here he supplies himself with the little cloth tickets, or "numbers," to be used by the sewer, and with large skeins of a peculiar thread, which is made of Sea Island cotton expressly for the bonnet manufacture. Having loaded his covered wagon with all articles needed, and fastened a large bag for bonnets to the rack behind, he is ready for his departure for Attleborough, Dedham, Taunton, or some other one of the eighteen or twenty towns visited by the stock deliverers of the Union Straw Works, whither we will accompany him.

Arriving, after a few hours, at the scene of operations, the carriage is stopped at one of those story and a half houses so common in Massachusetts, and we alight. Entering the cottage, we find a home scene peculiar to this part of the country. From the youngest to the oldest all are engaged in the straw business. To be sure, the little one is not of much help, as she puts the straws in disorder, watches every motion of her sister, and bothers her with questions; but said sister, the girl of ten years, is quite useful as she sits on her cricket and braids her daily stint. The mother plies the needle merrily as she, with flying fingers, forms the tip, laps braid upon braid as she sews spirally around it, and makes a splice when necessary; while the old grandmother, nearly seventy, a somewhat slower worker, manages to make a bonnet in no way inferior to that of her young competitors. In the laps of the sewers sit plaster of Paris model blocks, the quite convenient substitutes for the paper patterns formerly used for regulating the shape of the growing bonnet. Upon these blocks the partially completed bonnet is frequently fitted, in order to see if it comes to the proper marks, and if it is "*made*" in the right shape without requiring to be pulled into it.

The driving up of the "straw cart," with its coat of arms, a bundle of rye painted upon the panel, has been the signal for the sewer to bring out her bonnets from their receptacle, and when we enter she has them all ready for delivery to our companion. He inspects them to see if the numbers denoting the size, style of braid and sewer, have been properly placed at the tip, having an eye also to the workmanship; gives credit on his book for the work done, and retires with his load to the cart for more stock. He does not effect his retreat, however, without being urged by the lady to give her the best and finest straw he has; for not only can she generally make more in sewing this, but with a lady's taste, she finds it much pleasanter to work on a fine article, which shall look nice when done, than upon a coarse affair which she would be ashamed to wear herself. Of course our friend, the stock deliverer, is bound to comply with her request, or at least to seem to do so, and to have all of his sewers for special favorites. Bringing in a few pieces of braid of twenty or sixty yards each, with a sufficient quantity of thread to sew it and numbers to match, he charges the same upon her book and starts for the door.

We have already reached the carriage, but he is not with us. Ah! he has turned back to put his head into the room and give the usual injunction, "Be sure and have the stitches short on the outside!" Thus he leaves the sewer, who will be in a continual worry until he makes his next appearance for fear that amidst the ever-changing fashions she shall next week have to commence work on a new block, just as she has become accustomed to the one in accordance with which she now makes her bonnets.

As we ride along with the stock deliverer on his visits to his "lady friends," he gives us some particulars concerning the sewing of the braid. We learn that it takes about three hours to sew twenty-five yards of medium width braid, the quantity required for a bonnet, but that the sewer is paid according to the number of yards she sews, without special reference to the number of bonnets made. By reference to a copy of the "Rules," which he has the kindness to show us, we find that the braid must not be sewed wet or damp (often transgressed), that the thread must be unwaxed and tightly drawn, that "back stitches" not exceeding half an inch in length are to be taken, and that clean hands while at work are insisted upon.

We have imagined ourselves to be in company with the stock deliverer. We have obtained a glimpse of the manner in which the straw is sewed, and since our purpose has thus been accomplished, let us avoid the tedious all-day ride, with its frequent halts, to which the stock deliverer is doomed, and, reversing the course of our journey, consider ourselves back again at the Union Straw Works.

We are in the receiving room, the place where the bonnets are deposited after coming from the hands of our late companion. Here let us take heed to our steps lest we trample upon the bonnets and hats which lie about loosely upon the floor seemingly in the greatest confusion. Bonnets of various colors, wholly regardless of general notions with regard to keeping the races distinct, seem to mingle in almost perfect disorder, while the white, black and copper-colored join hands in brotherly love. Workmen are engaged in sorting and registering the bonnets and placing them in racks. Order having thus been brought out of confusion, a part of the bonnets are sent to the dye-house, while yet another portion is forwarded by families and detachments over the miniature railway which connects this part of the factory with the rear, and are disembarked at the bleach house.

The passage way to the smoke house has its unpainted wooden walls strangely discolored, and the further we proceed the more intensely comes the smell of brimstone to our nostrils, but on entering the precincts we find merely several long alley-ways, with their sides made up to a great extent of doors opening into large smoke closets. Bleaching having been temporarily suspended, some of these closets are open: let us look into them. On the floor are shallow pots of brimstone; above these, and on both sides of the apartment, are six tiers of rope-bottomed, berth-like fixtures, which serve to give to these closets the appearance of double state-rooms on a steamer. The bleachers are quite likely fellows in white aprons, and quite obliging as they show us around and describe the *modus operandi* of their department. And yet, after they have fully described the process which the bonnet here goes through, a certain air of mystery still surrounds it. That the bonnets are smoked for several hours once at least, and often twice, is quite evident, but when we come to inquire what is done to them in a room near by where we notice certain dipping operations going on, we are put off with some talk about whitening the bonnets, 'acids,' 'alkalies,' etc., which leaves us as much in the dark on the subject as ever. Questioning still further as to the operations here performed, and the materials used, we are frankly told by the mystic mixture-man that he and his brother workmen alone understand the process; that the Union Straw Works cannot just yet afford to part with one of the secrets which renders their work famous; and that, furthermore, he has been placed under heavy bonds not to reveal it.

Having taken a hasty glance at the drying yard, where thousands of bonnets sun and air themselves on long rows of upright pegs, we will proceed "by rail," if we like, to the sizing room. We will not delay long at this point, for it will take us but a moment to comprehend the operation performed here, to notice the stiffening of the bonnets with a thin solution of glue. While one workman, the "dipper," baptizes bonnet after bonnet in the galvanized iron "font" before him, his official assistants wipe lightly off the glue drops which have collected, and the bonnets are passed through a receiving room to the blocking room above.

Up to this time, save perhaps when first coming from the hands of the sewers, the bonnets have been characterized by a shapelessness far removed from their final beauty. The mysterious dipping, the day's rest in the berths of the brimstone closet, and the gluey baptism have combinedly left them in such a condition that no one but a "straw man" would ever suppose it possible to transform such affairs into any sort of an article of dress, much less into a head covering for a lady.

But in the blocking room, which we now visit, the bonnet commences a steady approach towards its final shape. Beside the counter which surrounds the room stand numerous workmen, each with several plaster model blocks before him. On these blocks the still damp bonnets are fitted, not a little pulling and judicious pounding being sometimes required to get them into shape, this being especially the case when the sewer, in disobedience to her rules, has allowed a carelessly formed bonnet to pass. Having been made to come up to the prescribed mark upon the block, the bonnets are pinned there and set away upon numerous racks, placed over steam pipes, to dry. Afterward they are taken from the blocks and are ready for the next operation. This room being so uncomfortably warm, the thermometer standing at nearly 80 deg., we are quite willing to quit it and seek another.

The next in order is the press room. On entering this we find that we have, figuratively speaking, jumped out of the frying-pan into the fire, for if the blocking room was hot this is hotter. Coats and vests are discarded as burdensome, and, it being a fair day, every window is thrown open. If we investigate the cause of this heat we shall find that it proceeds principally from the hot flats used by the many workmen here engaged in pressing bonnets. "But where are the bonnets?" the reader exclaims, as he examines the partial view of one of the press rooms given above. In answer to this very natural question it may be well to notice here that the establishment which we are visiting, manufactures, in its triple set of apartments, not only bonnets but both ladies' and gentlemen's hats. Save that a different shaped block is used in each case, these three forms of head-covering are made in very similar manners. To such an extent, indeed, is this true that we have not hesitated to present engravings of rooms in the hat departments, when we could thus more conveniently and better illustrate our subject than by prohibiting our artist's camera from entering any apartments save those devoted to bonnets. In the press room we are called upon to particularly observe the minute division of labor which is made a specialty by the proprietors of this establishment, and which is everywhere noticeable in it. We see the bonnet, during the simple operation of pressing, passing through three different hands, the tip, head and front being pressed by different persons. So thoroughly, indeed, are these three processes separated that the "tip man" could no more perform the labor of those coming after him than the printer's imp could fill with dignity the editorial chair. In each operation the bonnet is placed upon a special wooden block, and pressed by means of a peculiar machine. The machines are similar, however, inasmuch as they all consist of a kind of turn-table, upon which the block is placed, and which moves under a flat of several pounds weight. This flat is pressed down upon the bonnet by the application of the foot to a lever, connecting by a rod with the top of the machine. This is the usual manner; heavy hand flats, with handles at each end, are sometimes substituted, however, and the bonnets pressed upon blocks which allow of but little turning. With surprising rapidity the experienced presser places the bonnet upon the block of his machine, lays the damp cloth over it to prevent scorching, stands upon one foot, brings his flat to bear with the other, with one hand gives a few revolutions to the turn-table, with the other guides the flat as it smoothes the bonnet, and then, with his portion of the work performed upon it, passes it on to undergo the next operation. Opening out of the press room, and separated from it by iron doors, is yet a hotter locality, the heating room, containing large furnaces in which numerous cubical pieces of iron are transformed into the red-hot cores used in the hollow pressing-flats.

We will follow the bonnet, now smooth and shining, to the wiring hall. This is the pleasantest room we have yet visited, not only from its situation, but also on account of its occupants. Heretofore, in our journey through the factory, we have met only with men, but in the wiring hall we are to find the other sex. Even before reaching it we know this to be the case, for through the halls leading to it we hear the music of female voices, and as we draw nearer recognize the patriotic strains of "Hail Columbia" Yes, the "girls" (as the female operatives are always called) are really singing! Let none of our precise crusty old manufacturers be horrified at the idea, and assert that the work cannot be half done when the mind is diverted from it by such "carryings on." Let any one of them examine the workmanship and see if it is not quite as good in quality as that which comes from the drudges under his supervision—those rightly-called "poor factory girls," who are by him debarred from thinking of anything from morning till night save the toilsome labor in which they are engaged. Having found, as he certainly will, that light heartedness and good work are not mortal enemies, let him relax the oppressive rules which have previously crushed out the vivacious spirit of his operatives, and hereafter act upon the principle that the knight of St. Crispin who whistles will make the best shoe. But this is no place for moralizing. The "girls" are seated in couples at peculiar work tables, upon which are stands for bonnets, and in which are drawers for wire, thread, &c. In this room the thread-covered wire is sewn, as a stiffening, around the edge of the bonnet; the paper lining, to prevent the goods from sticking together when packed, is stitched into the crown; and a fancy ticket for price marks, with "Superfine" at the top and the wirer's number at the bottom, is placed upon one side. During these processes, which are rapidly gone through with, the bonnet gets much out of shape, and has to be sent to another room for the purpose of receiving the final touch. Here, in the shaping room, it is placed upon a block, by a pinch here and a pull there has its symmetry restored to it, and is finally complete.

We now proceed to the packing room. Here it might be supposed that considerable asserting would be required before the price could be fixed to the goods, and they be made ready for sale and for shipment; but such is far from the truth. During the various processes of manufacture, from the braid to the bonnet, one grade of goods has been kept entirely distinct from the other; and as the completed bonnets come by hundreds and thousands into the packing room, "Lot 999" is just as distinct from "Lot 1000" as if one had been made in Boston, the other in New York. Everything, in fact, with regard to the manufacture of the goods, has been so systematized, through subdivisions of labor and through systems of accounts, that not only can the final cost of any class of goods be readily determined, but the cost of each individual bonnet can at once be ascertained to the fraction of a cent in any department where it may be found. But little else is required, then, in the packing room, than to show customers the goods, slip the bonnets into boxes from the large pile always in readiness, and send them off.

While in the packing room the sight-seeing reader could not but have been tempted to ask where so many boxes came from. Should he walk a short distance across the Common he would find, nearly buried in logs and boards, an old church, one in which the writer, many years ago, listened with childish impatience to long sermons, eat caraway, and slept. Having been more than doubled in size this old church is now a box manufactory, or, in the town parlance, the "steam mill." The congregation daily attending here consists of about thirty persons. Through the agency of these about a million feet of lumber is annually converted into forty thousand cases, and from seventy-five to a hundred tons of straw board meet with a change into bandboxes, all for the use of this single straw bonnet factory. Such are a part of the results that have grown out of little Betsy Metcalf's First American Straw Bonnet.

After selecting "the manufacture of salt" as the subject for the next discussion, the Association adjourned to December 1st.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
Dec. 1*st*, 1864.

Chairman, Prof. S. D. Tillman; Secretary, Mr. B. Garvey.

Dr. Parmalee exhibited a piece of Chinese wax used by shoemakers there. Its composition was carbon, 30; hydrogen, 36; oxygen 2. It melts at 160 degrees.

Dr. Parmalee also burnt a piece of magnesium wire, which gave an intensely brilliant light.

Mr. Jireh Bull said, since the last meeting, a distinguished inventor and a member of our Institute has died, and I have thought it proper that this Association should take some notice of that event, and I therefore offer the following resolution:

Resolved, That this Association deeply deplore the recent demise of C. C. Harrison, a member of the American Institute, and an eminent mechanician, whose labors and genius have been exclusively devoted to improvements in optical instruments.

After appropriate remarks regarding the character and services of Mr. Harrison, the resolution was unanimously adopted.

The Chairman read the following items of scientific intelligence:

INDIUM.

Reich and Richter, the discoverers of this new metal, have been engaged in determining its atomic weight. The mean of their experiments gives 37 as its number on the hydrogen scale.

PRIZE FOR ANALYSES.

The Imperial Society of Agriculture of France has offered a prize of 2,000 francs, to be given in 1867, for the best analyses of the following woods: Oak (heartwood), of the age of at least forty years; Ash, of the age of at least twenty-five years, the whole of the wood except the liber and the bark; Pine of the same age, and Poplar of the age of twenty years. Analyses of the same trees, five years old, are also to be made, with the view of comparing the composition of the wood at different ages. Specimens of the wood and of the principles obtained from them must be sent with each paper.

Mineral Waters.

Mr. Scoutetten, in a memoir to the French Academy of Sciences, "On Researches on mineral waters and the cause of their active properties," says these waters, on coming in contact with the electro-magnetic currents in the bosom of the earth, undergo a sort of allotropic condition, which does not last, unfortunately, when the water comes to the surface, but is gone in three days at most.

EXTRACTING AND PRESERVING AROMA.

Mr. C. R. C. Tichborne states in the *Chemical News* he has successfully used glycerine, not only for preserving flowers but for extracting their aromatic properties. Flowers preserved for two years in glycerine have yielded on distillation perfume equal to the most recent product. In cases where the aroma of the flower is so delicate as to be much injured or entirely destroyed by the application of heat, it may be macerated with glycerine, which should be expressed and again treated with flowers, until the recipient is thoroughly saturated with ottar. The extraction is perfect as evidently the glycerine has a great affinity for volatile oils. Fresh mint suspended over a thin stratum of glycerine imparts its odor in a short time to the fluid. The glycerine saturated with ottar is diluted with water and shaken with a small quantity of choloroform. After well agitating the latter subsides, carrying with it nearly the whole essential oil; it should be separated, filtered and allowed to evaporate spontaneously. In working on a large scale evaporation by artificial heat may be resorted to, the boiling point of the fluid being very low; the last portion, however, should be separated by spontaneous evaporation. The glycerine to be used should be odorless and have a specific gravity of 1 24 at 60 deg. F. The same glycerine may be employed over and over again by diluting and passing it through charcoal, and afterwards evaporating it to the desired gravity.

Haloid Salts of Copper.

Regnault has presented another paper to the French academy on these salts, in which he describes their photographic properties. The bromide of copper is the most sensitive to light, and the picture may be fixed by employing the ordinary hyposulphite with care. Iodide of copper is less sensitive to light, and the fluoride is the least so, of the series.

Alcohol from Coal Gas.

Berthelot, in his new work on Organic Synthesis, demolishes the proposition to make alcohol from coal gas. The process is shown to be very expensive and the article produced very impure.

Photosculpture.

This invention of Mr. Willème, a celebrated French sculptor, was explained at the recent meeting of the British association for the advancement of science, and a bust of the president, Sir Charles Lyell, made by the process, was exhibited. Photography furnishes a pattern by placing the sitter in the centre of 24 cameras, when 24 profiles are taken at once. The outlines thus secured are copied in clay in regular succession; the model being turned one-twenty-fourth part of a circle for each profile. The artist, having thus secured proportions true to nature, has still verge and scope enough for h s genius in giving to the model the proper expression and finish. The saving of time, both to the sitter and the artist, is the chief advantage of this process.

Electro-Ballistic Apparatus.

This apparatus, invented by Major Navez, of the Belgium Artillery, is now in use in England for determining the velocity of a projectile, or the rate at which a shot proceeds from the muzzle of a gun. The novelty of Major Navez consists in measuring, by means of electricity, the minute portion of the arc described by a pendulum during the passage of the projectile through a given space.

Directly in front of the gun to be fired, and ninety feet from it, is placed a screen, and in the same range, one hundred and fifty feet distant, is placed another screen, the two being sixty feet apart. In each of these screens are placed two wires, connected with a voltaic battery, so arranged that when the gun is discharged the wires will be cut and the electric current broken. The wires extend three or four hundred yards to the place where the measurement is to be made. The wires from the screen nearest to the gun make an electro-magnet of wrought iron, which attracts a piece of soft iron on the pendulum, and holds it at the extremity of its arc of oscillation. To this pendulum is connected another pendulum, or needle of soft iron, and, when free, swinging over a finely graduated arc, which is also of iron, and capable of being changed to a magnet. The wires of the second or most distant screen are connected with what the inventor calls "a conjunctor," and holds a weight which falls the instant the current is broken, and, by means of a cup of mercury, immediately completes another electric current which magnetizes the graduated arc. When the gun is fired the projectile cuts the first wire, and the pendulum proper drops, carrying with it the index pendulum or needle. The projectile cuts the second wire, and the arc becomes a magnet and instantly clamps the index needle to the scale. The operator then reads from the scale the distance traversed by the needle. A table has been prepared showing the time required for the pendulum to move through any distance to one hundred and fifty degrees. The time thus ascertained is divided into the distance between the two screens, and the result is the velocity of the projectile. By means of this ingenious contrivance a skillful operator is able to measure pretty accurately one three-thousandth part of a second.

Enormous Casting.

Messrs. J. M. Stanley & Co., of Midland works, Sheffield, have just cast an anvil twelve feet square and eleven feet, six inches deep, weighing 358,400 pounds; an anvil of the same dimensions was cast by them in July last.

Animal Manures.

Mr. Barral, in the *Journal of Practical Agriculture*, France, states that the manufactory at Aubervilliers consumes annually 8,000 horses, 200 donkeys, 300 cows, 300 pigs, 9,000 cats and dogs, 6,000 kilogrames of meat unfit for food, 500,000 kilogrames of other refuse animal matter, such as skins, horns, &c. The raw material is first boiled to extract the grease. The flesh is separated from the bones, pressed, dried, and ground into powder; the bones are also ground and mixed with it, forming a manure containing thirty-five per cent of nitrogen and fifty-five per cent of phosphate of lime. The blood and the liquor obtained in boiling, together with a certain amount of mineral phosphates, are mixed with organic matter, such as wood-shavings and the parings of hoofs and horns, when fermentation takes place. During this process various phosphoric compounds and salts of ammonia are formed, and the whole is transformed into an excellent manure.

Extracting Must.

Mr. Richter, of Stutgard, has applied the principle, long in use here, for drying clothes recently washed, to the extraction of the juice from grapes. He puts them into a suitable strainer, rotating at the rate of 1,000 or 1,500 times per minute, and by centrifugal force the must is separated. By this process the time of extracting the juice from one hundred weight of grapes is only five minutes, and the quality is increased five or six per cent. "Stalking" is thus obviated, and the juice is so thoroughly mixed with air that fermentation takes place sooner than after the old process.

Preservation of Fruit.

At the Russian court fruit is preserved by being packed in creosotized lime. The lime is slaked in water in which a little creosote has been dissolved, and is allowed to fall to powder. The bottom of a plain deal box is covered with it one inch high, and over it is a sheet of paper. Upon this the fruit, well selected and cleansed, is arranged; over this another sheet of paper, and on top of this another such stratum of prepared lime; in the corners a little finely powdered charcoal is put. The whole box is then filled in this manner, and the well-fitting lid nailed down. Fruit thus kept will remain intact at least one year.

Smedley & Justice's Indicator Funnell.

The peculiarity of this funnel is that it is so constructed as to prevent the waste usually made on filling barrels with liquids. It has been found of great service in pouring petroleum. In order to guide the workman the escaping air is made to operate a whistle. Thus the noise is always a guide as to what is going on within. Besides preventing all waste by its alarm whistle and float, which indicates that the barrel is filled to the required gauge, it is said one man can do the work of three men with the ordinary funnel.

The Geology of Petroleum.

Dr. R. P. Stevens said the subject of petroleum is becoming of such vast importance that we can hardly dwell upon the subject too long, or bring it too often before the community. It is the Alladin lamp, destined to illuminate the world.

In a few preliminary remarks I wish to correct some of the errors that occasionally find their way into the newspapers. In the first place, there are no Alleghany mountains in the State of New York nor in Ohio. The great Alleghany range of mountains pass through the State of Pennsylvania and cross the west branch of the Susquehanna river, and are then deflected northward. The eastern ridge dies out before it reaches the Hudson river.

If we travel westward in a direct line from the Hudson river, we go up and down a dozen or more rills and valleys, some of them 800 feet deep; at times we ascend from a valley, and the top of the hill looks like a mountain, but it is not. On the contrary, the ridges of land from Lake Ontario are but plateaus, and these plateaus extend from the Catskill mountains to the Tennesee river, in Georgia. On the north and northwest, streams cut through from the summit of the plateaus down to the level of the St. Lawrence. And here, on these plateaus, are the oil regions. All of these valleys are valleys of erosion. There are no upthrows, no downthrows, but throughout that great extent in every direction, as far as the eye can see when standing upon the summit, it appears to be still a vast plateau. In McKean county there is the longest remnant of the preserved plateau. It is 20 miles long, and 1½ miles nearly a dead level. The rocks lay in a succession of gentle waves. Writers in the sensation papers speak of this appearance as due to volcanic action. Such an idea simply shows that these writers do not know what they are talking about.

Some 15 years ago a geologist of Cleveland tabled all the rocks that contained petroleum. Only a few of these have been worked, and I will only speak of those that are a commercial success. The upper Helderberg limestone, which is seen at Kingston, appears on the upper surface of the soil in Madison county, and goes clear through New York, Canada, Wisconsin into Illinois. These rocks show petroleum, and as we come to Chicago it increases, so much so that it oozes out of the houses that are built with this material. The limestone is merely composed of granules of lime and sea shells and corals. The petroleum is in the cavities of the corals and shells, and from this fact some theorists have arrived at the conclusion that all petroleum is the result of a change in the coral animal. If they had taken the pains to examine that limestone a little further, they would find other shells there also, Now, I do not think that a coral animal is capable of making petroleum. I cannot conceive how a mere animal gluten can be made into an animal oil. This may be true, but I cannot comprehend it. Another rock seen here is the Marcellus shale, and the theory is that all the petroleum in the United States is derived from this bituminous shale, and when fractured this oil comes through it at Oil Creek and elsewhere throughout the United States. My objection to this theory is that the coat is too short for the person it is intended to fit, as this shale does not extend all over the United States. It is not found in Ohio nor in Kentucky, Illinois and West Virginia. The Helderberg is from 40 to 200 feet thick; the Marcellus about 200 feet, and the Hamilton group is about 1,000 feet thick, and there are no bituminous shales in it. It is full of fossils, and the sea must have been full of animal life at that period when it was formed. There are certain strata commencing with the Catskill mountains, and which pass across the State of New York, containing the same species of shell which can be detected at once. This is so clear that a man might be let out of a balloon and he would immediately detect them at sight. I have myself been astonished to discover them in places where I would hardly expect to find them, sometimes 40 and 50 miles apart. The oil lately discovered at Rushville and at Seneca lake, and along Mud creek in Ontario county, are all of this group. They are undoubtedly of the Hamilton group. The Hamilton group goes down as far as Schoharie county and passes through about the centre of the inland lakes and through Canada over to the edge of Lake Michigan. The wells of Canada are also in the Hamilton or Marcellus group. Probably the well that has lately been discovered at Zanesville, Ohio, is of this group. The mountains at Catskill are over 2,000 feet thick by actual measurement, and we are not able to determine where the Hamilton group changes into the next group or the Portage. This is about 1,700 feet thick. Any one who has traveled on the Buffalo and Erie railroad, and looked out while crossing the high bridge at the cliffs and falls at Portage, on the Genesee river, has seen the Portage group of rocks. This group has no great number of gas or oil springs; but at Cuba there is an oil spring that has been known since the earliest settlement of our country.

The Chemung group comes next in order. (Here the Dr. made a transverse section on the blackboard, which represented the abrasion made by the waters of Oil Creek flowing southward.) Now at Oil Creek they bore 400 or 500 feet, and strike the third series of sand stone, and that sand stone must be near the junction of the Chemung and Portage groups. Somewhere near the upper portion of the rock upon the Chemung, in the State of Pennsylvania, comes in the Catskill group. This group of rocks is 5,000 feet thick. Those who have travelled on the central railroad west of Altoona by day, may have noticed the rocks turned up edgeways. These are the Chemung and Catskill groups. We next, on the south of the Appalachian mountains, come to the sub-carboniferous group, which is 3,300 feet thick, and on the top of this comes the true coal, 15,000 feet thick. From the limestone to the top of the coal, every portion of it is really a petroleum-bearing rock; and I have no doubt but that throughout the whole extent of the geological group alluded to oil will be found in abundance, so that we can go to other places besides Oil Creek to buy oil lands. At Oil Creek there have been some 2,000 wells sunk, and the region has been better developed than any other, and that is all the advantage which it possesses. Suppose that the first well sunk there had been a failure, no one would think of sinking another.

And now as to the theory of oil. I have had considerable experience with coal, and I can say that I never detected the least smell of petroleum in any coal mine. A theory has been advanced that oil is derived from the combination of the atoms of hydrogen and carbon in the higher forms of vegetable organisms that lived in previous ages of the world and flourished when these rocks were deposited; and I believe this to be the true theory. For instance, we can go into the coal mines of Ohio and there find fishes without a fin or scale wanting, and all the bones and skin will be petrified, but all the animal parts are bituminized. I brought down with me from Oil Creek a specimen of one of these series of rocks that extend across the great basin of the United States, and which is composed of what I suppose to be the organic part of plants. I have seen trees of this kind of plant, many hundred specimens of them. I have sent some to the State collection at Albany this summer. Our scientific men have already examined some fifty species of animals, plants, insects and reptiles.

Another theory has lately been broached and which has much plausibility, and that is, that the vast amount of limestone of the Silurian and lower Devonian systems throws off carbonic acid gas, which ascending, meets with water percolating from above, the gas parts with a definite proportion of its carbon, which unites with a definite proportion of hydrogen from the water, and consequently we have a hydro-carbon or *petroleum.*

To this theory there are the following physical objections: Between the limestone series of rocks and the most prolific of the oil-bearing rocks there are many hundred feet, nay thousands of feet of clay deposits, or shale rocks, which are impermeable to gas; and we have yet to see how gases can come up at least 5 or 6,000 feet, and finally meet with water at the surface and make that hydro-carbon we call rock oil. I am inclined to the opinion that the oil was formed about the time that these rocks were laid down, probably a little later, through all the series of oil strata. We have the Permian series, succeeding the coal formation, which also bears oil; then succeeds the red sand stone of New Jersey, and on the top of this comes in the cretaceous, and on the top of this comes the tertiary in which petroleum is found in California, but in other places it is found in the cretaceous. I have here also some specimens collected during the summer. This is a slate that is bitumenized, so much so as to burn (Dr. Stevens here lighted a piece of this slate). When this bitumenized slate is distilled it yields an oil. I do not think there is anything mysterious in the origin of rock oil. Whenever animals and vegetables began to live, in the sea or on the land, or both, the elements of oil were then combined in higher forms by the power of vital chemistry, than simple atoms of carbon and hydrogen. When these combinations were broken up by the death and decay of the animal or plant, the ever-varying and inconstant atoms could then come together in other proportions, forming, as the case might be, coal, peat, bog-butter, bitumen, petroleum or gas.

Oil, then, is not confined to any one series of rocks, nor any specific strata, but may be found in any rock which had the necessary conditions at the time of its formation.

Prof. Fleury read a short paper on petroleum, after which it was decided to commence the discussion of "the manufacture of salt" at the next meeting. Adjourned.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
Dec. 8th 1864.

Prof. S. D. Tillman presiding. Mr. B. Garvey, Secretary.

F. W. Geissenhainer, Esq., exhibited a specimen of silver ore from Tego mine, at Rosario, in the State of Sinola, Mexico, about sixty miles in the interior from Mazatlan. The analysis shows over 1,900 dollars to the ton. This mine has been worked over 130 years, and has, during that time, produced over thirty millions of dollars. It is now producing over thirty thousand dollars per month, although worked with old and very imperfect machinery. The ore is a mixture of limestone, quartz, and the chloride of silver, with small portions of antimony and arsenic.

THE MANUFACTURE OF SALT.

The Chairman said, as an appropriate introduction of the subject to be discussed, he would direct attention to an immense specimen of rock salt from the island of St. Domingo. It was taken from a large salt deposit found in a mountain. The right to mine for salt has been purchased by an American company. They have recently issued a pamphlet containing interesting statements regarding the locality.

TURKS ISLAND SALT.

Mr. Jireh Bull desired to make a few remarks in reference to Turks Island. He recently met an old friend who, many years ago, was supercargo of a vessel trading to various parts of the West Indies. In one of his voyages he went to Turks Island, and he described to me the manner in which the salt is made. It is the common impression that the salt is made from the sea water, and that advantage was taken of the flow of the tides, &c., for this purpose. But their method of making salt at that time was very different. It was done by excavations. The land there is very flat, and they dig down and put boards at the sides. When this is completed the water rises in the opening, which, after remaining some time, crystalizes, and the salt is then raked out and carried to the shore, where it is piled in immense heaps, some containing sixty and eighty thousand bushels. A large leaf grown on the island is placed over the heaps, and the salt remains there until exported. The manner in which the salt is placed on ship board is peculiar. The natives of the island carry it in small boats to the vessels, as they have no docks there, and so the vessel has to lay out from the shore. The salt was, at that time, sold for eight cents a bushel.

Mr. Bull then read, from the *New York Evening Post,* the following account of the

SALT SPRINGS OF NEW YORK.

THEIR HISTORY AND PRESENT CONDITION.

The Onondaga Salines belong to a geological formation extending through western New York and probably into Upper Canada. Salt can be obtained from springs here and there in different counties, but in the Onondaga valley it appears to be most abundant. This is apparently due to the formation of the valley. A stratum of rock cropping out at the north of Onondaga lake underlies the valley, making a tight floor for retaining the water. Above is drift highly charged with salt, and roofed over with an aluminous marl. It is probable that the deposit of salt exists also in the neighboring hills, and is dissolved by subterranean currents of water and conveyed into the valley.

The question has been mooted whether there was a liability of failure in the supply of water, or of deterioration in quality. So far as experiments demonstrate there is none. Mr. Clark, author of the "History of Onondaga County," asserts that the strength of the brine has actually increased about twenty-five per cent. It is supposed that all the salt wells which have been dug in the Salt Reservation communicate with each other, and measurements have been made, year by year, to ascertain the reduction made in the volume or depth of water by pumping. The result has shown that in those years when most water had been taken out and most salt manufactured, the water in the salt wells exhibited no more signs of having been lowered in depth, volume or quantity, than when less water was used. It is a fair inference, therefore, that more salt can be produced here for market in any year than has ever been manufactured from these reservoirs.

REGULATIONS OF THE SALINES.

The salt water on the Onondaga Reservation in and about Syracuse is the property of the State. Prior to the year 1797 any person was free to take it for manufacturing purposes. But the squabbles about the right of first occupation operated prejudicially; those persons who had "squatted" on the grounds immediately circumjacent would not permit new comers to cross over them to obtain water from the springs. Mr. James Geddes, afterwards so well known in connection with the history of the Erie canal, was obliged, to avoid quarrel, to establish his works elsewhere.

In 1797 a law was passed creating the office of superintendent of the Salt Springs, and imposing a tax of three cents on every bushel of salt manufactured and sold. The reservation was laid out in lots, and the manufacturers permitted to occupy them free of rent. Those salt works first in operation had the prior right to the water, and the other manufacturers after them in turn. Subsequently, in 1808, the owners of salt works at Geddes were permitted, on the same conditions, to convey salt water from Salina to that village. Syracuse, at that time, existed only in the vivid imagination of such men as Joshua Forman, then member of Congress, who foresaw a city in the almost impassable swamp, and an immense commerce to be carried on there by means of an aqueduct or trench.

The tax on salt was raised to twelve and a half cents per bushel in 1817, and the revenue derived from it was placed in the canal fund. In 1836 it was reduced to six cents, and in 1846 to one cent per bushel.

In 1825 further legislation was had upon the subject of priority of right to the salt water; and it was finally adjudicated by Judge E. T. Throop, by including the manufacturers in twenty-three classes, and allowing them the water in the order of their numbers, from one to twenty-three.

In 1841 the Legislature passed an act to prevent combinations or conspiracies for the purpose of limiting the production of salt or enhancing its price. The penalty was forfeiture of right to the use of the water. This has since been repealed, and all efforts to procure its re-enactment have failed. From 1852 till 1857 a salt-buying company was formed outside of the manufacturing companies, to purchase the salt and forward it to market. During these years salt rose from one dollar to one dollar and forty cents a bushel.

In 1857 the superintendent was directed by a resolution of the Legislature to prepare a bill which should embrace all the provisions of the laws in existence relative to the management of the salt springs, which were deemed necessary for the encouragement of the manufacture, etc. Such a bill was drafted, and in 1859 was duly enacted by the Legislature. It abolished "priority of right," so far as the manufactories in operation were concerned, applying it only to those who might erect works at a future period.

THE ONONDAGA SALT COMPANY.

The Onondaga Salt Company was then organized for ten years under the provisions of the general manufacturing law, for the purpose of reducing the business of manufacturing salt to a system, and producing it in quantities equivalent to the demand for it in the market.

The manufacturers desirous of combining their interests, began by appointing persons to appraise their property employed in the business. The aggregate valuation was $3,200,000. On this amount an assessment of five per cent. was levied, making a capital of $160,000, for the operations of the Salt Company. The manufacturers were allowed to take the stock in the ratio of the valuation of their salt property. Most of them did so, but Mr. George Geddes and one or two others, not considering the enterprise a safe one, did not take part in it.

The Onondaga Salt Company engaged to pay each proprietor of salt works twelve and a half per cent. annually on the valuation of his property, making in all $400,000; also to furnish fuel at cost prices for the manufacturer, and a market for what salt he makes. Each manufacturer only runs such of his works as the Salt Company may direct, year by year; it being the object to accumulate no more salt than can be sold at a profit.

The company proceeded to invest $100,000 in real estate in Chicago, and about $30,000 more at Buffalo, for the purpose of store houses and docks at those places. This investment has been successful; the salt manufacturers of Michigan never having been able since that time to obtain a foothold in Chicago, there to share or monopolize the trade of the West. The sum of $40,000 was also expended for the purchase of an interest in one of the mines belonging to the Morris Coal Company in Pennsylvania, and for buildings, roads, shutes and trestle-work for mining purposes. The capital of the Salt Company having thus been exhausted, a resolution was adopted some months since to increase it to $320,000, which went into effect in April last.

In March, 1860, the company began business, having on hand a large stock of unsold salt which had been made the previous year. This had to be disposed of before new salt, in any remunerative quantities, could get into the market. When the company, at the close of the season, balanced its accounts, it found itself unable to meet its engagements to pay the $400,000—twelve and a half per cent.—to the owners of salt manufactories.

In 1861 the company reaped a golden harvest. The salt works of West

Virginia were destroyed, giving New York their market. The salt then inspected amounted to 7,200,391 bushels. The liabilities of 1860 were paid off, $400,000 divided among the manufacturers, and a dividend of 40 per cent. on the capital of $160,000.

The next year prices were still higher, and 9,053,874 bushels were sold. The Salt Company paid $400,000 to the owners of the manufactories, and divided 237½ per cent. upon the capital of $160,000.

In 1863, apprehending that salt from West Virginia, Michigan, and other sources might come upon the market, the company directed the manufacturers to reduce the quantity of salt for the season. But this order was subsequently modified, and 7,942,383 bushels of salt were inspected. The company, after paying $400,000 to the proprietors, divided $304,000—190 per cent. upon their capital.

Thus, during the last three years the enormous amount of 24,196,648 bushels of salt has been manufactured at the Onondaga Reservation; for which the manufacturers have received $61,200,000; and then again, in the capacity of stockholders in the Salt Company, have realized in addition $748,000.

The following quantities of salt have been received at this port from Syracuse during the present year:

RETURNED BY WEEKS.

2d week	in May,	pounds	....	3,316,300
3d "	"	"	....	871,000
4th "	"	"	....	1,277,100
1st "	June,	"	....	420,300
2d "	"	"	....	1,703,400
3d "	"	"	....	1,997,700
4th "	July,	"	....	874,200

Making 196,240 bushels.

The revenue derived by the State from these springs—one cent per bushel—amounted, for the last three years, to $241,966.48, of which about $125,000 has been expended for salaries of officers at the springs and carrying on the works. There were efforts made in the Legislature in 1860, 1862, 1863 and 1864 to procure an increase of the duty, but they were unavailing.

The salt manufacturers assert before the legislative committees that their recent prosperity has been due to their control of the market by the destruction of the Kanawha salt works, and their facilities by their combination to procure fuel at lower prices, to be employed in their manufacture. They insist, further, that when the rebellion shall have been suppressed, West Virginia and the salt works of Southern Ohio must obtain the market in the valley of the Ohio, and that the manufacturers of Michigan will be able to divide if not to monopolize the north-western trade. It should be remarked, however, that proposals from Hocking Valley in Ohio, and Saginaw in Michigan, to divide the Western States into districts, one for each company to occupy without competition, were refused. Whether the apprehension of losing the western market will induce the Onondaga manufacturers, at a future day, to accede to such an arrangement, we cannot tell.

Analysis and Manufacture of Salt.

Prof. Joy, of Columbia college, exhibited the constituents of common salt, sodium and chlorine. He said, to make 100 parts of common salt, it requires 39.32 of the metal sodium and 60.68 of chlorine gas. Sodium is lighter than water and swims on it. It has a metallic lustre, and rusts very rapidly, so that it has to be kept under naptha. If water was used, it would take the oxygen from the water. In reference to the manufacture of salt, there are three different methods employed. The first is by evaporation of the salt water of the ocean. This method is pursued principally in France. There are some thirty of these manufactories there. The custom is to take the water from the salt marshes at high tide and overflow some thousands of acres, and then allow the evaporation to take place in the open air. Of course the evaporation is delayed by rain, which, when excessive, they draw the water off and evaporate by fire. Although the water of the ocean contains but two and a half per cent. of salt, yet there are other products arising from its manufacture that makes the process economical. The same process is pursued in Germany.

The second method of making salt is that adopted near the city of Cracow. The salt mines there were discovered in 1251. The mines have been traced twelve miles in length, and 1,200 feet thick. The salt in the mines is not pure, so they dissolve it and pump it up. The same process is pursued at Haller, where a peculiar tribe called "Wens," have the monopoly of working the mines. At these mines you enter them on the top of a mountain and come up in a valley, and you are ferried over several salt lakes, which are found here and there flowing over their crystal beds. They have a very curious way of going into the mines; it is very characteristic. When you wish to descend you enter a building at the top of the mines, where you are furnished with a leather apron, which you proceed to put on, as a blacksmith would, before you, but that is not the way, as you are told to put the apron behind, and you slide with this under you down an inclined plain into the mine, holding on to a rope, while your hands are covered with gloves to prevent the skin from being torn off.

The third method of making salt is from brine, and that is the method pursued in this country. The water is put into large pans, and allowed to evaporate: the salt is then formed in small crystals, which are raked out, and the pans filled again.

The method adopted for evaporating the salt water in Germany is called graduation, which consists of an immense pile of twigs hundreds of feet high. The water is pumped to the top of this and let trickle down, which evaporates the water very rapidly. If the wind is strong the evaporation is increased from three to four per cent. In time, however, these twigs become coated with gypsum.

Soda ash is largely manufactured from salt. In 1852 England produced 3,000 tons. They also manufacture 400 tons of bleaching soda every week. There are at least 10,000 workmen engaged in that manufacture there. In the manufacture of sulphuric acid they now obtain their sulphur from iron pyrites, while in this country we make it from sulphur. The manufacture of soda ash from salt, in England, is very extensive, but here, owing to the higher price obtained for the salt, very little is made into soda ash.

Prof. Englehardt, of St. Xavier College, said the new method adopted for evaporating the brine is to put it into large kettles, in the centre of which an iron handle is placed, and the sulphate of lime in the brine settles on this iron. When the brine is evaporated, the bromide of calcium, chloride of magnesium, &c., adulterate the salt. The manufactory where the salt is made has two rows of kettles, 50 on each side, and these 100 kettles are all heated by the one fire; formerly wood was used but they now burn coal. Those nearest the fire are evaporated first; when the solution is sufficiently concentrated it is removed to a large wooden building and kept there. This salt will always become moist on exposure to the atmosphere, because it contains chlorides of calcium and magnesium. To remove these some thirty or forty bushels of the salt is put into a vat, and to which is added a saturated solution of salt and water; the whole is then stirred up, after which the carbonate of soda is mixed through it, when the chlorine will unite with the sodium of the carbonate and form chloride of sodium, thus increasing the quantity of salt, while the chlorides of magnesium, &c., called bitterns are converted into carbonates.

The iron is removed from the salt before it is put into the kettles. The brine is placed into large wooden vats, and allowed to stand for several days; a certain amount of lime is added to it, when the lime precipitates the iron. If there is too much lime the chloride of lime will be formed.

Solar salt is much purer than that made by evaporating by fire. The tanks for solar evaporation are from eight to twelve feet square and six inches deep. They are filled with brine during the winter and allowed to stand covered till Spring, when they are uncovered and evaporation takes place by solar heat.

Prof. Englehardt illustrated his remarks by a series of formulas on the blackboard, giving in detail the constituents of the salts in their various combinations.

The Chairman said it might be interesting to know the comparative strength of the brines found in various parts of the United States. The following table was prepared by the late Dr. Beck of Albany. To make one bushel (56 lbs.) of salt requires

Of sea water from	300 to 350	gallons.
Connemaugh, Penn. brine	300	do
Shawneetown, Ill. brine	280	do
Jackson, O. brine	213	do
Lockhart, Miss. brine	180	do
Zanesville, O	95	do
Grand River, Ark	80	do
Kanawha, Va	75	do
Montezuma, O	70	do
Grand Rapids, Mich	50	do
Muskingum, O	50	do
Montezuma, N. Y	50	do
Onondaga, old wells	45	do
Onondaga, new wells	35	do

The new wells on Saginaw bay are said to yield as strong brine as those of Onondaga.

Dr. Richards remarked that the salt works on Saginaw bay which promised so much, are not now in operation. During a late visit to that section of the country he had made inquiries as to the causes which led to closing of these salt manufactories. He was informed that the high price of labor, and the high price of lumber had effected the change. It was found more profitable now to cut down the immense pine forests around Saginaw bay, and saw the timber for the markets on Lake Michigan, and to supply these markets required all the manual labor that could be obtained.

The Dew-point.

The Chairman said he was about to introduce to the audience Prof. William Baer of Maryland, who would speak on the influence of the Dew-point. As that gentleman's remarks will be made on the assumption that the subject in its general bearings is understood, and as there may be some present who have not made themselves familiar with this branch of Meteorology, he would present a few preliminary facts.

The atmosphere has the power of holding a certain amount of the vapor of water, which is proportioned to the temperature of the air. The warmer the air, the more vapor it may contain. But for each degree of temperature there is a limit beyond which the amount of vapor in the air cannot be increased. The air being saturated with moisture at a given temperature cannot be cooled without parting with a portion of this vapor in the form of dew. This point of saturation for a given temperature is called the Dew-point.

The capacity of air for holding moisture may be seen by the following table:

A cubic foot of air weighs				....	538.1	grains
At 100 degrees Fahrenheit it will hold, of water				...	19.12	do
90	do	do	do	...	14.38	do
80	do	do	do	...	10.73	do
70	do	do	do	...	7.94	do
60	do	do	do	...	5.82	do
50	do	do	do	...	4.24	do
40	do	do	do	...	3.06	do
32	do	do	do	...	2.35	do

From this table it will be seen that the air at 60 degrees will hold a little more than twice as much vapor of water as it will at 32 degrees, the melting point of ice. Air at 80 degrees will hold nearly twice as much vapor as air at 60 degrees. Air at 100 degrees will hold nearly twice as much vapor as at 80 degrees, and eight times as much vapor when at 32 degrees.

Estimating by bulk, the vapor contained in a given quantity of air at 32 deg. F. is 1-160; at 59 deg. 1-80; at 86 deg. 1-40; at 113 deg. 1-20. The tension of aqueous vapor computed from the experiments of Regnault, and expressed in inches of mercury is at 32 deg. Fah. 0.181; at 40 deg. 0.2475; at 50 deg. 0.3607; at 60 deg. 0.5178; at 70 deg. 0.7327; at 80 deg. 1.0227; at 90 deg. 1.4088; at 100 deg. 1.917 inches. By means of a complete table of this kind, the degree of atmospheric saturation at the time of an observation may be calculated. Suppose the temperature of the air is at 80 deg Fah., and the dew-point, that is, the point at which the air is saturated and dew begins to be formed is 70 deg., and that the saturating point at 80 deg. be called 1000. Then as the quantity of vapor is directly as the tension, we have by proportion—1.0227 : 0.7327 :: 1000 : x, or x=716.

Practically, however, it is easier to find the dew point by measuring the rate of evaporation at the time of the observation of temperature. This is done by means of the wet bulb hygrometer, which consists of two thermometers, both of which are covered with muslin and one is kept constantly moist by means of capillary attraction—a few cotton fibers being connected with the muslin and water in a separate vessel. The rate of evaporation and consequently the depression of temperature of the moistened bulb will be greater in proportion as the atmosphere is further removed from its point of saturation. By means of prepared tables the dew point is calculated from these observations.

The gentleman to address us this evening is a man of great experience, having reached his seventy-eighth year. He has for more than thirty years made regular meteorological observations, and he is one of the valuable corps of observers who furnish reports of the weather for the Smithsonian Institute at Washington. His views may be regarded by some as ultra, but they will doubtless have the effect of directing our attention to really important points which have hitherto been overlooked.

Prof. Baer remarked,—There was no law in nature which is more important than that belonging to the dew point. What is meant by the dew point is the relative amount of water, or moisture, in the atmosphere. No manufacturer of iron can make a uniform quality without taking into consideration the dew point; in fact every branch of manufacture is affected by it. Oxygen being a supporter of life, it becomes necessary that we should know its purity, that is when the atoms of the air which consists of oxygen and nitrogen in the proportion of about 21 volumes of oxygen to 79 of nitrogen. When these gases are disseminated, or fill up the interstices of vapor, of water, in breathing which a large amount of vapor is taken into the lungs that requires considerable effort of the system to get rid of, and air thus saturated with moisture is rendered impure. And in the case of the bloom-maker or blacksmith who wishes to make iron of a certain quality, and as a certain amount of oxygen is required for the fires, a south-east wind coming up laden with moisture, and which holds the oxygen in solution, a very great amount of heat will be needed to get this oxygen out of the moist atmosphere; and a No. 1 iron cannot be made; it will range somewhere about the quality of No. 4, or grey iron. As no more air than the bellows is capable of furnishing can pass into the fire; and this air being largely saturated with moisture which a large part of the heat is employed in dispelling, an indifferent quality of iron will necessarily be the result. We see here how important the dew point becomes in this extensive branch of manufacture. He had watched this matter very closely where he lived, as the iron furnaces were about a mile from his residence. He found that the month of June is generally a time when the dew point is high, and during that month three bellows are required where with a different atmosphere but one would be necessary. It was an impossibility to make good iron when the thermometer is at 90 degrees and the dew point at 80. At the Glass works where wood is used, which absorbs moisture, and with a northeast or a southeast wind, good glass could not be made, but it would have all the colors of the rainbow in it. When jellies are made at a high dew point, in 99 cases out of 100 they will become sour or mildew. So in breathing a moist atmosphere, instead of inhaling 527 cubic inches of air, but 421 are received, and in that moist atmosphere there is heat that must be got rid of by the lungs. To preserve health during the prevalence of such an atmosphere, a less quantity of food should be eaten. The bi-carbonate of soda would neutralize much of the ill-effects arising from this cause. Acetic acid is also very valuable. He rubbed down the legs of dogs with this acid when they were very tired after being out hunting, and its effect was such that the animals would immediately revive and continue on in the chase for hours after.

In the case of sun-stroke, he believed that the dew point was more the cause of it than the heat. He noticed that with the thermometer at 112 degrees and the dew point at 75, there would be no sun-stroke cases recorded; but if on the next day the thermometer should fall to 90 degrees and the dew point at 80, sun-strokes would be very frequent. When the dew point is high, vegetation will thrive, but man will sink. The stomach is the same as a furnace. If a steam boiler is out of order, the whole machinery will be the same. So in breathing an atmosphere that requires a strong effort of nature to obtain from it what is essential to support life, and in this effort heat is evolved to such an extent as to produce general lassitude, then the boiler is out of order. Much excitement prevailed at one time in this city in regard to what was termed swill-milk. Considerable of the evil, in this case, might be traced at times to the hygrometric state of the atmosphere, as, with the thermometer at 80 and a high dew point, the milk would be found to be in a state of putrefaction. It would not make butter; the cow is then unhealthy; as the dew point goes up, down goes the stomach.

At New Orleans the dew point rises highest, but let it go down to 60, and cholera will instantly disappear. If flowers are planted on a hill, some facing the southeast and others the northwest, it will be found that those flowers facing the southeast will bloom ten to fourteen days before the others. Fruit will also be found best on that part of the tree facing the southeast. When bread is made with the dew point at 80 and the temperature at 90 degrees, an acid is produced which prevents the bread being baked in the center; the water will not be evaporated; complaint will be made of the oven, yeast, fire, &c., but the true cause is the dew point. Flour should be ground, every grain, and not mashed; if it is not properly ground, it will ferment.

Prof. Baer continued his remarks to a late hour, and no time remained for a reply to some of his questionable deductions. The audience, however, were agreeably entertained, and at the close a resolution of thanks to speaker was passed.

"The cause of the impurity of our city atmosphere," was selected as the subject for the next meeting. Adjourned.

American Institute Polytechnic Association,
December 15, 1864.

Prof. S. D. Tillman, presiding; B. Garvey, secretary.

The Chairman read the following interesting items relating to science and art:

Production of Ice.

A description of Mr. A. C. Kirke's machine for producing cold by the expansion of air, was read before the Chemical Section of the British Association for the Advancement of Science. The method employed is to alternately compress and expand air in receivers; that holding the expanded air being surrounded by the liquid to be cooled; the other containing compressed air being surrounded with flowing water for the purpose of keeping it cool. The same air is used over and over again, a wire gauze respirator or regenerator being employed to equalize the temperature in its passage downward and backward between the two cylinders. The machines move day and night without intermission, and with the power from one ton of coal one ton of ice is made. It is superior to the ether machine in which there is an unavoidable loss from the escape of ether.

This item reminded Mr. Bartlett that a friend of his in Washington had used compressed air for cooling water, but not understanding the difference between the intensity and the quantity of heat, he failed in operating on a large scale. He found how easy it was to cool the mercury in his thermometer, but how more difficult to cool a large quantity of water.

Mr. T. D. Stetson said there was a fine machine in this city for freezing water, but it was found not to be economical.

No Nitrogen in Steel.

At the November meeting of the London Chemical Society it was stated that Messrs. Stuart and Baker have repeated the investigations of Fremy, using however the well known brands of English steel, also the Spiegelisen largely used in making steel They found no nitrogen in these varieties of steel, but they suggest the possible existence of the nitride of titanium, which might under special circumstances account for the appearance of nitrogen.

Protection of Iron Plates.

M. Bequerel announced some time since before the French Academy of Sciences, that iron-plated vessels could be preserved from oxidation by fixing bands of zinc on the plates at given intervals. At a later meeting of the academy he stated that the protection was not so complete in soft water owing to the fact that the electric current generated at the line of contact between these metals diminished in intensity more rapidly in pure water. The remedy is to use a proportionably larger number of zinc bands. Bequerel found that 9,387 cannon balls, twelve centimeters diameter under soft water, require for protection two square meters of zinc surface.

Dye for Feathers.

Beautiful shades of red, violet and blue, are obtained with aniline colors which adhere to feathers with as much brilliancy as to wool and silk. The colors are dissolved in alcohol and diluted with water, not too hot, into which the feathers are plunged. After being completely dyed they are removed from the bath, washed and dried. They are then curled by means of a well polished bone knife.

Anti-corrosive Mixture.

A solution of beeswax in benzole will prevent steel from rusting. A thin coating of wax will stick to the object imbued with it, while the benzole evaporates.

Destruction of Bookworms.

In the Bodleian Library the insects belonging to the peinidæ species—small-sized beetles of which there are three species—are found not only to attack books but to burrow in the wood carvings. They have been effectually destroyed by means of the vapor of benzine or benzole. It is essential that the rooms in which saucers of benzole are placed should be as nearly air-tight as possible. The application should be made in the spring, and as the ova of these insects are not all developed within one year, it is necessary to repeat the operation during the next spring to ensure their extermination.

Development of Wheat.

M. Pierre is continuing his investigations of the development of corn. During nineteen days of observation extending from July 6th to July 25th of the present year, he found the whole ear gained eighty per cent in weight, while the stalks and husks were undergoing a diminution in weight. The mineral substances in grain during this term decreased in weight nearly one-fifth, while nitrogen increased nearly one-seventh. M. Pierre believes the grain is nourished at the expense of the upper portions of the stem.

Dr. Rowell remarked that a lady had noticed that one grain of rye produced twelve hundred grains.

Refuse Corks.

The scavengers of Paris gather from the sewers corks which have been used and thrown away, and sell them to persons who make it their business to revive them. Some are recut, others retaining their original shape are covered with a powder which gives them the color of new cork. The holes in them are filled with mastic. Formerly these corks were sold only to makers of ink and blacking, but lately they have been used by the retailers of bottled beverages, such corks being bought for about one dollar and thirty cents per thousand.

The question has been raised whether there is not danger in this practice, as some of these second hand corks may hold poisonous salts which are soluble in the ordinary fluids used as beverages.

Dr. Rich said refuse corks were not extensively collected in this country for the purpose of being used again in bottles.

The Dis Fibre.

M. Lafon de Candeval has made both paper and yarns from the plant called by the Arabs dis. It grows in Algeria over an extent of 250 leagues. It yields

84 per cent. of fibre, $6\frac{1}{2}$ per cent. of gluten, which may be used like tapioca as food, and $9\frac{1}{2}$ per cent. of herbaceous elements and water. The fibre is not attacked by insects. Its average length is nearly five feet, and the cost of preparation about 42 cents per cwt.

New Discovery in Pompeii.

Recent excavations have brought to light a square block of marble near the Isis gate, on the sides of which the Roman calendar is engraved. Each side contains the days of three months in three columns, above which are the zodiacal signs. Interesting and important notices are placed opposite certain days, relating to astronomy, agriculture and the religion of the Romans. It has been placed in the museum of Naples.

Ancient Mining Machinery.

An ancient wheel found in a Portugese mine has been recently exhibited to the antiquarians of Paris. It is 29 feet in diameter and $1\frac{1}{2}$ broad. Eight of these wheels have been discovered in mines supposed to have been worked by the Romans at least 1450 years ago. They have been preserved by immersion in water charged with salts of iron and copper. They are supposed to have been worked as treadmills by men with naked feet on one side. The water was raised by one wheel into a basin, from which it was elevated another stage by a second wheel, and so on through eight levels.

Mr. Whittell said the old method for lifting water from the river Nile for irrigation was by means of pots fastened to the arms of a wheel.

Mr. Bartlett said the water was raised from Lake Michigan for supplying the summit level of the Illinois canal leading from Chicago to the Mis sissippi river, by means of buckets on a breast wheel. Water can be raised economically in this way six or eight feet.

Steam Power in Mines.

In the celebrated Gould and Curry mine steam generated in a boiler on the outside is carried 409 feet below the surface, and 1,100 feet to the engine. The steam pipe is carried along the bottom of the adit in a wooden case tightly packed with ashes. The difference in the pressure of the steam at the boiler and at the engine is only five pounds per square inch.* At the Almadan silver mine the steam is carried along the roof of the mine in pipes protected by ropes of straw for the distance of 1,300 feet, and with a loss in pressure of 14 pounds per square inch. At the Gould and Curry mine superheated steam is soon to be used. The steam pipes are provided at certain intervals with expansion joints, like those of the telescope, to provide for the contraction and expansion of the metals resulting from changes in temperature.

Dr. Powell stated steam on the Great Eastern was carried some three hundred feet to drive the propellor, the pipe conveying it was at first about two feet in diameter, but it did not work well, and pipe was increased to three feet in order to maintain the original pressure.

Mr. Stetson said in our Crystal Palace steam was carried across 42d street in a ten inch pipe enclosed in a box filled with tan. It was found that but one pound per square inch pressure was lost by this plan. If the pipe were made still larger there would be less loss of pressure, although there might be a great loss of heat.

A Four Legged Hen.

Dr. Rowell exhibited a *lusus naturæ* in the form of a live hen having *four* legs. The pair of legs not used were nearly full size, and were drawn up under the tail of the animal. This freak of nature was doubtless the product of a double yolked egg. It is said to be the general habit of the hen to throw out of the nest eggs of this description.

The regular subject for discussion was then taken up.

The Cause of the Impurity of our City Atmosphere.

The Chairman said those present were doubtless aware that we were often annoyed by a noxious odor or stench which passes away as suddenly as it comes. Prof. Mapes had informed him that the cause did not originate in the sewers, for he had taken pains to examine the openings to them during the time the stench was strongest, and detected no odor arising from that quarter. He had noted the position of the wind vanes visible from his residence in Bleecker street, and had found that during the prevalence of these odors the vanes always pointed in a northeast direction, or in other words towards the gas works situated on the East river.

Dr. Rich thought it impossible that the stench should arise from the sewers. Prof. Everett had informed him that when certain changes were made in the gas works in the night this odor came so strong into his summer residence up town, that he was compelled to get up and close the windows.

Mr. Charles A. Seelye said this question of odors was well understood up town. The stench from the gas works was quite distinct from that arising from the bone boiling establishments. There is another kind of odor prevalent down town which is generated by decayed vegetable matter.

Gen. Hall said he had noticed that in the part of the city where the odor complained of is the strongest, the children are remarkably plump and healthy.

Dr. D. D. Parmelee remarked that he had been, formerly, engaged in the manufacture of a chemical compound which required the generation of large quantities of the unpleasant smelling gas coming from gas factories, but no complaint was ever made by his neighbors because he caused all the gas to be absorbed by water, lime and other means. On Murray hill, where he lived, he and his neighbors were obliged to stop using illuminating gas on account of the sulphuretted hydrogen in it.

Gen. Hall said this might be accounted for by the fact that the new company supply families above Thirty-fourth street, and they are not as successful as the old companies in arresting and destroying the gas complained of.

The Chairman presented to the audience on the black board all the formula representing the impurities found in common air. Our atmosphere is called a mixture of gases and not a true chemical compound. The great mass of it consists of about four parts of nitrogen to one part of oxygen, by measure or bulk. The water present varies in quantity with the temperature of the air.

Carbonic acid gas is always present in very small quantity, together with a trace of ammonia. In cities the air is also tainted with sulphurous acid and sulphuretted hydrogen. This last, like nearly all the compounds of hydrogen, except water, is very detrimental to the human constitution.

Sulphuretted hydrogen, or hydrosulphuric acid as it is sometimes called, is formed on the water type, sulphur being substituted for oxygen. It is a colorless gas, having a disgusting odor resembling rotten eggs. Even when mixed with a thousand times its bulk of common air it can not be breathed by the lower animals without fatal results. It is heavier than common air, 100 cubic inches weighing a little over 38 grains, while the same bulk of air weighs 31 grains. Under a pressure of 250 pounds per square inch, sulphuretted hydrogen is reduced to a colorless liquid, and at 122° Fahr. below zero it is frozen into a transparent solid. The gas is formed spontaneously. For instance, where a soluble sulphate, by contact with decaying animal or vegetable matter, loses oxygen and becomes a metallic sulphide, which, in turn, is easily decomposed, even by the little carbonic acid always present in the air, the result being a metallic carbonate and sulphuretted hydrogen.

The average composition of the atmosphere is now given by the best authorities as follows: Every 100 parts, by volume, contains

Of oxygen gas	20.61
Of nitrogen gas	77.95
Of carbonic acid gas	.04
Of water-vapor	1.40
Of nitric acid and ammonia	traces.
Of sulphuretted hydrogen, in large towns	traces.
Of sulphurous acid, do do	traces.

Mr. T. D. Stetson admitted that noxious odors and gases frequently were generated in some of the manufacturing establishments of the city, but he dissented from the view of some that therefore these establishments should be suppressed. They were here, as in many other cities, one of the causes of our prosperity.

Mr. Enos Stevens did not know where we should stop if we began to exclude bad smells, and did not believe we should agree as to what smells were bad. Some paid a great deal for smells that others thought bad. He thought musk bad, and tobacco excessively nasty; but others thought them agreeable. There were others that were offensive to those who cultivated a dislike for smells that they believed to be bad, but were indifferent or imperceptible to those who did not attend to them. It was all imagination; they don't care about smells, except fancy smells that they pay for. Only the artificial people, who cultivate artificial miseries, are troubled by them, and they enjoy their troubles. So no harm is done.

The subject was further examined by several speakers, and the conclusion seemed to be that the most objectionable odor, that having a slight creosote smell, was from the gas houses, and must arise at the time of discharging from their purifying apparatus the lime saturated with various impurities.

Dr. Parmelee made an interesting experiment with phosphorus dissolved in turpentine. He explained how the phosphoric acid, generated in burning phosphorus, acted as a protection against further combustion, and showed why the general incendiary attempt on our principal hotels failed. After which he gave the following account of:

PHOSPHORUS.

Phosphorus was discovered by Brande in 1669. It is never met in nature in an uncombined state, but occurs in small proportion in phosphate of lime.

The portion of phosphate of lime in bones varies with the source from which they are obtained. The solidity and fineness of the bones of man and quadrupeds is owing to a considerable portion of phosphate of lime which they contain.

One hundred parts of ox bones contain 51 solid gelatin, 37.7 phosphate of lime, 10 carbonate of lime, and one-third of phosphate of magnesia.

In one hundred parts of man's bones there are 81.9 of phosphate of lime.

Phosphate of lime occurs in small proportion in or is a constituent of the primitive and volcanic rocks, by the gradual decay of which it passes into the soil; from this it is extracted by plants, which accumulate it, particularly in their seeds. Phosphorus is a never-failing ingredient, in the substances of which the brain and nerves are composed. It is likewise contained in albumen and in fi'rin, and is present in the form of phosphates of the earths and of the alkalies in the urine and solid excrements of animals.

Phosphorus was originally attained from the salts contained in urine, but is now obtained almost exclusively from bones.

The symbol of phosphorus is P., its eq. 32; density of vapor 4327. (The density of carbonic acid is 1529, not quite one-half of that of vapor of P.)

PREPARATION.

The earth of bones is decomposed by two-thirds its weight of sulphuric acid, and the insoluble sulphate of lime separated by filtration from the soluble phosphoric acid, which passes through with a quantity of phosphate of lime in solution. The acid liquor is then evaporated to the consistence of a syrup, and mixed with charcoal to form a soft paste, which is rubbed well in a morter and then dried in an iron pot, with constant stirring, till the mass begins to be red hot. It is allowed to cool, and introduced as rapidly as possible into a stoneware retort, previously covered with a coating of fire-clay. The beak of the retort is inserted into a wide copper tube of a few feet in length, the free end of which is bent downward a few inches from its extremity, and the descending portion introduced into a wide mouthed bottle containing water enough to just cover the extremity of the tube.

The heat of the furnace in which the retort is placed is slowly raised for three or four hours, and then urged vigorously till the phosphorus has passed over. The presence of certain gaseous substances, even in minute quantity, has a remarkable effect in preventing the slow combustion of sulphur; thus at 66 degrees it is entirely prevented by the presence o

1 vol. olefiant gas in 450 vols. air.

1 vol. vapor of sulphuric ether in 150 vols. air.

1 vol. vapor of naphtha in 1820 vols. air.

1 vol. vapor oil of turpentine in 4444 vols. air.

And the influence of these gases is not confined to low temperatures, a certain mixture of all of them defending phosphorus from oxidation even at two hundred degrees.

An explanation given of this is that the gases which exert this influence have an attraction for oxygen, and are themselves undergoing a slow oxidation at the same time.

When two oxidable bodies are in contact, one of them often takes precedence in combining with oxygen, to the entire exclusion of the other.

Phosphorus matches are usually made by melting phosphorus in water at 120 degrees, and adding a requisite proportion of chlorate or nitrate of potassa, which is dissolved in this water, and if metallic oxides are used, or binoxide of manganese or sesquioxide of lead, these are added, and then enough gum to thicken the liquid. The whole is well triturated till the globules of phosphorus cease to be visible, and the mass is colored with Prussian blue or red with sesquioxide of lead. The points of the sticks already sulphured are dipped into this paste, and then cautiously dried in a warm chamber. The object of the chlorate, nitrate or oxides is to promote the combustion of the phosphorus, and that of the sulphur to ignite the stick, and the gum to form a varnish which defends the phosphorus from oxidation till the surface is abraded.

Phosphorus is susceptible of four different degrees of oxidation, the highest of which is a powerful acid, while the acid property is not absent in the lowest. These compounds are:

Oxide of phosphorus	2 P.+O.
Hypophosphorus acid	P.+O.
Phosphorus acid	P.+3O.
Phosphoric acid	P.+5O.

Amorphous phosphorus may be obtained by several processes. A ready one consists in heating phosphorus with a small quantity of iodine. The amorphous phosphorus is separated from phosphorus in its ordinary condition by treatment with bisulphide of carbon, which dissolves the latter and not the former.

After selecting "The Manufacture of Sugar" as the subject for the next discussion, the Association adjourned.

American Institute Polytechnic Association,
December 22d, 1864.

Prof. Samuel D. Tillman, Chairman; Benjamin Garvey, Secretary.

Roasting Coffee.

The first article exhibited was an automatic coffee roaster. Mr. S. B. Ward stated that it was the invention of a physician who saw the necessity of giving uniformity and expedition to the operation of roasting coffee. The machine now presented, consisted of a wire gauze cylinder, which revolved in a cast iron frame, the whole, when placed on top of a cast iron cooking stove or range, was enclosed in a tin cover. When the coffee is placed in the cylinder, by moving a stop-key, the cylinder begins to rotate, and continues until the roasting is completed. The effect of this rotary motion is to present every berry to the heating surface for about the same length of time. The power used is a spring which is connected by small brass gearing with the cylinder. The fly-wheel serves the double purpose of regulating the movement and cooling the spring and machinery, which otherwise would be injured by the heat. The present cost of the smallest size is five dollars.

Dr. J. B. Rich remarked that the excellence of the coffee made in Turkey, consisted in the fact that every imperfect or over-burnt berry was removed. It is roasted and crushed, and immediately served up. It is crushed between two flat stones, or sometimes with a rude mortar and pestle. He did not remember ever to have had a bad cup of coffee during his stay in that country.

Prof. Fleury said he had recently learnt the means of preserving the aroma in coffee: it was by adding sugar which absorbed the volatile portion which passes off in roasting. His own father had been a large manufacturer at Vienna of ground or prepared coffee, made entirely of figs, which were nearly all exported to Turkey. The advantage of this coffee is, that it does not require as much sugar as the real berry. It is, however, far less stimulating than pure coffee.

Dr. Rowell said that the high price of the coffee berry had induced many to use a mixture of different kinds of grain.

Mr. Ward exhibited a round, small dark bean well adapted as a substitute for coffee. It is called the coffee bean.

The Chairman remarked that nearly all the ground coffee sold is adulterated with chicory, carrots, etc. It is the common practice of farmers and others in the country, to mix burnt grain with the real coffee, or to use it without the addition of any coffee berries. He would discourage the use of rye, but believed that barley, wheat, and especially the bean now exhibited, would make a very agreeable, and certainly a very healthy beverage.

The peculiar effects of coffee on the nervous system cannot be obtained from any of the substitutes named. Coffee acts very differently on different constitutions. It may be regarded as injurious to some, but it must be admitted to be highly beneficial to others. He had known many aged persons who claimed to be sustained almost entirely by coffee. Talleyrand and other statesmen who have attained great age, used this beverage very freely. While the drinking of strong coffee by the young should be discouraged, its use among those who have passed the meridian of life should not be objected to, because it tends to check the destructive processes that are constantly in operation in the human system, and the recuperative processes are therefore not required to be so powerful, in other words the body is constantly being rebuilt by means of a less quantity of food.

Testing Illuminating Gas.

Dr. Parmelee said the discussion of the previous meeting had prompted him to make a test before the audience of the gas now being used in the lecture room. He had before him a bottle of Croton water, and he proposed to place in it acetate of lead. He would saturate a piece of white paper with the salt, and expose it to a stream of the gas, and if there was any appreciable quantity of sulphuretted hydrogen in it, the paper would be blackened. He would also turn a stream of the gas into the solution.

These tests were made by the speaker, which proved that the gas in use was nearly free from sulphuretted hydrogen.

Re-Cutting Files.

Mr. Watson said some persons were claiming that old files could be renewed by means of sulphuric acid, he would enquire whether any one present had tried the experiment.

Dr. Rowell said that many years ago he had seen it tried, but there was no value in the process.

Mr. J. B. Root remarked the process had been tried by workmen in the same establishment with him, and it was found that although the file was bright and apparently sharpened, the edge did not remain five minutes after it was put in use.

The Chairman then presented the following interesting items of scientific news:

Indestructible Writing.

M. Lucas proposes for this purpose an ink composed of 20 grains of sugar dissolved in 30 grains of water, to which is added a few drops of concentrated sulphuric acid. By heat the sugar becomes carbonized and when applied to paper cannot be washed off, the stain being made more permanent by the decomposing action of the acid. After the writing is dry the paper should be passed through a weak alkaline solution to remove any excess of acid.

Manufacture of Aluminum.

M. Basset, of Paris, has discovered several substitutes for the alkaline metals used to decompose chloride of aluminum, which consist of those metalloids and metals forming by double decomposition chlorides more fusible and volatile than the chlorides of aluminum. Arsenic, borax, cyanogen, zinc, antimony, mercury, tin and the amalgams of antimony, zinc and tin may be used for this purpose.

Mr. Watson said this item of news reminded him of the great value of aluminum bronze; a mixture of tin with from eight to ten per cent. of aluminum, as a journal box where rapid rotation was required. It would heat but very little. He had seen a wheel revolving 7,700 times a minute which had journals quite cool to the touch. The wheel which he alluded to was in the melodeon establishment of Carhart & Needham. He would recommend this alloy for the journals of fan blowers which are driven at very high velocity.

Rubidium.

Prof. Bunsen, in his last account of experiments on this new metal of the alkaline class, states it is more electro-positive than potassium. It exhibits a flame similar to the latter metal when combining with the oxygen of water, but it inflames much quicker in the air. Its specific gravity is about 1.52. At 14 deg. F. it is soft as wax; at 101-3 deg. F. it becomes liquid, and at a red heat is transformed into bluish gray vapor. Its name has reference to the peculiar red line found in its spectrum.

A New Hydro-Carbon.

M. Bechamp lately announced to the French academy a new hydro-carbon in coal-tar, having a boiling point midway between that of Xylol and Cumöl. If it is not a mixture of these it cannot belong to the same series, for Xylol is $C_{16}H_{10}$ and Cumol is $C_{18}H_{12}$. The first boils at 263 deg.; the second at 299 deg. F.

The chairman added that there is no link wanting in the series between Xylol and Cumol, the increase being ($2CH$) he was, therefore, inclined to believe the compound was a mixture of hydro-carbons already known.

Metallic Coatings.

M. Weil explained before the French Academy of Sciences, his processes for covering metals with firmly adherent and bright layers of other metals. The method consists in dipping the metal to be coated in a saline solution of the metal to be deposited, rendered distinctly alkaline with potash or soda, and mixed with organic matter, such as tartaric acid or glycerine. In some cases it is necessary to set up, at the same time, a weak Voltaic current by keeping a piece of zinc or lead in contact with the metal. In this way iron or steel may be coated with copper, silver, nickel and other metals. A curious fact mentioned is that a clean surface of copper may be coated with zinc by placing the two metals in contact in a weak solution of caustic soda or potash. In the cold the deposit of zinc takes place slowly, but at 100° of heat very rapidly.

Hardening Cast Iron.

A patent has been issued for hardening the surface of iron castings. When the piece is filed up and finished it is brought to a cherry red heat, and then immersed till quite cold in a solution composed of 1,080 grames of sulphuric acid and 65 grames of nitric acid to 10 litres of water. The iron is said to suffer no distortion.

Mechanism of the Watch.

A prize of one hundred and fifty dollars is offered by the British Horological Institute for the best "treatise on the detatched lever escapement and its varieties." The essay must treat of the subject generally, giving tables of the proportions of the various parts of the ordinary constructions, and explain the effects of variations in these proportions, and the means of retifying any discovered error. Various tools for effecting measurements and for completing the escapement are also to be described. The essays must be sent in before the 31 of March next.

Ink Used by Arabs.

M. Guyon presented to the French academy a vegetable product used by the African Arabs and called by them *Semag.* It is a resinous matter exuded from the decayed parts of an arborescent species of Lentiscus, and is doubtless some form of *ulmin* mixed with the gum résin of the plant. This substance becomes intensely black after exposure to the light. When mixed with mucilage it flows and works well, and resists almost every agent that will not destroy paper.

Gunpowder as a Motor.

Mr. Ewbank, late Commissioner of Patents, communicates to the Franklin Journal his objections to compressed air and gunpowder as traveling forces. His remarks on gunpowder deserve especial attention. After noticing the conflicting statements of the amount of force generated, he says:

To whatever cause the discrepancies are to be ascribed, to variations in the quantities of the powder, its filling or only partly filling the exploding chamber, &c., there is enough in all conscience in the lowest estimates to lead mechanicians to inquire if this amazing agent, resistless as an exploding force, may not be converted into a quiet and efficient working one. Hautefille, Huygens, and Papin attempted this in the seventeenth century, and many more in the succeeding and the present one. Numerous notices may be found in the Mechanical Journals, but I do not remember any particular description of the testing apparatus, or any definite item of results. Desirous of ascertaining if the force could be introduced as a substitute for animals in rail cars at a moderate cost, I consulted my friend, Mr. James Bogardus, whose mechanical knowledge and inventive resource have rarely if ever been surpassed. The apparatus adopted was designed by him. It is only necessary to refer to a part of it here.

Instead of receiving the explosive impulse on air, the most elastic and durably elastic of agents, as suggested in the Patent Office Report of 1849, the piston driven by the powder compressed a steel spring formed by bending to and fro, a bar, twenty feet long, two inches wide, and one-quarter of an inch thick, into a series of short turns. The compressing force was determined directly by a weight passing over a pulley and making additions to it as the compression proceeded along a finely graduated scale. There could, therefore, be little or no mistake made in the amount of force thus received and given out to the revolving mechanism. The cylinder, or gun, was two inches bore and sixteen and a half inches long. The piston and rod were of one piece of metal, the latter one and a half inches square.

The experiments were interrupted by the death of Mr. Dornbach, killed while packing a case of gun cotton. We had tried *white* powder and preferring it, were waiting a further supply from him. The delay in resuming them is moreover due to the fact that the magic power ascribed to powder in the books, and mining and military engineering, vanishes in the workshop.

The power of a single horse is commonly estimated at 33,000 lbs. raised one foot per minute.

We found ten grains of powder only raised 250 lbs. one foot, hence 132 such charges, or 1,320 grains, were required to bring it up to horse power. A pound contains 7,000, and they could hardly keep the engine going five and one-third minutes. Eleven pounds and a half would be consumed in an hour, and that at twenty cents per pound would amount to over $22 for a working day of ten hours.

It should however be understood that from the construction of the testing machine, a feeding channel and a small receptacle for the residuum were exposed to the explosive impulse; and though the small quantity of air they contained gave back by expansion the compression received, there is little doubt that the effect on the piston would have been greater if there had been no communication with these—that is, if the force had been solely and strictly concentrated on the end of the piston. It was not intended to give any statements respecting the experiments till they were concluded, but on closing the remarks on Compressed Air, the opportunity seemed appropriate for a brief reference to them.

Mr. G. Bartlett said there appeared to be some miscalculations about the power of gunpowder in the article read. He believed gun cotton to be more expansive than gunpowder.

The Manufacture of Sugar.

The Chairman remarked that this subject had been lately very fully discussed in its chemical bearings, a report of which will be found in the last volume of our transactions. On the present occasion he hoped more time would be given to explanations of the mechanism used in sugar manufactories. He proposed to say a few words on

SACCHARIMETRY.

The saccharometer used to determine the quantity of saccharine matter in a fluid is the common hydrometer having a graduation suited to the purpose. It is however essential to discover the quality or variety of the sugar under examination. This was first successfully accomplished by M. Soleil by means of polarized light. Many inorganic substances have the power of rotating the plane of vibration of the polarized ray. The angle of deviation is in proportion to the length of a column of the same solution of cane sugar, and it follows that by using a column of the same length, any variations in the plane of vibrations must be due to a difference in the structure of the compound. Taking advantage of this fact, Soleil constructed a glass tube surrounded with a case to exclude the light and closed at both ends with plate glass discs ground to fit water-tight and pressed against the tube by means of screw caps. This tube he completely filled with the saccharine liquid and placed it on supports between two Nichol's prisms, one serving as a polarizer through which the ray passes into the liquid, the other being the eye-piece through which the observation was made, and to this was attached a graduated circle having a vernier which moved in a vertical plane. The most exact measurements are made by noting the disappearance of what is known as the transition tint, the purple, because the change of this to the red on one hand or the violet on the other is very sudden. This tint is produced by interposing quartz 3.75 millimeters thick, a double plate is used, one-half being composed of right-handed and the other half of left handed quartz. When the rotary power of the liquid under examination is considerable, an error arises which is obviated by what is called a compensator. In order to determine the strength of a solution, it is necessary that the solution contain only one substance, and that the quantity present be proportioned to the angle of rotation; that rotation of the red ray be known for one degree of concentration. Some substances rotate the plane of polarization to the right, others to the left; the first are called right-handed and the second left-handed.

With this brief description let us examine a few of the results obtained in relation to sugars and some allied bodies:

1. *Sucrose or Cane Sugar.*—$C_{12}\ H_{11}\ O_{11}$—It crystalizes in four or six-sided rhomboidal prisms and fuses at about 320° F. It produces right-handed rotation=to 73° 8.

2. *Inverted Cane Sugar*—from many recent fruits-formula, $C_{12}\ H_{12}\ O_{12}$. It is not crystalizable and produces left-handed rotation = 26° at 59° F.

3. *Glucose* or Grape Sugar, $C_{12}\ H_{12}\ O_{12} + 2\ HO$, is obtained from dried fruits or from starch altered by acids. It produces right-handed rotation = 57° 4. It crystalizes in cubes or square tables.

4. *Lactose*, or sugar of milk, $C_{24}\ H_{19}\ O_{19} + 5\ HO$. It crystalizes in four-sided prisms and produces right rotation, equal to 56° 4.

5. *Trehaloze* or Turkish manna, the product of an insect—formula, $C_{12}H_{11}\ O_{11} + 2\ HO$. Crystalizes in brilliant rectangular octohedra and produces right-handed rotation = 220°.

6. *Mycose*, from the ergot of rye, $C_{12}H_{11}O_{11} + 2\ HO$. Crystalizes in rhombic prisms and produces right-handed rotation = 266°.

7. *Melezitose*, from larch manna; $C_{12}\ H_{11}\ O_{11}$ + aq. Crystalizes in short rhomboidal prisms; produces right-handed rotation = 94° 1.

8. *Melitose*, from the Eucalyptus (of the myrtle family), $C_{24}H_{24}O_{24} + 4\ HO$. Crystalizes in slender prisms and produces right-handed rotation = 102°.

9. *Sorbin*, from berries of service tree; $C_{12}\ H_{12}\ O_{12}$. Crystalizes in octohedra with rectangular base; exerts left-handed rotation = 49° 9.

10. *Inosin*, from muscular tissue; $C_{12}\ H_{12}\ O_{12} + 4\ HO$. Crystalizes in radiated tufts and has no power on polarized light.

Sugar-Making in Cuba.

Mr. Brewster, who had been engaged for several years in manufacturing sugar on the island of Cuba, gave an interesting description of the process.

THE CANE.

There are two kinds of cane, the sweet and the crystaline. The sweet contains the most juice and the crystaline the most sugar. The cutting commences about this time of year. There is a dry season in Cuba of two or three months, beginning about the first of January, and if this dry season did not occur sugar could not be made on a large scale. However perfect the cane may be, if two or three rains fall upon it the sugar all goes down into the roots, and the cane must be left over till the next season. After the cane is cut the roots remain alive, and throw up sprouts the next year, so that the planting has to be done only once in several years. Some fields are planted once in three or four years, but the average is about once in seven years. I have been in a field that had not been planted in 28 years, and the canes were an inch and a half in diameter and twenty feet high.

THE MILLS.

The juice is expressed by passing the cane between iron rollers driven by steam engines. Three rollers are employed, making two spaces through which the cane passes; the first of these spaces is about five-eighths of an inch in thickness, while the second is not thicker than a case-knife. In the large mills the rollers are some six feet in length; the longest that I ever saw were seven feet six inches. A trough, of a width equal to the length of the rollers, extends back from the mill 100 feet, and into this the cane is thrown to the depth of about eight inches by a gang of negroes standing along on each side. The mill takes out from 75 to 85 per cent of the weight of the cane; the juice running off in quite a brook. The woody matter remaining, the begasse, as it is called, is used after being dried in the sun, as fuel for driving the engine. Some of the sugar mills in Cuba have cost $250,000 each.

THE BOILING.

Four boilers are used for evaporating the water from sugar. The first holds 600 gallons, the second 400, and the other two 300 gallons each. As the juice is boiled down, a scum rises on the surface, and is skimmed off. After the liquor reaches a certain density, as measured by a saccharometer, it is dipped out by ladles into the next boiler, where the process is repeated. In the last boiler it is concentrated to the granulating point.

THE GRANULATING.

When properly condensed the syrup is poured into conical moulds similar to those used in the refineries of this city, only larger. The molasses drains out at the bottom of the mould, leaving the sugar. It is customary to cover the sugar in the moulds with a layer of moist clay, the weight of which aids in forcing out the molasses and purifying the sugar.

THE PRODUCT.

Many estates in Cuba now turn out an article of really refined sugar, the mills being supplied with everything to be found in a New York refinery.

MAKING SUGAR FROM MOLASSES.

Dr. Rich.—I am told that a good deal of sugar is now made in this city from molasses. The molasses yields some 30 or 40 per cent of a second quality sugar, leaving a very inferior quality of molasses.

CENTRIFUGAL EXTRACTERS.

Dr. Rowell.—In some of the refineries the molasses is separated from the sugar by centrifugal force. A drum, the periphery of which is formed of fine wire cloth, is caused to rotate with great velocity, and on placing the concentrated syrup in this drum, the molasses is thrown out through the meshes of the cloth, while the sugar is retained within the drum.

Mr. Brewster.—These machines are in general use, both in our city refineries and on the Cuba plantations. It is the common method of removing the molasses. Some of the large mills have a dozen centrifugals. I have seen one that would hold 600 pounds of sugar, and the molasses was completely removed from this mass in fifteen minutes.

Sugar from Grain.

Mr. Bartlett.—Considerable excitement has been raised in relation to the new process for obtaining a large quantity of sugar from corn. It is well known that starch, when treated with sulphuric acid, yields grape sugar.

The new process as patented is simply the mixing of cane sugar with the glucose or grape sugar.

Improvements in the manufacture of Glucose Sugar.

The following article from the London Mechanic's Magazine describes the process patented by Mr. A. Maubre, of London:

Glucose sugar is now commonly produced by boiling starch or fecula diluted in water acidulated with sulphuric acid. Open lead and wooden vessels are generally employed in this process. Close vessels provided with open escaping steam pipes are, however, used for the purpose of hastening the saccharification of starch by heating the mixture to a few degrees higher than 212 deg. Fah., and also to turn the steam into account by making use of it for other purposes. When the starch or fecula is found to be saccharified, sulphuric acid is neutralized by carbonate of lime diluted in water; the saccharified liquid is then drawn off and conveyed through bag and charcoal filters, and evaporated until it has acquired the proper degree of consistency required for obtaining sugar in a state of syrup or in a hard state. It is then cooled and supplied to the trade. In making glucose sugar in the above manner, a quantity varying from 20 to 50 per cent. of gummy matter is produced, which lessens the value of the sugar when it is to be used for producing brandy, alcohol, vinegar, or for fermenting purposes, whilst the essential oil and empyreumatic fatty matters which have been dissolved during the operation of saccharification, remain combined with the glucose, imparting to it a bitter and empyreumatic taste, which empyreumatic taste is also imparted to the alcohol, brandy, vinegar, beer and other beverages, when manufactured and produced from such sugar, either used alone or jointly with malt or other matter.

Now, according to this invention, glucose sugar is produced, commercially called grape and starch sugar, free from gum, also from bitter and empyreumatic tastes, by treating and submitting starch or fecula diluted in water acidulated with sulphuric acid to the action of a high degree of heat, the minimum temperature employed being not less than 275 deg. Fah., but 320 deg. Fah. being preferable, as the process is thereby quickened, by which means the whole conversion or transformation of gum into sugar is obtained; and the essential oil and empyreumatic fatty matters are vaporized and eliminated, which are distilled off out of the converting or saccharifying apparatus. The apparatus preferable to use for getting up the high degree of heat required to perform the improved process, is a kind of boiler called a converter—its shape and form are similar to a high pressure steam boiler. It is made of strong wrought iron, capable of resisting a pressure of 90 pounds to the square inch (six atmospheres), and is lined inside with lead to prevent corrosion, and outside is covered with a jacket, a space of four inches being left between the jacket and the converter, which interval is filled up with sand or any other non-conducting matter to prevent radiation of heat. The converter is further provided inside with a perforated lead steam pipe, through which steam passes and blows up into the mixture for heating it. It is also provided at its top with a pipe furnished with a cock, through which diluted starch may gradually be introduced into the converter; also with safety valves, steam gauge, water gauge, thermometer, pipe for escape of steam, exit cock at bottom, and a worm or distilling pipe, through which the high pressure steam is allowed to blow off out of the converter, carrying with it the essential oil and empyreumatic fatty matters vaporized and gasified by the action of the high temperature to which the mixture is submitted.

In carrying out the process of converting starch or fecula into glucose sugar, according to this invention, it is preferable to employ the starch or fecula, sulphuric acid and carbonate of lime in the following proportions: 2,240 lbs. (one ton) of starch or fecula; 1,120 gallons of water, being five times the weight of starch or fecula; 112 lbs. of sulphuric acid, being five per cent. of the weight of the starch; 168 lbs. of purified carbonate of lime, being 7½ per cent. of the weight of the starch.

The manner in which the process is conducted is as follows: Place in the converter above described 56 lbs. of sulphuric acid of 66 deg. density, diluted with 560 gallons of water; the mixture is then to be heated up to 212 deg. Fah. During the heating of the acidulated water in the converter, place into an open wood vessel, which may be called a diluting vat, provided with steam pipe, let-out cock, and with stirring apparatus, the other 560 gallons of water, in which is also to be diluted the other 56 lbs. of sulphuric acid, which acidulated water is also heated up to 85 deg. Fah.; as soon as this temperature of 85 deg. Fah. is attained, gradually pour into the said diluting vat the 2,240 lbs. (one ton) of starch or fecula, stirring the mixture well, and raise the temperature to 100 deg. Fah., the stirring maintained the whole time. Then gradually pour the diluted starch heated at 100 deg. into the converter, in which the acidulated water is kept boiling, continuing to blow in steam in order to keep the temperature in the mixture throughout this part of the process to its original heat of 212 deg. Fah.

When the whole of the diluted starch is introduced into the converter shut off the cock of the pipe through which the diluted starch has been conveyed into the converter, and then continue to blow in steam so as to raise the temperature in the mixture up to 320 deg. Fahrenheit, equivalent to a pressure of six atmospheres, or 90 lbs. per square inch. When this temperature of 320 deg. Fahrenheit is attained, open the cock of the worm or distilling pipe through which the steam escapes, carrying away out of the converter the essential and empyreumatic fatty matters which vaporize and gasify at about 270 deg. Fahrenheit; hence by heating and maintaining the temperature in the mixture to the higher degree of 320 deg. Fahrenheit, not only are the said vaporized and gasified essential oil and empyreumatic fatty matters readily distilled off, separated and got rid of, but also the whole of the gum converted into glucose sugar is obtained, which conversion takes place at the temperature of about 275 deg. Fahrenheit. Continue to heat and maintain the temperature of 320 deg. Fahrenheit in the mixture, until by testing with iodine all the starch is found to be converted, and further, until by testing with silicate of potash or acetate of lead, it is found that there is no dextrine or gum in the saccharified liquid. For the purpose of testing proceed as follows: Draw off out of the converter a sample of the mixture, then neutralize the sulphuric acid, pass it through a small bag of charcoal filter, and when cool, submit it to the test of the above described re-agents. The process of conversion or saccharification lasts from two to four hours, according to quality and purity of the starch or fecula. When the whole of the starch and gum is found to be thoroughly saccharified or converted into sugar, then draw the mixture into another open wood vessel, which is called a neutralizing vat, provided with stirring apparatus and let-out cock, and proceed to the neutralization of the sulphuric acid by gradually pouring into the said neutralizing vat the 168 lbs. of purified carbonate of lime diluted in 50 gallons of water, stirring the liquid to hasten the neutralization and the escape of carbonic acid produced during the operation. The neutralized saccharified liquid is then permitted to settle for from two to four hours, during which period almost all the sulphate of lime is deposited at the bottom of the neutralizing vat. The saccharified liquid is then drawn off and received into an open iron copper, called a precipitating pan, to proceed to the precipitation of the sulphate of lime, which remains in solution, and combined with the saccharified liquid. For that purpose introduce carbonic acid gas or oxalate of ammonia into the said liquid, and the sulphate of lime is precipitated and separated as carbonate or oxalate. Then pass the saccharified liquid through bag filters and receive it into an evaporating pan in which it is evaporated until it gets the consistency of syrup, viz., a density of 20 deg. of Baume's saccharometer; then draw the said syrup into a clarifying pan, called a blow-up pan, to be purified. For that purpose pour in and mix with the syrup a more or less quantity of calcined blood and charcoal powder, according to the impurity of the syrup, when by heating it up to about 180 deg. Fahrenheit, foreign matters will coagulate and deposit at the bottom. Then convey the said clarified syrup through bag filters, then through charcoal, and receive into a baking pan, in which it is evaporated and concentrated until it gets a density of 38 deg. Baume's saccharometer for producing glucose sugar in a state of syrup, and until it gets a density of 38 deg. Baume, for producing glucose sugar in a state of solidity or hardness. Then cool the glucose sugar and put it into any kind of cask, or otherwise for the use of the trade. Glucose sugar produced by the above improved process, is quite pure, free from gum, acid, sulphate of lime, and from bitter and empyreumatic tastes. Its properties and chemical composition are identical to those of grape and malt sugars. It will, therefore, be found economical and advantageous in producing beer, ale, porter, alcohol, brandy, gin, cider, vinegar, wine, ginger beer, liquors, &c.

After selecting as the subjects for the next discussion "The Manufacture of Bisulphide of Carbon, Ether and Chloroform," the Association adjourned.

American Institute Polytechnic Association,
Dec. 29, 1864.

Prof. S. D. Tillman, Chairman; B. Garvey, Secretary.

Railroad Screw Spike.

Prof. C. Mason exhibited a model of a railroad screw spike which elicited some debate, after which the Chairman read the following memoranda of science and art:

Soda Salts.

The reactions which take place in the celebrated process of Leblanc for manufacturing soda have never been fully and satisfactorily explained. M. Scheurin Keshner now states that the reactions in the formation of black ash or impure carbonate of soda, pass through three phases. In the first, sulphate of soda is reduced to sulphide of sodium, carbonic acid being given off—10 atoms of sulphate and 20 of carbon, giving 10 of the sulphide and 20 of carbonic acid; then a double decomposition takes place between the sulphide of sodium and carbonate of lime; and lastly a partial decomposition of the carbonate of lime employed in excess is effected by carbon, carbonic oxide being disengaged. This reduction is arrested by the cooling of the mass. The quantity of carbon required is nearly 20 to 100 parts of sulphate of sodium, but an addition of excess of chalk is always desirable.

Crystalline Pictures.

M. Kuhlman, in a communication to the French Academy, refers to the crystalization on glass of saline solutions thickened with gum. Barbers and others ornament their windows by the use of sulphate of magnesia, but the most beautiful effects are obtained with the sulphate of zinc, and the appearance is improved by painting over the crystalization with an alcoholic solution of some coloring matter such as fuchsine. As these pictures are very instable he has applied photography in copying them. He also tried the galvano-plastic method for reproducing them so as to be able to print them on paper or fabrics. He obtained the crystalization upon a thin plate of copper, and copied it by pressing this plate on another by means of powerful rollers. He suggests pressing gutta percha on glass plates covered with crystals and electrotyping the mold. He exhibited also a specimen of ornamentation in gold and silver which is proposed as a substitute for the ordinary chasing used on ornaments made of these metals. The author stated that no two crystalizations were precisely alike. They can only be copied by photography, for the fineness of the designs would defy the burin of the most skillful engraver. He therefore proposes that designs obtained in the way described on copper plates be used for bank notes. If printed with pale blue ink on a bright yellow ground, the photographer and the engraver would both fail to produce a counterfeit.

An Iron Letter.

The Birmingham (England) *Journal* announces the reception of a letter by the last American mail, remarkable both as a documentary curiosity, and as a specimen of manufacturing skill. It is written on iron rolled so thin that the sheet is only twice the weight of a similar sheet of ordinary note paper. The letter is dated "South Pittsburg (Pennsylvania), November 6, 1864." and says: "In the number of your paper dated October 1, 1864, there is an article setting forth that John Brown & Co., of the Atlas Works, Sheffield, had succeded in rolling a plate of iron 13½ inches thick. I believe that to be the thickest plate ever rolled. I send you this specimen of iron made at the Sligo Ironworks, Pittsburg, Pennsylvania, as the thinnest iron ever rolled in the world up to this time, which iron I challenge all England to surpass for strength and tenuity. This, I believe, will be the first iron letter that ever crossed the Atlantic Ocean. Yours, &c., John C. Evans." The *Journal* says: The iron is said to be of exceedingly fine quality, and the sheet is by far the thinnest ever seen in this country. The letter will be deposited in the museum of the Midland Institute. Tested by one of Holtzappfel's gauges the thickness of the sheet is found to be the one-thousandth part of an inch. A sheet of Belgian iron, supposed hitherto to be the thinnest yet rolled, is the 666th part of an inch thick, and the thickness of an ordinary sheet of notepaper is about the 400th of an inch.

Sunshine in Scotland.

The meteorological returns from various stations in Scotland from the year 1857 to 1863, inclusive, show that the average hours of sunshine per diem was a little more than four and a half hours. The sunniest month of the year in three instances was May, in three instances June, and in two instances July.

The African Scorpion.

Dr. Guyon, in a communication to the French Academy of Sciences, says the sting of this insect (the *Androetonus funestus*) is not so fatal as many suppose. Of grown persons scarcely one in a hundred die from the sting. Children are more liable to die than adults. Those stung on or near the head are in the greatest danger.

The Long Bridge at Washington.

This bridge, 4,046 in length, has just been completed. It has two draws of 75 feet long each, so constructed as to be opened and closed in two minutes. The cost of this bridge is only about $150,000.

Gold in Connecticut.

Dr. Keith, the mineralogist, has discovered a vein of gold on a tract of land owned by him in Greenwich, Conn., which he is now working. One piece of the precious metal taken out is valued at $600. The same piece of land was formerly mined for copper.

Great Bridge over the Seine.

The Western France Railway Company are constructing a bridge over the Seine 933 feet long and 45 feet wide. It will rest on five cast iron piers 166 feet apart.

Storage for Explosive Materials.

At St. Ouen, near Paris, a large iron floating-dock or boat has been launched on the canal. It is divided into 100 compartments in which are to be stored dangerous volatile fluids. It is 210 feet long, 36 feet wide, and 18 feet high. Ten similar floating-docks are to be built immediately.

The Great Pyramid.

Prof. Smith, the astronomer royal of Scotland, is about to investigate the metrology of this remarkable structure. He will take with him magnesium wire for the production of light in the interior by which to photograph the mysterious inner chamber and coffer.

Anthracite for Locomotives.

On the Pennsylvania and Reading Railroad a great number of experiments prove that a locomotive drawing an average train of six cars, weight 80 tons, over a road 95 miles long, having an average grade of 6.16 feet per mile, at an average speed of nearly 26 miles an hour, will consume in the trip only 23 lbs. per mile of anthracite coal. Twenty-two stoppages were made in each trip, with the "exhaust" and "throttle" wide open; the speed of the engine being regulated by the reverse lever. By slight modifications almost any engine can be made into a coal-burner, and thus the smoke nuisance can be entirely abated.

Mr. E. Stevens said the high price of coal at the present time has driven railroad companies in New England to the use of wood. The census reports show a large increase in the amount of wood grown in New England.

The selected subjects were then taken up.

The Manufacture of Bisulphide of Carbon.

Dr. Parmelee stated that about $50,000 worth of bisulphide of carbon is used annually in the United States. It is a powerful solvent of India rubber and other gums, and being very volatile, is easily removed from the solution. It is remarkably transparent, and has extraordinary powers of refracting light; these two properties have recommended its use for lenses in optical instruments.

It is a chemical compound of carbon and sulphur, in the proportion of two equivalents of sulphur to one of carbon, $C\,S_2$, which is in the proportion of 6 pounds of carbon to 32 of sulphur; the atomic weight of carbon being 6 and of sulphur 16. To effect the combination it is only necessary to bring the two elements in contact at a bright red heat, the atmospheric air and other matters being excluded. Charcoal is heated in a close vessel, and brimstone in small lumps is dropped in upon it. The sulphur is evaporated, and as the vapor comes in contact with the incandescent coal, chemical combination takes place in the proportion stated.

As the bisulphide of carbon boils at 110°, it is of course in the state of vapor in the heated vessel where it is formed, but it is reduced to the liquid state by passing it through condensers. When first formed it is mingled with the vapor of sulphur and with sulphuretted hydrogen, but may be purified from these.

The speaker then made drawings on the blackboard of the apparatus which he had employed on a large scale in manufacturing the bisulphide of carbon, but these could be reproduced only by elaborate engravings.

Manufacture of Chloroform.

The Chairman gave a short description of the mode of making chloroform, and stated that he was pleased to learn that the first that was ever produced in the world was made in this country, thus completing our claim to the discovery of anæsthesia—the greatest discovery in medicine that has ever been made. It is admitted that nitrous oxide and ether were first employed in this country as anæsthetics, but as Dr. Simpson, of Edinburgh, substituted chloroform for ether in 1847, the English and Scotch lay claim to the discovery. But Samuel Guthrie, of Sackett's Harbor, in this State, discovered chloroform in 1831. Professor Ives, of New Haven, first administered it by inhalation in January, 1832, as a curative agent.

It is a compound of carbon, hydrogen and chlorine, in the proportion $C_2, H\ Cl_3$. Guthrie obtained it by distilling a mixture of alcohol and chloride of lime, and subsequently rectifying the product.

Ether.

The Chairman said ether is now usually made by mixing together equal weights of alcohol of sp. gr. 830 and concentrated sulphuric acid. On subjecting it to distillation in a large retort and a suitable condenser, the ether passes over mixed with water and a small portion of alcohol. By keeping the retort filled to the proper level by pouring in alcohol, the process may go on until thirty times the quantity of alcohol originally mixed has been converted into ether. The fact of using sulphuric acid in this process has given rise to the misnomer, sulphuric ether. It is more properly called ethylic ether, because it is a formed on the water type by substituting two atoms of ethyl for two of hydrogen—water and ether being represented thus: $\left.\begin{matrix} H \\ H \end{matrix}\right\} O_2$; $\left.\begin{matrix} C_4\ H_5 \\ C_4\ H_5 \end{matrix}\right\} O_2$

As a small quantity of sulphuric acid is sufficient to convert a very large quantity of alcohol into ether, many explanations have been offered as to the cause of this change. Liebig divides the conversion into two stages, by the first sulphethylic acid is formed; by the second, this sulphethylic acid, when brought in combination with more alcohol, is converted into sulphuric acid and ether. The last reaction returns the original sulphuric acid to the mixture, when it is prepared to undergo the first change. The theory of Liebig is now generally received by chemists; although Berzelius and others, finding the sulphethylic acid formed and decomposed under the same conditions, prefer to explain the change by the action of what is called the catalytic force of sulphuric acid, thus keeping us really still in the dark, as no one can yet throw light upon the nature of this contact-action.

The combinations of ether and ethyl with many chemical elements and compounds are too extensive to be embraced within the limits allotted to this discussion. Many interesting experiments have recently been made with ethyl in combination with a metal which are worthy of the study of those who aim to keep pace with the great chemical advances made in our own day. On motion adjourned.

American Institute Polytechnic Association,
January 5th, 1864.

Prof. S. D. Tillman, presiding; Mr. B. Garvey, Secretary.

Frosting Glass.

Mr. Maddock presented a specimen of glass covered with an artificial frost work, produced by the use of Epsom salts and sugar.

A Specimen of Microscopic Engraving.

The chairman exhibited an engraving of the Declaration of Independence of precisely the size of a silver dime. It was engraved on steel by an Irish artist, then in the employ of the Bank Note Company, but since deceased. A *fac simile* of the signatures of the committee who drafted the instrument was appended by means of a pantograph. To read the instrument required the aid of a very strong magnifying glass.

The Chairman, instead of his usual scientific summary, presented the following statistical tables, made up to the close of the year 1864.

Railroads of the United States, Jan. 1865.

Recapitulation of Annual Statement of the American Railroad Journal, Jan. 7, 1865.

States, etc.	Mileage — Total.	Mileage — Completed.	Cost of Road and Equipment.
Maine	640,59	509,37	$18,297,635
New Hampshire	687,73	659,32	22,572,830
Vermont	586,17	586,17	23,841,120
Massachusetts	1,348.55	1,280,93	58,979,200
Rhode Island	151,74	119,24	4,571,496
Connecticut	715,07	635,07	22,697,496
New York	3,570,92	2,869,47	135,623,240
New Jersey	1,001.25	836,27	38,964,372
Pennsylvania	4,323,61	3,610,29	169,184,691
Delaware	182,59	126,90	4,548,850
Maryland and District of Columbia	699,40	467,30	23,847,123
West Virginia	361,50	361,50	22,126,393
Kentucky	898,40	564,20	20,877,180
Ohio	3,954,33	3,389,65	121,147,588
Michigan	1,614,50	874,22	36,430,367
Indiana	2,482,50	2,199,40	71,318,673
Illinois	3,600,70	3,119,40	117,375,523
Wisconsin	1,449,70	1,045,20	41,880,302
Minnesota	1,584,00	161,00	7,700,000
Iowa	2,037,10	804,80	27,715,052
Missouri	1,412,39	925,75	51,187,275
Kansas	360,00	40,00	1,400,000
California	628,98	147,39	7,870,000
Oregon	19,50	19,50	500,000
Total in Loyal States	34,310,62	25,372,25	$1,050,356,406
Virginia	2,054,48	1,378,70	$45,146,843
North Carolina	1,352,42	977,30	19,308,018
South Carolina	1,072.93	988.93	22,423,690
Georgia	1,635,23	1,421,22	29,169,513
Florida	586,50	401,50	8,628,000
Alabama	1,434,70	891,16	21,351,102
Mississippi	1,072,12	867,12	24,112,507
Tennessee	1,392,49	1,317,78	33,967,478
Arkansas	701,33	38,50	5,800,000
Louisiana	838,00	335,75	13,527,664
Texas	2,787,00	451,50	16,509,772
Total in Rebel States	14,927,20	9,069,46	$237,054,587
Grand Total	49,237,82	34,411,71	$1,287,310,993

PROGRESS OF RAILROADS.

Table showing the mileage of railroads in operation near the 1st January yearly.

Years.	Miles.	Years.	Miles.	Years.	Miles.	Years.	Miles.
1826	3	1836	1,102	1846	4,870	1856	19,251
1827	3	1837	1,421	1847	5,336	1857	22,625
1828	3	1838	1,843	1848	5,682	1858	26,090
1829	28	1839	1,920	1849	6,350	1859	26,755
1830	41	1840	2,197	1850	7,475	1860	28,771
1831	54	1841	3,319	1851	8,589	1861	30,493
1832	131	1842	3,877	1852	11,027	1862	31,769
1833	576	1843	4,171	1853	13,497	1863	32,471
1834	762	1844	4,311	1854	15,672	1864	33,860
1835	918	1845	4,522	1855	17,398	1865	33,442

The total mileage of city passengers railroads is about 780 miles, with about 1,000 miles of track. Including these, the aggregate length of railroads in the United States is upwards of 35,000 miles, or one mile to every 1,000 inhabitants.

1864. Railroad Accidents.

During the year 1864 there have been 140 accidents; 404 persons killed, and 1,283 wounded. This list does not include accidents to individuals, caused by their own carelessness or design. Compared with the preceding year the casualties have nearly doubled.

1864. Steamboat Accidents.

Number of accidents on steamboats, exclusive of those persons killed in naval engagements or by their own carelessness, for the year 1864, is 26. The number of wounded, 143; of killed, 358, being an increase of more than twenty-five per cent over the accidents in 1863.

Imports at New York.

Total imports of woolen goods for 1864, $31,411,965 ; of cotton goods, $8,405,946; of silk, $16,194,080; of flax, $11,621,831; of miscellaneous dry goods, $3,956,630; the sum total being $71,589,752, and in round numbers exceeding by $4,000,000 the imports of 1863. The total imports of foreign merchandise at New York, for the year 1864, is $214,604,238, being an increase over the total of 1863.

Losses by Fire in the Loyal States.

The following table shows the losses by fires during each month, compared with those of the year 1863:

	1863.		1864.	
Months.	*Fires.*	*Losses.*	*Fires.*	*Losses.*
January	8	$490,000	21	$1,650,000
February	18	1,203,000	35	4,240,000
March	11	1,150,000	20	1,985,000
April	11	785,000	20	1,535,000
May	13	1,333,000	19	1,947,000
June	8	568,000	23	1,855,000
July	8	1,461,000	37	7,060,000
August	8	1,055,000	17	1,105,000
September	18	1,423,000	28	2,235,000
October	13	1,060,000	23	2,080,000
November	7	546,000	21	1,230,000
December	24	2,997,000	20	1,600,000
Total	150	$14,000,000	294	$28,522,000

The following table gives the losses by fire in the United States from the year 1854 to 1863 inclusive:

Year.	*Losses.*	*Year.*	*Losses.*
1854	$20,578,000	1859	$16,058,000
1855	13,040,000	1860	15,597,000
1856	21,159,000	1861	18,020,000
1857	15,792,000	1862	17,640,000
1858	11,561,000	1863	14,060,000
Total			$163,505,000

Commerce of New York.

ARRIVALS AT THE PORT OF NEW YORK DURING 1864.

We do not give the nationalities of the vessels arriving during 1864, for the reason that a large number of Americans are temporarily sailing under foreign flags:

Vessels.	1863.	1864.
Steamships	364	402
Ships	774	588
Barks	1,238	1,143
Brigs	1,695	1,578
Schooners	1,011	1,098
Total	5,082	4,809

The number of passengers arriving during 1854, was 198,342

Transactions in Gold at New York.

The receipts of gold at this port for the last ten years, compare as follows:

1864	$12,952,967
1863	11,847,286
1862	24,882,846
1861	34,379,547
1860	33,499,400
1859	39,975,750
1858	31,179,344
1857	34,222,903
1856	40,319,929
1855	41,682,524

The monthly receipts of gold at the New York Custom House in 1864, were as follows:

	1864.	1863.
January	$6,180,536	$4,127,607
February	7,474,228	3,590,714
March	5,659,771	4,554,461
April	13,982,556	3,857,198
May	3,885,187	3,873,866
June	3,311,148	3,738,934
July	3,585,848	4,912,718
August	6,237,364	6,332,334
September	4,084,492	7,270,543
October	3,670,188	6,238,943
November	3,455,156	5,075,846
December	3,467,368	5,248,189
Total	$66,993,842	$58,921,638
Increase		$8,072,204

It will be observed that while the receipts of the early months were largely in excess of those of the business year, the amount for the closing months were much below the same periods of 1863. For the last four months of 1863, the receipts were $23,833,524; for the same months of last year, the aggregate was only $14,677,204, or at the rate of $42,000,000 per annum.

The export of specie from New York for the past and twelve preceding years, has been as follows:

1864	$50,113,809	1857	$14,360,174
1863	49,751,066	1856	37,326,297
1862	59,437,021	1855	27,571,813
1861	4,216,250	1854	37,157,288
1860	42,161,909	1853	26,753,356
1859	69,618,528	1852	24,912,345
1858	25,973,006		

The following amounts of gold have been paid at the Sub-Treasury in this city as interest upon the funded debt of the United States during 1864:

January	$3,156,904	July	$1,881,000
Februry	1,114,602	August	2,103,784
March	253,116	September	3,113,699
April	5,195,731	October	1,895,006
May	4,951,898	November	4,032,956
June	2,261,772	December	3,163,406
Total at New York			$33,126,874
Gold interest not called for			5,231,726
Paid and appropriated at New York			$38,358,600

Canals of New York.

TIDE WATER RECEIPTS OF PRODUCE.

The quantity of flour, wheat, corn and barley left at tide water, from the commencement of navigation to the 8th of December, close thereof, during the years 1863 and 1864, was as follows:

	Flour, bu.	Wheat, bu.	Corn, bu.	Barley, bu.
1863	1,560,000	22,206,900	20,603,600	3,190,500
1864	1,184,300	15,465,600	10,352,400	3,045,900
	376,500	6,741,300	10,251,200	144,000

By reducing the wheat to flour, the quantity of the latter left at tide water this year, compared with the corresponding period last year, shows a deficiency equal to 1,724,760 bbls. flour.

The following comparative table shows the quantity of some of the principal articles of produce at tide water from the commencement of navigation to the close thereof, in the years indicated:

	1862.	1863.	1864.
Canal opened	May 1.	May 1.	April 30.
Flour bbls	1,828,500	1,560,800	1,184,300
Wheat, bu	32,669,900	22,207,900	15,465,600
Corn	23,709,800	20,613,600	10,352,000
Barley	2,662,700	3,190,500	8,401,900
Oats	5,940,000	12,437,500	12,177,509
Rye	7,000,000	470,500	620,300
Beef, bbls	71,900	87,200	75,700
Pork	169,800	232,200	53,300
Bacon, lbs	6,732,000	3,711,500	579,600
Butter	6,028,000	5,171,500	1,327,800
Lard	10,200,000	20,776,100	2,614,800
Cheese	13,700,000	9,614,000	4,298,900
Wool	1,760,000	429,200	1,226,100

R. G. Dun & Co.'s Statistical Table, showing the Estimated Wealth of the Merchants, Manufacturers and Traders throughout the Northern States.

States and Principal Cities.	Business Houses.	Wealth.
Connecticut	5,832	$145,588,000
Delaware	1,150	24,701,000
District of Columbia	1,282	17,448,000
Illinois	12,215	207,568,000
Indiana	8,512	134,240,000
Iowa	5,052	38,532,000
*Kansas	438	3,357,000
*Kentucky	1,528	39,559,000

States and Principal Cities.	Business Houses.	Wealth.
*Louisiana (New Orleans only)	802	60,794,000
Maine	4,982	99,298,000
Maryland	3,665	102,359,000
Massachusetts	17,302	868,815,000
Michigan	5,934	83,943,000
*Missouri	3,263	81,334,000
Minnesota	979	7,602,000
New Hampshire	2,851	38,685,000
New Jersey	5,910	90,250,000
New York	36,932	1,677,204,000
Ohio	17,005	310,725,000
Pennsylvania	22,941	733,296,000
Rhode Island	2,487	115,704,000
Vermont	2,494	19,989,000
Wisconsin	5,369	53,775,000
Total	168,925	$4,944,766,000

Export of Petroleum in 1864.

The following statement shows the export of petroleum to all parts of the world :

		1864.	1863.
From New York	galls.	21,288,499	19,547,604

The following is the quantity exported from other ports, Jan. 1 to Dec. 31:

		1864.	1863.
From Poston	galls.	1,696,307	2,049,431
From Philadelphia		7,760,148	5,595,738
From Baltimore		929,971	915,866
From Portland		70,762	342,082
Total	galls.	10,457,188	8,703,117
Total export from United States		31,745,687	28,250,721
Same time 1862		galls.	10,887,701

Petroleum is now sent in considerable quantities to almost every foreign port with which we have commercial relations. Great Britain is the largest consumer of the product, the export from New York thither during last year being 6,275,000 gallons. France is next in importance, her import from this port having been 4,625,000 gallons, a large increase upon the receipts of 1863. The shipments hence to Antwerp have also been large, amounting to 4,149,000 gallons, against 2,692,000 gallons in 1863. Bremen has imported nearly one million gallons; Hamburg 1,186,000 gallons, and Rotterdam 533,000 gallons. The shipments to Cronstadt indicate a large growth in the demand in Russia, the export thither having increased from 88,000 gallons in 1863 to 400,000 gallons in 1864. The export to Genoa, Leghorn, Trieste, Lisbon and Australia are also of considerable importance.

As yet the trade in this article with South America and the West India islands has not grown to such an extent as might have been expected from our intimate trading relations with those countries. It may be safely asserted that the general demand for petroleum is yet in its infancy. Next to gas, petroleum is the best and cheapest illuminating agent yet discovered, and it appears to be destined to become the illuminator of the world. In Asia, in many parts of Europe, and in South America, it requires time for a new commodity, however desirable it may be, to create a demand. But each year the consumption must become more generally diffused in all

* These States, in consequence of the disorganized state of trade caused by the rebellion, are not fully represented.

countries. If the supply can be kept up to the demand, it would not be surprising to find the export of petroleum, five years hence, three or four times its present amount, placing this product among the foremost of our articles of commerce.

[From the Shipping and Commercial List.]

Our Maritime Commerce.

We have received a volume of statistics of the Foreign and Domestic Commerce of the United States, communicated by the Secretary of the Treasury in answer to a resolution of the Senate, which contains matter for grave consideration—especially that portion relating to our maritime interests. Commerce is shown to have lagged and shrunk away because of piracies aggravated by the stagnation of the mercantile interests. Our wonderful increase in the brief period of our national life, which raised our tonnage from almost nothing when the nation had established its freedom to superiority over that of the greatest commercial country, it is well known, caused fear as well as jealousy abroad, and any method was hailed by our enemies which promised to destroy or cripple it. Much has been done to that end. Many of our best ships have been burned, while a much larger number have been driven to seek shelter under foreign flags; and thus, not only our foreign commerce, but much of our domestic, has been broken up and destroyed.

In 1857, the aggregate commercial tonnage of the world was estimated at about 15,500,000 tons. This was distributed as follows: The United States 5,661,416 tons; Great Britain 5,043,270 tons; France 716,130; Italian States 546,021; Holland 456,462; Spain 379,421; Prussia 368,729; Norway 368,632; Austria 324,447; Greece 264,981; Denmark 208,109; Mexico and South America 192,735; Turkey 182,000; Bremen 160,000; Sweden 147,828; Hamburg 119,884; Russia 105,509. This estimate excludes China, Japan, and the East generally, where no definite data are procurable. It yielded an excess of about ten per cent to the commercial tonnage of the United States over that of Great Britain, and an excess over all European nations, excluding Great Britain, of over one hundred thousand tons.

The aggregate of tonnage entering the ports of the United States from foreign countries in 1857 was 7,186,316, of which 2,464,946, or 34.3, was foreign; in 1860, 8,275,196, of which 2,358,911, or 28.4, was foreign; in 1861, 7,261,471, of which 2,217,554, or 30.6, was foreign; in 1862, 7, 362,-953, of which 2,245,278, or 30.5, was foreign; and in 1863, 7,255,076, of which 2,640,378, or 36.4, was foreign. The facts thus presented show to how great an extent we are a commercial and maritime people; and though our present tonnage can hardly compare with that of a quarter of a century ago, it is not probable that the present deplorable state of things will continue beyond the close of the war. With peace and unity restored to the country we shall soon rally, and the lapse of many years is not likely to occur before we shall have recovered our lost ground. We are rich in all the essentials for maritime supremacy, We have the raw materials for exchange which prompt such enterprise, and the taste for commercial enterprise which improves such possibility. Then again, we raise in excess and excellence everything for shipbuilding, and have, moreover, the mechanical aptitude and the knowledge which utilizes them. These facts have worked out the great results of previous years, and it is fair to assume they will work out greater in coming years, and their product will distribute among us a steady stream of wealth to nourish every important industry.

In this connection much could be urged in favor of a greater proportion of steam tonnage, which should, and doubtless will in due time, be far in advance of what it has been. We touch the beginning of the end as to the war, and we are therefore in a condition to consult our prospective welfare. Let us be prepared for the activities and responsibilities, the profits and emoluments of peace, by extending our steamship communication wherever it is practicable, and it is to be hoped that Congress will lend its aid to any enterprise which looks to inter-communication with foreign commercial nations. It may be remarked that the custom and commercial interests of England have induced her to subsidize ocean steamship lines in every direction, and to an amount which has been considered appalling by other nations. The custom has increased her tonnage, expanded her commerce, her manufactures, her exports of every variety, and proved so profitable generally as to have become usual. If we intend to compete for the commercial advantages of Europe, South America and Asia, we must employ the instrumentalities which are used against us. Nor has there ever been a time, perhaps, in our national history, when we were so pushed to expend the penny in order to secure the pound as at this moment. The wisest economy consists, occasionally, in a very lavish expenditure.

The Chairman next called on Mr. Watson to open the regular subject of the evening—

The Manufacture of Thread.

Mr. Watson—To the people of this country at large, the importance of a good sewing thread is very great. Until a few years, almost from the commencement of the war, English thread controlled the market, but within the time spoken of a vast trade has sprung up, involving tens of thousands of dollars of capital, and giving support to hundreds of persons. There are, at this time, in this country, many thread manufacturers, and the aggregate value of the manufactured products amounts to $4,000,000 annually. The number of yards made is incalculable.

The necessary qualities in a good sewing thread are strength, smoothness of finish, regularity in size, rotundity, freedom from knots, and uniformity in the quality. All these are obtained in our best American threads. I have been at some pains to obtain the leading threads in the market, and I have brought here, for your inspection, the Willimantic thread; the Green & Daniels thread and the Stafford Bros. thread. In addition to these there are other threads made. Perry's Water-twist, Samoset, Shaker's, and Circassian, are well known brands.

I have here also an English thread of Coats, and another one whose name I shall not give; the latter I submit for your examination. (The speaker here handed around an English thread which was very inferior.) Coats English thread is justly celebrated. It has been in the market twenty-five years, and is uniform in quality. I think, however, that our domestic thread is, in all respects, superior. In the matter of strength I will make a simple test. I have here a spool of Coats' six-cord cotton and one of the Willimantic Linen Company. They are both of the same number—twelve—and both are taken indiscriminately from a dealer's stock in a store. I have but little faith in public experiments, for like spoiled children, they seldom show to advantage, nevertheless I will tie both together at the same length and see which will break first. (The speaker here tried the experiment, which resulted in the breaking of the English thread.) This accords with private experiments to determine the same thing. I took weights and applied them to a suspended Coats thread. When it broke I took the same weights and applied them to an American thread, which not only sustained them, but twenty-five per cent additional weight, without breaking.

I have heard it asserted that a glazed thread will lose its strength after the size has been washed off. I tried an experiment to determine this also, and saw no difference whatever, although I think it is possible to wash any glazed or unfinished thread for sinister purposes, so that the fibers will be dissolved or torn apart, and the strength destroyed.

I have here an American thread made by Messrs. Green & Daniels, and one made by Stafford Brothers. That of Messrs. Green & Daniels is styled "ivory finish;" that of Stafford Brothers "enalmeled thread." Both of these threads are first class goods. They are 200 yards spools, four-cord threads and warranted to be as represented. They are now widely used, and manufacturers have told me that they used American black glazed thread in making silk cloaks, it being cheaper and as durable for their purposes as silk thread itself. I am also informed that three-fourths of the thread now in use is American thread, and our manufacturers are putting up extensive works to enable them to supply the demand.

The Willimantic Linen Company have erected a mill in Connecticut, over 400 feet long, at a cost of $1,000,000, in which they will make a six-cord soft-finish cotton. Very little soft-finish cotton has heretofore been made in this country, for the reason that our makers have had from 75,000 to 80,000 dozen glazed thread ordered in advance of their ability to supply it, so they were unable to make other kinds.

There are many persons who dislike glazed thread, and the introduction of it was attended with difficulties. It was asserted that the cloth was cut by it; that it ran stiffly through the needle, and was liable to kink. These defects are apparent where thread is glazed too much, and experience has shown our makers that a little or medium sizing is preferable to a greater amount.

For sewing machine use glazed thread is much liked. I have questioned many sewing-machine operators, and they assure me that what I have stated to this meeting previously is correct. In my own family I have been in the habit of using the Willimantic Linen Company's thread, and I may here say that I was led to examine the subject from the excellence of that article. I therefore do not speak from casual acquaintance but from actual test.

Our American cottons, at least that variety last named, are four-cord. From No. 40, up, the Willimantic cotton, and, I presume, the others also, is made from Sea Island cotton, which is the finest in the world for that particular service. The lower numbers are long staple, Gulf, or Texas cotton. Some cotton, from Pernambuco, South America, has been tried by the Willimantic Company, but they were unable to use it, and suffered loss from the experiment.

The sizing of thread is commonly supposed to be starch. It is not. What it really is the manufacturers know best. That is one secret which I can not disclose. I am able to inform you, however, that one firm used an article called salep, procured from Turkey. I have never seen any salep, but am told that it is exceedingly hard and almost vitreous in its nature, and one of the most difficult substances to grind known to man. It will destroy a French burr mill stone, and is, if my informant did not tax his imagination too highly, a most remarkable article. In the place of this salep, five ingredients are used, but of the nature and proportions of them I am ignorant. A sized thread is more costly and troublesome to make than soft finish.

English manufacturers are now putting up a mill in New Jersey, which they intend to stock with English operatives, for the purpose of competing with American makers.

From what I have said it will be seen that American thread is, in all respects, equal to the imported. I am unable to see why it is not better; for my own use I prefer it to English. It is certainly cheaper, for the best American threads can be bought for $1.10 to $1.15 per dozen, where the foreign-made costs $1.50. If it be urged that the duty on the latter is great, I present for your consideration the war tax of our makers, which is, I am sure, quite as onerous.

If it be a fact that American thread enjoys a monopoly of 75 per cent of the trade, I hope the time is not far distant when it will absorb the remaining 25 per cent, and retain the home trade for home makers.

The hour for adjournment having arrived, "Heat" was selected as the subject for the next discussion.

Adjourned.

American Institute Polytechnic Association,
Jan. 12, 1865.

Prof. S. D. Tillman in the chair; Mr. Benjamin Garvey, Secretary.

Paper made from Sugar Cane.

Mr. Bartlett exhibited paper made from cane brake, and remarked that the process of Mr. Lyman for disintegrating or slivering wood by exploding the material from a steam gun, was at first found to be impracticable, because the wood had to be properly shaped to be packed in the gun; but as it was supposed that cane could be used, a gentleman, Mr. Sellers, purchased the right to use the machine in the southern States, and gave it a practical trial. The machine was found to be of no service, and the same gentleman had prepared paper stock from the brake by a process of his own, the silica in the cane being removed by alkalies and acids. The only specimen shown to the meeting was a brown paper, which seemed to have the requisite strength for wrapping paper.

THE METAL PALLADIUM.

Dr. Parmelee exhibited a coil of palladium wire weighing about four ounces, Troy, and valued at about $600. He states the sample was manufactured by Messieurs Desmontes, Morin & Chapuis, of Paris, and that the specimen is more interesting from the fact of its being chemically pure, while others are generally alloyed with from 40 to 60 per cent. of silver. Its general characters are like those of platinum; but, while it is infusible in an ordinary wind furnace, it melts at a lower temperature than that metal. Its specific gravity is 11.5; atomic weight, 52.24. It occurs chiefly in the ore of platinum, in the proportion of about one per cent.; it is extracted by dissolving this ore in aqua regia, and precipitating the palladium from the solution by chloride of ammonium. After filtration the palladium is separated by cyanide of mercury as cyanide of palladium. This is usually converted into a sulphide by heating it with sulphur; and afterward the sulphur is expelled by repeated heatings. There are other processes of a more complicated character and probably less valuable. Palladium has been applied in a few cases to the construction of graduated scales of astronomical instruments. Porcelain manufacturers employ it in some instances to produce a fine silver gilt on ornamental wares. It is also used in bronzing brass for ornamental purposes. Photographers also employ the chloride to some extent for toning their pictures. The scarcity of the metal has limited the application of it to few uses. This wire is the one-thirty-eighth of an inch in diameter, and is worth about $40 per foot.

Prof. Seely remarked that a few years ago, at a meeting of the Photographical Society, Dr. Draper suggested that palladium might be used to advantage for toning photographs. When photographs are made the darks are silver, and the color of this metal is not pleasing to the eye; photographers therefore dip their pictures into a solution of gold, which gives them a beautiful purple color. Dr. Draper's suggestions attracted a good deal of attention, and palladium was probably inquired for at every place in the city where there was any reason for supposing that it might be found. There was none to be had, and the speaker applied to Dr. Draper, who said that a few years before there was plenty in the market at $10 per ounce. The supply had been exhausted by makers of gas fixtures and others, who used the metal for giving a beautiful bronze finish to their work.

Prof. Everett stated that a few years since he obtained about four ounces of palladium from some platinum ore that he was analyzing, and he made it into a solution of chloride of palladium, to be used for bronzing. After selling three bottles it was discovered that the supply in the market was running short, and when we sold the first lot from the fourth bottle, my partner filled up the bottle with water. The solution seemed to work just as well till it became very weak, so that we got as much for the fourth bottle as we did for the other three.

Mr. Maddock stated that the bronzing of porcelain is now effected with a preparation of iron.

THREAD.

Dr. Rowell illustrated by a piece of tape that if a thread or other string is wound on a card with the right hand, holding the card in the left, a twist is put in the string at every revolution around the card; but if the card is shifted to the right hand and the winding continued with the left, the twists are taken out, or the thread is twisted in the opposite direction. The same action takes place in ordinary sewing by hand, a twist being put into the thread or taken out at every stitch. It is for this reason that girls are taught to work button holes always in the same direction, going from left to right along the lower edge, and from right to left above when "twist" is used. The twisting is avoided in winding thread by adopting the method usually practiced by boys in winding their kite strings. To avoid kinking or spoiling the thread from the twisting in sewing, thread is cabled, as it is called; that is, it is first spun into thread, and then these are twisted together. In sewing on sewing machines, no twisting of the thread takes place, it is therefore not necessary to cable the cotton for this use.

The Chairman presented the following interesting compendium of late scientific investigations:

Action of Ozone on Silver Haloids.

Statements in foreign journals that ozone generated by electricity is capable of giving sensitiveness to insensitive iodide of silver, led Mr. Carey Lee, of Philadelphia, to make experiments in this direction with ozone generated by chemical means, by phosphorus, and by the action of sulphuric acid on the cameleon mineral. The result of a great variety of experiments described in the January number of the *American Journal of Science and Art* appears to show pretty clearly that ozone has no power of giving sensibility to insensitive iodide or bromide of silver, formed in the presence of excess of alkaline iodide, when such excess is removed, or when the excess be left present, as was the case with the alkaline bromide.

On the Separation of Metals.

Dr. Wolcott Gibbs, Rumford professor in Harvard University, has contributed to the January number of Silliman's Journal very valuable processes: *First*, for the separation of chromium from metals belonging to the group analogous to iron. *Second*, for the separation of aluminum and iron from other bases by means of acetate of sodium. *Third*, for the separation of manganese from cobalt, nickel and zinc. *Fourth*, for separating cobalt from nickel. *Fifth*, for separating uranium from zinc, cobalt, and nickel. *Sixth*, on analysing copper and nickel by means of their electrolytic precipitation.

Petroleum Wells

The borings for oil in Western Pennsylvania are made through three strata of sandstone. The oil found immediately below the first stratum is thick and heavy; that just below the second stratum is lighter, and that from the greatest depth, forming the flowing wells, is clear, limpid, and lightest. Such is the testimony of Mr. Ira Sayles, in Silliman's Journal.

Prizes for Meteorological Observations.

The French association for the advancement of meteorology, now under the presidency of Le Verrier, offer a prize of 4,000 francs for an extended series of observations made on the Atlantic Ocean. Three thousand francs will be divided between authors of the best observations made at sea or at points but little known to meteorologists. Two prizes, of 500 and 300 francs each, are offered for the best memoirs upon the application of meteorology to agricultural questions. All meteorologists are admitted to competition without distinction of nationality. Memoirs must be delivered to the Secretary of the Society before the 31st of December, 1865.

A New Mordant.

M. Shultz has discovered a new mordant for silks and other dyes, consisting of acetate of alumina and arseniate of soda, which he believes will take the place of albumen, gluten, tannin and other matters now employed for that purpose. He mixes at the ordinary temperature four grammes of ordinary aniline violet in powder with a quarter of a litre of acetate of alumina and twenty grammes of arseniate of soda, thickening it with starch boiled in water, the quantity of starch to be diminished in proportion to the darkness of the color to be fixed. In the case of prints it is recommended to mix the arseniate of soda and the acetate of alumina with the coloring matter, and to steam the fabric or yarns over the mixture. For dyeing it is said to be better to treat the tissue or yarns in the first place with the mixture of the two salts and afterwards to dip them in the color vat in the ordinary way. Salts or compounds of tin, combined with alumina, may be substituted for arseniacal acid.

California Silk.

California is better adapted than any part of Europe to the growth of the mulberry and the breeding of silkworms. The fertility of its soil and the dryness of the climate give a peculiarly rich and nutritive character to the leaves, which imparts a higher, finer, and more delicate quality to the silk produced from them. Certificates from the highest authorities in Europe show that California silk, after being tested, carefully analyzed, and compared with European silk, proves to be of a very superior quality.

Imperial Tokay.

The village of Tokay, which gives to this wine its name, is situated in Hungary, on the top of a hill, at the confluence of the rivers Rodvog and Theiss. The vineyards from which this peculiar wine is made are in extent but little over three miles square, about ten square miles. The earth is a yellow chalk mixed with large pebbles. The wine is white. There are four different kinds. That which is generally exported is made by placing sound grapes in a wooden vat with a double bottom, the upper one being pierced with small holes. The vat, when carefully filled with grapes, is covered with boards. After a few hours the grapes become heated to 80° Fah., when fermentation begins. This destroys the tartaric acid, and the weight of the grapes forces the juice below the false bottom. Afterwards, the grapes are trodden by foot. The wine is poured into casks, and after fermenting for two days, is exposed to the air for a month. The best wine has a silvery, oily color, a sweet and mellow taste, with a peculiar earthy flavor. It is highly astringent and aromatic, but is not drinkable until it is three years old. The Emperor of Russia has of this wine forty or fifty casks per annum.

Iron Plates and Rivets.

At a late meeting of the London Society of Arts, the Duke of Somerset, first lord of the admiralty, presiding, William Fairbain, the well known mechanician, read a paper "on the application of iron to the purposes of naval construction." He spoke first on the strength of plates when torn asunder by a direct tensile strain in the direction of their fibre, and then torn across it. Second. On the strength of plates when united by rivets, as compared with the plates themselves. Third. On the resistance of plates, in varied forms of construction, to the force of compression; and Fourth. On the distribution, strength and value of wrought iron plates and frames as applied to ships and other vessels

His views cannot be even condensed here except on a single subject, the relative strength of riveted plates. Taking the strength of a plate at 100, the strength of the double riveted plate will be 70, and the strength of the single riveted 50.

In the discussion which followed the reading of the paper, Mr. Henshaw begged to differ from the opinions expressed by Mr. Fairbain regarding the use of punched instead of riveted holes. The speaker had advocated the old-fashioned method of punching, but he (Mr. H.) had for years practiced the system of drilling the holes for the rivets, and was convinced of the superiority of this method. He had no hesitation in saying, if the Brittannia tubular bridge had been put together by drilled instead of punched holes, the result would have been twenty or twenty-five per cent better. He had used a machine which drilled thirty, fifty and even eighty holes at once, and the work obtained was superior. On examining plates put together by drilling and those by punching, the difference will be apparent on sawing the plates asunder, it will be found that the line of demarcation between the rivet and the plate in the first case will be scarcely visible, while in the second case numerous interstices not filled up could be seen.

Mr. J. Grantham thought in bridge building and in plain, straight work where drilling could be easily done, it was preferable; but Mr. Fairbain's paper was devoted to ship-building, in which entirely different conditions arose, and he agreed with the position taken in that paper.

Mr. Fairbain, in reply, said punching was the best test of the quality of the iron. He had found that in drilling, the holes were not always found coincident.

Improved Water Communications.

Mr. J. Nickles writes to the *American Journal of Science and Arts*, that the almost certain success of the canal across the Isthmus of Suez fixes attention more than ever upon other projects of the kind. The cutting of the Isthmus of Malacca and of Darien awaits only the completion of the Suez ship canal. In France they are talking of uniting the Atlantic Ocean with the Mediterranean by a ship canal, which would borrow part of its route from the old Southern canal. In Holland a society is incorporated, under the title of a company, for the cutting of the Isthmus of Holland, to establish a canal joining Amsterdam and the North Sea by a direct route, while at the same time the Dutch government has undertaken to establish another navigable route from Rotterdam to the sea.

A new project is presented which, if realized, will complete a series of maratime communications in the north of Europe. It is proposed to establish a canal, navigable for ships of war and commerce, between the North Sea and the Baltic, to avoid making the passage of the Danish Islands. This project, often thought of, is now very seriously considered.

Finally, they are speaking of cutting one other isthmus, and this time it is Spain which has the honor. It is proposed to pierce the Spanish isthmus in such a way that Gibralter will be an island. The canal is to start from Trafalgar and end at Andalusia. The canal which would cost hardly a hundred millions of francs, has for its object to prevent more than 4,000 vessels every year from "lying to" before the strait of Gibralter without power to get out.

Heat.

The regular discussion was opened by Dr. Rowell, with remarks upon heat as a mode of motion.

The Chairman remarked that the discussion of the abstract question of "heat, as a mode of motion," opened a very wide field. The subject has been fully and clearly presented in the work of Prof. Tyndall, of the Royal Institution, London. To understand why heat cannot be matter, but must be the effect of the undulating motion of a very attenuated, imponderable fluid, it is necessary to study the phenomena known as the polarization of heat. There are many phenomena connected with light which have their counterpart in the action of heat. That light is not the result of the emission of matter, has been as absolutely settled as any other question upon which experiment can give us positive knowledge. The plain inference in the absence of direct proof would be that light is a mode of motion. But there are many phenomena which can be repeated at pleasure, confirming the view that the effects of heat and light are the result not only of motion but of a particular kind of motion which seems to be exhibited only in connection with them and actinism. The chair suggested the propriety of confining our discussion at present to the best modes of generating heat, and of applying it to useful ends. It should be stated however that this association is always desirous of witnessing new experiments which may illustrate the operation of any physical law.

Mr. Fisher said: "According to the new theory of heat, which has been stated by Dr. Rowell, it makes little difference what agent it acts upon, whether water, ether, air, gas or steam. But though the power evoked may be the same, there may be a difference in the proportion of it which is utilized, and there is a difference in the cost of material and in the durability of metal under different temperatures. Steam boilers last sixty years in cases of slow combustion and low pressure, six years in other cases, and six months if the firing is violent and the water spaces narrow. Air engines last for months, or weeks, or days, according to the firing. Ether, carbonic acid, sulphuret of carbon, and such agents, are costly and unpleasant, and, of course, not to be used if the new theory dispels the idea that because they are vaporized at low temperatures they require little fuel. Steam is cheap, but to superheat it much requires a temperature that is destructive to any apparatus yet constructed. Five hundred deg. F. is the highest temperature that has been recommended; and as this involves 600 deg. or more for the metal, the durability has been much less than that of apparatus in which water is present. Some years ago I had occasion to inquire what economy there might be in superheating. Assuming 500 deg. as the highest temperature allowable, and the specific heat of steam to be 475deg., as found by Regnault, and the dilatation to be 1-480th for 1 deg., I found that the effect of fuel might be a little more than doubled by superheating steam of 100 pounds pressure to 500 deg., and that the total heating surface might be a little less than that of a boiler alone for equal power. This seems a contradiction of the new theory. But it must be observed that in making steam we change the state of water; and it cannot be said that no power is required to change its state. Nor am I aware that it is proved that heat will give the same mechanical power through liquids as through gases. Moreover, if there be such a general law of heat, it changes at the maximum density of water, or at 40 deg.; thus, if we apply heat to water at 32 deg., instead of expanding it and lifting weight, we contract it and the weight sinks, until the temperature has risen to 40 deg., and above that, as the temperature increases, the weight is lifted. And in the change of state from liquid to solid, mechanical power is not given out; on the contrary, there is an expansion that bursts the strongest vessels, and at the same time 140 deg. of heat are given out. More investigation is needed as to the convertibility of heat into power, into liquids, and their conversion into solids and into vapors. But these familiar facts are sufficient to warrant us in the application of this law of heat to aeriform fluids, and it is even disputed whether there is not a change of law, similar to the change in water, at 40 deg., in steam a little above the temperature of vaporization. Fourteen years ago Dr. Haycraft, of Greenwich, England, reported some results of experiments which he thought indicated the existence of such a law; and the disagreement as to the economy of superheating warrants a suspicion that there is something to qualify the calculations we make. What I have said as to the possibility of doubling the effect of fuel by superheating, will, therefore, be taken with this qualification."

Dr. Rowell explained that, according to Dr. Tyndall, there is in each gas or other fluid a zero point, analogous to the point in water below which heat will contract it, and above which expand it. The meaning of the conversion of heat into power was this: that to change the volume of gas or vapor required more or less heat according to the resistance; 10 grains of fuel will double the pressure of a cubic foot of air, the volume being constant; or it will double the volume of it if the space be enlarged by external force, and yet make the pressure equal to what it was at first; but if the air as it is heated has to lift the weight that confines it, then it requires 14½ grains of fuel; and the temperature of the air, also the pressure, are at the end of the experiment exactly as they were in the case when only ten grains were burnt. The extra 4½ grains are presumed to have been converted into the power that raised the weight; and from this it has been concluded that the heat which will raise the temperature of a pound of water 1°, will lift 772 lbs. a foot high.

Mr Fisher hoped that the effect of heat, in changing the state of water from solid to liquid and to vapor, and in changing its temperature when in these states, would be further investigated. Some had argued from the new theory of heat that there could be no gain from expansion in steam engines; others argued from the same theory that there was no gain from superheating. These views were not held by Dr. Rankine, who is a supporter of the theory; but men who claim to be practical, and have influence for much good if they be right, or much harm if wrong, select certain results of experiments that accord with this construction of the theory, and doubt the truth of the reports of other experiments and observations that, if true, refute their views. Unluckily these doctrinaires have the sole and secret management of the experiments now being made to settle these questions; and however sincere they may be, it is scarcely to be expected that they will not deceive themselves.

Mr. Bartlett alluded to the fact that the scientific world were agreed in the opinion that Heat, Light, Electricity and Magnetism were convertible forces, and may therefore be regarded as having the same or similar media of action.

After selecting the subject of "Pumps" for the next discussion, the Association adjourned.

American Institute Polytechnic Association,
January 19th, 1865.

Prof. S. D. Tillman in the chair; Benjamin Garvey, Secretary.

New Pump.

Dr. Willard exhibited a new pump. It is a double acting force pump, with a heavy double acting valve substantially within the piston, which is water-packed. The whole apparatus being of cast iron, is made cheaper than ordinary pumps. The piston rod is hollow and forms the pipe through which the water is conveyed to the height required; when not in action the water is discharged at the bottom, so that fresh water is always drawn when this pump is used in wells.

The pump called forth considerable criticism, which was generally favorable; the principal objection presented being that the water passed through a circuitous route to reach the pipe above the piston, thereby causing increased fiction.

Emery.

The Chairman said Silliman's Journal for Jannuary contained an account of the discovery of a mine of emery in the town of Chester, Mass., written by Prof. Charles T. Jackson, of Boston, that gentleman is now present and the association would be gratified to hear from him regarding location and extent of this mine.

Prof. Jackson said he did not expect to say anything here upon the subject of emery, but he would briefly give the facts regarding the discovery.

In the town of Chester, 27 miles from Springfield, and near the railway leading to Albany, is an immense bed of emery equal to that of Naxos. The emery trade had been monopolized by two houses in Liverpool. In this country there is a great demand for emery on account of the large number of fire arms manufactured here. The emery of Chester is situated in the very heart of the arms-manufacturing establishments. It is found in two mountains, north and south mountain. It is found 750 feet above the Westfield river. The widest part of the vein is from ten to fourteen feet thick, but the average is seven. It has been traced about four miles. It will doubtless in time supercede the great monopoly of Asia minor and control the market. The supply may be regarded as exhaustless.

Dr. Jackson illustrated the geological formation by a drawing on the blackboard. On the upper side is first mica slate, then soap-stone, below that talcose rock, talc, crystaline talc, talcose slate, chlorite slate, then emery. On the opposite side of the emery is very beautiful hornblend, the handsomest he had ever seen. The effects of segregation are seen here distinctly. There are immense masses of round fine emery surrounded by a mineral called margarite. Pure emery is crystalized alumina and iron. Sapphire is pure alumina and ranks in hardness next to the diamond. The chemical analysis of the emery of the south mountain is:

Alumina	45.50
Protoxide of iron	43.00
Silica and titanic acid	11.50
	100.00

It was discovered by means of margarite. This is called useless, but it was the guide board which led to this discovery, as it is always associated with emery. When he first saw it he supposed it was a bed of magnetic iron ore, but when he found the margarite he at once declared it to be emery. Emery is very difficult to break with the aid of heat, but it is crushed or separated under pressure quite readily. At the present time emery is sold at Naxos at $140 per ton, and here at $300 per ton. The emery is of different grades; the flour emery is made by mixing it with water several times and separating the finer particles. The largest kind, used at the Springfield armory, is about the size of a grain of wheat. Emery wheels are made by mixing emery with valcanized india rubber. They are the most powerful wheels known for cutting metals. Emery is largely used in polishing granite and porphyry columns. The ancient columns of Greece are as perfect to-day as when first erected. There are no mosses or other disfigurements growing on them because there is no chance for the water to enter the pores of the stone. There are numerous places in this country where porphyry can be obtained. And in the course of time we shall have in use tables of Porphyry which cannot be scratched and tombstones that can never be covered with moss. Solid sapphire and crystals of corundum have been found in the state of New Jersey, but emery in quantity has never been found in this country before the recent discovery at Chester.

Dr. R. P. Stevens equired whether the Professor had any theory as to the manner in which these metamorphic rocks associated emery were crystalized.

Prof. Jackson replied, there was no difference in opinion among geologists in regard to the stratified rocks; they were deposited at the bottom of lakes and oceans. But some of these, since their deposit, have been metamorphozed or changed to a crystaline structure, and there has been much discussion in relation to the agencies by which this metamorphism was effected. It seems to me that M. Daubree has cut the Gordian knot, and has shown that the crystalization was produced mainly by the action of superheated water, that is, water heated above the boiling point. This can be done, as you are aware, by confining water under pressure. M. Daubree enclosed various substances in strong iron tubes, filled the tubes with water, closed them tightly with screw plugs, and had them built in the brick work of gas furnaces, where they were exposed constantly to a high temperature for several weeks or months. Wood thus enclosed was first melted and compressed into a globular mass, and if longer exposed, was finally converted into anthracite coal. Glass was decomposed and its silex formed into beautiful quartz crystals. M. Daubree found that if sufficient time was allowed, it was not necessary even that the water should be superheated. The warm springs of Plombiers were used for baths by the Romans, who led the water through aqueducts constructed of brick or cement. On examining the materials of these aqueducts, which have been subjected to the action of warm water for 2,000 years, it was found to be transformed into the same crystaline minerals that occur in the metamorphic rocks.

Air and Steam Engine.

Mr. A. L. Murdock, of Boston, exhibited diagrams illustrating the combinations used in P. Shaw's patent union air engine. In this arrangement the products of combustion are used as a motor in combination with steam, The air which feeds the fire is forced in and after combining with the carbon and hydrogen of the fuel is made to move a piston in a similar method to that employed in the Roper air engine. After the air has passed from the piston, it expends its heat upon a boiler containing water, and the steam thus produced passes into combination with the products of combustion and assists in moving the piston. Mr. Murdock stated that this engine had been favorably noticed by the Boston Academy of Science and Art. and they had given several hundred dollars to enable him to complete his engine.

Rumford Prize Fund.

The Chairman requested Dr. Jackson to give a history of the Rumford Prize Fund.

Dr. Jackson—Count Rumford, formerly Benjamin Thompson, of New England, left a bequest to the American Academy of Arts and Sciences of Boston, the oldest scientific association in the country, to be devoted to improvements in light and heat, especially such as should be useful to the middle classes of the people. The academy unfortunately has not displayed proper activity in discharging the duties of this trust. For forty years the only prizes bestowed were the gold and silver medal awarded to Dr. Robert Hare, the distinguished American chemist, for the invention of the oxy-hydrogen or compound blow-pipe, in which hydrogen and oxygen combine, forming water and at the same time generating the most intense heat known, and by which platinum and rock crystal (quartz) are not only melted but sublimed; and for the invention of the intensely brilliant calcium light, now commonly but improperly known as the Drummond light, which consists in burning the same gases in the presence of the oxide of calcium or lime. This prize fund of the Boston academy has now increased to $30,000, and recently the members of the academy have been demanding more energy on the part of the Rumford committee. Capt. Ericson, of New York, applied for the prize for the invention of an air-engine, and the prize was awarded to him, not because he had constructed the best air-engine, but because his inventions and exertions had given such an impetus to efforts in this department, that they might be considered as having led the way to all subsequent improvements.

Air Engines.

A committee of the Academy, by careful trials, found that Ericson's air engine yielded one horse power by the consumption of fourteen pounds per hour. Roper's engine, in which the products of combustion are used, yielded one horse power by the combustion of five pounds of coal per hour, and that air and steam engine of Shaw required but two and a half pounds of coal per hour to produce one horse power. He believed the latter is the best engine in which air is used that has yet been made, but he did not claim to be a mechanician, and would be glad to hear the views of other gentlemen present regarding this engine.

Prof. Charles A. Seeley said the great difficulty which Mr. Ericson had to encounter was the heating of a large quantity of air very rapidly. A small quantity could be heated readily, but then at the risk of burning out or consuming the iron which surrounded the air to be heated. The true principle of heating air is to make it go through the fire. Capt. Bennett and others had long ago tried the plan of using the gases generated in the furnace, but they had met with difficulties which have been surmounted by Mr. Shaw.

Mr. Murdock stated that the Boston Academy Committee experimented with Mr. Shaw's engine, using first only air and afterwards mixing steam with the air, and found by the latter method the economy for this engine, which has already been stated.

The Chairman suggested that if by using the heat of the gaseous products of combustion which have done their work on the air piston, by passing such products under a steam boiler, more than double the power was produced by the engine than when air alone was used, it might be more economical to dispense with the air engine apparatus, and use all the heat in generating steam. It appeared to him that the addition of steam power to caloric engines was a step in the right direction.

Pumps.

The regular subject of the evening was opened by Dr. Jos. W. Richards, who occupied nearly all the remaining time of the evening in describing the various kinds of sucking and forcing pumps now in use. They are all too well known to require full descriptions here. One of the most simple yet efficient pumps is used by tanners in raising the tanning liquor from tan vats In this "lifting" pump the direction of the water is not changed by the operation of the valve, which is a leather cone surrounding the pump rod, the smallest end being fastened to the end of the rod. When the cone is lifting the water it presses against the sides of the pipe, and when descending the water passes between the cone and the pipe.

The subject of "pumps" was continued for the next discussion.

Adjourned.

American Institute Polytechnic Association,
January 26, 1865.

Prof. S. D. Tillman in the chair; Mr. B. Garvey, Secretary.

Stillometer.

Mr. Griswold exhibited an invention by him for graduating the size and number of drops issuing from a vial. The name he had given it was founded on the Spanish word *stilla*, a drop. The principle used was that a fluid will only pass out by its own weight, as air passes into a bottle, but it may be pressed out by means of a small india rubber tube. This tube and the small eduction pipe are fastened into the cork of the vial. When it is filled with liquid and inverted, the india rubber tube is also filled, and by squeezing it the drops are forced out.

Dr. Parmelee and others expressed doubts as to the practicability of using this machine in administering medicines.

Rubber-valve Faucet.

Mr. Albert Fuller exhibited a faucet having a valve lined with rubber which was closed and held to its place by an eccentric. It is a simple and durable contrivance, and can be used for all liquids but oil. It is also used as a gauge cock on steam boilers.

Carbolic Acid.

Dr. D. D. Parmelee exhibited a beautiful specimen of crystalized carbolic acid. This compound is one of the products from coal gas manufactories, for which not much use has been found. It is also known by the name of phenic acid. It is composed of $C_{12} H_8 O_2$. It is very pungent and corrodes the skin. It boils at 250° Fah. When carbolic acid is mixed with ammonia it is converted into analine, the compound from which the new and beautiful colors are made. Carbolic acid is used to adulterate creosote, which it very nearly resembles.

The Chairman then presented the following interesting notes of progress in science and art:

Flora and Fauna of the Oil Age.

The plants and animals which flourished preceding the coal age, whose remains are found in the Upper Devonian system, are thus summed up by our associate, Dr. Robt. P. Stevens: Plants, genera, 42, of which three are sea weeds; species, 100, of which five are sea weeds. Corals, genera, 16; species, 29. Bryozoa, genera, 6; species, 10. Echinoderms, genera, 25; species, 71. Molluscs, genera, 106; species, 479. Crustacea, genera, 25; species, 31. Fish, genera, 8; species, 16. Reptiles, genera, 1; species, 1.

Gamboge.

M. D. Hanbury stated before the London Pharmaceutical Society that the exact botanical origin of gamboge had remained in obscurity until recently. It was known to be a plant of the genus garcinia, but the species had not been determined. The garcinia gambogia of Ceylon, it is said, does not yield a good form of the drug, but the garcinia morella does. Gamboge is not exported from Ceylon, but is produced in Siam. It is now believed that the two mentioned are varieties of the same tree, depending on soil and cultivation. Messrs. D'Almeida, of Ceylon, have twenty-eight trees on their plantation. They are from thirty-five to fifty feet high, the largest being three feet in circumference. They grow luxuriantly on the side of a hill without any attention. Gamboge has been extracted from them from time to time, but only as a matter of curiosity.

Paris International Exhibition for 1867.

It is reported that the building for the next great exhibition will be a crystal palace in the new boulevard, extending from the arc de Triompe, at the head of the Champs Elysees, to the river Seine. It is to occupy the central part of the boulevard, leaving on one side a space for carriages and pedestrians, and on the other room for a street railway, on the American plan.

Tea from India.

Forty years have not elapsed since the announcement of the discovery of the tea plant in Assam. The sales of Assam teas were only 144,161 pounds in 1847. The immense increase in this production will be realized when it is stated that for the last year, ending in October, the sales of these teas at Calcutta amounted to 3,343,663 pounds. It is believed the increase for the present year will be at least twenty-five per cent. The amount of production is only dependant of the kind of labor required. It is said that the various failures to cultivate tea successfully are the result of a want of intelligence among the only class of laborers which low wages can command.

Coal in France.

In a recent railway excavation made, only fifteen miles from the city of Lyons, a seam of good coal has been discovered which, it is said, indicates a large deposit of coal at no great distance from the soil. No nation would put coal to a better use than the French.

A New Thermograph.

One of the new instruments furnished for the French scientific exhibition to Mexico is the self-registering thermometer of M. Marey, of Paris. It is a modification of the air thermometer, consisting of a metallic bulb attached to a metallic tube only 0.0079 of an inch in diameter. The indicator of temperature is a glass tube bent in the form of a semi-circle, one extremity being closed and attached to the circumference of a metallic wheel resting on knife edges and counterpoised. A mercurial index is attached to the glass tube, which divides it into two chambers, one closed, the other open to the air. The metallic tube is passed through the mercury into the closed chamber of the glass tube. On the axis of the wheel is an arm carrying a tracing point which marks the variations on the registering cylinder. When the bulb is heated the air passes into the closed portion of the glass tube, forces back the mercury, and of course disturbs the equilibrium of the apparatus to an extent marked by the tracing point on the cylinder. The metal air tube is furnished with a valve near the bulb, so that the interior may be placed in communication with the exterior, in order to set the apparatus to zero.

Influence of Odor on Silkworms.

M. E. Fairre read a paper before the French Academy, in which it appears that, although the silkworms are inconvenienced and many are destroyed in consequence of the presence of certain aromatic leaves beneath their ordinary food, those which survive are impelled to spin up sooner, and to produce finer cocoons than those which have not been subjected to this exceptional treatment.

Gas in Egypt.

The city of Alexandria was lighted by gas for the first time on the 23d of December last. The lamplighter is nightly followed in his rounds by a crowd of wandering Arabs, who insist that the marvellous blaze following his touch must be provoked by the will of genii. The improvement has made great changes in the habits of the place. The municipal order requiring everybody going abroad after dark to carry his own lantern has been rescinded.

Hippophagous.

The brilliant Paris correspondent of the *New York Tribune* gives, in the following, some interesting statistics relating to animal food:

Economical bucolic readers of *The Tribune* may be interested in this bit of Prussian statistics: "From the first of October, 1863, to like date 1864, there were slaughtered in Berlin 1,552 horses, the flesh of which was sold at from five to six cents the pound." Some years ago the lamented Geoffrey St. Hilaire, enthusiastic propagator of the sound doctrine of Hippophagy, set out a table at his residence by the Jardin des Plantes with baked, and broiled, and stewed, and toasted, and fried, and boiled, and smoked, and roasted horse meat, and preliminary flesh soup of the same. Doctor Yran, one of a dozen partakers of that generous horsepitality, gave a toothsome account of the banquet in the time of it.

A somewhat similar horsepitable experiment was tried on volunteers, after a lecture on the subject, at the Garden of Acclimation in the Bois de Boulogne last year. All who have eaten are agreed that, prejudice being set aside, horse-meat is good eating. And there is exclamation of regret over the loss of 160,000 pounds of nutritious horse-meat; lost to hungry Frenchmen annually by their unreasonable prejudices. Of other meat-victuals, meanwhile, the following statistics seem to promise them tolerable supply. There are in France to-day three million horses, three hundred thousand asses (quadrupeds), three hundred and sixty thousand mules, ten million two hundred thousand neat cattle (of which 300,000 bulls, 2,000,000 oxen, 5,800,000 cows—the rest calves), thirty-five million sheep (of which twenty-six million pure or crossed merinos), a million four hundred thousand goats, as many adult swine and three million tender suckling piglings.

To wash down this meat-victual the French folks have wine, got from 6,250,000 acres of vineyards, whose average product, as this year for example, amounts to one thousand three hundred and twenty millions five hundred and seventy-six thousand gallons—multiply by five for the bottles. Of this blessed abundance of drink, to be sure some small rivulets run down foreign throats; but that is a detail. The large estimate of exports is only a little over three million hectolitres, or about one-twentieth part of the whole product; distillation into brandy takes up say twice as much more; the rest is drunk in France. And with all that, do you know that we have very good authority for the woful belief that we here in Paris drink one-third, at least, more wine than ever crosses the *octroi* boundary; that is, one bottle is composed of two parts of grape juice and one part of Seine water, drugs, deviltry and Mackay mixture generally.

New Steam Omnibus in France.

Nantes was the birth place of the omnibus, and to this day the arrangement of a conductress swinging in a basket at the rear is adhered to. Having been first to apply horses for moving the million, the busy town seems bent on setting aside its own former pet in favor of a new one in the shape of a steam carriage. This invention of M. Latz is said to be a success. It moves at the rate of nine miles an hour, and turns readily, with two carriages attached, within a circle of 30 feet in diameter.

Building Materials in Ceylon.

Mr. J. W. Heath stated before the London Institute of Civil Engineers that, during a residence in Ceylon for seven years, his attention had been directed to the materials used in the construction of permanent buildings. The habitations of the lower classes are formed of a rude framework of stout bamboos: the sides and roof consisting of reeds closed in with the interwoven leaves of the cocoanut palm, the latter being washed over with the slimy juice of a native fruit which when dry resembles copal varnish. In the huts built of "wattle and dab," the framework is made of rough squared jungle trees, the space between being filled, and both the inside and the outside of the hut being covered with clay and sand, well kneaded, and afterwards plastered over with earth thrown up by the white ants, mixed with a powerful binding substance produced by the ants. Superior houses are built of "cabook," a soft kind of rock found a few feet below the surface. This material has the appearance of a coarse sponge, the interstices being filled with soft clay. Before being used, the blocks should be exposed to the rain to allow some of the clay to be washed out. Cabook requires to be protected from the weather; but if covered with a thin coating of lime plaster, it will last for years. Hard stone is not much used in consequence of the expense of working it. The bricks used are badly made, and require a covering of plaster or coating of oil or coal-tar to prevent them from crumbling. Iron also requires oil or tar to preserve it from oxidation, but zinc will last many years with little or no decay.

The items read by the Chairman elicited considerable discussion, after which the regular subject, resumed from the last evening, was taken up.

Pumps.

Mr. E. P. Watson said. perhaps there is no machine for domestic use on which there has been so much ingenuity displayed as the pump, the valves of which, we are aware, have been the cause of much trouble, and pumps with many valves are looked upon with disfavor. To overcome this objection pumps have been made without valves, and of different forms, but only with partial success. The common form of valve in the old-fashioned pump, is the ordinary box valve, or clapper, opening upward. This style of valve is objectionable, as, when the water is low, the valve becomes dry and will not work until water is thrown in. The ball valve, in rising and falling so rapidly, batters the seat and leaks; it is also difficult to make water-tight all around. The spindle valve is now generally used in force pumps. The flap valve, sometimes called the butterfly valve, is simply a door with a hinge: they are generally made of brass. The difficulty with this style of valve is that it is not always tight, as, if it is not hinged evenly, the seats will not fit so as to be water-tight. There is a mode of raising water by the admixture of atmospheric air. If a vertical tube be placed in a reservoir of water, and if a quantity of air be injected into it at the bottom of the tube by a bellows or force pump, the water in the tube will immediately rise to a higher level, and remain until the air has escaped at the top; and if the tube be of proper height, the water will overflow. This mode, however, does not appear to be an economical way of applying force. There is another style of machine called the bag pump, made of a bag of leather connected with the piston of a pump and placed in the cylinder. In this pump there is very little friction, but it is probable that the want of durability would be its greatest objection. This bag is alternately extended and contracted, like a bellows, by every stroke of the piston, and raises the water without much friction in the pump. We have also the rope pump, which is made of a single rope or a bundle of ropes passing over a wheel above and a pulley below, moving with great velocity, which draws a certain quantity of water by its friction. The water probably ascends with about half the velocity of the rope, and the cohesion of the water is sufficient to prevent its falling or being scattered by any accidental inequality of the motion. A pump that was very popular, and even now much used in the country, is the chain pump. It consists of an endless chain, moving over two wheels, downward without, and upward within, a barrel. This chain has a number of discs or circular plates attached at certain lengths, which, on passing through the barrel, carry the water in a constant stream before them. An objection to this device, however, is the enormous friction, and there is considerable loss from the facility with which the water runs back. The velocity with which some valves work is very great, and they wear out very fast. There is a pump made in Portland that is used on steam fire engines, which has no valves, but has a hollow plunger connected to one end of the rod of the engine, and it is said to work well. (Mr. Watson illustrated his remarks by diagrams on the blackboard of the various pumps spoken of.)

Mr. T. D. Stetson remarked that many improvements had recently been made in pumps, owing to the demand for them at the oil regions, where the value of a good article is appreciated, and hence inventors are now devoting much attention to this matter; and which would, no doubt, result in some important advantages.

The Chairman remarked that great improvements in the pump have been made in this country. The first object was to obtain a cheap pump for household uses. This was accomplished, some thirty years ago by Mr. Minor, a very ingenious mechanic of Western New York, who made the first cheap wooden pump. By means of machinery, he was enabled to bore the inside, turn the outside of a piece of scantling, and cut a screw on each end at one operation. The whole time occupied being but little more than one minute. The stock was also turned from wood. The only iron parts of the pump, were the cylinder, the valves, and the pump-handle. This very cheap pump had an extensive sale. Several persons retired with fortunes made in its manufacture. It was soon found that the stock could also be made of iron, with less trouble than of wood, and that by placing the piston in this stock, which formed the cylinder, there was in fact a great saving. This kind of pump in various forms has long been made in large numbers at Seneca Falls in this State. Probably there is no place in the world where more pumps are turned out as rapidly as at this place. Pumps for nearly all uses are made there, and one of the few good rotary pumps was invented and first made there by Birdsall Holley. It is a modification of the pump formed by two wheels gearing into each other, by means of which a continuous stream is furnished. After further remarks, "Telegraphs" was selected as the next subject for discussion.

Adjourned to February 9th.

American Institute Polytechnic Association, }
February 9th, 1865. }

Prof. S. D. Tillman in the Chair.

Sheaves or Rollers for Sliding Doors.

A model of Hatfield's sheaves for sliding doors was exhibited, and explained by Mr. Capron. By this arrangement the superior advantages of a roller over those of a wheel are secured in moving a door, or any other burthen having a reciprocating motion. In the ordinary form the roller is inapplicable to a sliding door; but, by a modification, as shown in this sheave where the burthen presses on an axle, instead of the periphery of the roller, the distance traveled by the roller is so much lessened that its application to the sheave is quite practicable. In common sliding door sheaves, it has been found difficult to lubricate the working parts, and in consequence, it is found after a year or two that the axle is ground away. This is so serious that the door settles gradually until it comes in contact with the floor, or with the track, and thereby prevents the moving of the door, except by great exertion. The roller sheave most effectually prevents the occurrence of this evil, and herein is its principal advantage; for, their being no friction between the axle and the plane upon which it rolls, neither of them can wear away, hence the door must remain at the height at which it was first placed, and continue to move with ease for any length of time. This article illustrated by the accompanying engraving is manufactured by Newman, Onderdonk & Capron, No. 1172 Broadway.

Mr. J. K. Fisher presented the following paper:

Petroleum as a Steam Fuel.

Mr. J. C. Richardson, C. E., has made experiments at Woolwich, the result of which the London *Times* states to be that one ton of petroleum is "equal for steam purposes to five tons of coal," and will occupy less room, and will require fewer stokers, and so on.

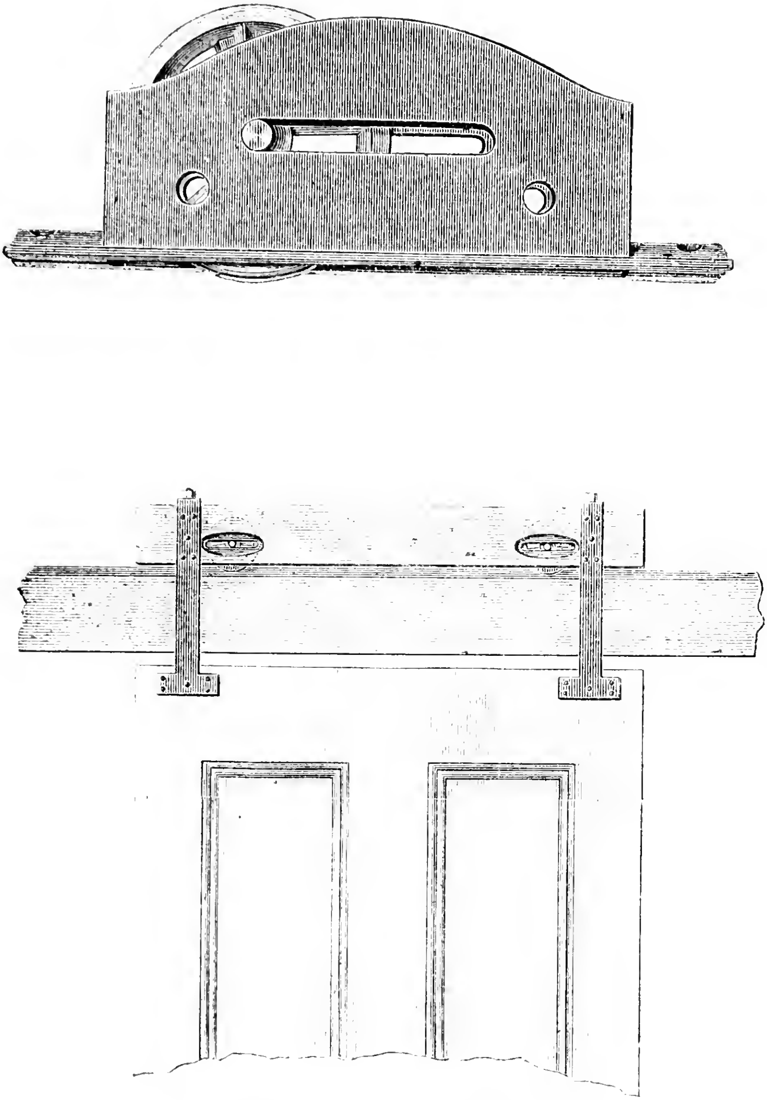
Mr. B. H. Paul controverts this. He concludes that there cannot be a saving while petroleum is near its present price.

Mr. Richardson replies, claiming that with petroleum at £17 per ton, and coal at 15s., and freight at £7 per ton, "a return of £14.15s. is made in favor of petroleum."

The *Mechanics' Magazine* reviews the discussion, and concludes that Mr. Richardson has miscalculated—that it follows from his own data that the balance will be £2.17s. per ton *against* petroleum; and it says that "while the Woolwich authorities may possibly have good grounds for their alleged report in favor of petroleum as fuel for ships, it is certain that Mr. Richardson has not shown such grounds to the public." The report of the engineers appointed some months ago by our navy department was favorable to the view that petroleum may in some cases be used with advantage.

When petroleum cost ten cents per gallon I proposed a plan for using it to aid the combustion of smoke in locomotives. I read a paper on it before this club, and published it in the *Railway Review*, which I then edited. But the price soon rose so high that it seemed to me that it would not be economical, and I therefore did not pursue the subject. But since the explanation of the geological relations of petroleum, by Dr. Stevens, it seems as if the price of it cannot remain high, and may be expected to decline until it can be used for steam fuel, at least in the cases referred to in the reports.

The method of combustion which I propose is an extension of what I published two years ago. It is to vaporize the petroleum in a boiler, under a pressure of about 150 lbs. per square inch. From the boiler it is to go to the furnace in pipes perforated with minute holes, and to blow in jets into the air, so as to be mixed and perfectly burned. The direction of the jets may be such as to draw air into the furnace, as in D. K. Clark's method. But for this present plan I propose to pump in the air under a pressure of about 130 lbs. per inch, and to make the air enter in directions corresponding to the petroleum vapor jets in order to cause perfect mixture and combustion. Now I expect there will be no solid matter resulting from the



Hatfield's Sheaves or Rollers.

combustion—no soot or ashes—nothing but gas and water. If this perfection of combustion is attained, it will probably be by an excess of air; but that is a part of my plan, which is to make an engine in which hot air is one of the agents, as in Bennett's, Roper's, and others. The other agent is steam. The products of combustion are to go from the furnace, through proper valves, into the water; and to pass through proper screens of wire gauze, or other devices to cause the heat to be given to the water—such, perhaps, as spraying the water. The condition I desire is, that there shall be a mixture of hot gases and superheated steam, of about 130 lbs. pressure, and of a temperature not over 500°, or not too hot for the working parts.

This idea of forcing air through the fire into the boiler, through the water and through the engine, was carried out by Capt. Bennett in the old steamboat *Novelty*, in 1835 or 1836; but he was troubled by ashes and unburnt fuel. The improvement now seemingly attainable will consist in perfect gasification, and avoidance of all that can grind the cylinders and valves, and foul the water in the boiler.

It is doubtful whether we can retain the condenser. But perhaps we may send the products of combustion in the usual way through a boiler, and make pure steam, and temper the gases with a little steam on Mr. Wethered's plan, and use the pure steam in a condensing engine, and the mixed air and steam in a non-condensing engine. This practice may be well for a long voyage vessel, in which the freight-room occupied by fuel is of such value as to warrant the expense and complication of a condenser.

The uses to which this method is most likely to be applied are for small engines in buildings, and for steam rail-cars and carriages. The boilers will be without tubes and very small, and safer than common boilers; and insurance premiums will not be much increased by them; and the consumption of fuel can be economized or stopped at any instant. When the jets of petroleum vapor are shut off, the generation of steam instantly ceases; and when the jets are throttled it is instantly diminished; and an automatic safeguard may be made to operate on the throttle, so as to lessen the heat as the steam pressure increases.

As the advantages of this fuel, and this method of utilizing all the heat, so as to use as little fuel as possible, and especially as little water as possible, are not all apparent, it may be well to indicate one of them. There is now a new demand: underground railways are on the increase; Mr. Bazalgettte, chief engineer of the English Board of Trade, reports that 258 new lines are already projected, their aggregate length to be 417½ miles, and their estimated cost £70,000,000. These railways require engines that use the best fuel and water, and make the least dust and sulphurous gas. Now an ordinary locomotive wastes from 33 to 43 per cent of its fuel through its chimney; that is, it pollutes the air with a hundred measures of gas instead of 57 or 67 measures. And as to water, by superheating the steam, and substituting air for it as far as may be without injuriously heating the apparatus, it is probable that we may work with a third of the water now used in locomotives. We can save a third of the gases, and two-thirds of the vapor, that now pollute the air in tunnels. To meet this new demand we have this new fuel—this *essence of coal*—which I hope is to become cheap.

Several members replied to the statements of Mr. Fisher, the prevailing opinion being that petroleum could not, unless very much cheaper, be brought into competition with anthracite coal.

Arnold's Twist Drills.

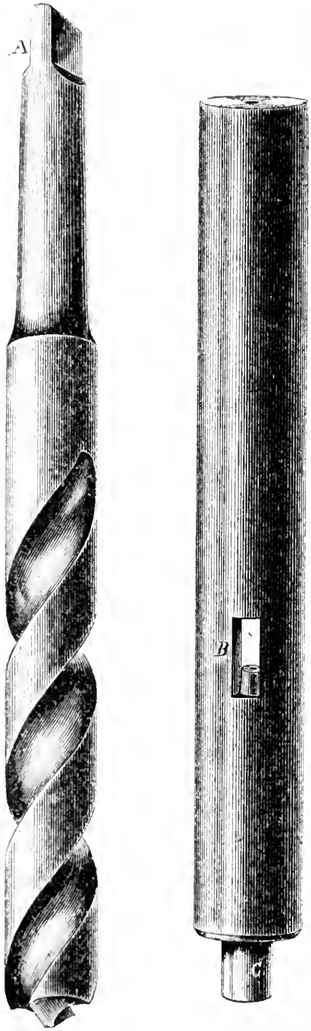
Mr. Watson brought to the notice of the association some very beautiful samples of twist drills used by machinists in boring holes in metals, and in alluding to them said:

The perfection to which we have attained in metal-working is one of the miracles of modern times. In all of our large machine shops iron is planed and turned in large masses with a speed and accuracy unknown in former times. I have here one of the modern tools used for working metal, which is, as may be seen, not only externally beautiful, but constructed on sound principles. I have here also a common flat drill, such as is ordinarily used, and I deem it unnecessary to more than to show you the two, side by side. The advantages resulting from the use of such drills as this twisted one, are that the work can be done in less than half the time. To say nothing of the first cost of the two tools—which is largely in favor of the twisted drill—it commends itself to mechanics by reason of its perfect accuracy in all that affects size, uniformity of quality and temper. These are standard tools, and as such have a great value even beyond their intrinsic worth. When I say *standard* I wish to convey the impression that they are all alike. A hole drilled by a thirteen-thirty-second drill to-day will be the same as one drilled last year by any other drill of that size from the same factory, so that work which is laid off and executed by them can be reconstructed in case of breakage with the certainty that the bolts or other fixtures belonging to the job will fit. Beyond this mechanical advantage there is the very great additional moral one of having in daily use tools that are calculated to excite emulation and stimulate mechanics to do good work instead of poor.

These drills are of all sizes, from three-eights, varying by thirty seconds of an inch up to one inch and a quarter, with turned taper shanks and sockets to match with straight shanks, made of Stubb's wire, from three-eighths down to a sixty-fourth of an inch, or from No. 1 wire to No. 60 wire.

I can easily conceive what an immense advantage these drills will be to all metal workers. I have always thought that twist drills should be sold in the stores as cheaply as augers for carpenters; and when I speak of the price it is almost incredible to see how they can be sold for it. Why, sirs, this splendid inch and a quarter drill, turned from end to end with a taper shank, accurately ground and tempered, sold ready to drill a hole with on the spot, costs but five dollars. No man could go to work and make one like it for three times the money. The four sockets cost but ten dollars. I know something of metal working, and these tools could not be afforded at anything like the sum, unless the company worked upon a regular system and had ingenious machines constructed for this very purpose.

It was not my intention, when I came here, to occupy too much time in the discussion of this tool, but I have felt it important to metal workers that the fact of such drills as these being offered at such moderate prices



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should be made known. The Manhattan Firearms Co., of Newark, N. J., the manufacturers, spared no pains or expense to make a perfect tool, and I would advise every one interested in metal working to send for samples.

The best fine tools we have in this country are not made here but abroad. I mean by this, small rimmers, screw plates and similar wares; and I think that, as members of this association, we should take pains to make the facts I have previously stated widely known.

Mr. Arnold, the inventor of machinery for making the drill, was present, and gave some interesting information as to the manufacture of the tool.

S. H. Maynard.—I should like to have the inventor state how he tempers the drills. Does he mean to say that he does not lose any of them, and that they do not buckle or twist in hardening?

Mr. Arnold.—I can answer that question by saying that we harden them by plunging the shank end in the water first and draw the temper afterwards to the right color. The taper on the length of the drill, 12 inches, is barely the sixty-fourth of an inch and we rarely find any so bent that they are useless; a little deviation can easily be corrected by a hammer. Mr. Arnold stated that the drill was never touched by a hammer to be forged from the time the steel was drawn, and was therefore homogeneous throughout.

Telegraphs.

The subject for the evening, "Telegraphs," was taken up, when Mr. T. D. Stetson gave a detailed account of the various submerged cables that have been laid, and the methods adopted to overcome the difficulties experienced in their working. A large part of those submerged on the Eastern continent have ceased to work well, without any well defined cause being given. The practical working of a cable coiled in a tank filled with water, such as the new Atlantic cable is being subjected to, does not argue the same result as when placed at the bottom of the ocean, as there different influences are at work. He had considerable doubt in his mind, notwithstanding all that had been said on the subject by what may be called good authority, whether there has ever been a dispatch sent through the first Atlantic cable after it was laid; although we have credible accounts of dispatches being sent through one line in the Mediterranean 1,700 miles long, most of which was submerged. Mr. Stetson here exhibited a specimen of the new Atlantic cable, now being finished in England, which is made on nearly the same principle as the first one, only being about twice the size of the old one.

Dr. R. P. Stevens said there appeared to be some radical defects in the plan of telegraphing across the Atlantic ocean. If unfortunately the cable should break, it would be a very difficult matter to mend it, and a continuous wire of some 2,300 miles at the bottom of the ocean, where no defect can be seen, is hardly to be expected. The next question is, how long will the material last of which the cable is composed. I feel convinced that it will decay at the bottom of the ocean. At the present time the ocean contains salts of copper and acids that will affect the metal covering of the wire, and the vegetable matter, such as the hemp and gutta percha used in its construction must sooner or latter be destroyed. There are scavengers in the sea, as well as on the land, and these animals in the ocean will eat every kind of vegetable matter. There appears to be no provision made to overcome this difficulty in the new cable about being laid, a piece of which we have before us. The only route that was destined to succeed, was in his view, that now being built overland across this continent by way of Behring Straits. Extending in a northwest direction from the Red River of the North there is a route entirely across the British possessions, which is free from mountain ranges, broad rivers, and other serious obstruction. It is inhabited by half breed Indians who have been trained to labor by the Hudson's Bay Company, and who could be easily employed to put up the line and keep it in repair. By this route a line of telegraph can be constructed from New York city to the Russian possessions without encountering a sigle mountain in the whole distance. This is a fact that those who publish our school geographies do not seem to be aware of. The objection he had heard against this route was the fear of its being destroyed by the hostile tribes who inhabit the region through which the wire must pass, but he apprehended very little danger from this source, as it could be easily made to the interest of these tribes to take care of and not destroy it. He was informed by a gentleman of experience engaged in the telegraph business, that there has always been more fear of damage to the wires from the "bulls and bears" of Wall street, than from the savages along the route through which the line passed. He was told that on the arrival of a steamer, or when important news was at hand, the utmost vigilance of the company was exercised to keep the wires from being cut by interested parties who could claim no relationship to savages. In a very short time the Californians will have a line that will reach Russia. And although they have great obstacles to contend with, still there is that enterprise on the western coast that eventually must succeed. But as he said the best route is that northwest from St Pauls, clear to and across Kamtschatka, by which we avoid the mountains and the great storms that sweep over the plains. And through this valley there will be found plenty of timber for posts. And from the time it strikes the Red River, probably 550 miles from St. Pauls, clear through to the British possessions, the line can be under the control of the Hudson's Bay Company.

Mr. Benjamin P. Finnell exhibited a piece of the first Atlantic cable from on board the stèamship "Niagara," and since kept in a damp place; the gutta percha was found to be shrunk half an inch in the piece eight inches long, while the outer iron wires and the hemp remained the same as when made. He said that the outer iron wires which covered the gutta percha was wound over it in a spiral form, which of course was elastic, while the copper wires in the centre being laid lengthways could not yield in the least. The effects of this on a cable of some miles in length was obvious.

Mr. Johnson said he observed the size of the wire, which formed the core of the new cable, was very small. In his experience in telegraphy he found that with two of Groves batteries wire like this would become very brittle and is easily broken. Now it is a question of some importance, what will be the effect of several batteries of intensity sufficient to send electricity 2,000 miles. We know that such batteries must generate a great amount of heat, sufficient to melt a wire of such fineness. When the line between New York and Boston was first laid, the wires were covered with gutta percha, and it was found that this substance impeded the velocity of the current. However much inclined to see the Atlantic project succeed, he had very serious doubts of its becoming practical. He had seen wire eight miles long unwound from a coil and it was twisted in such shapes that on straightening it out it broke in several places. Would not the new Atlantic cable be subject to the same trouble? At Crawfordsville, Indiana, he had seen a local magnet break after three months use.

The Pacific Telegraph was selected as the subject for the next discussion. Adjourned.

American Institute Polytechnic Association,
February 16th, 1865.

Prof. S. D. Tillman in the Chair.

Automatic Fan.

Mr. Chipman exhibited a model of his oscillating fan, for keeping flies and other winged insects from alighting on and injuring articles. It was worked by clock gearing. The advantage of this machine over others, the inventor claimed was the small power used to operate it, the fans being counterbalanced. This fan was also designed to be used for hospitals, and for keeping off mosquitoes. The price was from eight to ten dollars.

Mr. Jireh Bull remarked that some few years ago he was in an establishment on Broadway, where a steam engine was employed to operate large fans, and the proprietor told him that he was more than repaid for the expense he incurred, by the saving of his goods from damage by flies and insects generally.

The Chairman read his summary of scientific news.

The Chimes in the Church of St. Germain, L'Auxerrois.

The new chimes will consist of forty bells. M. Colin has invented a cheap form of barrel, by which a large number of airs can be supplied, thus breaking the monotony usually belonging to chimes. One of those barrels will cost about fifty dollars, whereas not less than $12,000 was paid for a single barrel belonging to the celebrated chimes of Bruges.

Mr. William H. Butler said that some ten years ago the chimes in Trinity Church, in this city, were worked by keys, the same as a piano.

Japanese Matches.

Dr. A. N. Hoffman exhibited before the London Chemical Society some matches or fuzes brought from Japan by the Prussian expedition. Beautiful arborescent scintillations were thrown off during their combustion. The nature of the composition was the point of interest, some persons having supposed the peculiar light must be the effect of steel filings, but analysis had shown the composition consisted of two parts wood charcoal, three parts of sulphur, and six and a half parts of nitre. The paper covering was of the finest description, and known as Chinese paper. About forty milligrams of the mixture was folded up with each match.

Zinc Relief.

Boettger described at Giessen, a method of writing on zinc with a solution consisting of one part of chloride of platinum, one part of gum Arabic, and ten parts of water, by which black characters are produced. When the plate is placed in dilute nitric acid, the parts not written upon are eaten away, and the writing stands out in relief.

On Drops.

Prof. Guthrie of Mauritius, in an elaborate paper, read before the Royal Society on drops. After detailing the numerous experiments made by the author, to ascertain the sizes of drops obtained from various liquids under different conditions, he gives the following laws governing a liquid dropping from a solid through a gas.

1. The drop size depends upon the rate of dropping. Generally the quicker the succession of drops, the greater the drop; the slower the rate the more strictly is this the case. This law depends upon the difference, at different rates, of the thickness of the film from which the drop falls.

2. The drop size depends upon the nature and quantity of the solid, which the dropping liquid holds in solution. If the liquid stands in no chemical relation to the solid, in general, the drop-size diminishes as the quantity of solid contained in the liquid increases. The cause of this seems to be, that the stubborn cohesion of the liquid is diminished by the solid in solution. When one or more combinations between the liquid and solid are possible, the drop-size depends upon indeterminate data. For example certain varieties of the drop-size of solutions of chloride of calcium of different strengths, point to the existence of definite hydrates; while the regularity of the variation of drop-size in the case of nitrate of potash, points to the absence of hydrates.

3. The drop-size depends upon the chemical nature of the dropping liquid, and little or nothing upon its density. Of all liquids examined, water has the greatest, and acetic acid the least drop size. It is remarkable that butyric acid, which has sensible the same specific gravity as water, gives a drop less than half the size of the water drop.

4. The drop-size depends upon the geometric relation between the solid and the liquid. If the solid be spherical, the largest drops fall from the largest spheres. Absolute difference in radii, takes a greater effect upon drops formed from smaller, than upon those formed from larger spheres. Of circular horizontal planes, within certain limits, the size of the drop varies directly with the size of the plane.

The fact that the drop increases in size according to the increasing radius of the sphere from which the drop falls, and that the difference from this cause may amount to half the largest drop-size, the author regards as important to dispensers of medicines. The lip of a bottle from which a drop falls is usually ring-shaped. The amount of solid in contact with the dropping liquid is determined by the size of the two diameters, one measuring the width of the rim of the neck, the other its thickness. In most cases the curvature and massing of the solid at the point whence the liquid drops, is so irregular as not to admit of any mathematical expression.

5. The drop size depends upon the chemical nature of the solid, from which the drop falls, and little or nothing upon its density. Of all the solids examined, antimony delivers the smallest, and tin the largest drops.

6. The drop-size depends upon the temperature generally, the higher the temperature the smaller the drop. With water the effect of a change of temperature of 20° to 30° centigrade is very small.

The nature or tension of the gaseous medium has little or no effect upon the drop size.

The Barberry.

M. Boutin communicated a note to the Academy of Sciences, Paris, on the advantage to be gained by cultivating the Mahonia Ilicifolia. The juice of the barberry will yield eight per cent of alcohol of agreeable flavor. The wine made from it is too acid. The seeds when roasted make a drink very like coffee in taste and appearance.

Photographs of Natural Colors.

This subject is still under investigation by M. Niepce de St. Victor. He finds that the chlorides which give colored flames reproduce objects of the same color as the flame. Chlorine, chloride of copper and perchloride of iron appear to be the best agents, and by varying the dose of chlorine and chloride he obtains certain colors in a marked manner. They are, however, not permanent. But this gentleman has been completely distanced by M. Chambray, of Mauritius, if the newspaper report be true. The portraits made by M. Chambray are incredible resemblances of the originals; life circulates under the skin, and the color is unchangable. These wonders have not yet reached Paris. Americans who have had some experience in this particular "sensation," are not impatient to hear the particulars regarding these discoveries.

Sugar from Palms.

Dr. De Vey exhibited to the Scientific Congress at Giessen a specimen of sugar made from the juice of certain palms growing in Ceylon and Java, and stated that it was producible in large quantities.

Electro-Magnetic Locomotive.

The model of the invention of Messrs. Bellett and De Roavre has been exhibited at Versailles, France. The driving power is attached to a single pair of wheels in the rear. A number of magnets are arranged radially on these wheels, one pole being at the circumference. The Voltaic current is sent from the center of each wheel to all the magnets in succession, and these latter act directly on the rail itself. The inventors propose besides the large locomotive to make a small one for carrying packages at the rate of 120 miles per hour. The great expense of this kind of engine has been fully proved in this country. The only advantage it possesses as a motor for locomotives is that no injurious gas is formed by the products of combustion.

Vaccination.

The smallpox is rather prevalent in Paris, and it is recommended to follow the practice of vaccinating directly from the cow to insure safety against taking any other contagion with the smallpox. A new idea has been started—to drink the milk of the infected cow. The doctor has found it effectual, and now recommends that young ladies who are afraid of the lancet should drink a glass of this kind of milk every three or four years.

Dr. Vander Weyde, formerly one of the active members of the Polytechnic, makes the following communication to the *N. Y. Herald.*

Photography as a Detective.

As a matter of information to your many readers, I wish to remark that as the dark retina of the eye lies in the interior, and is entirely invisible, so any image seen in the eye is due to the reflection of the outer surface or cornea, and that when taking an enlarged photograph of it these images may always be seen in the print. These are simply the images of the objects reflected at the time and place when and where the picture is taken. I had once the image of myself and apparatus visible in an enlarged daguerreotype of a living eye, and it is indeed difficult to photograph an eye at all without obtaining such reflected images.

The human face seen in the photographed eye of the murdered woman in Florence was (if really a human face), undoubtedly the image of the artist's own face when he took the picture. In a living eye the image is a perfect likeness. In a dead eye this image is, by the collapse of the cornea, either destroyed or at least distorted and impe.fect, and cannot be recognized.

When we take into account all the conditions necessary to produce a permanent image of any object, it appears surprising that persons are found who have any faith in such a fable as that the eye of a dead person could possibly contain any permanent visible picture. Probably the poetry of the idea strikes and pleases the imagination of many; but all belief in it is destroyed when tested by the true philosophy of facts and experience.

P. H. Vander Weyde, M. D.,
Professor of Industrial Science.

Girard College, Philadelphia, *Feb.* 6, 1865.

Gottschalk, in his "Notes of a Pianist," in the February number of the *Atlantic Monthly*, thus discourses:

Music as a Physical Agent.

"It communicates to the body shocks which agitate the members to their base. In churches the flame of the candles oscillates to the quake of the organ. A powerful orchestra near a sheet of water ruffles its surface. A learned traveler speaks of an iron ring which swings to and fro to the murmur of the Tivoli Falls. In Switzerland I excited at will, in a poor child afflicted with a frightful nervous malady, hysterical and catalyptic crises, by playing in the minor key of E flat. The celebrated Doctor Bertier asserts that the sound of a drum gives him the colic. Certain medical men state that the notes of the trumpet quicken the pulse and induce slight perspiration. The sound of the bassoon is cold; the notes of the French horn at a distance, and of the harp, are voluptuous. The flute played softly in the middle register calms the nerves. The low notes of the piano frighten children. I once had a dog who would generally sleep on hearing music, but the moment I played in the minor key he would bark piteously The dog of a celebrated singer whom I knew would moan bitterly and give signs of violent suffering the instant that his mistress chanted a chromatic gamut. A certain chord produces on my sense of hearing the same effect as the heliotrope on my sense of smell and the pineapple on my sense of taste. Rachel's voice delighted the ear by its ring before one had time to seize the sense of what was said, or appreciate the purity of her diction.

"We may affirm, then, that musical sound, rhythmical or not, agitates the whole physical economy—quickens the pulse, incites perspiration, and produces a pleasant momentary irritation of the nervous system."

After speaking of music as a moral agent, he thus treats of

MUSIC AS A COMPLEX AGENT.

It acts at once on the instinct, the forces, the organism. It has a psychological action. The negroes charm serpents by whistling to them. It is said that fawns are captivated by a melodious voice; the bear is aroused with the fife; canaries an sparrows enjoy the flageolet; in the Antilles, lizards are enticed from their retreats by the whistle. Spiders have an affection for fiddlers; in Switzerland the herdsmen attach to the neck of the handsomest cows a large bell of which they are so proud that while they are allowed to wear it they walk at the head of the herd; in Andalusia the mules lose their spirit and power of endurance if deprived of the numerous bells with which it is customary to deck these intelligent animals; in the mountains of Scotland and Switzerland the herds pasture best to the sound of the bagpipe; and in the Oberland, cattle strayed from the herd are recalled by the trumpet.

"Music being a *physical agent*, that is to say, acting on the individual without the aid of his intelligence; a *moral agent*, that is to say, reviving his memory, exciting his imagination, developing his sentiment; and a *complex agent*, that is to say, having a physiological action on the instincts, the organism, the forces of the man—I deduce from this that it is one of the most powerful means for ennobling the mind, elevating the morals, and above all, refining the manners."

Silvering Mirrors.

At the Giessen congress Bothe's process for silvering glass was given. The inventor uses oxytartrate of silver, in a solution of ammoniacal nitrate of silver, and produces beautiful results.

Sound from Muscles.

At the same congress Helmholtz presented a paper on the production of sound from the contraction of muscle by which he is enabled to determine the number of vibrations in the muscle.

Pacific Telegraph.

The regular discussion was opened by Dr. I. B. Rich, who exhibited maps and diagrams of the Pacific railroad, and explained very clearly and minutely its course. His remarks, promised by him for this report, have not been furnished. This debate naturally led to

Electro-magnetism.

The Chairman said it was important to remember the manner in which the poles of an electro-magnet were changed by direction of the electric current.

The wire surrounding an electro-magnet is arranged spirally, but the wires carry the electric force around a magnetic needle are necessarily parallel with each other above and below it. To fix in the memory the manner in which the poles of a magnetic needle are changed, let a person imagine his spine to be the wire and the electric current to pass from the head toward the feet; his extended arms will represent a needle above the wire; his right hand will represent the north pole, and left hand the south pole. By a simple mnemonical rule this position may be remembered. S will stand for the south pole and the sinister or left hand. If the current pass from the feet to the head the poles are reversed.

The Chairman then directed attention to

Ohm's Law.

Prof. Ohm, after investigation, announced the following law: The *intensity* of the Voltaic current is equal to the electro-motive force divided by the resistance. If I represent the intensity, E the electro-motive force, and R the resistance, the law is expressed by the following formula:

$$I = \frac{E}{R}.$$

The *resistance* of a conductor depends on three properties: 1st. Its conductibility, which is a constant for each conductor. 2d. Its section; and 3d. Its length.

The resistance is *inversely*, as the section, and *directly*, as the length of the conducting wire. In the case of a metallic wire, the greater the conducting power of the metal, and the greater its diameter, the less the resistance, but the greater the length of the wire the greater the resistance. If c represent the conductibility of the wire, s the area of its transverse section, and l its length: then $R = \frac{l}{cs}$. Substituting this value of R in the first equation, we have, when E is a constant,

$$I = \frac{E}{\frac{l}{cs}} = \frac{E \times cs}{l}.$$

In a Voltaic battery, composed of different elements, the intensity of the current is equal to the sum of the electro-motive forces of all the elements divided by the resistance. The elements of a battery are usually of the same kind, and the resistances are two: 1st. That offered by the liquid conductor, called the internal or essential resistance; and 2d. That offered by the wire connecting the plates outside of the liquid, called the external or non-essential resistance.

Upon the conclusion of his remarks, the Chairman announced the selected subject for discussion, "The Manufacture of Bells" Adjourned.

American Institute Polytechnic Association, *February 23d*, 1865.

Prof. D. L. Tillman presiding.

Fine Chinese Carving.

During the miscellaneous business, Dr. Rich exhibited a string of olive pits, on which were some very fine specimens of Chinese carving. He said there were three places in China noted for different kinds of carving. At Ningpo they carve exclusively in wood, and at Amoy they are celebrated for fine pit carving, such as those exhibited. They are really beautiful, the very small figures and the various character of each pit is remarkable, every pit having an entirely different subject engraved on it. There is one that has 600 faces carved on it. This is all done with three or four small steel gouges and a bow-saw, such as watchmakers use. The work is done in the open street; two or three Chinese carvers will sit around a small table and make these fine figures without using magnifying glasses. At Canton they work in ivory only.

Velocity of the Pistons of Steam Engines.

Mr. Watson said he had seen it stated in the English journals that they were about constructing engines that would have a speed of 350 feet per minute. That speed might be something new in England, but we have engines in this country the pistons of which travel 750 feet per minute. Most of the engines on the boats running on Long Island Sound make 500 feet.

The Chairman read the following items of scientific news:

A New Electro-Magnet.

M. Cavlier, of Paris, has made an electro-magnet by means of a helix of uncovered wire, which is stated by trustworthy experimenters to have nearly three times the attractive power found in a magnet of similar size in a coil of covered wire of equal length. The requisite condition to be observed to obtain this effect is that the different coats of wire shall be separated by a sheet of paper, and that the exterior of the bobbins, whether in wood or copper, shall be covered also with an isolating substance.

Mr. Bartlett stated that Dr. John Bradley, of this city, some years ago made helixes of uncovered wire. His magnets are so much sought after that he cannot now supply his orders

Suspended Magnetic Action.

M. Plateau has treated, mathematically, the question of the suspending of a magnetic needle in the air by the contrary action of two magnets, and concludes that it is quite impossible to obtain such equilibrium, whatever may be the number and distribution of the magnets. Thus the legend of Mahomet's coffin falls to the ground.

On the Cause and Cure of Cataract.

Sir David Brewster, while presiding at the late meeting of the Royal Society of Edinburgh, stated that many years ago his attention had been directed to this subject in consequence of having experienced an incipient attack of this disease. Luminous bodies appeared surrounded by imperfectly triangular lines of light, some parts of which were deeply tinged with prismatic colors. He traced the cause of this disease to a deficiency in the supply of the *liquor morgani* in the crystaline lens, and its consequent separation into laminæ. The cure was effected in eight months by copious and continuous doses of pulvis salinum compositum. He supposed the supply of fluid to the crystaline lens might be derived from the aqueous humor, and the cataract might result from too large a percentage of albumen in that secretion. The cure might be effected, first by injecting water into the aqueous humor, or, second, by tapping the aqueous chamber in the hope that the new secretion would contain less albumen than the old. The cure of the soft cataract, on the other hand, would be effected by introducing albumen into the aqueous humour. These views have since received confirmation from various researches of physiologists.

Metamorphoses in Fishes.

Prof. Agassiz, of Harvard College, in a communication to the Paris Academy of Sciences, states that he has lately observed certain fishes undergo metamorphoses quite as marked as that of the tadpole to the frog, and he expresses the opinion that a natural classification of fishes can be founded on the correspondence which exists between the embryonic developments and the complication of their structure in the developed state.

Iron and Steel Shavings.

The long spirals resulting from turning iron or steel in a lathe have been found by M. Greiss to possess very decided and permanent magnetic properties. This is particularly the case with shavings from soft iron. The end of the turning first made is found to be invariably the south pole, and the last end made the north pole. Mr. Greiss also observed that the shaving whose revolutions were made in an opposite direction to those of the hands of a watch, the observer being the south pole, were more magnetic than those corresponding with the motions of the watch hands.

Elasticity of Steel Wires.

Prof. J. C. Maxwell thus writes to Dr. Tyndall, of the Royal Institution, London: I have been swinging discs, &c., by torsion a good deal, and I find that after a steel wire has been twisted until it takes a slight set, and so has a new position of equilibrium, it gradually entwists itself with a very slow motion, so that after four hours it is still creeping back to its position before it was twisted. A wire twisted and allowed to untwist back to its first position, undergoing a slow molecular change, is therefore not only a reservoir of energy, like the wound up spring of a watch at rest, but a moving agent like a watch going, because it gradually uncoils itself. I suppose the strained state of the external parts is gradually overcome by the constant torsion force arising from the inner parts of the wire, which are never overstrained. I find that the set produced by very slight torsion is as the square of the angle of torsion; just as in the case of very slight magnetization the resident magnetism is as the square of the maximum.

Manufacturing and Use of Bells.

This being the subject for the evening, Mr. Watson made some diagrams on the black-board, illustrating the method of making the moulds for casting large bells. He said, it was remarkable that the largest casting we have, was made by people that we look upon as semi-barbarians. The great bell of Moscow, which was cast a little before the year 1600 and weighing 400,000 pounds, excites our admiration. The mere money value of this bell is estimated at 300,000 dollars. When it was cast, it was left for a long time in the pit, on account of not having a lifting apparatus capable of removing it, but a method was at last devised, and it was placed in the chapel of the Tzar. In a short time the bell was cracked, when it was taken down. In Moscow there are more large bells than in any other city on the continent. They have 1790 bells there, and a chime of 32 bells in one tower. The largest casting in modern times is that of an anvil block weighing 140 tons.

Mr. James Harrison said, we were indebted to a member of this Institute for taking a photograph of the bell of Moscow, which gives us an exact view of it and its present position. When it was raised from the pit and placed in the chapel, it was struck one or two blows, when it cracked. It now stands on a stone-wall; the peice that was broken out, is used as a door to enter the bell. It is impossible to conceive how so massive a work could be executed, particularly in that age of the world. 400,000 pounds of metal, poured into one mass at the same time, is very remarkable. The inscriptions around the bell are exceedingly beautiful, and altogether it forms one of the most wonderful pieces of workmanship known.

For hundreds of years until quite recently, all bells have been made of a composition of copper and tin. Indeed, so identical was this composition with bells that it has been and is now known as bell-metal. While the inventive genius of the people had been applied to the improvement of all other articles of manufacture, that of bells has escaped their notice. Perhaps one reason for this was that it seemed impossible to make them of any other material than the old bronze metal. But in 1855 a discovery was made in Prussia that bells could be made of cast steel, and their introduction has reduced their costs very considerably, and at the same time awakened a spirit of inquiry which has led to many improvements. But the question is raised, will bells made of steel and its compositions be durable? Will they not break? A little reflection will show that steel is much the strongest metal, and experience has proved that steel bells are durable. They are not as likely to break as bells of other metals. Of course, bells will be broken, no matter what kind of metal they are made of, if they are struck violently in one place for any great length of time.

The key of a bell should be adapted to its weight, as the tone naturally becomes deeper with the increase of weight, and *vice versa*. There are some peculiarities about the distance that bells can be heard that is not yet fully understood. There are some bells of 250 pounds that have been heard in clear weather four miles off, and some of 500 pounds that are heard 8 miles; while there are others of equal size and weight that cannot be heard more than half those distances.

The opinion seems to be that a great deal depends upon the location as well as upon the manner in which the bell-room is built. It has been found that bells are heard much farther in those towers where the bell-room is left open without blinds, and with the top ceiled immediately above the windows. The largest bells are not always heard at the greatest distance—for instance, the bell in our City Hall park, weighing 22,000 pounds, cannot be heard as far as one located in the upper part of the city weighing only 11,000 pounds. Bells of the higher keys can be heard farther than those of lower keys, but deep-toned bells are the more pleasant. Church and alarm bells are expensive luxuries, or necessities, and a fragile kind of property. They are frequently put to very hard use; and the metal of which they are made, will not always bear with safety the severe pounding they receive. A church bell while ringing, will receive about 1,000 blows every hour, struck with a clapper or hammer weighing from 50 to 80 lbs., and each blow striking in the same place, that part becomes heated, and in cold weather that portion is expanded, and operates like a wedge upon other parts of the bell. Improvements have been made of late, by which a bell can be turned round, so that the clapper will strike a different place at each blow.

On motion it was decided to continue this discussion at the next meeting. Adjourned.

American Institute Polytechnic Association,
March 2d, 1865.

Prof. S. D. Tillman, presiding.

The Chairman introduced to the audience Mr. David Christy, who has traveled extensively in the Middle and Western States and made many observations which will be found of great interest.

Serpent Fascination.

The power of serpents to charm the smaller classes of animals, which they capture for food, has long been held as an undoubted fact. It has also been believed that they could fascinate the larger orders of animals, so as to bring them within range of their deadly fangs; and that even the intellect of man is not exempt from their influence. The common theory upon this subject gives to the serpent, having the power of fascination, an ability to gain the attention of its victims, to paralyze them as if by an electrical influence, and to attract them toward itself as if by magnetism.

Birds, more generally, are supposed to be the victims of these charms. They have been seen moving around serpents in such a manner as to indicate, in the opinion of the observers, that they were under the power of fascination. The testimony upon this point describes the bird as moving in a circle, or a semicircle, around the serpent. If upon the ground, they run with extended wings, gradually narrowing their circle of motion, but never stopping for an instant, till within a foot or two of the serpent. Then, as if conscious of their peril, and just at the moment they are about to be seized, they fling themselves backward on the wing, so as to be out of the reach of their terrible enemy. The birds, thus escaping for the moment, stop and survey the foe from their distant position. This seems to be a fatal dallying with danger. The serpent's eye, quick as the lightning's flash, again darts its mysterious magic into theirs; and again and again they advance and recede, as if drawn irresistibly toward the point which has become the all-absorbing centre of attraction. If the serpent is upon a tree, the bird flutters around it, advancing and retreating as when upon the ground.

The popular interpretation of these movements of the birds is this: the serpent establishes a connection between itself and them, by which it controls their wills, and draws them within its reach. In accomplishing this object, it does not go in pursuit of them, but lies in coil, with head erect, awaiting their approach. It appears, however, that the serpent's power has its well-defined limits, and its own peculiar philosophical phenomena.

If the movements of birds toward it are due to the attractive powers employed by the serpent, then the law of attraction in this case is a positive reversion of the laws of magnetic attraction. The attractive power of the magnet is greatest, when the body acted upon is in contact with it, and it loses its force in proportion to the distance to which that body may be removed. That is to say, it requires more force to remove a piece of iron when in contact with a magnet, than is required for its removal, when at a distance of several inches from it. But such is not the case with the serpent's power of attraction. In the supposed fascination, the birds, though unable, while at the distance of ten or a dozen feet, to resist its attractive powers, are able, nevertheless, at the last moment, when the devourer is in the act of striking, to break the charm, and, by a reverse movement, to fling themselves instantly out of danger's way. Thus it appears, that when the birds are at a distance, the serpent can draw them within its reach; but that when they come in close contact, its attractive power is lost, and they can retreat without hindrance.

Such is the theory of fascination, as based upon occurrences that have been witnessed by many observers. Its philosophical defects may be inferred from the hints already given; but whether such transactions prove that serpents possess the power of fascination, or that the observers have been mistaken in their deductions, will be better understood when a case is stated which was witnessed by myself.

Business led me to cross the Chilhowee Mountain in Tennessee, on the 27th of June, 1857. When near Montvale Springs, two birds were noticed at a couple of rods distance from the road, which were acting in a manner new and strange to me. They were in an open space, near the stump of a fallen tree, but did not take fright at my approach, as under ordinary circumstances they would have done. On reaching a point opposite to them, it was noticed that they were the brown mocking bird or thrush, and that a very large black snake lay coiled at the side of the stump. On seeing me, it suddenly began to uncoil itself, and move off as if to make its escape; the birds at the same time pausing a moment in their movements. But before it had stretched itself to more than half its length, they were again in motion, and flew at it in a most energetic manner. Instantly, the snake once more whirled itself into coil in its former position. The male bird then commenced to run and skip with great activity in a semi-circle, the serpent being the centre, and gradually closed in until within a foot or two of its coils, when, with a sudden dart forward, the bird thrust its head toward that of the snake, and, in the same instant, threw itself backward, alighting on the ground at the distance of about ten feet. Before the male had closed this feat, the female had commenced a similar set of actions. All the movements of the birds were made with extended wings, as if ready to fly in a moment. By the time the female had thrown itself back from the snake, the male was in position again, repeating the same movement as at first. In the mean time my horse had carried me some four or five rods into a thicket of bushes, whither my hand had guided him, and where I dismounted and secured him. All this took place in a minute or two; and as only an indistinct view had been gained of the action of the birds in passing, a favorable position for observation was taken, so that all that occurred could be noted. The first movement of the male bird, in thrusting its head forward into close contact with the snake, impressed me with the conviction that a case of the so-called fascination was enacting before me, and I determined to observe it in a philosophical manner.

It was half-past one o'clock P. M. The birds were still eagerly at work, when I turned my eye upon them after the interruption of hitching my horse. They were panting, as if greatly fatigued by long exertion, but manifested not the least disposition to remit their efforts. If not fascinated, they were at least so earnestly enlisted in the affair on hand as to disregard every thing else around them. The snake lay in its coil, with head erect and drawn back, so as to be in the best possible position to strike and seize the birds as they advanced. The many convolutions of its lengthened body moved in graceful curves, as its glittering head followed their motions. Its eye sparkled in the sunlight like the polished diamond, while its movements gave to its ever-shifting scales the brilliant hues of the rainbow. Again and again, as the birds approached, it would strike at them, with open mouth, exhibiting a malignity of disposition that portended death to them, had they been seized in its jaws.

A few minutes sufficed to show that a battle, and not a scene of fascination, was presented before me. The birds at each approach, struck the snake with their beaks, or with their talons, when generally, but not always, it darted forward at them, only to find that it was aiming at a moveable target. This can be easily explained. The snake in striking, could never project itself more than about two-thirds of its length, but its defense was made with determined courage. Its position by the stump protected it in the rear, so that the birds could only approach it in the front. They were as adroit in their attacks as it was resolute in its defense. In attempting to seize them, it could not curve to either side after starting, so as to follow their motions, but invariably shot forward in a straight line to the point they occupied when it made its spring. The birds in advancing to the attack by a circular movement, were certain of being away from the spot at which it aimed, and when its teeth smacked together where it expected its prey, it had nothing in its grasp.

The warfare lasted after I had reached the spot, about twenty-five minutes by the watch. Once or twice during the contest, the reptile made a movement to escape up the hillside, but the birds, as at its first attempt, immediately brought it into position again. At last, seeming to despair of success in securing a dinner in that locality, it darted off down the hill toward a grove of trees and bushes, nor turned to the right or left. The birds swept after it, pecking, scratching and striking it with their wings, as if inspired with the consciousness that victory was theirs.

At this moment I rushed forward, and after some difficulty, killed the snake and cut it open. There was not a particle of food from one end to the other of the intestinal canal. It must, therefore, have been hungry; and if it possessed the faculty of charming, it would undoubtedly have employed its powers on such a delicacy as these birds.

When the dissection of the snake was finished, the birds were not to be seen. It was the season when their young were in the nest; and doubtless, the conflict which had just terminated, had been waged for the protection of their offspring. Less active birds, venturing as close as they did to their enemy, must have been captured.

Remaining most of the summer in the mountains of North Carolina, frequent opportunities were afforded of inquiring of hunters and others, what they knew about birds being charmed by serpents. All believed in the theory of fascination, and several had witnessed encounters such as I have described; but none had ever seen the snake seize the bird. They had looked on until the bird as they supposed, was attempting to thrust its head, under the influence of the charm, into the serpent's mouth, when they had rushed forward and killed the serpent to save the bird from destruction. In all the inquiries made, no instance has been related where there was any more evidence of fascination than in the one observed by myself. In all cases, however, there was a singular uniformity in the descriptions of the manner in which the birds fluttered around the snakes. So nearly did their accounts correspond with what I had witnessed, that I was convinced of the truthfulness of their statements.

A few additional facts having an important bearing upon the subject of fascination, came under my own notice during 1859. In the summer of that year, some amusing incident led me to secure a number of serpents of different species, and amongst them a couple of fine specimens of the rattlesnake. This serpent is somewhat sluggish in its movements, and unlike many other species of its order, is not an active climber. While many of the others can with ease ascend bushes, trees and precipices, to rob the nests of birds of their eggs or young ones, the rattlesnake, less agile, has to find its prey in a more limited range. For this reason, it has been supposed that the rattlesnake must possess the power of fascination; otherwise, it could not secure, as it does, such active animals as mice, rats, squirrels, rabbits and birds; for, as has been plausibly asserted, this serpent assuredly will not use poisoned food; will not first strike the animals it designs to eat; and then, some of these animals are combatants of no trifling power, and could easily kill the snake or escape from it; so that unless the rattlesnake is endowed with the ability to fascinate, it is averred it could not possibly capture the food upon which it subsists.

The opinion that venomous serpents do not eat the animals they kill by the poison of their fangs, like many other popular notions, turned out to be an error. This I know from my own personal observation; and for the satisfaction of naturalists a few particulars are given. My specimens were placed in a box covered with glass, and having a wooden lid secured by lock and key. A few small holes, for ventilation, were made in the sides of the box, but too small to allow the escape of even a mouse. Birds, when put into the box, in the division including the rattlesnake, would often hop around and over it for hours unmolested; but, at length, when in a favorable position, the snake would strike the fatal blow, and death ensue in a few minutes. One instance only need be noticed; a half grown bird, when struck, at once commenced screaming with wings outstretched, and, turning round once or twice, seemed to droop and sicken rapidly. In three or four minutes from the moment it was bitten, it fell forward toward the mouth of the rattlesnake and expired. The movements of this bird were in accordance with such actions as have been observed in cases where fascination alone was supposed to be employed. In this case the charm was a fatal one, truly, being nothing less than the poison of the serpent coursing through its veins.

The birds placed in the box were not swallowed by the rattlesnake seemingly, as afterwards appeared, because it would not encumber its jaws so as to be unprepared for defence while the human eye rested upon it. In experimenting on the non-venomous species, it was found that they also would not take their food when any person was present; but that when alone and secure they would eat ravenously; one of them, the common bull snake, having eaten nine young birds in a few hours. Profiting by this discovery, a rat, two-thirds grown, was thrown to the rattlesnake, when it immediately struck it twice. The victim soon exhibited signs of dying, and the box was closed and locked. Upon examination, fifteen minutes afterward, the rat had been swallowed and the serpent's thickness proportionably increased

By this experiment and others similar, it was ascertained that the rattlesnake does eat food which has been poisoned by its own venom; and that it is probable that it always captures its victims by striking them, as, unconscious of danger, they pass its place of concealment; the poison of its fangs being a much more efficient agency than the fascination of its eyes.

It may be remarked, in explanation, that although the poison of serpents infused into the veins and arteries, is always fatal to the smaller animals, yet it may be received into the stomach without injury, as it is easily digested and exerts no prejudicial influence upon the system. In the smaller animals killed by the bite of the snake, no inflammation, no swelling of the body, takes place as in the case of the larger animals, for the reason that the extinction of life occurs too soon to allow of any such effects.

If, then, the venomous serpents eat the food killed by their own poison, and the non-venomous species can climb almost everywhere that birds build their nests, where is the necessity of any of these reptiles being endowed with the powers of fascination? They possess the means of attack and defence, independent of the power of charming, in a degree fully equal to the necessities of their existence, and, in this respect, are not behind any other order in the animal kingdom. Why, then, should they be given such an advantage, as fascination would confer, over the other orders of the irrational creatures?

Earthquake of 1811—Sandblows—Fissures—Production of Lakes.

Troy, Obion county, Tennessee, is situated within the range of the great earthquake of 1811, which destroyed New Madrid, on the Mississippi river. There are two lakes in the neighborhood of Troy, which were formed during this earthquake. One of these lakes, visited during my journeyings, is called Reel-foot Lake, and is from one to four miles wide, and forty miles long. It runs parallel with the Mississippi, but owing to the serpentine course of that stream. it varies in distance from it at some points one mile, at others eight. Reel-foot river, which supplies this lake, had its outlet formerly into the Mississippi, forty or fifty miles above its present mouth, which is into the Obion river

The general opinion has been that this lake, as well as the less extensive one formed by the Obion river, were both produced by the sinking of the earth; but an intelligent gentleman of that vicinity assured me that this theory of their origin was erroneous.

The first question, of course, was whether these lakes were formed by the earthquake. An affirmative answer was soon given. Military land warrants had been laid upon the lands now covered by the lakes, some time previous to their immersion, and the surveys made and recorded; and bills for the relief of those who had lost their lands by the earthquake, allowing them to lift their warrants and locate elsewhere, had passed the National Legislature. Before the passage of this relief law, one man had sold his tract as first rate land; but the purchaser finding himself in possession of only a "water right," resorted to lynch law and shot down the seller. Fortunately he recovered from his wounds, but with the loss of his left eye—a misfortune that turned to his advantage afterwards, as surveyor, enabling him to use his instruments, in sighting, without the trouble of shutting an eye. These facts are conclusive as to the earthquake origin of the lakes.

But other testimony, of more importance to science, and equally conclusive, still exists. Trees of the largest class, which grow only upon dry grounds, were yet standing in the lakes at the time of my visit in 1846, but were all dead. The trunks of the cypress trees, which grow only in swamps, partially covered by water, were submerged to the height of fourteen or fifteen feet. The walnut, oak and other dry land trees, were but slightly sunk in the water, sometimes only a few inches. There were also points in the lakes where the trees are still growing, the grounds being higher than the surface of the lake, and not covered by water.

It would appear from these facts that dry land has existed on the spot now occupied by the lake, and that the period when the water attained its present elevation is so recent that green trees then submerged, so as to kill them, have not yet had time to rot down; and that the rise of the water must have been at least sixteen feet, because the cypress swamps are, generally, at least two or three feet above the level of the water in the streams, while the cypress trees in the lakes have their trunks covered to the height of fourteen or fifteen feet.

These lakes, being of recent origin, the question remaining to be answered is, how were they produced

Close observation presented these facts: For the distance of twenty or thirty miles back from the Mississippi river, and more than forty miles south of Troy, the surface of the country here and there presents numerous "sand-blows," as they are called by the people of that region. These are mounds of sand, differing in size from a few bushels to many wagon loads, and often only a few rods apart. They are principally in the valleys, but sometimes extend to the higher grounds. The sand, in these "blows," is very fine grained and light colored along Obion valley. They increase in size in the direction of the Mississippi river and of these lakes. On the western side of the Reel-foot Lake, near the former outlet of that river, some of these sand-blows are said to be half the height of a house, even now, when they are all greatly flattened by time; and that places which seem once to have been much lower, have been filled up by them.

Connected with these sand-blows are numerous fissures or chasms in the earth. These are known to have been produced at the time of the earthquake; and as they abound in the region of the lakes, and some of them are very large and occur on hill sides, where the dislocated portions have tumbled off, or slid down, the conclusion drawn by many was that the lakes had been formed by the sinking of the earth. This opinion is strengthened by the appearance of the extensive forest, before described, miles in length, standing in fifteen feet water. Were this conclusion correct, then these fissures ought to extend entirely around the margin of the lakes, which is not the case; and all the streams emptying into the lakes from their old levels, would have some fall at their mouths. But, instead of falls, there is back-water in all such streams for several miles, and in the Reel-foot river itself for ten miles.

The conclusion to which such facts lead, is that these lakes have not been formed by the sinking of their beds, but that the waters have been raised so as to overflow all the grounds of less elevation than fifteen feet above the original level of Reel-foot river; and that this rise was caused by the damming up of its channel by the sand-blows.

That these mounds of sand have not been formed by surface currents of water, drifting the sand along the hills and valleys, seems certain, because they are uniformly pure white sand, without any intermixture of clay or leaves, or branches of trees, or gravel, or other surface substances.

But there is still another fact which more fully demonstrates that Reel-foot Lake has been formed by its channel having been dammed up by the sand-blows. At the foot of the lake, this river, leaving its old channel towards the Mississippi, which has become an embankment of sand, starts from the lake with a fall of fifteen feet, carrying it to the ordinary level of the main Mississippi valley. From thence it reaches the Obion River, distant twenty miles, in a divided condition, forming several smaller streams. This fall of fifteen feet, is produced by the passage of the waters of the lake over a depression in the dividing ridge, or elevated grounds, originally midway between the two rivers. When the waters have fallen the fifteen feet, on the southern slope, they reach the roots of the cypress trees, growing in the swamps on the south side of the dividing ridge. On the north side, the cypress trees are standing fifteen feet in the water of the lake. This proves that the roots of these trees stand in grounds of the same level, and that, therefore, instead of the earth having sunk and carried the trees down with it, the water must have risen upon the trees to that elevation, by the damming of the old channel of Reel-foot River.

But how could the earthquake throw up this sand to the surface? Here a little geology is demanded. In the future, I may describe the Artesian wells of the country, a little south of the section under consideration. These wells are supplied with water, from a water-bearing bed of sand, underlying, at a depth of several hundred feet, the chalk formation of that region. This water-bearing sand-bed underlies the region disturbed by the earthquake; and is here overlaid by a bed of compact, tenacious clay, in which the sides of ordinary wells, dug in it, will remain for years without curbing. A fissure produced in this clay, would present smooth sides to the bottom, and permit any fluid or gas to rush up to the surface, on the application of force from beneath.

A description of these two deposits will be more appropriate, as I have said, in connection with a notice of the Artesian wells further southward. Here, in the area disturbed by the earthquake, it need only be remarked, that we have a surface deposit of compact clay, of considerable thickness underlaid by a deposit of sand, measuring a hundred feet in thickness, at distant points where it crops out at the surface. This bed of sand is completely saturated with water; so much so, indeed, that a well dug through the clay into it, at certain points, is inexhaustible, and cannot be dipped dry—the sand being liable to flow, like any other quicksand.

The manner in which the sand-blows were produced, may now be understood. The expulsion of water from the earth, is no unusual thing, during an earthquake. When the undulations of the earthquake rent the clay bed, in the district under consideration, the tremendous upward pressure seems to have been amply sufficient to force the water of the sand-bed, together with much of the sand itself, to the surface, and thus, as the supply from below was ample, the amount of sand in the mounds could have easily been borne by the uprising water through the fissures.

It is true that the sand-blows, as they now appear, are not always accompanied by fissures, nor the fissures by sand-blows. But as the latter do not exist, excepting in the vicinity of the former, which are known to be the product of the earthquake, it is probable that both had their origin at the same moment. A bed of gravel, in some localities, in the sand deposit, may have prevented any sand from rising; or the fissure may not have extended downward to the quicksand, so as to form an open seam for the water to rise; or, in some cases, after the rush of water and sand to the surface, a fissure may have again closed up; and, thus, we find sand blows without fissures, and fissures without sand-blows.

A word as to the character of the fissures. In the vicinity of Reel-foot Lake, twenty-five years ago, eye-witnesses say that some of the fissures, now partially filled up, were as much as fifteen feet in width, and two miles in length. In passing from Troy to Covington, Tennessee, in a southern direction, I had ample means of examining the fissures upon the route. They were first noticed a mile and a half north of Obion River, and were from six inches to three or four feet in width, and from one to forty rods long. On the southern side of Obion River, the sand-blows and fissures were continued, eight or ten of the latter being in sight at one time. In a small hill, two miles south of Merriweather's Ferry, the fissures were so numerous that the hill was literally rent to pieces. Some of them were four feet wide and four or five feet deep, though thirty-five years had elapsed since their formation. Twelve miles south of Obion River, where I crossed Forked Deer River, and five miles farther, at the south fork of the river, the fissures continued in abundance, and the sand-blows were also numerous. But here, as elsewhere, they were all above high-water mark; those at a lower level, if any, having been obliterated by the overflowings of the rivers.

These fissures sometimes pursue a straight line, and run parallel with each ôther. Others of them describe an irregular segment of a circle. Others, again, after running in a straight line for some distance, divide into branches, and form acute or obtuse angles, in the form of the letter <, while others, after taking this form, have their branches again united, as if two of these letters were joined at the top, thus <>, leaving the inclosed portion separated from the surrounding grounds, like an island in a river. Occasionally, these fissures are directly beneath the centre of some large tree, and it is found riven in two, by the firm adhesion of its roots in the clay, to an extent corresponding with the width of the fissure, sometimes the split extending up the trunk as much as fifteen feet.

In relation to the origin of the sand-blows, Solon Robinson informed me that, on his visit to the region of New Madrid, he found that sand, in small quantitiés, continues, in places, to be forced up by gases from below. I had adopted at first, the theory of the gaseous origin of these hillocks of sand; but upon more extended research into the geology of that country, I found a more natural solution of the facts above described, in their aqueous origin.

Fog and Rain in the Mountains of North Carolina.

The dwellers in the lowlands, who see no mountains towering up in the embraces of the clouds, have but a faint idea of the manner in which their rains are brewed The first indication they have of approaching storms, usually, is in seeing the dark clouds arise from the distant horizon, or in hearing the rumbling sound of the thunder from the point where the earth and sky are blended. It is far different, however, in mountain regions. There the eye often sees the sky overcast at the zenith, while the horizon remains quite clear, or the ear is at once stunned by the loudest peals of thunder immediately overhead.

A sojourn of a few months in the mountains of the south-west Alleghanies, afforded me an opportunity of witnessing some of the interesting scenes, constantly occurring, in which fog and rain play their part. Take a few examples:

One morning about seven o'clock, while awaiting breakfast, I seated myself in front of the log cabin of Edward Delozier, with whom I had tarried over night. The house is located in Tuskegee Cove, Cherokee county, North Carolina, and is surrounded on three sides by mountains, one of which ascends in a peak fourteen hundred and fifty feet, and another eighteen hundred and fifty feet above the Tuskegee creek, which runs in sight of the door--the highest one having an altitude of about four thousand feet above the sea level. The mountains range along the north, the west, and the south of the cove. Cheoah river runs on the farther side of the west mountain, and Stecoah creek on the farther side of the south mountain. To the eastward runs the Little Tennessee river, and in this direction there is a wide opening in which hills of moderate elevation only are interposed. On the south, a gap in the mountain affords an outlet to the horseman, and on the west a deep notch serves a like purpose. This notch is intermediate between the two peaks, and is not more than one-third their height.

Suddenly a few misty flakes of fog came moving slowly through the notch, from the Cheoah Valley on the west. Presently larger masses followed, and these, again, were succeeded by still more extensive volumes. Breakfast over, we resumed our seats, Mr. Delozier warning me not to set out upon my journey. The fog was now rolling through the notch tumultuously, and filing off gracefully to the right and left, like soldiers passing a defile, and preparing to attack an enemy by extending their wings.

The rising sun was shining brightly. The foliage of the forest trees had all the maturity and richness of verdure which the earlier springs of that latitude afford. Among the flowering bushes, beneath the lofty trees, were the azalias, decked in their blossoms of white, yellow, orange, and crimson; and the rhodendrons and kalmia, in their white and pink. The lilies and the lady-slippers, with a hundred other plants, in full bloom, lent their gaudy flowers to complete a landscape of surpassing beauty.

From our position, the fog wore the appearance of gigantic fleeces of the whitest wool. Onward, and still onward, its masses rolled along, the foremost seeming to be impelled forward, not by the winds, for it was calm, but by the fog in the rear; or rather, perhaps, by the attraction of the mountains, or the force of an upper current in the atmosphere, or the changing condition of the air, from the warming influence of the sun's rays, now shining fully into Stecoah Valley, over the eastern hilltops.

It was a beautiful scene, to witness these bearers of fertilizing showers, as they gathered along the flanks of the mountains, leaving the summits undimmed in the sunbeams, while they gave a refreshing coolness to the crescent-like area which they overshadowed. The sun was yet low in the east, so that, though his empire was thus rapidly invaded, he could still shoot his beams far up the slope, beneath the fog, which had now advanced its front, so as to appear, from our stand-point, one broad mass of darkening clouds. The morning dews had not yet been dissipated, and the sun's rays, illuminating the vast amphitheatre not shaded by the clouds, caused every dew drop on leaf and flower to glitter like diamonds. The circles of light and shade, standing in strong contrast before us, with their beautiful floral ornaments, produced a scene that was gorgeous in the extreme.

But the clouds accumulating faster and faster, soon covered not only the mountain sides, but overspread the whole area of the Cove; and advancing eastward, covered the face of the sun as with a curtain, shutting out his rays from the landscape around. We were now startled by a sudden flash of lightning, succeeded instantly by the roll of thunder, which reverberating among the mountains, prolonged its tones to a duration unknown to the dwellers among the low lands. The rain which for a few minutes had fallen in a feeble drizzle, now descended at once in a copious shower, as though it had been awaiting the signal of the electrical flash to do its errand of mercy.

A word here about the form of these mountains, before proceeding with further descriptions. Like all mountains composed of stratified rocks, those of North Carolina run in lengthened ranges, mainly from north-east to south-west. In countries where the unstratified rocks prevail, the mountains are often thrown up into dome-shaped forms. Here and there, however, in North Carolina, there are points which rise dome-like, a thousand feet above the ordinary elevation of the surrounding portions of the mountains; but they differ in nothing except altitude, from the geology of the country at large. These domes in the section of the country under consideration, attain a height of three thousand feet above the beds of the rivers, and about five thousand four hundred feet above the sea level. Some of them reach an elevation of two hundred or three hundred feet above the line at which the ordinary forest trees can grow, and are destitute of timber, though covered with grasses and flowers. Here and there a group of briers, laurels, azalias, and other shrubs add their presence to vary the scenery of these celestial prairies.

These elevated domes have much to do with the formation of clouds and the production of rain. They are locally called balls, from their round appearance and naked surface. In the clearest days often, the clouds can be seen forming around them at a greater or less distance above or below their summits. At times the rain-fall is limited to the area around the ball, where the cloud spends itself, so that its remaining vapor is drifted off or dissolved again in the atmosphere. At other times the clouds accumulate largely, and either from the influence of currents of wind, or from electrical action, they move off so as to water the surrounding mountains and intervening valleys. It is not unusual for two balls, or for the summits of the lower mountains, to be forming wreaths of clouds around their brows at the same moment. These clouds, not unfrequently, are attracted towards each other, and thus the vegetation of the intervening districts has an additional chance of receiving new life and vigor from the rains yielded by this means.

It is these occasional showers which serve to keep up the mountain springs and streams in perpetual flow, and which supply to the animal kingdom the water it demands, in a purity almost equal to the dews of heaven. The general rains of this region, as distinguished from those of local origin, come usually from the west and south-west in broad sheets of clouds overspreading the whole sky.

On the 17th July, 1857, I set out from the head of Valley river, a branch of the Hiwassee river, to measure the height of the ball upon Valley river mountain. Making the measurement with "Locke's level," I could at least gain a close approximation to the true height. The distance from the river's bed to the top of the ball was about five miles, and the elevation two thousand nine hundred and eighty-seven feet; or about three thousand feet above the bed of the Hiwassee at Murphy, North Carolina.

Before reaching the top of the main ball, a cloud came sweeping along, from the direction of the Tusquitta mountain, to the southwest, and poured down its rain as it progressed. It reached us, in our elevated position, in the form of a dense fog, as all clouds appear when we are in their midst. It first struck our mountain at a point about five hundred feet below its summit, and then rolled along amidst the trees to the top of the ball. While hovering there, as a hen over her brood, it sent an arm down the eastern side of the mountain, above the tree-tops, to a distance of several hundred feet; and then, as if reluctant to lose any portion of its mass, this arm was drawn up again into the bosom of the cloud. Rendered light and airy, from the loss of its rain, the cloud soon swept off to the eastward, so that our measurements could be completed.

Nearly all the balls in sight, more than a half-dozen in number, and many of the higher portions of the lower ranges of these mountains were repeatedly covered by rain-clouds during the day, which were either formed upon them, or floated to them from one or another of the surrounding elevated points. Four or five of these clouds passed up Valley river toward us, but were generally exhausted of their rain before reaching our positions. The valley is narrow, being little more than a mile in width, and runs in a southwest direction to the Hiwassee river.

These showers presented varied appearances as they succeeded each other. The first was from a cloud, the margins of which were equal in depth and density to the main part of its body. Its breadth was nearly equal to the width of the valley. There being little wind, the rain fell vertically, and presented the appearance of a large curtain of semi-transparent gauze, suspended from the cloud to the earth, having a length of two thousand feet. A second shower fell, an hour afterward, from a cloud with attenuated margins but dense centre. The sheet of water which fell from it, presented the appearance of a semi-transparent fog in its centre, but it gradually shaded off toward the margins into a misty haze, scarcely obscuring the objects in the back-ground. A third, which occurred during our descent, was from a dense black cloud that overshadowed the valley and half the adjacent mountains. It had also great length to the westward. The body of water which it afforded was so dense, and the distance through which the eye had to penetrate so great, that every object in the back-ground was as completely obscured as though the pall of midnight had been drawn across the valley.

We had reached a position two thousand feet below the summit, and one thousand above the base of the mountain, when this shower had so far passed over as to allow the sun to shine out brilliantly from the clear sky in the west. Immediately a rainbow of the greatest beauty was produced. The top of its arch reached a little above the top of the ball, which we had just measured, thus throwing the main part of the bow below its level, and giving it a back-ground of the richest green which the foliage of the mountain could afford. Two mountains of unequal height intervened between us and the ball. The nearest one was much the lowest, while the other rose half-way to the summit of the ball. Upon the entire slope, the lines of the rainbow were presented in a richness of color far excelling any thing of the kind I had ever witnesssd before; the accompanying secondary bow being about as brilliant as the ordinary rainbows of the lowlands.

Clayton, Georgia, is located not far from Rabun Gap—a low depression in the Blue Ridge. This depression consists of some swampy lands in which the head waters of the Little Tennessee and the Savannah Rivers take their rise. The mountains on each side of this gap rise to the height of fifteen hundred feet. On the morning after my arrival at this town, my travelling companion awoke me to call my attention to a wonder.

The sun was just rising. On looking out at the window toward the north, I beheld a vast volume of fog, filling Rabun Gap from base to summit, and occasionally extending even above the highest parts of the mountains. It was as white as snow, and resembled a vast deluge of cotton as it falls loosely from the gin. In front of the main gap, and between it and the town, there stands a small mountain, detached from the principal range, with a gap upon each side. The fog as it rolled through the main gap, deflected into the smaller gap, to the east of the little mountain.

On viewing it for a few minutes, I was soon startled by noticing, that though the whole immense volume of the fog was rolling forward at quite an observable rate of speed, yet it never passed much beyond the southern side of the little mountain. Onward it came with a sufficient force, and bulk sufficient to overwhelm in its darkness, the whole southern side of the Blue Ridge. But beyond the line named it could never pass. A barrier existed there, in the different conditions of the atmosphere, which at once dissolved the fog, and left the air beyond as transparent as ever. Once in a while a small portion of the fog would whirl forward, a few hundred feet beyond the main mass, like a bold leader in front of an army, as if to encourage the forces behind to move onward with greater daring. But all was in vain, as leader and follower were quickly involved in a similar fate. The law which controlled the movements of the fog, said to it emphatically, "Hitherto shalt thou come, but no further."

Turning to my friend who had patiently watched me while I was absorbed in contemplating this wonderful phenomenon, I asked him if it had ever occurred before. "Yes sir," he answered, "it occurs every clear morning from spring to fall. Beginning to roll through a little before the sun appears above the horizon, it continues till eight o'clock sometimes, and as late as ten at others; and this it repeats every clear morning, and has repeated, doubtless ever since the dry land appeared, and the mountains and the rivers were formed."

Again I turned to view the fog, and found it coming on to its fate, as regardless of consequences apparently, as we poor thoughtless mortals are when treading upon the very verge of destruction.

As explanatory of the phenomena at Clayton, and of the production of clouds and rain in the mountains, a few general principles in natural philosophy must be stated:

At all temperatures, moisture exists in the atmosphere in an invisible state. It sustains itself there in the intervals that exist between the particles of air. These intervals are either partially or wholly filled with vapor constantly arising from the earth. When they are wholly filled with vapor, the atmosphere is said to be saturated. An increase of temperature by dilating the air, increases its capacity for moisture; while a diminution of temperature is followed by contrary effects. But the capacity increases at a faster rate than the temperature, so that while the air at thirty-two degrees Fahrenheit, can contain only the one hundred and sixtieth part of its own weight of vapor, at one hundred and thirteen degrees it can contain the twentieth part of its weight. Thus it appears that while the temperature advances in an arithmetical series, the capacity is accelerated in a geometrical progression. A considerable increase of temperature, therefore will enable even a saturated atmosphere to receive a greatly augmented amount of vapor, and as it were, to swallow the clouds that may pass into it, without any diminution of its own transparency. On the contrary, when the temperature is diminished by the rapid union of two currents of air saturated with vapor, the one being warm and the other cool, the average temperature is so reduced that an excess of vapor exists, which is incapable of sustaining itself in the diminished capacity of the air, and is necessarily precipitated in the form of rain. But when two currents of air not fully saturated with vapor, are brought into contact, the precipitation of moisture is slight, and mists only are produced. When the mists thus precipitated are near the earth, they are called fogs, but when high in the air they take the name of *clouds*.

Saussure and Kratzenstein have investigated the nature of fogs and mists. The vapor, in this condition, is found to consist of minute globules, upon which rings of prismatic colors were discovered, like those seen upon soap-bubbles, but which are never observed upon drops of water. From this discovery it was concluded that the globules are hollow, and filled with air or gas. The size of these globules is greatest when the atmosphere is very humid, and least when it is dry.

Another fact must be noted. The temperature of the air diminishes with the altitude, but the law of decrease is very irregular, being affected by latitude, seasons, hours of the day, and a diversity of local circumstances. It may, however, be assumed as a general rule, that a loss of heat occurs to the extent of one degree, Fahrenheit, for every three hundred and forty-three feet of elevation. But this is an average result, for the rate of decrease is very rapid near the earth, after which it proceeds more slowly, and at the loftiest heights is again accelerated.*

From this brief statement of the general principles governing the production of fogs and clouds, it will be apparent that the higher portions of the mountains of North Carolina must be refreshed by frequent rains. The elevated *balls*, ever clad in mantles of cool air, stand as so many custom-house officers to exact tribute from all the currents of air laden with vapor, from the warm regions below, which attempt to sail over their summits. These currents of air cannot but pause, when richly freighted, to divide their treasures with the thirsty soils and mountain-springs. And even when they are lightly burdened with vapor, and no rain can be condensed from them, these passing currents often yield copious clouds of fog, covering the vegetation, by contact, with moisture, and promoting its more vigorous growth.

Nor are the mountain summits alone in the exactions they make upon the moving atmosphere for its vapors. The mountain bases, all along the

* These brief statements are from Brocklesby's Meteorology.

rivers and larger creeks, cool the surrounding atmosphere during the night, while the waters of the streams, retaining their warmth, send upward a plentiful evaporation. The vapor which is thus formed, rising into contact with the overhanging colder air, is condensed into fog and floats above the streams till the morning sun sets it in motion, or dissipates it by increasing the temperature of the air along the mountain sides.

The phenomena of the fog at Clayton can now be easily explained. The Little Tennessee River takes its rise in Rabun Gap, and runs northwest. By the junction of several large creeks, heading in the Blue Ridge, the river, soon after emerging from that mountain, becomes quite a considerable stream. It is walled in on each side by other mountains, of fifteen hundred to twenty-five hundred feet in height, which extend northward, as cross-ties, from the Blue Ridge to the Great Smoky Mountain. These mountains are covered with forest-trees from the base to the summit. The sun, during the hottest hours of the day, teems down its rays into the valley, and imparts a great amount of heat to the waters of the river, as well as to the rocks among which it runs. The temperature of the water is thus kept up during the night, while at the same time, the surrounding mountains cool the overhanging air. The vapor which rises rapidly from the heated water coming into contact with the cold atmosphere above, is converted into fog. As the sun rises in the morning his rays at once act upon the air south of the Blue ridge, where no obstruction exists; but his heat cannot affect that of the narrow valley of the Tennessee, till the sun attains a sufficient elevation to overcome the altitude of the mountain upon its eastern side. The rarefaction of the atmosphere on the south side of the Blue Ridge, while that of the Tennessee valley remains at a lower temperature, produces a current of air from north to south that bears the fog along with it through Rabun Gap. But here the increased heat expanding the air or gas, in the globules of vapor composing the fog, bursts the bubbles, and the fog is dissolved by absorption into the warmer atmosphere, as transparent vapor.

The fog which rolled through the notch into Tuskegee Cove, had, no doubt, formed the night previous in the valley of Cheoah River, lying to the west and running northward. Overshadowed by high mountains, the atmosphere of that river must have been cooler than that of the Cove into which the sun was brightly shining. Two masses of air, both of which must have been saturated with vapor, being thus brought into contact, the temperature was diminished and the excess of moisture precipitated.

Tellulah Creek taking its rise southward, near Nantahala River, is the main branch of the Cheoah River. Big Snow-bird, Little Snow-Bird and other considerable streams are its tributaries. The Indian names are of Cherokee origin.

Water Spouts.

In this connection another meteorological phenomenon, occurring in the mountains of North Carolina and Tennessee, may be noticed. It is not one of the peaceful nature of the fog and rain, but, though limited in its range, must be terrific beyond conception. An eye witness describing one of these scenes to the writer, conveyed a most vivid impression of the fearful character of the elemental strife accompanying the descent of *water-spouts* upon the land; if water-spouts they may be called.

Once in a generation or two, perhaps, a water spout bursts upon some elevated point of a mountain. Previously to its descent, the clouds are seen moving to and fro, and commingling in a confused manner, somewhat as the circling eddies of a vast whirlpool. When concentrated above or around the mountain's summit, the cloud acquires such a density as to wear the appearance of the blackness of darkness. The roll of the accompanying thunder is deafening, and almost continuous, shaking the eternal hills to their base; while the flashes of lightning following each other in quick succession, afford a glare of glimmering light nearly as luminous as that of the sun. Then comes a river of waters dashing down the mountain-side, and tearing up in its resistless progress earth, rocks and trees, so as to create in its course a deep canal. The amount of water at times discharged from such clouds is immense, swelling inconsiderable streams into great rivers.

Many years since, a water-spout burst upon the North Mountain, to the westward of Newville, Pennsylvania, carrying destruction in its course. Many cattle and hogs were drowned at the foot of the mountain, where they were confined within inclosures preventing escape. The largest rocks were torn from their beds, and a deep chasm excavated from the top of the mountain to the valley. Its course can now be traced by the difference in the trees within the channel from those on either side—a growth of pines now occupying it, instead of the oaks and hickories of the surrounding forest.

Another water-spout fell upon the western end of the Chilhowee Mountain, where it faces the Little Tennessee River, about the date of the first settlement of the country. Its course is marked, like the one at Newville, by a large growth of evergreen trees. Again, on the west side of the same mountain, not far from Tuckalechee Cove, and near Little River, a water-spout fell, not many years since, carrying away a distillery, around which, the day previous, being the Sabbath, the young men of the vicinity had met, in a frolic, and perpetrated some enormous blasphemies—in their drunken revels undertaking to make a mock of religion, by the administration of its sacraments. Monday was ushered in by as clear a sun as ever shone. In the course of the day, however, the thunder pealed forth a signal, startling the neighborhood into fixed attention: there they beheld, gathering upon the mountain's brow, the ominous cloud, that soon burst out into one vast deluge of water, which, descending down the mountain side, laid desolate the very spot where the profanation of Heaven's ordinances had occurred. The terror created by this celestial phenomenon was such as to produce a religious revival, accompanied by the conversion of many of the thoughtless fellows who had taken a part in the iniquities of the preceding Sabbath.

Having seen the traces of all the water-spouts noticed, and having heard the descriptions of eye-witnesses, to the accumulation of the cloud which produced the rain-fall, in one case so furious in its descent, I concluded, as usual, that there had been a concentration, to one point, of nearly all the water yielded by the cloud, through the agency, probably, of a whirlwind motion of the air controlling it; but this theory had to be abandoned, as soon as I completed for myself, the investigation of the facts connected with the great fall of water-spouts, upon Tusquitta Mountain, on July 8th, 1847.

An intelligent professional gentleman, who visited the scene soon after its occurrence, described the chasm, excavated in the earth, as having a depth of several feet, with its sides cut out as vertical as if dug with the spade. The roots of the trees and plants, beneath the surface, were cut off as squarely as if done with the knife. At the surface, close up to the sides of the chasm, nothing seemed to be disturbed. The shrubs and grass, and even the fallen leaves upon the ground, remained unmoved, as though no running water had come into contact with them. This was the condition of things where the water-spout first struck the earth; and as the excavation, at the point of origin had a width of but a few yards, the whole volume of the descending water he concluded, must have been concentrated within that space, and continued thus contracted till the contents of the cloud were exhausted. In descending the mountain, along the line of the widening chasm, evidences existed that the torrent in places, had attained a depth of fifty or sixty feet, uprooting in its course the largest trees, and removing immense rocks from the avenue created in its descent to the valley below.

In all the descriptions given, I had inferred that but a single water-spout had fallen at the same time, from any one cloud. Such had been the case in the old ones grown up with evergreens. But very different indeed had been the results on Tusquitta Mountain

In the month of May, 1859, I called upon Robert Martin, Esq., who resides in the Tusquitta valley near the spurs of the Tusquitta Mountain. He had resided there in 1847, when the water-spouts fell upon that mountain July eighth. From his statement and that of Mr. Pierce, his neighbor, who also noticed the whole of the movements of the clouds, during the space of three hours, or from first to last, I make up my statement:

The clouds were some two hours in forming. One group gathered in the south-east, another in the south-west, and a third in the south. The unusual commotion among them as they were forming, attracted the attention of these gentlemen, and riveted them to the spot where each one stood, near their own doors a half-mile apart.

When nearly fully formed, the clouds commenced moving rapidly in eddies of many whorls, toward Tusquitta Ball. Salutations of thunder, from the first, passed between them, as though cloud called to cloud, in organizing for the coming conflict. The play of the lightning at first occasional, became almost continuous as the constantly accumulating masses began to move swiftly toward a common centre; while the thunder increasing also in frequency, soon became terrific. In addition to the thunder, and just before the rain began to fall, there came a succession of sharp keen cracking sounds, lasting for ten or fifteen minutes which resembled the sharp crack of the electric spark; and then came a crash as if ten thousand pieces of artillery had been discharged. The earth fairly trembled with the concussion. There was also a loud roaring sound, independent of all the other sounds, for some minutes before the clouds came into contact; and when they did meet they shot instantly upward with great velocity like an arrow shot from a bow. The forests, a few rods distant, became so dark that nothing could be seen.

The rain now began to fall in torrents. In a few minutes the small spring branch at Mr. Martin's, having its rise a mile or so farther up the mountain was swollen into a river. In an hour the rain was over and the sun again appeared as bright as ever.

The gentlemen named then commenced an examination of results. About three hundred feet above the head of the spring branch, a water spout had fallen excavating a canal ten feet deep, and seventy-five feet wide at its head. The side-walls at this point were perpendicular, while farther down it varied both as to depth and width; the vast body of water, of course, obeying the general laws controlling the descent of that fluid down a steep inclination. This torrent in rushing down toward the spring branch at an angle with the line of that stream, could not make a sudden turn but dashed across, rising on the opposite side to the top of a spur of the hill thirty feet high, when from the farther side it naturally fell into the channel of the branch, swelling it into the proportions of a river.

Upon more extensive examination, the water-spouts, if these rain-falls may be so called, were found to be very numerous; nearly a hundred canals existing within a regular area, not exceeding three miles in length. The largest one was eighty feet in width, and others not more than eight or ten feet.

But these excavations were not the only effects produced during this hour of awful sublimity. Many forest trees had been struck by the lightning and explosions of electricity from the earth, had thrown out large masses of clay and rock, in many places, producing excavations of sufficient depth and width often, to bury a common hogshead; the vegetation all around these spots being scorched and withered by the electric fluid.

The seat of these water-spouts lay about four miles from the Tusquitta Ball. Two gentlemen were upon the top of the ball when the cloud reached that point. One of them, Mr. William R. Martin, described the rain-fall as so dense as to almost suffocate him. The sensation was such as is experienced when under water; and the only remedy was to lean the body over so as to have a little space of air to breathe from beneath the breast.

The volume of water discharged from these combined clouds was such as to raise the Hiwassee River very much higher than it had ever been before or has been since. Here, too, the contest between cold water and alcohol was repeated, a little mill and distillery having been swept away, and the mill-stones forever lost in the depths of the Hiwassee.

On the twenty-third of May 1859, I commenced a personal examination of the area, upon which the so-called water-spouts had fallen. I was accompanied by Dr. G. G. McCoy, of Fort Hembre.

In ascending the mountain we could see at one time, more than a dozen of the excavations. The first one measured was about twenty-five feet wide at its head, and must have been some six or eight feet deep. It was only about twenty yards from the top of the mountain-spur, upon which the water had fallen. The torrent had passed down into a trough-like depression in the mountain-side, cutting out its channel as it progressed; but there was only a very slight dishing where the spout first fell, insufficient wholly, to accumulate sufficient water to make such a canal within the space of twenty yards. Then as there has been no washing away of the surface rubbish above the point of excavation, it would appear, that the agency which produced the cutting must have begun its work at that spot.

The next excavation examined, was where two spouts had fallen close to each other, being separated at the head by about three rods of unbroken ground. Each of these canals measured forty feet in width, and when united a few rods below, the channel was sixty feet in width. These two are not in a trough or concave portion of the mountain, but fall into one some distance below their junction. The heads of both are about twenty yards from the top of the mountain spur.

The same general features were present in the other excavations, and additional descriptions are therefore not necessary.

One remark only need be ventured, in relation to the agency which cut out these channels. That it was water, none can doubt. But that the water was concentrated to one point by a whirwind-like action of the cloud, compressing its falling rain-drops into one compact sheet, capable of cutting away all the mere clays and fragmentary rocks upon which it might fall, is disproved by the multiplicity of excavations upon Tusquitta Mountain. The only remaining solution of the mystery then, in relation to the manner in which the rain becomes condensed, in what are called "land-spouts," is to be found in the statement of philosophical principles upon a preceding page. When two clouds meet of different temperatures, the result is a more copious discharge of rain, than either separately is capable of yielding. The clouds at Tusquitta upon meeting, were observed at once to ascend swiftly, as if doubling upon each other. This of course, brought more cloud-surface into contact, than would have been the case had the clouds on meeting, blended together at once. May I not suggest therefore, that this sudden folding of the clouds upon each other by their upward motion, might have produced an almost solid sheet of water at the main points of contact, which, upon descending to the earth, would be capable of cutting its way down through any amount of clays and decomposing rocks, so as to bear them away and leave an open canal as the result? That the descending water-sheet remained stationary for a few moments so as to limit the excavations to the spot first struck, is supposable from the fact that the motion of the clouds may have been momentarily arrested by their collision with each other.

But I must leave this whole question to the philosophers.

Bells.

The regular subject was then taken up.

Mr. James Harrison, said a chime of eleven bells in the tower of St. Anns Church, Lowell, Mass., were suspended from a wooden frame suited to the tower, cords were attached to the clappers and passed down to the manuals, arranged as a key-board. This manual read the same as a piano, melodeon or organ, the lowest notes always to the left hand. Any one that can play on any of these instruments, can learn to ring chimes in one hour

With this arrangement very quick music can be played; and a very great variety. He played 105 different tunes and 2,000 changes in one day (a greater variety than was ever played upon eleven bells before.)

Some years since, a Mr. Dennison was charged by the British Government with the commission of providing bells for the new House of Parliament. In the execution of this trust, he instituted a careful and extended examination into the whole matter of bell-making, including of course, the best material for bells, and arrived at the following conclusions, which he reported to the government, namely: that simple copper and tin, in proportion of about 4 parts of the former to 1 of the latter, constituting what is known to us all as bell-metal or bronze, was the best composition for the purpose, then known. The use of silver, which had been much vaunted as giving to bells a soft melodious sound, he thought a mere whim, and the supposed improvements effected by it, almost imaginary. He found that almost every conceivable alloy of metals had at one time or another been tried, but that there had been no departure from the compositions of the common bell-metal, wherein any positive advantage had been the result. The sound produced by all other combinations he deemed inferior to this.

But though Mr. Dennison had arrived at a conclusion entirely justified by what was then known of the possibilities of metal alloys, yet he did not by any means settle the question for all time. He did not, and necessarily could not, close the door against future discoveries and inventions. It remained a fact, as true after his report as before, that to produce a bell capable of giving forth a loud, deep, pleasant, far-reaching sound, required a vast weight of bell-metal, and involved a large expenditure of money; and everywhere the additional fact was continued to be recognized, that if the same sound could be produced with less metal and at less expense, it would be a consummation devoutly to be wished.

It is believed that this desirable object has been attained, and if so, the credit of the discovery belongs to our own country. The foundation of this new composition is steel, but with it there is mingled some other metals which entirely subdues that sharp, thin, cutting sound peculiar to steel, and imparts all the softness, depth, and sonorousness of the best bronze. This composition is also more tough and tenacious than bronze, and it is not necessary to give bells made of it so great a thickness to render them secure against fracture, and hence a given weight of this metal will produce a larger and louder bell than the same weight of bronze. And as this metal cannot be melted except at a very high heat, and cannot easily be broken, the bells made of it are not liable to be injured in cases of fire, by falling from their hangings, or by being struck too hard with the tongue or hammer, in ringing, they are thus more durable than bronze. Bells made of this metal, cost less than one third of those made of bronze. The cost of bronze is 28 cents per pound, while the steel composition can be obtained for 12½ cents per pound, and a 1,000 pound bell of this metal, is equal in tone and volume to a 1250 pound bell of bronze. To avoid the danger of breakage, some founders make their bells so soft that they are little better than chunks of cast-iron. Others again make them so thick and out of proportion, that the sound is not half so good as it would be if the bell were made right: for instance as in the case spoken of at the last meeting, where a bell weighing 22,000 pounds, and one of 11,000 pounds, this latter bell could be heard farther than one twice its weight. This difference is owing to the proportion according to which they are made, and the quality of the metal used. Those who use the best metal and proportions, are compelled under the circumstances to use a much smaller clapper, than they otherwise would, thus getting but half the volume of tone from the bell that could be got by using a larger clapper.

To obviate the difficulty of using a large clapper, it has sometimes been the custom to hang heavy bells in such a way, that they could be unscrewed at their support at the top, turned around a part of a circle, and fastened up again. This method of hanging, though a valuable improvement, involves great labor, and does not reach all the difficulty. The danger of sudden heating and cooling is not provided against, for instance, allowing the bell-ringer to turn the bell every month, week or day, as the case may be. Now suppose the bell is rung for one hour during Sunday, it will receive at least 1,000 blows from a large clapper or hammer, in the same place. With the bell turning apparatus here exhibited, the bell or clapper would have gone round on its centre twice, in ringing one hour, and distributed the blows equally around the bell, so that only two blows would be struck in the same place on the bell instead of 1,000.

By this apparatus the bell is rotated while ringing without any trouble. By no other yoke is this done, all other rotary yokes do not rotate the bell, but are simply arranged so as to enable the ringer to unscrew several nuts, and then by main strength turn the bell a short distance; the model here shown, can be turned round without unscrewing a single nut or bolt. The value of this improvement will be best understood, when it is known that at least 20,000 dollars worth of bells are broken annually by the old way of ringing. The proprietors of one of our bell foundries have bought and melted up over 10,000 dollars worth of broken bells in one year.

The sound of a bell will go one-quarter further, if the mouth of the bell is turned in a certain direction; that is, if the sound goes in one direction four miles with the bell stationary, the sound will penetrate five miles in the direction to which the mouth is turned. The distance at which bells can be heard also varies with the weather. The barking of dogs and the sound of bells have been heard by those in a balloon at a distance of five miles from the earth. My idea is, that during a heavy snow storm the sound cannot penetrate upward, and so passes along the earth, and is heard further at such times; but in clear weather much of the sound passes upward. The improvements made in bells in this country have been very great. Before we began to make steel-composition bells the price was one dollar and a half a pound; now the bells we make are not only cheaper, but also much lighter. No other country can produce a bell of *b* flat with 1,900 pounds. Good bells are put into schoolhouses that can be heard several miles for twenty cents a pound, and that, too, at the present advanced cost of everything. The weight of these bells vary from fifty to two hundred pounds; but the one-hundred pound bell is one mostly used for schools, and can be heard for two and sometimes four miles.

It seems strange that the combination of two soft metals—such as tin and copper—should make a hard metal-like bronze. In experimenting, we tried wrought iron and Franklinite pig iron, but did not succeed very well, as we found we had to make them into steel first. The composition that we mix with the steel is put into the melted mass last. Steel melts at 3,500 deg., and tin at 600 deg. I put some tin into melted steel lately, and it immediately fell to the bottom of the mass. If zinc was used thus, it would be likely to set the building on fire, so when zinc is to be united with other metals that melt at a higher temperature like steel, it has first to be combined with copper, in putting it in it makes such a commotion that it mixes itself thoroughly with the mass; it has the quality also of making the metals run like water. In mixing tin with steel, about twenty-five per cent of the tin is lost. We have to be very careful to know the temperature at which to pour our metals.

Dr. Rich exhibited a photograph of the great bell in Moscow, Russia.

The Chairman described the manner of combining small bells so as to form a musical scale. They are all of the same shape, being portions of a hollow sphere; in the top of each is a small hole through which a rod is passed. The bells are thus all placed on the same rod, there being between each a washer, to prevent contact with each other. They are in fact a nest of bells, so near together that they may be played upon by means of keys, not farther apart than those of the piano forte.

After selecting "Musical Instruments" as the subject for the next discussion, the Association adjourned.

American Institute Polytechnic Association,
March 9th, 1865.

Prof. S. D. Tillman in the Chair; Mr. B. Garvey, Secretary.

Corn-Stalk Paper.

Mr. Dudley Blanchard desired to call attention of the Association to a manufactured article described here some time ago. He had tested the paper made from corn stalks according to the Austrian process, and would bear testimony as to its good qualities. He had used it in making mechanical drawings, and found it to answer the purpose admirably.

Theory of Music.

The Chairman, by request, made very complete illustrations and explanations of the theory of music, and of his new system, by which it was claimed all the mysteries of melody and harmony could be easily comprehended and remembered.

The human ear, he said, is too delicately organized internally to convey the impression of a single contact, but a series of pulsations, however delicate, will excite the sense of hearing, and produce the sensation of sound. Air is the common medium of sound-force, in which waves of density move outward in all directions from the point of impact or of original agitation. Air waves moving irregularly, produce the sensation called *noise*, but when regular or isochronal, they generate a musical sound.

The loudness of sound depends on the density of the wave, which may increase or diminish without changing the rate of vibration, the same as the oscillations of a pendulum may vary in extent, but not in number in a given time.

The quality of sound, which the French call *timbre*, probably depends on the order in which the particles of air in each wave are arranged. Waves of water change their form, as they near the shore, without changing their velocity; we may, therefore, compare the same note of a trumpet, when round and full, or when harsh and shrill, to smooth or crested ocean waves.

The pitch of sound depends on the velocity of air waves. The lowest or gravest sound has the smallest number of waves, and the highest or most acute sound has the greatest number, in a given time. Any change in pitch is therefore the result of a change in the rate of vibration of a series of waves. The lowest sound which can be perceived by the most sensitive human ear is caused by air waves moving at a little less than the rate of sixteen per second, while the highest sound is the result of a rate of more than sixteen thousand waves per second.

Music is a combination of sounds varying in pitch, timbre, intensity, duration and in distances of time between them. Melody is a succession of single sounds, and harmony a succession of chords, that is, several different sounds at the same time, which harmonize with each other. As the highest expression is derived from Contrasts, discords and even noise are introduced to give greater effect to pure harmony.

A musical scale consists of a series of sounds at fixed intervals, in which the first sound and the eighth sound above it, so nearly resemble each other, that they are distinguished by the same letter. The cause of this resemblance arises from the fact that the eighth note is produced by a series of waves, just double the number of those producing the first note. If the scale be further extended upward, the fifteenth sound will be the result of four times as many waves as the first, and is consequently distinguished by the same letter. The distinct series therefore consists of seven sounds, and any extension of the scale, above all below, will be the whole or part of a similar series. Great difficulty has arisen in comprehending musical changes by what the speaker regarded as an error in counting. The notes distinguished by the same letter should also be distinguished by the same number. The tonic or key note should not be called the first, eighth or fifteenth, but always the first of three similar series of notes.

The greatest complication is involved in changing the pitch of the tonic or fundamental sound, because the seven sounds of a series are not at equal intervals, that is, the number of waves producing the so called octave above, divided by seven, will not give the rate of increase in waves required for each note in regular succession. The seven sounds of the scale are fixed so that the rate of the vibrations producing them will harmonize with each to a certain extent and be expressed by ratios. For instance the waves producing the notes C and the first C above are as 1 to 2; the waves for the first C and for the first G above are as 2 to 3; for C and E as 4 to 5; for C and F as 3 to 4; for C and A as 5 to 6; for C and D as 8 to 9, and for C and B as 8 to 15.

The consequence of this arrangement is that two classes of intervals are formed, called tones and semi-tones, and in the diatonic scale there are five tones and two semi-tones. In changing the pitch of the tonic, on all keyed instruments, it is requisite to divide the tone-intervals into semi-tones, so that this scale may be said to be made up of twelve semi-tones. As the word semi-tone is a misnomer when applied to intervals, the speaker proposed to call them *grades;* and as two grades are required for a tone-interval, the intervals of the scale would be represented thus:

Duograde, Duograde, Grade, Duograde, Duograde, Duograde, Grade.

The true scale cannot be made for each key by any keyed instrument, the sounds are therefore given as near as may be, by what is called tempering. Instruments of the violin and trombone classes, as well as the human voice, can make the sounds belonging to any key absolutely correct, but as the tempered system is the only one in common use, what is now said will be applicable to that only.

Under the old system of counting, the intervals were measured along a continuous right line, but another system is required to show the similarity of sounds. The system invented by the speaker, is based on the spiral or helix, which measures by distance seven intervals, and returns nearly to the place of beginning. Ten of these spirals in the same plane around a given point, would represent ten octaves or series of seven sounds. Each spiral is divided into twelve equal parts, to represent the semitone or grade intervals by means of twelve radial lines at equal distances apart. Seven of these radial lines will mark the notes of the diatonic scale in any of the twelve keys, that is, when each of the twelve sounds of the series are in turn used as the tonic or key note.

These twelve radial lines are numbered like the dial of a watch in order to readily remember their position. The number 12 is C, and is the tonic in the natural key, major mode. If the first three notes of the diatonic scale are on even numbers, the remaining four will be on odd numbers; or if the first three are odd, the remaining four will be even numbers. Thus 12, 2, 4, 5, 7, 9, 11, represent C, D, E, F, G, A, B, the notes used in the key of C, which are made by the white keys of the piano. In the key of five sharps 11, 1, 3, 4, 6, 8, 10 represent the order of the sounds used, distinguished in the old system, as B, C sharp, D sharp, E, F sharp, G sharp and A sharp made by the five black keys and two white keys of the piano. So the other ten keys might be given ; yet these two are sufficient to prove the readiness with which the notes belonging to any key can be designated. To ascertain what would be the order of tonics in a regular modulation by sharps, the number seven must be added to the last tonic, thus we have 12, 7, 2, 9, 4, 11, 6. For the tonics in a regular modulation by flats, add five to the last tonic, thus we have 12, 5, 10, 3, 8, 1, 6. Both modulations end on the same key, because on keyed instruments the same note represents both F sharp and G flat.

For a full explanation of the tempered and the true systems the speaker referred those interested to a work by him published several years since, entitled "Musical Treatise and Tonometer" in which the intervals are measured to the eye, so that even one who has no "ear for music" may easily comprehend the system.

The speaker also proposed a reform in the solfeggio. The syllables now used are meaningless, but by a slight change they will be always associated with the names of the several chords. Instead of do, re, mi, fa, sol, la, si, use To, Re, Mi, Fa, Do, La, Si; then To will always be the Tonic; Re, the first related tone; Mi, the Mediant; Fa, the falling or sub-dominant; Do, the Dominant; La, the latent tonic, or tonic of the relative minor mode; Si, the serial note closing the series. These syllables used in the solfeggio, may be substituted with great advantage for the figures now employed to express chords; for instance the only three major common chords, are 1st. the tonic common chord To, Mi, Do; 2d. The dominant common chord Do, Si Re; 3d. The sub-dominant common chord Fa, La, To. The first interval in a major common chord is always measured by four grades, and the second interval by three grades, while in a minor common chord the lengths of the intervals are reversed, the first having three grades and the second four grades. This statement will explain why there can be only three minor common chords, viz: La, To, Mi; Re, Fa, La, and Mi, Do, Si. These with what is called the imperfect fifth, Si, Re, Fa, having two intervals of three grades each, make up the seven triads of the Septave. If the octave sound so called, of the first sound of a perfect triad be added to such triad the last interval will always consist of five grades; but if instead of a sound forming a five-grade interval, a sound forming an interval of four or of three grades be added to the triad, four classes of dissonant chords are formed called Sevenths. The further pursuit of these questions relating to Thorough-base may be considered too intricate. The Chairman concluded by expressing the hope that the time was not far distant, when the system now partially explained will be generally received.

Musical Instruments.

The discussion on this subject was opened by Mr. Samuel C. Swartz, who devoted his remarks to instruments of the reed class, particularly to those manufactured by Messrs. Carhart, Needham & Co. This firm submits the following article, embracing many interesting statements which deserve a permanent record.

INSTRUMENTS USED BY THE ANCIENTS.

The human voice is the most wonderfully constructed, variable and efficient producer of melodious sounds. The ingenuity of man has, however, from the most early periods of time, invented a vast series of instruments that are constantly nearing perfection. It would take years of time and volumes of space, to even briefly mention the various apparatus that have been placed before the world under the appellation of musical instruments. The Egyptian flute was only a cow horn with three or four holes bored in it, and their harp, or lyre, had only three strings; the Grecian lyre had only seven strings, and was very small, being held in one hand; the Jewish trumpets, that made the walls of Jericho fall down, were only rams' horns. Their flute was the same as the Egyptian. They had no other instrumental music, except by percussion, of which the greatest boast made was the psaltery, a small triangular harp or lyre, with wire strings, and struck with an iron needle or stick; their sackbut was something like a bagpipe; the timbrel was a tambourine, and the dulcimer was a horizontal harp with wire strings, and struck with a stick like the psaltery.

CLASSIFICATION OF MODERN INSTRUMENTS.

The limits of this paper forbid our mentioning even the names of the many musical instruments now in use. However, there are certain broad distinctions between them, which enable us to classify them, not with reference to the mode by which they are played, but to the manner in which the sounds are produced. The vibrations of a column of air in a tube produce the sounds of those which we are accustomed to term wind instruments; while the vibrations of a stretched cord or wire, are the source of sounds in the numerous instruments of the violin class, as also of the piano-forte. But a period of about thirty or forty years has witnessed the introduction of a great number and variety of instruments in which the sounding body is a metallic spring, fixed at one end, and free to vibrate at the other. Thus they have been designated *free-reed* instruments.

HISTORY OF FREE-REED INSTRUMENTS.

Who was the inventor of this free-reed, although we have made diligent search and inquiry, we are as yet unable to state positively. That something of the kind had been known for ages to musicians, is evident by the *Jews harp*, in which a metallic tongue is struck in a peculiar way by the finger, and at the same time breathed upon; but in this case one spring is made to yield several notes by altering the form of the cavity of the mouth. It is also known that organ-builders had for many years occasionally used a metal tongue as the vibrating body in those organ-pipes termed reed-pipes, and M. Grenie, an eminent musical mechanic of France, had adopted a form of tongue in a measure similar to that now used in the melodeon, accordeon and instruments of this class. We may also mention the musical "snuff-box" as an instrument in which the sounds are elicited from metallic springs. It is probable that other attempts to produce music by this means could be cited. But it is only since about the year 1825 that a series of instruments under the names of melodeon, æolian, harmonica, melophene, symphonion, seraphine, accordeon, concertina, reed organ, etc., have been brought before the public, and have demonstrated the variety of ways in which sounds may be educed from metallic springs, or as they should be properly termed, free-reeds.

In an article in "The Musical World and Times," some years since, the invention of this class of instruments is claimed for Mr. James H. Bazin, an ingenious musician and mechanic of Canton, Mass. The account referred to contains the following:—"Late in the year of 1821 some young men from a neighboring town brought a small, round brass pipe, with the letter A marked on it, and a piece of thin brass screwed on one side; which brass appeared to have been made to vibrate through an opening about one-half the length of the pipe, but which had been broken off near the screw.—They had borrowed this pipe from a singing-master in Boston, and wished to have Mr. Bazin repair it, and make several more like it." From this statement it is evident that Mr. Bazin's improvement consisted not in first making a free-reed but in arranging a number of these reeds together so as to form a complete chromatic scale, and in applying a bellows to operate them, for it seems that previous to this time the reed had been set into vibration only by means of the human breath.

To illustrate the exact situation of this class of instruments in Europe, in 1830, we have concluded to present the following from a lecture on the subject, delivered at the Royal Institute by Professor Faraday, during that year. He spoke of the desirableness of connecting the springs with the mechanism of an organ or piano-forte, and described such an attempt nearly as follows: "It was found that the steel springs might be made to yield any note within the compass of a keyed instrument, while that for the lowest note was not more than four inches in length, and one in breadth; so that the mechanism would occupy less space than the smallest cabinet piano-forte. Some difficulty attended the accomplishment of the design, for the springs, under certain circumstances were bent, by the mere vibration, beyond the elastic strength of the metal of which they were composed; the consequence was the gradual disintegration of the metal, and an alteration of the tone, which increased until, at length, the springs were actually broken off by use. Another formidable difficulty arose from the tardiness with which the vibrations of the spring commenced when the air first acted on it; so that a note, when struck, did not immediately yield its sound. Means were, however, adopted that completely obviated both these defects, and, in 1829, the Society of Arts presented a medal to Dr. Dowler, for an instrument constructed on this principle with keys. The bellows were placed underneath and the springs arranged over a continued wind-chest, furnished with a valve to each note. The springs, or, as they have been called, the tongues, with the exception of the highest octave, were made of an alloy called German silver, or electrum, which is composed of a mixture of copper, zinc and a little nickel. The springs of the remaining octave were manufactured from extremely thin sheet steel, imported into this country from Switzerland. This instrument was tolerable of its kind, but inferior to one that has been made by Mr. Day, an ingenious mathematical instrument maker, who has considerably improved the manufacture of the springs." This was about the state, in Europe, in 1830, of an instrument, which, by subsequent improvements, has attained the name of seraphine, melodeon, etc., in later times; but, at the period alluded to, there was a great inequality and harshness of the tones, which caused the lecturer to doubt whether, without great improvements, it would ever become a popular and useful instrument. We will here remark, that, in our own minds, we have no doubt of the fact—which truth, by an extensive research, could probably be demonstrated—that the free-reed originated in Germany; but like many other important inventions we could cite, it owes its thorough adaptation and value almost solely to the ingenuity and skill of American mechanics and artisans. And our remarks hereafter will be expressly in reference to the advancement and perfection of the instrument on this side of the Atlantic.

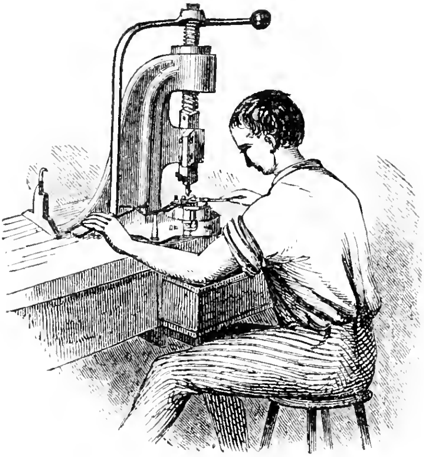
JEREMIAH CARHART'S IMPROVEMENTS.

In the year, 1839, Mr. Carhart devoted his leisure hours to the manufacture of a seraphine for his own use. It had five octaves, and two sets of reeds in unison, and was furnished with the old-fashion organ bellows. The reeds were made of steel springs, fastened on cast metal blocks, but, during the course of construction, he experimented on a great variety of materials for the reeds, such as various kinds of wood, horn, ivory, gold, silver, steel, brass and many other compositions; his object, at that time, being more to procure softness and sweetness of tone, than with a regard to the irregularities that might occur by changes of temperature, to which they would be subject in different seasons and climates. When he put this instrument together, it was found to be far superior to any similar one that had been seen or heard of in that section of the country, although his employers had on sale seraphines, etc., both domestic and foreign, with all the then latest improvements. Every person, except Carhart himself, who came within hearing distance, expressed themselves perfectly delighted with it; but to the fastidious ear of its constructor, there were the old faults; not so perceptible as formerly to be sure, but the sharp, unpleasant twang, and tardy movement were still distinguishable, and in his opinion, they were decidedly against it, and must be remedied. Again, the whole affair was so complicated, that there was a great amount of labor and difficulty in taking it apart to get at the reeds and valves. In order to facilitate his further experiments, he desired to turn the reeds *up side down.* It must be stated that in this primary instrument, as in all others up to that time, the reeds were on the *under side,* next the opening on the bellows, the wind passing *upward and outward.* In order to make the reed "speak," when turned over, he found it would be necessary for the wind to pass through the reed from the *upper side downward.* This circumstance was the first application of his idea of the suction bellows, and proved to be the initiatory step to his great invention. He immediately set about constructing a bellows that would produce the desired effect, and which he already foresaw would greatly diminish the impediments in his further experiments, as thereby the reeds would be accessible from the upper side, and could be removed and replaced at pleasure, without taking the instrument to pieces. His exertions here were long and tedious, and had he not been possessed with most indomitable energy and perseverance, he would have given up in despair a dozen times. In a very few weeks he accomplished the musical object; but effort after effort was cast aside as being too complicated and cumbersome—he being determined that if it ever was placed before the public, it should have all the valuable qualities desired. At times he would defer operations on it, and long before it was perfected he had made three other important inventions; one a planing machine, another a machine for turning irregular forms, and the third, a brick press; all of which have since been patented and put into successful operation by other parties. Finally, after years of patient industry, during which he not only labored almost incessantly, night and day, but submitted to all the inconveniences of a light purse and a young family to support, he succeeded beyond his most sanguine expectations, and "Carhart's Suction or Exhaustion Bellows," now so universally admired and acknowledged to be perfection itself, was brought into the world.

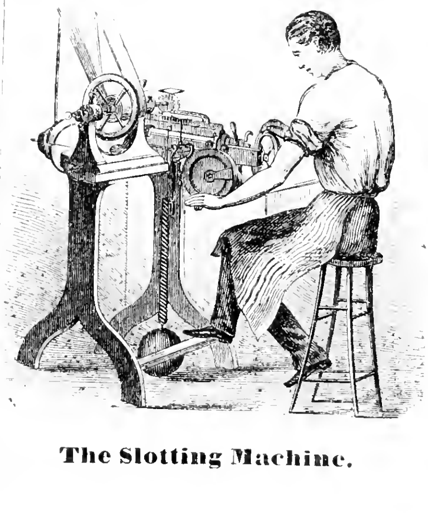
During the making of these first six instruments, Mr. Carhart had the good fortune to make a discovery, which has been acknowledged by all to have been one of the greatest improvements in reeds, which has ever been brought to light. He discovered that by bending or curving the point of the reed, the quality of the tone could be changed at pleasure. To this invention he applied the name of "voicing." The peculiar advantage derived from it is the command which a skillful tuner is capable of exercising over the reed, as by varying the curve, he can produce any quality of tone, from extreme harshness to the opposite extremity of softness; the volume and power of the tone can also be graduated at pleasure by means of this principle. Its universal adoption is convincing proof of the value of this discovery.

After some time, during which a long succession of difficulties were met and promptly overcome, the half dozen melodeons were finished and submitted for examination. The last improvements so perfected the tone, that a soft, sweet strain could be procured at pleasure; the new application of the bellows was rapid and effective, and in a moment the melodeon had become a "fast talker," while its beautiful flute-like sounds delighted and enchanted each hearer. Of course, the public verdict was unanimous in its favor; and the patent being at once secured, their sale commenced immediately. This was in 1846, and as a most remarkable circumstance we state the fact, that notwithstanding their facilities, Messrs. Carhart & Needham were unable to fulfill their orders from that time until late in 1853, when the general financial and commercial depression was felt in every department of manufacture, trade, etc.

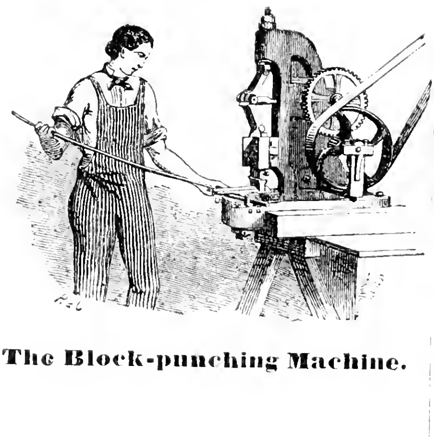
The manufacture was continued in the city of Buffalo, until 1848. In the meantime, Mr. Carhart's ever active mind had conceived, and by rude experiments demonstrated, his justly celebrated "theory of the action of a current of air upon reeds placed in particular positions." He had also conceived the idea of making a tube-board in one piece, and solely by machinery, in which to place the reeds; and after due reflection, it was determined to dispose of their establishment in Buffalo, and remove to the great commercial metropolis; and there, after, constructing the most perfect machinery and apparatus, and securing suitable premises, to commence the manufacture of melodeons on the most extended and liberal scale. It had been about that time discovered that this class of instruments were affected by changes of the atmosphere. Soon after his arrival in this city, Mr. Carhart proceeded to an extensivs rolling-mill in Connecticut, where, after a series of experiments of some weeks duration, he produced the amalgam now known as "reed-metal," which has ever been found to possess the exact virtues required from it, and since its adoption the manufacturers have heard nothing of the "buzzing" sound, that in some cases was formerly complained of in melodeons.



The Riveting Machine.



The Slotting Machine.



The Block-punching Machine.

REED RIVETING MACHINE.

While constructing the machinery for the new establishment, another superior contrivance emanated from the prolific brain of Carhart A machine for riveting the frames and reeds together, (see illustration,) and this perfect and effective little automaton is certainly one of the most elegant, useful and ingenious pieces of mechanism of the age. It is thus described in the *Evening Post*, about the time the patent was secured:

"One machine for riveting the tongue to the frame is a great curiosity. The former being placed on the latter, they are seized with a pair of pincers of peculiar construction, and inserted in the machine, a slight jerk of the lever and a portion of the frame is driven directly through the tongue, forming a rivet most complete and ingenious, thereby securing two truly important qualities, strength and perfect vibration—bringing out a tone which it is almost impossible to attain in any other way." Although we have taken some moments to describe the operation of this machine, its motions are much more expeditious, as its ordinary working speed, it perfectly rivets fifteen reeds per minute.

After their removal to New York, the firm was taken by surprise by the constant orders for reeds that was daily pouring in upon them, from manufacturers and others in all sections of the country. Owing to the filling of which, and the time required to make their new machinery, they did not get permanently located until late in the fall of 1849, when they leased a large establishment in Thirteenth street, and commenced the manufacture of the melodeon on a scale never before attempted in this country.

BLOCK MACHINES.

Beside the machine for riveting, described above, there are three others for forming the blocks and tongues, the whole of which is performed in the most expeditious and perfect manner; in fact, it would be impossible to secure the same uniformity on any other yet known plan. One machine (see illustration) punches out the blocks; another trims and shapes them, another takes out half the cavity for the tongue, which cavity is finished complete in the next operation. The tongues are worked out precisely in the same perfect and expeditious manner. All the metal turning, filing, and iron finishing of the whole concern, is done in a room fitted with lathes, vices, and all the machinery desirable to expedite the operations.

FORM OF MELODEON CASES.

Carhart's Improved Patent Melodeon, may be classified under three heads, as follows: *First*. The Folding Scroll Leg, commonly called the "Portable Style." *Second*. "The Piano Style." And *Third*. "The Double Reed, with Two Stops." All these styles are modified into a great variety of shapes, as far as the external appearance is concerned. The four-and-a-half and five-octave Portable Styles are probably the most prominent, inasmuch as from their cheapness, compactness, and the feasibility by which they are readily transported from place to place, are accessible to parties in the most distant sections of the country. As will be observed in the illustration of the "old style" of melodeon, the bellows at that time dropped down in front of the instrument, it will be readily admitted that this feature did not improve the outward appearance of the article. In the new style, this has been obviated by altering the slope of the bellows, so that the feeding or exhausting chamber is *within the body of the case*, and therefore a disagreeable deformity is expunged. The cross-piece to which the pedals are attached, called the "stretcher," is readily removed, when the legs, which are hinged, fold up beneath the case, the bellows receding at the same time; and the whole instrument occupies a space the size of the case alone. The top is hinged at the back—as is also the case in each of the other styles—and is opened to expose the interior arrangements of the instrument without difficulty. The "sounding board," which is a thin strip placed perpendicularly lengthwise the case, a few inches behind the keys, is removable at pleasure, by which the reeds are exposed to view, and taken out, tuned and replaced, with the utmost ease and facility. The extreme simplicity and perfection in the construction of these instruments, enables a person with the least intelligence to comprehend them at a glance. Again, if by any unforeseen circumstance, a reed should get broken or cracked, by just writing to the manufacturers, and mentioning the name of the note, another is forwarded by mail that is sure to suit the instrument; such equality in the notes is only arrived at by the superior machinery with which they are manufactured.

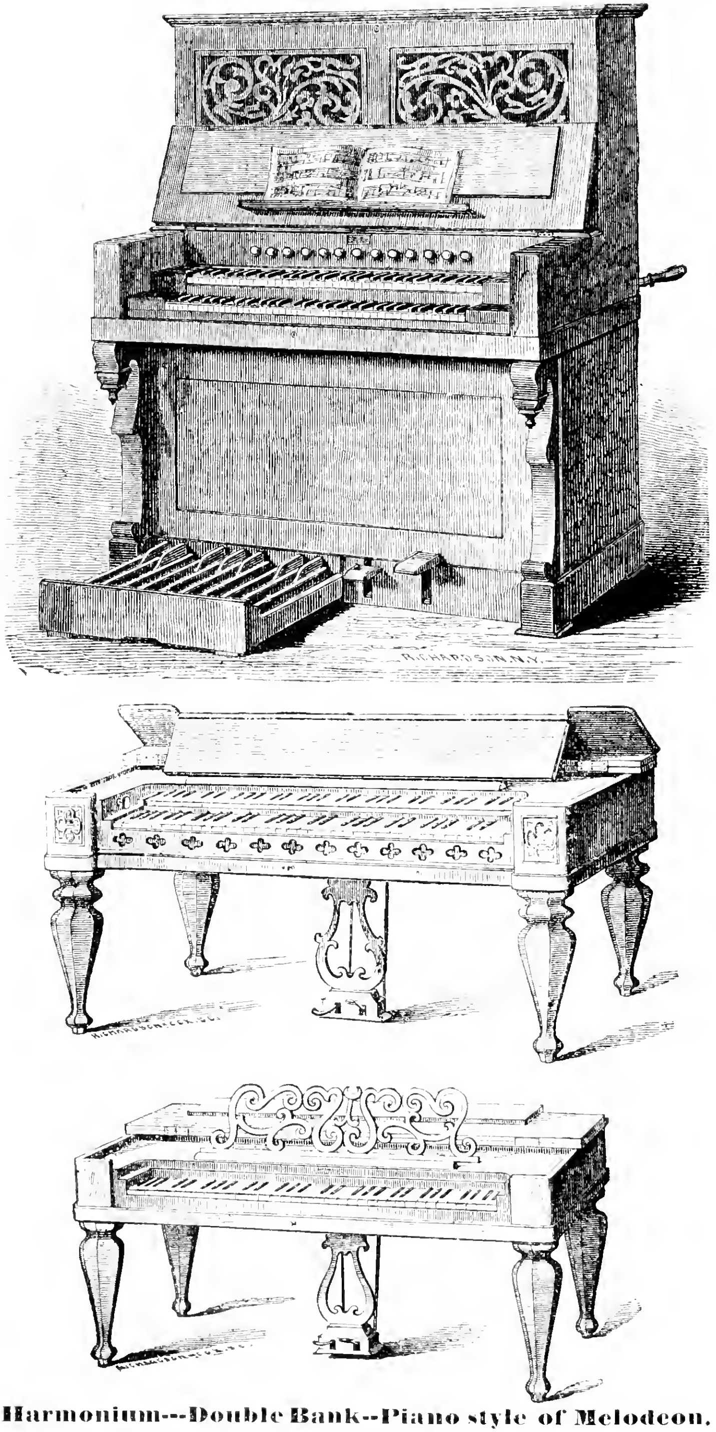
The Piano style is made with from five to seven octaves, and in its internal arrangements is about the same as the above described. In external appearance they are precisely like a small piano. They are finished with octagon and fancy-carved legs, panneled, and mouldings to suit the tastes of the most fastidious.

The "double reed" has two sets of reeds, named the "principal" and "diapason." They are tuned an octave apart, and may, by means of the stops, be played together, or separate, producing a pleasing variety.

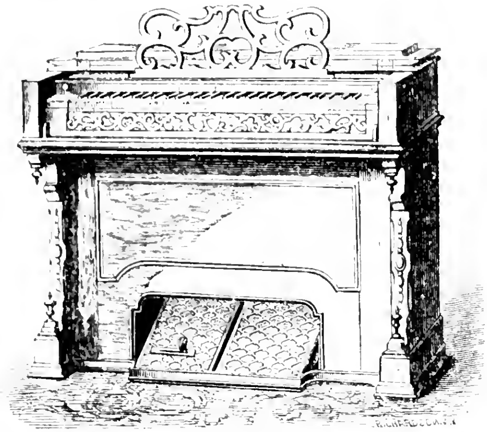
The Seven Octave Parlor Melodeon is a style unique to this establishment, and either as a superior musical instrument, or an elegant piece of furniture, it is equally deserving of gracing the drawing-room of the most distinguished in the land. In regard to the musical qualities of these melodeons, the best judges in Europe and America have pronounced them superior to any other in the world.

PARLOR ORGAN.

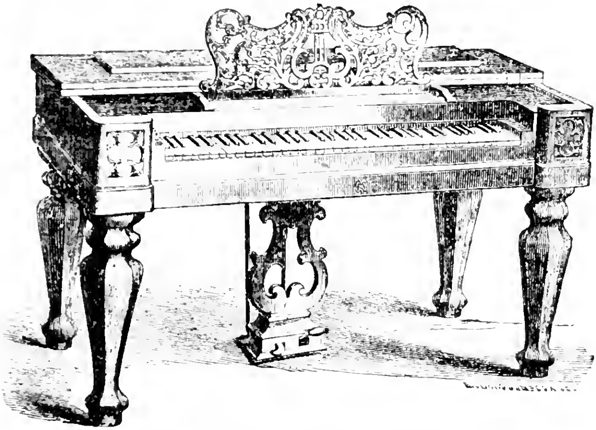
Our new Parlor Organ just completed, is the best and most complete instrument of the kind. The great objection to instruments having double blowing pedals, has been the want of a swell which would be under complete control of the performer at all times. As both feet are employed to supply the bellows, various mechanical contrivances have been applied to produce the *crescendo* and *diminuendo*, among which may be named swell or forte stops, to be drawn with the hand; swell levers, projecting in front to be operated by the knees; and several devices to operate the swell by means of the contraction and expansion of the bellows, as in the automatic swell, &c. It will be readily seen that the appliances named do not place the swell (upon which depends the finest effects of the instrument), under complete control of the performer. The forte stop produces no gradation of power whatever; it is either loud or soft; besides which, the hand of the player must be removed from the key-board to operate it. The knee



The Harmonium--Double Bank--Piano style of Melodeon. 528



Parlor Organ Melodeon.



Double Reed Melodeon.

Improved Portable Melodeon.

lever is an improvement on the forte stop, but it is placed in an awkward position, and cannot be used with ease and effect by a gentleman, much less by a lady.

The several automatic devices being operated by the contraction and expansion of the bellows, cannot be under complete control of the player, inasmuch as when the tone is loudest, the bellows is contracted to its utmost, and in order to produce the softest tone, sufficient time must elapse for the bellows to fill, and *vice versa*. This arrangement differs from the "forte stop" in this respect; it is all gradation, with no power to make a quick transition from loud to soft, or soft to loud. The utter impossibility of playing music as it is written, by means of this latter contrivance, is obvious.

These defects have hitherto deterred us from making instruments with double bellows pedals, until such time as we could make an improvement which would overcome the difficulty.

This we have thoroughly and satisfactorily accomplished in the "combination swell," which is so placed and combined with the bellows pedal as to rest lightly against the outside of the left foot, and may be operated with perfect ease while in the act of supplying the bellows It will be readily seen that by means of this invention the *crescendo* and *diminuendo* may be produced at will, perfect and complete, even with one foot (the bellows having great capacity); the wind can be easily supplied and the swell operated at the same time.

The Parlor Organ has two sets of reeds, two stops (Diapason and Principal), and contains all of our best inventions, consisting in part of our "double exhaust bellows," "pneumatic stop," "combination swell," "improved action," &c., &c. The tones are clear and sweet, and when swelled to their fullest extent acquire a full, round, organ-like character.

The Church Organ Harmonium.

These instruments are adapted to churches and large public rooms. They contain a variety of stops. For instance, of those now illustrated, No. 2 has four sets of reeds and ten stops, viz: diapason, principal, bassoon, bourdon, tremolo, flute, principal, hautboy, clarionet, grand organ. No. 4 has two banks of keys, five sets of reeds, twelve stops; a'so one-half and two octaves of pedal base. The stops are arranged in a row above the key-board, within convenient reach of the performer, and are so named and numbered that the various combinations may be quickly made and changed. The Grand Organ stop commands the full power of t e instrument, when drawn, and on being closed, the original combination is restored. As a new feature in this class of instrument, we have introduced the "tremolo" stop for solos and interludes.

These organs contain the patent pneumatic stop or mute, which always insures a perfect closing of the stops; also the new action, which simplifies the internal mechanism, so that the reeds, valves, &c., may be easily and quickly removed.

Is pleasing in its architectural proportions, and in appearance like an upright or "Boudoir" pianoforte, made of solid kiln-dried black walnut, finished in oil. They are also made in rosewood, highly ornamented and polished. The lower part of the case is devoted exclusively to the bellows and sub-base, forming a large resonance or vibratory chamber for the baso reeds, to which fact, in a degree, is attributable their deep, full, sonorous tones. The upright part contains the reeds, valves, stops and swell, which are only separated from the external atmosphere by a silk covered fret-work panel and a perpendicular organ swell, it will be obvious that a greater amount of power may be obtained (when desired) than could possibly be had were the reeds enclosed beneath the box of the old style square case.

Each instrument is provided with a lever or "blow-handle," so that a second person may supply the bellows if desired. A "tell-tale," or indicator, is placed above the "blow-handle," indicating the amount of air exhausted and replaced, by observing which the person supplying the bellows will be enabled to do so with ease and uniformity.

Mr. Carhart intends to make still greater improvements in relation to increasing the number of stops. He finds room behind the representation of the pipes of the church organ to place any number of sets of reeds desired. In this manner an instrument resembing, in every essential particular relating to sound, the church organ, has been made which has the advantage of remaining in tune for a long time.

Not long since the *Scientific American* contained an interesting explanation of the essential parts of the melodeon, of which the following is a condensed account.

THE REED.

A melodeon is in all essential points an accordeon upon legs. The sound is produced in the same way and by the same agents, namely, a current of air, driven with greater or less velocity through a brass block, having a brass tongue fitting an opening in the same, as in fig. 2. The reed itself is *a*, or the small tongue of brass, and this is set in a block, *b*, called the reed-block.

The reed or the tongue in former times was punched out. Experience has proved, however, that punched reeds are not durable. The metal is condensed so much about the base of the reed (where the square shoulder is) that the cohesion of the particles is destroyed, and the reed breaks at the place designated. The improved practice is to saw them out by means of a series of delicate cutters set in a wheel. This process takes more time than punching, but a much better piece of work is produced.

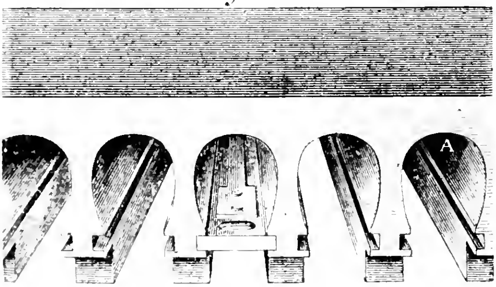
When the reed is sawed out it is riveted on to the block by another machine, which, although insignificant in its appearance, has worked a complete revolution in this branch of making melodeons. The appearance of the rivet head can be noticed by referring to fig. 2. It will be seen that there are two raised heads, *d*, crossed with lines. These heads are portions of metal pushed up out of the reed-block, as at *e*, in fig. 1; there is no pin or solid rivet in the reed or its block, and the saving of time in punching holes, cutting off the pins, putting them in and closing them, as practiced in the old method, is apparent

After the reed is in its place in the block it is planed on top. The thickness of the reed is less at the base than at the free end, and the tone of the

Fig. 1

Fig. 2

Fig. 3



reed is determined by this planing. So accurately does this planing machine work, that the reed, when delivered finished from the machine, is within a sixteenth of a true note, and requires only a little adjustment to make it perfect. When we add that the tuner, in giving the reed its proper pitch before it is finally placed in the instrument, uses a smooth file, and that one rub of this file is sufficient to alter the tone materially, it will be seen that the machine must be very nicely adjusted to make the reeds correct, or nearly so, at first.

THE REED BOARD

is simply a strip of plank, the length of the key-board, full of little cells, as shown in fig. 3, at A, etc. In the middle cell, as illustrated, will be seen a reed-block and reed in its place in a cell.

The cells, or tubes as the makers call them, where the reeds set, are all made by a most ingenious machine, contrived by Mr. Carhart. This machine is automatic, and the strip of plank out of which the board is made, having been placed in a certain position, the cutter goes on and produces all the cells, as at A, and performs its office with a regularity and exactitude which is almost human. This machine will rank with the automatic lathe of Blanchard; for it is not only capable of executing work in straight lines, but also carves scrolls for lyres, and similar work with such nicety and rapidity that no hand work can approach it. The cutters revolve with great velocity, 7,700 times a minute, and the speed of the driving belt is just one mile in a minute.

There is another little detail in this reed-board which commands our attention, and this is the small groove the reed-block sets in. This groove is about a tenth of an inch wide and deep, and is made by a swiftly revolving cutter. Each groove is an exact fac simile of the other, and those made years ago will fit any reed-block made to-day. One of those tube boards is cut in five minutes, and the rapidity with which the details are executed is worthy of notice.

Beneath the tube-board is a series of valves, lined with soft kid-skin, which close the cells. When either of these valves is raised by depressing a key on the finger board of the instrument, the air is admitted to cells in which the air has been partially exhausted and in passing by the reed or tongue gives it such vibration as to produce a sound.

In the discussion which followed, many interesting statements were made by Dr. Rowell and others. The most essential fact elicited was that the reeds are now made of an alloy consisting of copper, 45, zinc, 45, and nickel, 10, which is nearly unaffected by the moisture in the air. These vibrating tongues are all made to a standard pitch so that if one is injured an order may be sent for another to go by mail, and it will be sure to accord.

After deciding to continue the discussion of musical instruments at the next meeting, the Association adjourned.

American Institute Polytechnic Association, *March* 16*th*, 1865.

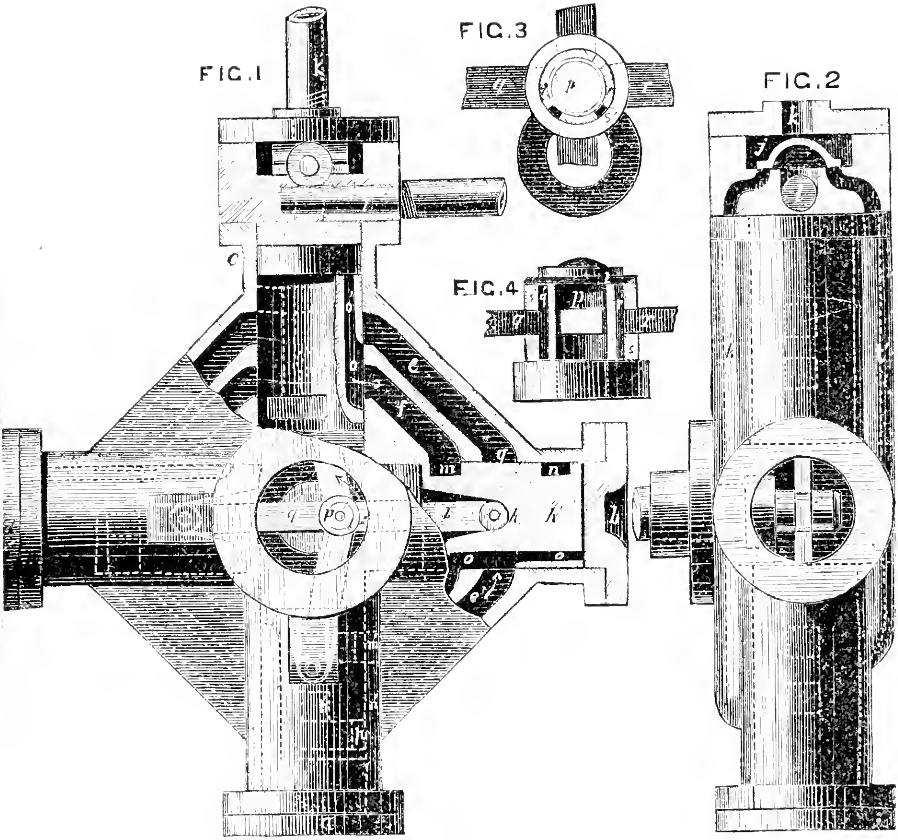
Prof. S. D. Tillman occupied the chair.

The chairman read a communication from Joseph Dixon, Esq., of Jersey City, relating to an account of Shaw & Justice's Steam Gauge, described in the last annual volume of Transactions of the American Institute. It would appear from the description there given that their mode of measuring the pressure of steam by means of a short mercurial column pressing on a piston of comparatively large diameter, was new; but he, Mr. D., had used the same mode for years in his manufacturing establishment. To prove which he sent to the Institute the identical gauge, now broken, for the inspection of members. It was a French invention, manufactured however in this country. The only difference between this and that of Shaw & Justice is that, in the former, the pressure of the mercury is on the bottom of a piston and the pressure of steam is on the top of a piston of smaller diameter, the two being separated by a diaphragm of India-rubber, while in the latter, the application of the pressures is reversed. The arrangement used by Messrs. Shaw & Justice was admitted to be, on the whole, the most convenient and desirable.

Hicks' New Steam Engine.

Mr. Wm. Cleveland Hicks, Civil Engineer, and Professor of Mechanical Engineering in Trinity College, Hartford, exhibited drawings and made explanations of his newly patented Steam Engine, patented Feb. 21, 1865. He said the chief feature of this invention is its matchless simplicity. While retaining the entire principle and action of the best approved reciprocating-piston engines, and doing no violence to the convictions of our most intelligent engineers that this principle and action cannot be superseded as long as the present mode of applying steam continues; the details are so far simplified that the pistons connected directly to the crank, form the only moving parts, and these with the cylinders compose the whole machine. This is done by making the pistons of suitable form and arrangement to enable them to perform also the offices of valves and cut-offs, dispensing not only with these contrivances, but also with the whole array of valve-rods, eccentrics, rock-shafts, packing-boxes, slides, levers, cross-heads, and external attachments of every kind which they necessitate. The action of the pistons is alike simple and uniform, each being a slide-valve for the one next preceding it. This invention, therefore, forms the most radical and entire change in steam engines which has occurred since the days of Watt, and gives a better machine, simple, compact, light, durable, accurate, and economical in operation beyond all comparison with the past, and at far less original cost than ever before attained.

In the arrangement, four cylinders are employed, the pistons in which receive the pressure of the steam or other fluid in one direction only, or are what is called single-acting. In the annexed engravings, these are shown as standing at right angles to each other, or in the form of a cross, the inner ends being open and having a crank in the centre or equidistant from each of the inner ends and as shown in fig. 1, in which *a* is the first cylinder, *b* the second, *c* the third, and *d* the fourth. The cylinders are



Hicks' New Steam Engine.

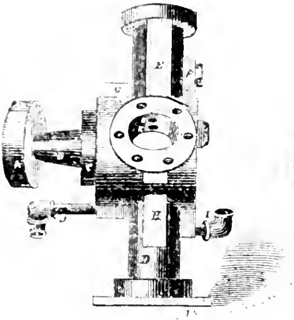


Fig. 1

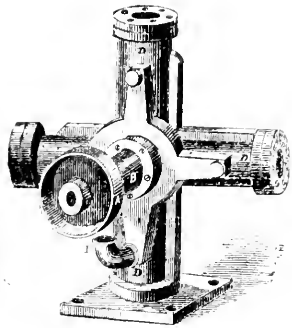
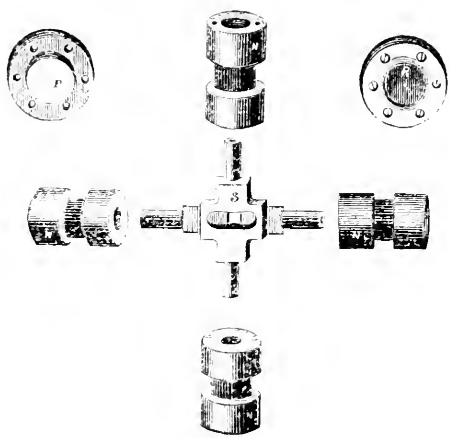
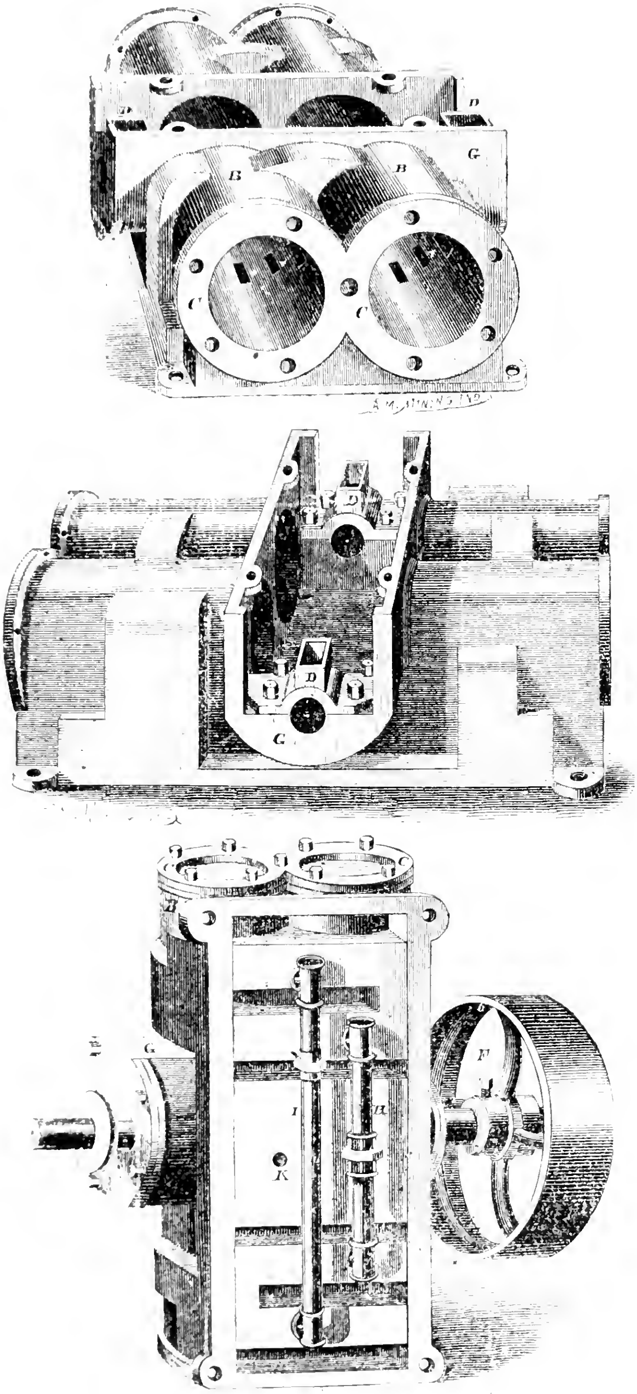


Fig. 2

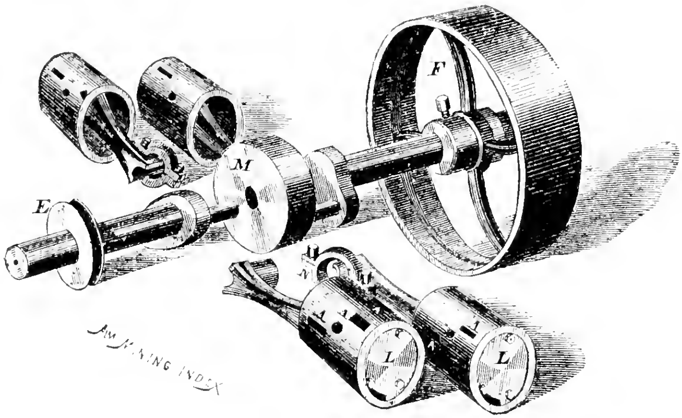


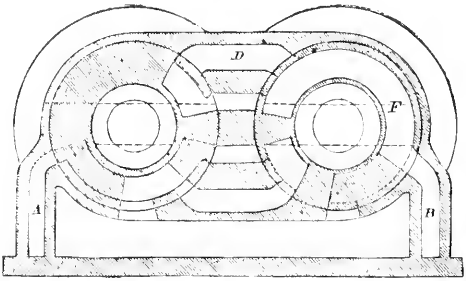
connected with each other by two steam channels *e* and *f*, one of which *e* is for direct steam and the other *f* for the exhaust, although in reversing the engine *e* becomes the exhaust and *f* the steam passage. The pistons are cylindrical and take up sufficient space to lap over the openings of the steam channels *e* and *f* where those enter the cylinders and are shaped as shown at *g*. In the sides of the piston channels or recesses are cut, on opposite sides proper to meet the steam passages, when the piston is moved along the cylinder, so that they shall stand over their openings. It is to be understood that the valve does not operate the steam for its own cylinder, but always for the cylinder next preceding it. Thus the valve in the cylinder *a* regulates the flow of steam to and from the cylinder *b*, and *b* for *c*, *c* for *d*, and *d* for *a*. There are six steam openings into each cylinder, viz: *e* and *f* leading from *b* to *c*, and e^1 and f^1 leading from *a* to *b* on the opposite side, and so likewise for the other two cylinders, and lying in the same plane. The other two openings enter on opposite sides of the cylinder at a right angle to those first named and as shown by the dotted lines *h* h^1 and *i* i^1 in cylinders *a* and *b*. The openings *h* and h^1, as also the similar openings in the other cylinder, all lead to one common receiving pipe for the admission of steam, as shown at *k*, figs. 1 and 2, k^1 being the branch pipe for connecting all the cylinders with it. The openings *i* i^1 also lead in like manner to one common exit pipe *l* through l^1 in like manner. The valve *j*, fig. 2, is shown as closing both pipes, and the engine is accordingly at rest. The valve on each piston acts precisely as the D slide valve of ordinary engines. At *n* *m* are recesses on one side of the valve *g*. One of these *n* passes round one quarter of the circumference of the cylinder on the under side, while *m* extends in like manner one quarter on the opposite or upper side. It will be thus seen that when the piston *g* has moved along so that the channel *n* stands opposite *e* it will also be over the opening *h*, so that steam will pass at once into the cylinder *c*. The same is also true of *m*, for when that recess is opposite *f* it will also stand over the opening *i*, and the steam can flow out of the cylinder *c* as shown. On the opposite side of the piston *g* there is another opening for receiving and discharging the steam according to the working of the valve in *a*. This opening is seen at *o* and extends through the narrow channel o^1 up and through the piston, thus communicating with the steam space between the piston and the head of the cylinder; as shown, it overlaps the two ports e^1 and f^1, and acts in that respect like an ordinary slide valve. The crank is placed in the opening in the frame at the inner ends of the four cylinders as seen at *p*, that being the crank pin. Four connecting rods, each attached to one of the four pistons, are joined to the crank pin. As the cylinders stand at right angles to each other there is necessarily always one or two pistons in action upon the crank, so that when any pair of pistons which stand opposite to each other are at the end of their strokes the other two will be at the half of their stroke. Thus the piston in *a* is at half stroke, moving toward the crank, *c* is also at half stroke retreating from the crank, and *b* and *d* at the extremity of their respective strokes. Now, it is when the pistons are at half stroke that the valves begin to operate upon the steam for the preceding cylinder, either to admit or exhaust the steam as may be required. It will be seen that the recess n^1 in the valve in cylinder *a* is just ready to lap the channel e^1 and cover the opening h^1, thus admitting steam at once to the cylinder *b* above its piston *g*. This channel will be kept open until the piston in *a* has completed its stroke and returned back to the half stroke, for then the piston *g* will have completed its stroke and be ready to return; it must, therefore, be allowed to exhaust its steam. The recess m^1 will now have come to the opening i^1 and channel f^1, thus at once exhausting the steam, for the two half strokes of the piston in *a* are just equal to the whole stroke of *g*. The piston *g* acts in like manner for the valve for the cylinder *c*. The piston in the latter is returning for a new stroke and is accordingly exhausting its steam; the channel *f* is accordingly in connection with the escape passage *i* through the recess *m*, as shown, and the same operation takes place for the cylinders *c* and *d*. Thus it will be understood that in each cylinder there is contained, beside the piston, a valve operated directly by the piston to admit and exhaust the steam to and for the next cylinder. The valve *j* is for the purpose of starting, stopping, and reversing the engines. When this valve is drawn so that the steam admitted at *k* passes from the top of the valve into k^1, the steam will be exhausted through l^1 by the under side of the valve, and *vice versa*, the crank turning according to the direction the steam takes in these two pipes.

Figs. 3 and 4 are enlarged views of the crank, showing the manner of attaching the connecting rods. As the cylinders all lie in one plane, the ends of the connecting rods all meet and abut upon the crank pin, some device must be resorted to to keep them there. The end of each of the connecting rods terminates in a crosspiece q^1 on the connecting rod *q* and r^1 on the opposite rod *r*; each crosspiece on its face is hollowed out to fit the crank pin and press against it. These faces are less than a quarter of a circle, in order to leave room for the vibration of the rods as seen in figs. 1 and 3. The connecting rods are kept pressing up to the crank pin by means of two rings which embrace the whole four of the cross arms, one ring being between the crank and the connecting rods, as seen at *s*, fig. 4, and the other above the rods and extending out to the end of the crank pin as at s^1, figs. 3 and 4. These rings are kept in place by a cap *t*, fig. 4, screwed to the end of the crank pin *p*. The operation is as follows: Steam being admitted throug *k*, the valve *j* is drawn, so as to allow it to flow through k^1, whence it will pass by the branch pipes to each of the cylinders, *a b c d*. The piston *g* is just at the end of its return stroke and in the position ready to receive steam. The position of the recess n^1 of the valve in cylinder *a* is just at the edge of the port or opening into the channel e^1 and likewise at the steam aperture h^1. So soon as the said recess passes these openings, a continuous channel is at once formed, and the steam flows through *o* into the cylinder *b* above the piston, and accordingly drives the latter toward the crank. At the same time that the piston in *b* is receiving the effect of the steam admitted through the cylinder *a*, the piston in *b* is performing the office of regulating the flow of steam into and from *c*, the piston in this latter cylinder having performed its stroke is exhausting its steam, and it will be seen by the direction of the arrow flowing back through *f m* and *i* to the final discharge *l*. The lower face of the narrow channel o^1 forms a "cut off" by lapping over the port in e^1 as soon as the



Figures 4, 5, 6.





Figures 7, 8.

piston has performed one half of its stroke, in which position it is shown in cylinder *c*. This lap may be made adjustable as to length by a sliding piece, and therefore regulates the expansion to any degree desired.

Several variations can be made in this engine. It is not necessary that the channels *f* and *e* be separate; they may be included in one and may terminate in the cylinders above the pistons, so as to omit the passage *o* and o^1; the cylinders need not also stand in the position shown in the engravings, but may be placed parallel to each other. Steam has been described as the fluid used for the motive power, but water, gas, or other fluid may be employed, and the engine also be employed as a pump.

Mr. Hicks then gave a short description of the engine in its horizontal form, which would be used in locomotives, steamboats, and many purposes where great economy of steam is desirable, as the passages from cylinder to cylinder are so reduced as to save nearly all the steam usually lost in the ports.

Fig. 4 represents an end view of engine D, with the caps to the crank-shaft bearings; all the other parts being removed. A A inside of the cylinders, show the ports connecting the cylinders to each other, and to the steam and exhaust ports.

Fig. 5 represents a side view of the same engine, and the caps to the bearings, with the other parts removed.

Fig. 6 represents the engine standing on one end, with shaft and pulley in place; also the steam and exhaust pipes I and H, as attached to the bottom.

Fig. 7 represents the pistons, crank, shaft, pulley, governor pulley and connecting rods, disconnected, but in the positions occupied when in the engine. The pistons show the ports and passages for steam, exhaust and cut-off.

Fig. 8 represents sectional view through B B, fig. 4; A B being steam passages in the cylinders; C D being the exhaust.

The exhibition of this new engine elicited an interesting discussion, in which the novelty and value of the arrangement were fully explained.

Warming Carriages.

Mr. James Campbell illustrated by diagrams on the blackboard his method of warming carriages. He proposes placing in the box under the driver's seat, or beneath the floor of the carriage, a tank filled with water, leading from which are small iron pipes that pass around the interior of the coach. The water in the tank is heated by a petroleum lamp. Mr. Campbell said the necessity for such an apparatus in vehicles was very evident. In his trade of coachmaking, the enquiry was often made by those ordering private carriages, if some plan could not be devised for warming them, and hence he was induced to experiment, and of the various plans tried, the one here shown seemed best calculated to effect the object. Carriages now made weigh from 1,400 to 1,700 pounds, and the entire weight of this apparatus would not be over 75 pounds.

Mr. Stetson said that this device appeared quite novel for warming carriages by hot water pipes, and using petroleum for fuel. The idea of placing the tank under the floor of the carriage seemed to him to be best, as by that means, the water as it gave off its heat could be made by its own gravity, to return to the tank and be used over again.

Musical Instruments.

The subject selected for discussion was taken up. Mr. Albert Weber, manufacturer of pianos, took the floor, and occupied an hour in describing the successive steps of improvement which had resulted in the production of the piano forte in its present form and arrangement. The following is a condensed report of his remarks:

The first string instrument, made on the principle of the piano, was constructed in the year 1001. It was about four feet square, and was made with three strings. This was improved upon in Germany until there were twenty strings used. About the year 1600 keys were applied to these instruments, such as those in use now, but of course very imperfectly made. We contend that the Germans are the original inventors of the piano, and that the first real piano was made by a German named Silberman. This was about 1725. Afterwards a Mr. Rutherman, in England, made one with outside keys. They were painted and inlaid with wood, and the whole was as handsome as any piano that could be made, and it is now regarded as a great curiosity. The first seven instruments made were bought by Frederick the Great, in 1747. The strings of these instruments gave a continual sound when struck, and was a source of much trouble until an Italian, named Crystophy, invented a method to stop these vibrations. Various improvements were afterwards made, but it is only within the last twenty years that the pianoforte has been brought to its present perfection. The firm of John Broadwood & Co. has been in the business since 1780, in London, and have made 132,000 pianos. They now make about fifty a week. In New York we have about seventy manufacturers, and they make from two hundred and fifty to three hundred a week. The largest part of the pianos on the continent are made in England. We are now making more pianofortes in this country than any other. England comes next. France follows, and Germany the fourth. It is a debatable matter as to which manufacturer makes the most in this city.

Mr. Weber here drew diagrams on the blackboard showing the inside construction of the various styles of pianos. An impression prevailed, he said, that pianos were made of rosewood, but the thickness of that wood is not greater than an ordinary card. The sounding board is made of spruce wood, because it is the best conductor of sound. This board is made to taper, in thickness, from an eighth to one-quarter of an inch, which is strengthened by ribs. Some are made from an eighth to a sixteenth in thickness. The ribs are an inch thick. In his estimation all the excellence of the piano depended on the sounding board. The iron frame to which the strings are attached was introduced about thirty years ago. Some manufacturers still use the wooden frame. The strings are turned at an angle to stop all vibration, and the whole sound of the instrument is thrown into the sounding board. If a piano is not in proper tune throughout, it is because the wood is of a different character in some places. The spruce wood has little red streaks in it, and some manufacturers think the larger these streaks the finer the tone, but he thought the smaller the streaks the better the tone. Some contend that the tone is increased between these streaks. Various metals have been tried for sounding boards, and even glass, but it was found that metals always destroyed the sound or tone. Our main guide is the violin sounding board. The style most made in this country is the square piano. Ninety-eight out of every hundred are of this kind. The square piano is used for a large room, and the upright for a small room. The strings in each are precisely alike, but the action of striking is different. A greater power can be exerted upon the horizontal than upon the upright piano strings. The action most used by makers in New York is called the French grand action.

The piano keys are balanced with lead so as to make each end precisely of the same weight. If this is not done the key will not respond readily to the touch. There is no rule laid down for makers to go by. Each establishment has its own system or scale to which all its pianos conform. It is surprising, however, to hear the great diversity of opinion expressed by professors and experts regarding the tone of the same piano. There is no book to give instruction regarding the manner of producing uniformity of tone by the arrangement of the woodwork. The art is attained by a few workmen who, as a general rule, are not piano players, and therefore take the opinion of professors as to the quality of tone produced.

Adjourned to March 23d.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
March 23, 1865.

Prof. S. D. Tillman in the Chair; Mr. B. Garvey, Secretary.

The Chairman said he would substitute for his usual budget of scientific intelligence, an article by him, lately published in *Humphrey's Journal of Photography*:

CLYDONICS—No. 1.

BY PROF. S. D. TILLMAN.

Read before the American Photographical Society.

Under this title, derived from the Greek, *Kludon*, it is proposed to embrace those branches of science which treat of waves and undulations; of oscillations, vibrations and pulsations. By grouping in this manner, manifestations of force through to and fro motions, more or less rapid, the student is enabled to view this class of reactions from a stand-point where comparative measurements and estimates greatly assist him in reaching and retaining correct conclusions. All the notes in Nature's harmony, heard and unheard, thus become a part of one grand gamut, extending from the profound sub-base of the great tidal wave, having a single diurnal culmination, upward through the diapasons of sound and color, to the very altissimo of the tremulous æth, whose waves—quicker than thought—generate a pitch far higher than the violent tone, and, being beyond the range of human vision, are only known to us by the wonderful effects they produce in the hands of the skillful photographer.

This paper will be devoted to that subdivision of Clydonics which includes considerations regarding the relative action of the most common media of light and sound.

It is very difficult, if not impossible, to form a correct conception of the extreme attenuation and rapid motion of the ethereal medium which is termed æth, to distinguish it from the ether of chemistry. In papers previously presented I have endeavored to show that all the distinct and apparently diverse effects known as heat, light and actinism may be the result of wave motions of the same fluid varying in velocity. Bearing in mind the broad distinction between the normal movements of air waves and the transverse movements of æth waves, let us by gradual ascent upon the atmospheric ladder, so to speak, reach the dizzy height at which rapidity of motion is apparently the rule, and rest the exception, in the wonderful economy of nature.

The propagating of sound through air, having the temperature of the melting point of ice, the mercury of the barometer standing at 30 inches, is about 1,090 feet per second. Its velocity is directly as the square root of the elasticity and inversely as the square root of the density of the air. When the temperature is increased one degree on the Fahrenheit scale, any gas is increased $_{4}{'}_{1}$ in bulk. The formula of Newton, with the correction of Laplace, expressing the ratio of the specific heat of air at a constant volume, with its specific heat at a constant pressure, has been confirmed by actual measurements. In gases under the same pressure and of the same temperature, the velocity of sound is inversely as the square root of their densities. Dulong produced tones from organ pipes by means of different gases, and found that sound was propagated in one second through hydrogen 4,154 feet, through carbonic oxide 1,105 feet, through air 1,093 feet, through oxygen 1,040 feet, through carbonic acid 857 feet. The density of oxygen being 16 times that of hydrogen, it will be seen that the velocity of sound thus obtained in these gases correspond very nearly with the calculated rate.

The elasticity of the atmosphere being directly as its pressure, the velocity of sound would be the same at all heights through air of the same temperature. The variations caused by decrease of heat in upward progress can be calculated from data gathered by Mr. Glaisher during balloon ascensions to the height of five miles. Without attempting to give even a near approximation towards the true height of the atmosphere, which must have a definite boundary at that line where gravitation exactly counterbalances the repulsive force of its particles, attention is called to the following table showing its rarefaction; increasing in geometrical ratio with each ascent of 3.4 miles.

At	17	miles it is	32	times rarer.
	34	do	1,024	do
	51	do	32,768	do
	68	do	1,048,576	do
	85	do	33,554,432	do
	102	do	1,073,741,824	do
	119	do	34,359,738,368	do
	136	do	1,099,511,627,776	do

This possible attenuation of air will not excite surprise when we consider that a grain of gold may be so expanded as to be divided into 4,900 millions of parts, perceptible with the microscope; but astonishment cannot be repressed upon calculating the velocity of sound in a fluid vastly less dense than air thus expanded, provided its elasticity remains the same as at the earth's surface under the standard pressure and temperature. If we take the comparative rarefaction of such a fluid at only 1,098,304 millions, we find its square root to be 1,048,000, which multiplied by 12,386, the number of miles per minute at which sound moves through air, gives 12,980,528 miles per minute as its velocity through such a medium; while the propagation of light through æth is only at the rate of 11,520,000 miles per minute.

Assuming that any energy generating wave motions in a fluid, in consequence of its elasticity, follows the same law, we now have the means of making a comparative estimate of the density of the æth directly enveloping our globe; and it may be stated in gen ral terms that such æth does not exceed the density which a cubic inch of air would have were it expanded to 1,098,304,000,000 of cubic inches.

Sound would be propagated, with exactly the velocity of light through a fluid, under the standard pressure, 874,094,104,900 times rarer than air. Therefore, if the density of air be 1, the density of æth is represented by the decimal. 000000000000114.

It will not be inferred from this view that the aim has been to reach

"The fir t of things, quintessence pure,"

for the elastic quality of æth involves the hypothesis of a still more subtle fluid. We have raised one curtain only to find another to be raised. As the unfathomed vaults of Heaven recede before the sweep of a more powerful refractor, and nebulæ resolved reveal nebulæ beyond, so the most diminutive germ that springs from the Creator's touch, discloses through the lens of higher power, new signs of more wonderful mechanism within. Each nucleus has its nuclei! Each entoblast is but the boundary of a microcosm! Each particle, a galaxy of atoms revolving in the all-pervading æth! Thus before every far reaching human advance, circumference and centre will forever retreat.

Norman Wiard, Esq., on invitation, presented the following paper, to which he added explanatory remarks.

Great Guns.

1. Since the battle of Solferino, when rifled cannon were first actively put in use, all the nations liable to a state of war have been straining every nerve to improve their ordnance, and hence their improvements in the means of defense, and the experi ents conducted to produce large rifled guns were cotemporary with the experiments in iron-clad ships. Modern warfare, therefore, with large rifled guns and iron-clad ships, is in its infancy, although large smooth bores and wooden ships have an earlier date; their general use in service began with the present rebellion, and, at this date, the large gun of either class, not liable either to the accident of enlargement of the bore or bursting has not yet been made; while of rifles we have none over 30-pounders that have not proved utterly unsafe, except

a few 60-pounder Parrott's, untried in battle, and some experimental 50-pounders which have been made, but never put in service.

2. As field rifle guns were successfully used before the rebellion, it appears that no improvements have been made in large guns during the war, whilst every other branch of inventive genius has been successfully keeping pace with the march of the revolution in science and mechanics.

3. We can, and we should have guns to answer the purpose of their creation equally with agricultural instruments.

4. What farmer would continue to use a plough, if it were liable to burst and blow him and his team to atoms? Private enterprise overcomes these difficulties, why does not the government likewise?

ACCIDENTS WILL HAPPEN.

5. At Fort Sumter, in the beginning of the rebellion, the only casualty was by the bursting of a gun. In the attack on Fort Fisher all the casualties in the fleet resulted from the same cause. At the bursting of every gun more or less life is lost, beside the sacrifice of property, and owing to the reticence of the departments but a small percentage of the numbers that burst, and the losses sustained by the government, are published. Those we hear of in the newspapers generally come from some literary, but unscientific reporter.

FORT FISHER AND THE NAVAL BOARD.

6. Eighteen large rifles were disabled on Admiral Porter's fleet at Fort Fisher, yet the Secretary of the Navy reported to Congress but five had burst; and recently a board convened by the Ordnance bureau of the navy to investigate the cause of the disastrous failures of guns off Fort Fisher, reported twenty-one burst altogether, out of 703 in service, while their own tables, accompanying the report, show thirty-four had burst, and the last report of the chief of the bureau exhibits 1,005 at that time available. The board likewise suppressed the truth, in not reporting that of the 703, 483 were twenty and thirty pounders, which were not of the classes under contemplation or liable to burst.

7. I have had twenty-five years' experience in manipulating iron, and all the talent or inventive faculty I have, resulting from that large experience, has been for three years entirely devoted to this subject. The chief of the Ordnance bureau has said that I have great experience, much inventive talent, and am a great mechanic; yet I was not allowed to give any information to the board. Mr. Horatio Ames was also present in Washington at the time, who has the reputation of being one of the most extensive iron manufacturers, with experience in the manufacture of guns, in the country, and who had made a 50-pounder wrought iron gun that could not be burst, yet he was not allowed to testify, nor Mr. Hotchkiss, another very efficient ordnance mechanic. Only Mr. Parrott was heard. Hence it can be seen why no improvements are made in guns. The departments persist in shutting out the light.

THE REASON WHY THERE IS NO IMPROVEMENT.

8. In the navy, some years since, a young lieutenant, of considerable talent, much ambition, with a remarkably fine address, exhibited great

aptitude for ordnance. The country being at peace, he worked without rivalry, except in an officer sustaining about the same relation to the army. They were each more or less successful, owing to the general ignorance on this subject, and at the birth of this rebellion each was the autocrat of ordnance in their respective branches of the service, and their different systems were covered by patents: the one the Dahlgren navy gun, cast solid in a mass double the weight of the gun, chipped off, and bored out in the lathe; the other the Rodman army gun, cast hollow, and cooled from the center with water. It is doubtful if at this period Europe had so far advanced as we. But they have kept on while we have stood still, utterly, disgracefully still, so far as the departments are concerned. The mechanical talent of the country has had no encouragement.

Private foundries have been employed to make Parrott, Rodman and Dahlgren guns, but not other or better ones. This being the result, the influence of these systems became deeply rooted in the minds and interests of those connected with ordnance and the bureau.

A CIVILIAN'S OPINION.

9. Robert Mallet in the preface to his great work on ordnance says: "There are those who affirm that all that relates to the fabrication or improvement of artillery belongs properly to the officer of artillery or of engineers, and that he alone is qualified to treat of or to direct such, and to these some apology may seem fitting for meddling with matters deemed so purely professional. To superior knowledge, wherever found, I willingly defer, and recognize the great ability and brilliant attainments of very many within the scientific corps of our army, among whom I reckon some honored friends, but I cannot admit the preceding doctrine, nor do I believe it possible that, under the existing conditions of military education and life, or perhaps under any others consistent with its primary necessities, commissioned officers can attain that varied, comprehensive, and accurate scientific and practical knowledge, and that educated physical tact which long experience in technical matter alone confers, to the extent that civil life permits, and which the education and occupation of the civil and mechanical engineer create and empower, '*Non omnia possumus omnes.*' Experience proves it to have been of necessity so always and in all countries. Who have been the great improvers, if not the creators of the science of gunnery itself? A long list of illustrious men, in civil life—Tartaglia, Galileo, Cassini, Marriotte, Hawksbee, Robins, and Hutton, while many of the most important practical details applied to the military art have also come from men such as Forsythe, a country clergyman, the inventor of the percussion lock," to which we may add the following names of Americans: Sharpe, Colt, Treadwell, Dickinson, Hotchkiss, Doremus, Professor Barnard, James, &c.

HISTORICAL.

10. The first effort at heavy guns were in wrought iron, and they have, from a very early period, been tried in every conceivable shape, but always burst. James II, of Scotland, was killed by one of a pair made by an artist of his day, and the other of the pair burst at a later time. A large wrought-iron gun burst on board the Princeton, killing Mr. Upshur, a mem-

ber of the cabinet; in fact, they have in every instance failed. After them came a series of bronze guns; then cast-iron was tried for a while, after which wrought-iron built up guns, fabricated with more skill than had previously been bestowed upon them; yet they failed, for 1,476 Armstrong guns, or parts, were returned for repairs up to July, 1862. Then cast-iron again cast solid, the same as the Dahlgren system, which was in turn abandoned for cast-iron banded guns, (Parrott's system.) The English government burst or rejected 356 of this kind, and they were abandoned as old iron in 1862, following after or coeval with which came guns cast hollow as by Colonel Rodman. Not one of these systems has stood the test of battle, and most of them not that of proof.

SOLID CAST GUNS.

11. The Dahlgren gun has exhibited better endurance in proof than any other large gun, yet Dahlgren only allowed limited charges of powder fired from them, and that behind spherical shells; they could not stand a charge commensurate with the size of the gun, with a solid shot, especially under rapid firing. Although the gun is made so as to secure a quality of porosity to the interior metal, which can be heated inside without being expanded to sufficient extent to break the dense surrounding metal, under slow firing, as used in proving and ordinary practice: for example, the finger may be inserted into a sponge without rupturing the outside, while a needle cannot be inserted into a cake of ice without causing radiating cracks. The effect on this gun under heavy firing would be similar to the effect of powder in rock blasting. The rock is somewhat compressible and of brittle texture; the pressure of powder enlarges the diameter of the hole by compressing the material immediately surrounding it; then first, suppose the bore two inches in diameter to be so enlarged as to start two cracks on opposite sides to a depth of two inches, the gases of powder enter these cracks, acting then upon a surface six inches wide. If the pressure in the bore, two inches in diameter, was before sufficient to induce cracks two inches wide each side, when the pressure acts upon six inches, the cracks will be increased six inches in addition on each side, making eighteen inches width of surface upon which the pressure acts to continue the fracture further. (See fig. 1.)

NECESSITY FOR INITIAL TENSION.

12. "If we make equidistant circular marks on the end of an India-rubber cylinder, and stretch it, we can see plainly how much more the inside is strained than the outside or even the intermediate parts. The spaces between the marks will become thinner, each space becoming less thin than that outside of it, and the inner space much thinner than the others, showing that when the inside is strained almost to breaking, the intermediate parts are doing much less work, and those far removed almost none.

13. "In the first volume of the 'Transactions' of the Institute of Civil Engineers, p. 133, there is a paper by Professor Peter Barlow, F. R. S., on the Strength of Cylinders." The law he deduces is, that "in cylinders of metal the power exerted by different parts varies inversely as the squares of the distance of the parts from the axis. Thus, in a 10-inch gun, when the inside, which is 5 inches from the axis, is fully strained, the metal 2

inches from the inside, or 7 inches from the axis, can only exert a force 25-49, or little more than half as much; 3 inches further, 10 inches from the axis, the force exerted diminishes to 25-100, or but a quarter of that exerted by the inside; and if the gun be 12 inches thick, the outside, which is 17 inches from the axis, can exert but 25-289, or about 1-12 as much power as the inside. Of course, casting the gun still thicker would add but very little to its strength; we cannot, therefore, be astonished that it has been found in practice that cylinders for hydraulic presses with a thickness equal to about half the diameter of the piston are very nearly as strong as if ten times as thick."

14. "In 1855, Dr. Hart, of Trinity College, Dublin, investigated the problem. His calculations (see note W., p. 259 of Mr. R. Mallet's work on the Construction of Artillery) give the greater strength to the inner parts, but still less to the outer, than those of Professor Barlow. Both these gentlemen, as well as Gen. Morin and Dr. Robinson, the astronomer, who have also studied the question, agree that no possible thickness can enable a cylinder to bear a pressure from within greater on each square inch than the tensile strength of a square inch bar of the material; that is to say, if the tensile strength of cast iron be six tons per inch, a cylinder of that metal, however thick, cannot bear a pressure from within of six tons per inch." Hence the necessity of shrinking bands one upon another each with a certain pressure upon what it encloses to get a gun into the state of so-called "initial tension" necessary to its sustaining the greatest pressure from within possible to a given thickness of wall, which as applied to a hydraulic press cylinder is correct, but for a gun it is a fallacy; the effect of the expansion of the interior by the heat of the powder not being taken into the account.

THE REQUIREMENTS OF ACTUAL SERVICE.

15. Thus, solid or hollow-cast guns are useless for actual service and against armored ships, which is now the means of defense to which our means of offense must be adapted; and no proper preparation is made for such a contingency. The Navy Bureau design adopting the Rodman system of casting hollow and cooling from the center, thereby admitting their want of confidence in the Dahlgren plan. Yet this will increase their weakness against the expansive force of heat engendered in battle firing. For it has been seen that the Dahlgren 11-inch gun is not capable of enduring heavier charges than 15 pounds of powder and a hollow shot, and that it is only safe under slow firing, principally because of its porosity inside, whereas if it is cast hollow as in the Rodman plan, and cooled from the center, although it will stand occasional heavy charges better than the other, and have more enduring surface to the bore, it must burst when fired rapidly, even with small charges, thereby rendering it entirely inefficient for actual service. For the inevitable effect of the system is to produce an initial tension to the verge of rupturing, rendering them certain to explode by the force of the metal expanding when quickly heated from the interior; in fact one of the Rodman guns burst itself on cooling in the foundry at Pittsburg before it was taken out of the pit.

16. Of the classes of guns that have, up to this date, been fabricated, those of cast-iron are of three kinds: the Dahlgren gun, cast solid, the

Rodman gun, cast hollow, and cast-iron guns banded round the breech with wrought iron.

17. Of wrought iron and steel guns there are three kinds: those made from solid forged masses, as by Wiard in 1861, by Krupp of soft steel, and by Ames of wrought iron. Those that are barrel-banded, as by Armstrong, Blakeley, Whitworth and Treadwell, and staves with bands, as proposed by Mallet, and practiced from the most ancient times. Bronze guns are only used for small calibres. Each kind of material fabricated can be used with success, in making small guns, but for larger guns, although made in the same manner, they invariably fail when subjected to the actual conditions of service, and at this time no absolutely safe large gun is to be found in any service in the world.

THE STRONGEST METAL DOES NOT MAKE THE STRONGEST GUN.

18. That this failure is due to other causes than inability to withstand the pressure of the gases of the powder, may be found in the fact that a large calibre steel gun, with a tensile strength of 120,000 pounds to the inch of section, exhibits less endurance under rapid firing than a cast-iron gun of the same calibre, form and size, with a tensile strength of 18,000 pounds. Or 8-inch cast-iron guns made from metal having a strength of 38,000 pounds to the inch of section, have less endurance than a gun of like calibre and form of which the iron has a tensile strength of only 27,000 pounds.

19. The following extract from Rodman's work on ordnance, pages 137 and 138, (erasing the repetitions of the words *solid-cast* whenever they occur,) fully illustrates this principle. It is not deemed out of place here, in order to show the necessity of further investigation into the properties of cast-iron, in its application to the manufacture of cannon, to notice some facts in the history of gun founding in this country since 1849.

20. The very low endurance of the first pair (8-inch) of experimental guns which were cast in that year, was attributed to the inferior quality of the iron of which they were made. Two years were spent in searching after a better quality of iron, which was undoubtedly found; and in 1851 another pair of 8-inch guns was cast.

21. The iron in this pair of guns has a tenacity of near 38,000 pounds, while that of the iron in the first pair was only between 27,000 and 28,000 pounds. The gun of the first pair burst at the 85th fire, and that of the second pair at the 73d fire; the superior iron giving the inferior gun.

22. These results did not, however, destroy confidence in strong iron for guns, and the first pair of 10-inch guns was made from the same lot of iron; and with a tenacity of iron of 37,000 pounds the gun burst at the 20th fire. This result weakened confidence in very strong iron, and the tenacity was reduced. In 1857, after guns of good tenacity had failed at Fort Pitt, South Boston, and West Point foundries, four out of seven guns offered for inspection at the last named foundry have burst in the proof. Mr. Parrott, proprietor of the West Point foundry, one of our most experienced gun founders, cast his trial contract guns of iron, having a tenacity of 30,000 to 32,000 pounds.

23. One of these guns has endured 1,000 service charges of 14 pounds

powder (800 rounds with shell, and 200 with shot). The iron selected at that foundry, and from which the last five experimental guns have been made, was of the same quality, and in the same proportion as in the guns last above referred to.

24. In 1858, after the failure at the 169th fire of the West Point experimental gun made from this iron, Mr. Parrott condemned it as being too high for heavy guns.

25. And again, "these facts to my mind are conclusive as to the fact that we are at present far from possessing a practical knowledge of the properties of cast-iron in its application to gun foundering; and it is too much to expect of private enterprise to take up and prosecute so intricate and expensive an inquiry." Thus we see how recently the author of the system of casting hollow, acknowledges his ignorance of casting iron, and I venture to say that neither Bureau knows more to-day. Colonel Rodman's plan of hollow casting provides well for the pressure of the powder in a gun, but the gun that is in the best state to resist the pressure, viz: by initial tension, is in the worst state to resist the unequal expansion from the heat of firing; the same holds good in a wrought-iron or steel gun.

FOR PRESSURE.

26. Built up cylinders, *i. e.* with bands shrunk upon an inner tube of all kinds are better able to withstand pressure than solid forgings or castings, as has been heretofore and will be hereinafter more fully explained; but must be made of soft ductile iron that will stretch, to thus be disabled and need repairing, or they will burst by unequal heating if made to be used as guns.

EFFECT OF INITIAL STRAINS.

27. The tensile strength of gun metals is usually only tested by simple extension of length, one of the dimensions undergoing which extension other dimensions are reduced. It is not known how the tensile strength of a sample would be affected if force was applied to extend all its dimensions at the same time. As for instance, take a hollow cylinder of which the area of cross-section is known and subject it to a pressure of liquid on the interior, having *only* the tendency to enlarge its dimensions *radially*, while the measured force of the instrument by which its tensile strength was being measured, was applied to extend its length only. Or, better, have the forces acting to enlarge the diameter *pulling* from the outside instead of *pushing* from the inside, it would undoubtedly be found that while subjected to such additional forces the extension or rupture would be accomplished with less force. For the attraction of cohesion acts with greater energy as the faces of crystals or atoms are near or distant, in the same ratio as the shadow of a screen upon a wall from a point of light increases or diminishes in superficial area as the screen is moved toward or from the light; hence the more dense the sample of cast-iron from remelting, or greater time in fusion, the greater the tensible strength. When the initial tensions within the mass of the sample, from unequal cooling or heating, do not affect the result, the extension of length would require more force, because the faces of crystals are not all perpendicular to any

axis. The strength of metals in large masses is much less than in small ones, owing to initial tensions.

INITIAL STRAIN IN WROUGHT-IRON.

28. "The initial strains of large cylindrical forgings are, to some extent, deranged by a cause that operates so unfavorably in solid cast-iron guns—the cooling of the exterior first, and the consequent stretching of the interior. Mr. Clay acknowledged this difficulty before the defense commissioners, and stated that his new process, hollow forging, overcame it. Such a result actually occurred in the case of the Horsfall gun; a breech-plug or false bottom was placed in the chamber to cover a crack arising from this cause."

29. "One of the illustrations given by Lieut. Col. Clark represents a 12-inch wrought-iron cylinder, ½-inch thick and 9 inches deep, after being heated to redness, and cooled by immersing its lower half in cold water—these operations having been repeated twenty times. The upper edge of the cylinder (in the air) did not alter; the lower edge (in the water) contracted 3-inch in the circumference, and at about one inch above the water-line the circumference was reduced 5.5 inches.

30. "The general effects noticed in the paper are a maximum contraction of the metal about one inch above the water-line; and this is the same whether the metal be immersed one-half or two-thirds its depth, or whether it be 9, 6, or 3 inch deep. With wrought-iron the heatings and coolings could be repeated from 15 to 20 times before the metal showed any signs of separation; but with cast-iron, after the fifth testing, the metal was cracked, and the hollow cylinder separated all round just below the water-line after the second heating. Cast-steel stood 20 heatings, but was very much cracked all over its surface. (See fig. 2.)

31. "As respects the change of form of cast-iron and steel, the result was similar to that in wrought-iron, but not nearly so large in amount. Tin showed no change of form, there being, apparently, no intermediate state between the melting point and absolute solidity. Brass, gun-metal, and zinc showed the effect slightly; but instead of a contraction just above the water-line there was an expansion or bulging." In this example the hollow cylinder was cooled from the inside and outside surfaces. The following example shows the effect of heating and cooling from one surface only.

32. If we produce a homogenous ball of wrought-iron, and subject it to repeated heating and cooling, it becomes larger in dimensions, and may, by continuing the process, be made distinctly hollow. Upon heating it the outside receives the heat first, enlarging the interior—the dimensions of masses of metals may be enlarged or separated by the application of sufficient force, indefinitely; while the dimensions of a mass cannot be materially reduced, no matter what force is applied—at a later time when the interior is heated, the outside is enlarged, or receives what has been termed a "*permanent set.*" Again, in cooling the outside loses its heat first, being unable to compress the inner metal, (for the resistance to first increment of compression is about six times as great as the resistance to first increment of distention to give a permanent set;) it is by repeating the process another enlargement occurs, and so on. And this explains the cause of the

enlargement of the bore of the Ames gun at the 450th round, as mentioned in the pamphlet "*on the inefficiency of heavy ordnance*," by *Wiard, page* 21.

THE EFFECT OF ENLARGEMENT OF THE BORE.

33. The parallelism of the bore of a wrought iron gun is continually changing, affecting its range and accuracy—both disabling the gun and preparing it for an explosive bursting, by communicating to it initial tension, by enlarging the interior; in which state, if it is afterwards fired rapidly, it will burst like any other gun.

34. A gun is heated nearly the same with small charges of powder as with heavy, because, with a heavy charge the shot is ejected somewhat quicker, and, although the temperature of the gases is higher, the time of action is less.

ENDURANCE OF CAST-IRON.

35. Cast-iron has heretofore exhibited greater endurance of surface to the bore in guns than any other material used. A 30-pounder Parrott fired on Morris Island endured 4,606 rounds before it burst, with a minimum abrasion of surface of bore and enlargement of vent. Its small size, thinness of wall, heated through more uniformly than a gun of thicker walls; and being fired slowly with intervals of fifteen minutes between the rounds, it was not exposed to the rupturing principle hereafter to be more particularly described. The only enlargement of bore occurring in a cast-iron gun being within the limits of its elasticity, it recovers its original size and form after the force acting upon it has been expended. If the forces acting upon it are great enough to extend it beyond the limits of its elasticity, it is ruptured, having but little ductility. It will be shown that these qualities are most desirable in guns, and that cast iron can be so used as to be absolutely safe from bursting, whether by heavy charges or by rapid firing, when of course its endurance of surface and cheapness is so much in its favor that it must be the material from which heavy guns are to be made hereafter.

36. All guns of large sizes are subjected to severe strains from unequal heating or cooling, at two important periods viz: when they are being fabricated and when they are used in service.

UNEQUAL COOLING OF CAST-IRON.

37. A fifteen-inch Rodman gun, cast hollow, and cooled from the exterior to get initial tension, at Pittsburg, a few months since, when nearly cold and ready to be removed from the pit, split from end to end. The inner metal had been cooled by water passing through the bore while the outside metal retained a higher temperature. By this means Colonel Rodman attains initial tension in his gun, as in the hooped guns of Parrott, Armstrong, Blakely and Brooke. (See fig. 3.)

The outside metal cooling at a later time shrinks upon the inner metal like the tire upon a wagon wheel, but in the case referred to the tension was too great. The cast block was about sixteen feet in length, and the wall about sixteen inches in thickness—consequently the area of cross section ruptured was equal to 3,172 inches. If the tensile strength of the metal was 30,000 lbs. to the square inch of section, the pressure bearing upon the inner metal was about 95,000 of pounds on each side, or a whole pressure of 190,000,000 of pounds.

38. I acknowledge this to be a somewhat exaggerated statement, if referring to the finished gun, as the cast block was longer by the length of the sinking head than the gun, and part of the outside metal in a state of tension is turned off along the chase.

39. Since the above was written another 15-inch gun has burst spontaneously at the Pittsburgh foundry. The fissures were somewhat different to those in the first, some of them being nearly transverse around the gun, behind the trunnions, and opened about one inch wide on the outside, showing the skin of the gun was too small. The perfection of the state required by the advocates of the "initial tension" theory. It can be seen that if these guns should not burst spontaneously before they are used that but little heat would be necessary, communicated to the inside by the powder when they are fired rapidly, to insure rupture.

UNEQUAL COOLING OF WROUGHT IRON MASSES.

40. The initial strains of large cylindrical forgings are, to some extent, deranged by a cause that operates so unfavorably in solid cast-iron guns—the cooling of the exterior first, and the consequent stretching of the interior.

FISSURES IN THE MONSTER MALLET MORTAR.

41. The masses for this mortar were forged from puddled slabs of manageable size, "by slabbing up two or more large flat pieces, laying these upon each other, and welding them together into a rude sort of square prison, which was afterwards partially rounded down, at the corners, under the hammer. (See figs. 4 and 5.)

42. Mr. Mallet gives the following facts and illustrations as to the cause of fissure: Two masses, about two and a half feet in diameter and eight feet long, were forged for two 36-inch mortars, which was constructing for the British government. They were slightly tapered, and at one end there was a collar projecting six inches all round, and about twelve inches wide in the line of the axis, presenting laterally the general form shown in the cut.

43. These pieces were welded together, apparently, perfectly sound, but after they had become cold they were invariably found, upon borings being made into the centre, to have large rents internally, with jagged crystalline, irregular surfaces * * * * At first it seemed probable that the rents due to cooling, now to be described, were found in the direction of the broad planes of the slabs; but more careful and exact examination proved that in more than one case, at least, these rents had undoubtedly been found across, or at right angles to those planes. The opposite faces of those rents were counterparts, and presented distinct evidence of having been torn asunder by contraction, from the center towards the circumference, as the mass cooled."

44. One of these rents are shown in figure 6. "The limits of the fractures, as seen perpendicularly to their plane, were found to be generally as shown by figure seven. The ascertainable extent was from two to three feet along the axis, and usually rather more than half the

extreme diameter of the mass in breadth, measured across the large end. The cracks were from a half to seven-eighths of an inch open at the widest part in the center, and passed off, at each extremity, to an indefinitely thin wedge.

45. In no case was there a trace of bad welding or of defective workmanship. They were clean fissures, presenting opposite surfaces of solid, sound metal, though rough by being torn asunder. In this conclusion Mr. Clay coincided. On consideration, it appeared that the phenomenon was simply due to contraction on cooling."

46. These silent and insidious effects of heat have to do with all our practical pursuits; and nothing in the science of natural philosophy is so little understood, or so necessary to be known, if we would work metals; we can not ignore them if we would succeed, for they are the principal agents, not only during the fabrication of guns, but the effects must also be considered when we use them. We are not likely to avoid the difficulties in our way occurring through their agency in the fabrication of so large a mass of metal by chance; and of course less likely to avoid them also in utilizing the gun after it is made, as a blind man may blunder into a labyrinth, but he could not be expected to blunder in and out again.

AMES GUNS.

47. Mr. Ames made eight guns before he produced one sound one, and he informed us that he expended $90,000 to produce his first five 50-pounders. This is about the experience of every one making the effort, the cause of which is explained by the failure to comprehend that fissures occur at the time of fabrication from a cause that cannot be averted. I found them in all blocks of twelve inches in diameter and upwards, during my early efforts to produce large guns. Upon building up a large mass of forging, the last welds are the largest planes of weakness, (welds of all areas of surface being weaknesses). If all the welds are longitudinal, the fissures will be lengthwise of the block. If transverse, as in the Ames' gun, the fissures are most likely to occur around the bore. If the block is forged hollow, and partially cooled from the interior, the fissures will be in the centre of the mass, equidistant from the cooling surfaces (proportional to the rate in rapidity of cooling.) This statement will be appreciated best by practical founders, who well know that the surface of castings may be sound while the centre is porous. The Dahlgren gun, cast hollow, has its porosity in the center of the block. The Rodman gun, cast hollow, has an annular region of porosity, between the inner and outer surface, always located where the heat leaves the mass last, both in cast and wrought iron. The policy that only attempts to procure guns from those who do not know how to make them, will always result in ruin to the contractor, and disappointment to the government. No contractor can long continue to produce guns when receiving less than $25,000 for a lot of five guns that cost $90,000, as shown by an affidavit of Mr. Ames, and which is according to my experience.

48. Steamboat shafts, that are only examined on the outside, where they are always dense and perfect, may long continue to be produced and used, made in a faulty and uncertain manner, as all heavy forgings are of neces-

sity made; but to make a gun that is to be bored out, exposing more surface to critical examination, and to the searching test of powder, is of questionable propriety, to say the least. The effect of powder upon the best and most minute welds of even the best quality of wrought iron is shown in a marked manner by the evidence of Mr. Anderson, superintendent of the royal gun factory, for Armstrong guns, before the select ordnance committee of the English House of Commons, as follows:

49. Question 1676, by Sir Frederick Smith: Will you be kind enough to state to the committee how the failures take place when your guns are under proof?

50. From what I have already said, you will see the tendency is for us to wish for a hard metal, in order to avoid indentation; but the harder we get it, the greater is the liability for non-welding. The chances are, when the iron is hard, that some portion is unwelded, and then the powder acts upon that part of it, and very soon makes it appear worse, and renders it necessary to withdraw the interior of the gun, and put in another lining.

51. 1677. Will you explain to the committee how the unwelding can take place?

52. If you were to see the process performed, and to see it even in the turning lathe, you would think it was perfect; but the powder soon shakes it up, and shows the smallest defect.

53. 1680. In what part of the bore is the defect first seen?

Most in the vicinity of the bullet; the pressure of the gas indents the iron (see paragraphs 33, 34, 35, of this paper.) We always leave the bore a little smaller, so as to enable us to enlarge it to the proper size by boring out afterwards.

54. 1690. Do you consider that it is possible to find any iron capable of resisting a heavier charge than that which has been lately used in the 300-pound guns?

55. No; we could not get a better iron for gun material. We could get it harder (*i. e.*, with greater tensible strength), but still not better as a whole, at the present time, than what I have already stated.

56. It will be discovered by a careful study of the subject that this failure to comprehend the effect of heat upon the gun, when it is being fabricated, as well as when it is used, is the foundation of all the errors and misapprehensions connected with this intricate subject. If it were not for the unequal heating or cooling, the strongest and most rigid metal would make the strongest gun.

57. In England, as in this country, the fabrication of guns is intrusted to a class of men educated in college in the higher sciences, so far above the ordinary practical pursuits of life, that they have overlooked the real difficulty of the subject. They arrogate to themselves all knowledge on the subject they have in charge, and all the emoluments growing out of success. Hence practical men, who might have advanced the science of ordnance, have been deterred from giving attention to it. For myself, I find hearty corroboration of my views from the superintendents, foremen, and workmen in foundries, and have no doubt that I should get certificates from every skillful worker of metal on an extensive scale in the United States as to the correctness of my theories, and from each the relation of a

familiar example that would show that they understood the effects of heat upon metal as I have been so long endeavoring to illustrate them.

58. The pressure of powder is undoubtedly uniform, and it is a folly to attribute greater pressure to it at one time than another, unless such accidents occur as not ramming the shot home, when the straining effect on the gun is said by some to be greater, or by using heavier projectiles, to overcome the *vis inertia* of which requires more nearly the entire effort of the powder.

59. It is undoubtedly true that the pressure upon a square inch of surface of a chamber filled with powder of one size will be the same as upon a like size or area of surface of a larger chamber also filled, and cast-iron chambers have endured charges of powder from which there was no escape of the gases, as well as where the gases escaped slowly, as through a small vent, which is positive evidence that the full pressure of the gases of powder can be restrained by cast-iron walls, whether the chamber be filled or partly full.

A PRACTICAL EXAMPLE.

60. When the steamship Great Eastern was launched, Braham or hydraulic presses were used of ten-inch calibre, and with ten inches thickness of walls of cast-iron, consequently these presses had the usual proportion of thickness of walls in a ten-inch gun. Ten-inch guns have been fired with double-shotted charges without bursting. These press cylinders burst as often as five thousand pounds pressure to the inch was applied on the occasion alluded to.

ANOTHER EXAMPLE.

61. Major Wade and Major Hagner conducted experiments at Springfield armory, in which water pressure was applied at different points in the length of musket barrels. Twenty-five hundred pounds to the inch would permanently enlarge a musket barrel in the "thinnest part, near the muzzle, and five thousand pounds to the inch would permanently enlarge it in the strongest part," a result, says the report, never attained by the proof charges of powder and bullet. In these examples, five thousand pounds to the inch had a greater effect upon the barrels or cylinder, both of large and small sizes, and of wrought and cast iron, than the pressure of powder.

62. Having seen that initial strains from unequal cooling, are sufficient to rupture all kinds of guns, and that the pressure of powder is uniform under like circumstances, we must conclude that some other force besides the pressure of the powder, is the cause of bursting. It has been established in previous papers, and is undoubted, that guns are heated unequally by firing rapidly the very circumstances that attend the bursting. Then to what else shall we attribute the accidents.

POSITIVE EVIDENCE.

63. One of Blakely's first guns, as exhibited in diagram number 8, failed by the longitudinal extension of the inner tube, and the bands between the trunnion ring and the cascabel. The gun was strengthened longitudinally by four bolts, reaching from the trunnion ring to a cascabel piece against the breech of the gun.

64. Capt. Blakely says of this accident: "At this round the four bolts gave way—the four united being equal to a solid bar the size of the bore. The rest of the gun was uninjured. * * * I had this gun re-made with four bolts of the best charcoal iron, but they, too, broke without injury to the tubular part."—*Paper read by Capt. Blakely before the United Service Institution, England; vol. III, Journal.*

65. There is no way to account for this, except by the extension of the length of that part of the gun sustained by the bolts, by heat; if the pressure of the powder had broken the bolts, the whole breech would have been shot away. It is satisfactory to us in this manner to learn that in England they do not know the cause of the failure of guns; we may thus now far excel them, if we utilize the knowledge we have.

66. The inner tube of the Whitworth gun shown in General Gilmore's report, increased in length one inch (shown marked a b on cut 9), by the heat communicated to it, and closed the vent. If the bands had been fastened by screw-threads, as recommended by Prof. Treadwell and by General Gilmore, the bands would have parted transversely, as did the bolts of the Blakely gun.

67. There are two views of this gun in General Gilmore's book, a slight mark on the reinforce would lead us to suppose the reinforce had been cracked transversely. It is strange that the other view should be one of the opposite side of the gun, and that nothing should be said of the crack.

68. A three hundred pounder Armstrong gun, in which the breech piece was inserted by screw threads within the principal reinforce band abutting against the inner tube of steel, was burst by the lengthwise expansion of the inner tube, pushing out the whole breech, breaking the reinforce band transvertely (cut number 10.) Compare this example with the Whitworth gun shown in General Gilmore's report, and with those Parrotts that have failed at the breech (see cut eleven), and see the analogy.

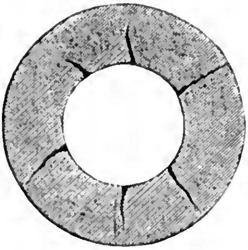
69. An Armstrong gun, a banded tube, failed by the breaking of the outside band. If the pressure of the powder had broken it the parts would have been thrown off with projectile force. (See cuts 12 and 13.)

70. Here we have five guns, exhibiting the effect of the expansion of the inner metal of guns by heat of the powder to the extent of rupturing them, and the most astute of our ordnance officers will find it difficult to account for the result in any other manner.

71. In the face of these well attested principles, so thoroughly known to practical founders, the Ordnance Bureau act on the erroneous idea that guns burst from the explosive force of the gases only, and give their attention in the fabrication to counteracting this supposed difficulty; hence the further they proceed in this direction, the wider they are from the mark.

72. They do not seem to know that the heat engendered from the burning gases of gunpowder has any effect upon the gun.

73. No little amount of surprise is expressed by inexpert persons that the acknowledged difficulty of making large guns is not overcome by using strong materials, as, for instance, wrought-iron or steel in the place of cast-iron. Ordnance officers excuse this discrepancy on the plea of the imposibility of perfectly welding large masses, and no other reason is given, and often speak of the "mysterious force" of gunpowder. Professor Tread-



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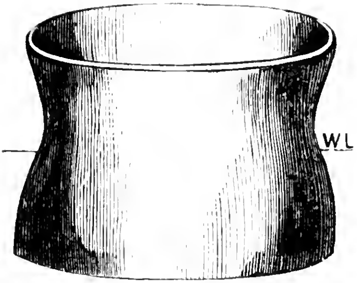
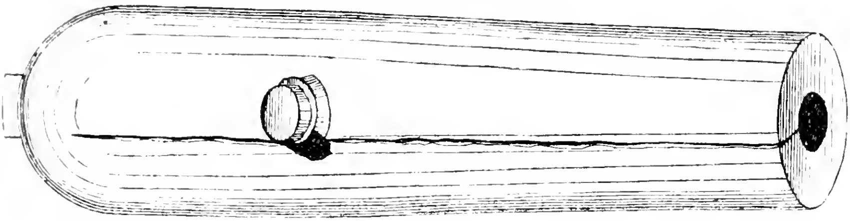


Wrought-iron cylinder after 20 heatings and coolings.



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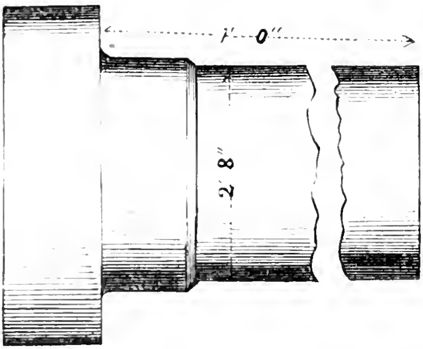

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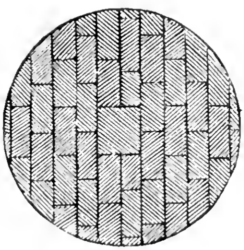

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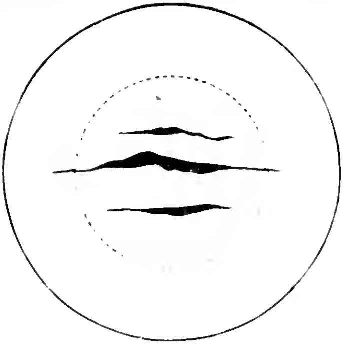

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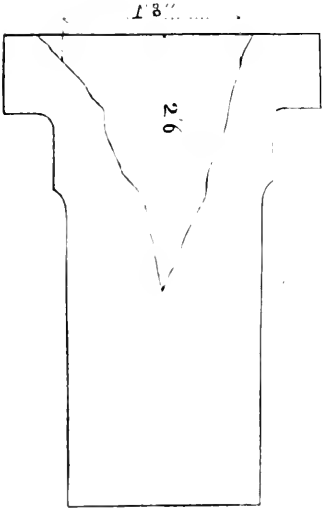

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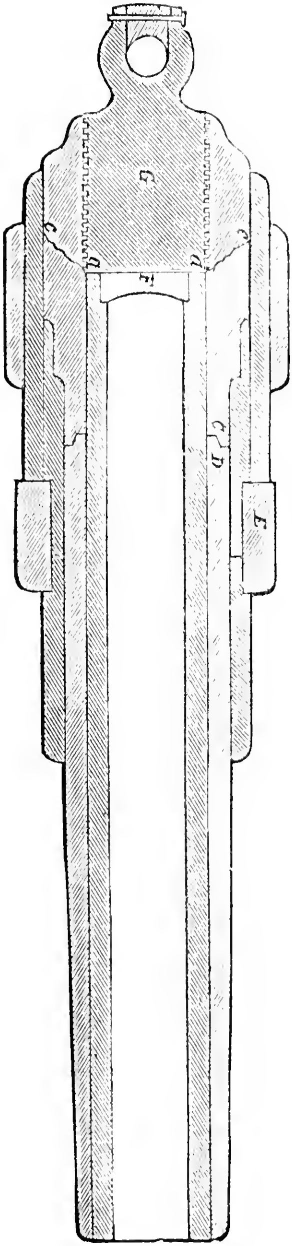

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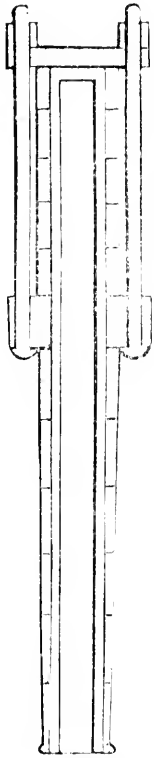
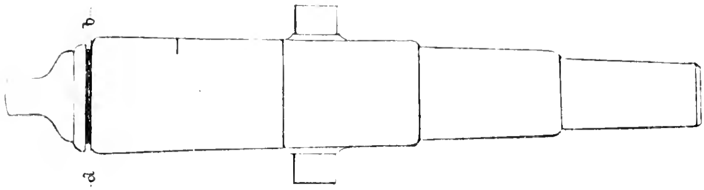
300-pounder Armstrong gun, breech pushed out by extension of inner tube





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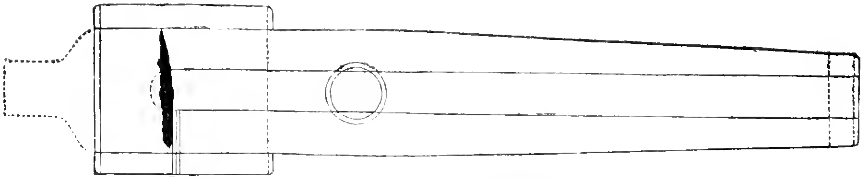

Parrott gun, breech forced out by extension of inner tube.

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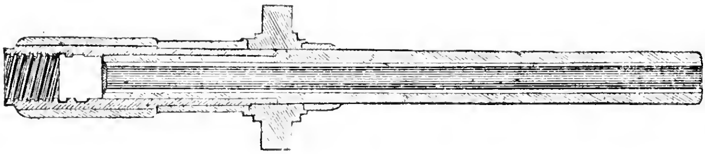

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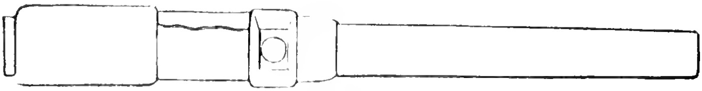

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well of Cambridge, Massachusetts, shows distinctly how large guns may be made of these strong materials, and triumphantly points out, by calculations which cannot be disproved, that the *pressure* of gunpowder can be resisted by guns made upon his plan, even upon the supposition that the pressure is enormous; and that there are no fissures or tendency to them, but the reverse state of initial tension; but his imitators, in carrying out his theory, have failed as others have done before; an evidence that the guns fail from some cause not understood, and other than the direct pressure of the powder. And hundreds of the heavy rifles of Admiral Dahlgren having been abandoned because of the liability to bursting; the large number of Parrott guns that have failed in service, and during proof; the spontaneous bursting of Rodman guns; the enlargement and fissures in solid forged guns; the mysterious and uncertain endurance of all built-up guns, by whoever made, either by bursting, distortion of the bands, or by enlargement of the inner tube, and stretching the bands if ductile, and breaking them if strong and hard; points to the absolute necessity that some new skill and class of ideas should be engaged upon the subject.

75. It is not a little gratification to American mechanics to believe that the state of the art in foreign countries has not kept pace with our own, notwithstanding the greater expenditure upon foreign ordnance, and that we have so clear a field, which we may enter, and distance all competitions, if we utilize the energy, genius, and skill of our artizans, not heretofore brought into requisition.

THE DAHLGREN GUN.

76. The Dahlgren gun is a shell gun, and is the most beautiful gun in any service in the world, but it is believed that more effective guns are now required for attack on iron-clad ships. The first Monitor was armed with guns of this class; and great reliance was placed on them in case that certain wrought iron solid projectiles, prepared for them, were to be used in any encounter with the Merrimac; but it is understood that the inventor forbade the use of the latter, even with the fifteen pound charge of powder. Lest his directions should not be obeyed, it is said that he caused them to be taken off the Monitor, while she was at anchor in Hampton Roads, and certain other hollow shots, covered with bronze, substituted. Shells broke against the sides of the Merrimac, inflicting no injury. Hence the Merrimac continued to be the terror to our army and navy for a long critical time. But for this we might have captured Richmond sooner than we did Yorktown; and who can conceive or estimate the cost of life or money that has resulted?

77. Other eleven-inch shells have been projected against iron sides without effect. We must have better guns than these to meet the requirements of modern naval warfare.

THE RODMAN GUN.

78. Next we have the Rodman fifteen-inch gun, cast hollow, and cooled from the interior, the object attained by which is to freeze the metal from its liquid state immediately surrounding the bore first. As the heat is nearly all withdrawn from the cast block through the surface of the bore, successive strata of the iron freeze and contract upon the stratum within

it, having the effect to contract or squeeze it into smaller dimensions, both longitudinally and radially. In this manner the state of "initial tension" is attained in the gun, which makes it capable of resisting a greater pressure from within, having a tendency to rupture the wall or enlarge the bore of the gun; the necessity for which tension has been beautifully described and illustrated by Professor Treadwell, of Harvard, and by Captain Blakely, R. A., England. Although the longitudinal tension might be considered advantageous in assisting to resist the lengthwise pressure of the powder against the bottom of the bore or chamber of the gun, there is another rupturing force to be provided for, viz: the unequal heating when it is fired; for then this force has the tendency that cannot be resisted by any amount of strength in the gun to increase both the longitudinal and radial extension, for the part even slightly heated becomes both longer and larger in diameter.

SPONTANEOUS EXPLOSION—LOSS TO THE FOUNDER.

79. The Rodman gun, as cast at the great Fort Pitt foundry, is strained in this manner to the extreme limit of the elasticity of the outside metal, and to the extreme limit of compressibility of the inside metal, which is proved by the fact that one of them was ruptured at the abovenamed foundry, from end to end, before it was removed from the mould in which it was cast; and the fissure, occurring through a wall of iron sixteen inches thickness and about sixteen feet in length, remained in the close contact along the bore, while it was gaping along the outside wide enough for the insertion of the fingers. Like St. Rupert's drops, these guns are liable to fly into pieces on slight occasions. How wonderful it is that any of them endure firing at all.

LOSS TO THE NATION.

80. If a tightly-fitting tompion happens to be placed in each of the large number of Rodman guns mounted in the forts of New York harbor, when for some time the weather has been warm, and then changes suddenly to extreme cold, it is quite possible a number of them may be found bursted. The tompion would protect the surface of the bore from the change of temperature, which would dangerously contract the outside upon the inner metal. We have never noticed whether these guns are furnished with tompion or not. If they are, we would advise that they be not used.

81. Guns with "initial tension" can withstand more *pressure* than without. Consequently, a single very heavy charge can be fired from these guns without bursting them, while rapid firing, such as practiced in battle, will burst them even with small charges. When these guns are proved, as well as in target practice, they are fired slowly. If we ever have to resist the entrance to our harbors of a fleet of iron-clads, each gun will have to be fired rapidly. What if they burst at that critical time? No fort or works on which these guns are mounted has ever been attacked. They have never been subjected to the test of actual battle, yet hundreds of them are being mounted on the works at the entrances to our most important sea-port, and we rest in fancied security because they look formidable.

82. Of those mounted in our turret-ships, we believe eight were in the

encounter with Fort Fisher, and two of the eight burst under the most rapid firing they have yet been subjected to. The navy-charge for these guns is thirty-five pounds of powder, with a shell of three hundred and fifty pounds, or a shot of four hundred and fifty pounds, which is a very small charge, and usually they are fired once in fifteen minutes. The velocity of the shot is so low that the effect is not what was promised or expected of them. Of the only two shots we know to have hit the sides of an iron-clad, one struck the pilot-house of the Atlanta, and one struck the Tennessee, but neither accomplished much.

PARROTT GUNS.

83. Twenty-three large Parrott guns burst on Morris Island in 1863, under General Gilmore, yet this alarming failure has not hindered the continuance of their supply. Before that time six had burst in the navy, beside a great number that were disabled, and in 1864 about thirty-three have burst in the navy, of which eighteen failed in Admiral Porter's fleet; perhaps there were more, for the admiral reported that all the rifled guns in the fleet had burst. At the time of the encounter with the iron-clad Albermarle, it was reported that one hundred-pound Parrotts were useless against plating with ten pounds of powder. Now it is proposed to reduce the charge to eight pounds, which must vastly diminish their value.

84. The Parrott gun embodies "initial tension" also under the band. When fired rapidly the inner metal is expanded lengthwise and radially; when so strained a slight shock will break it. The rapid firing off Fort Fisher was too much for them.

85. On Morris Island, the guns were fired mostly at high elevations; under such circumstances the pressure and temperature of the gases is higher, and the time of the action of the force and heat is longer for each discharge; consequently less rapid firing bursts the gun.

86. The thirty-pounder that endured four thousand six hundred rounds was a small gun, and was heated more nearly uniform throughout because of the thinness of the walls, and because of the long intervals between the rounds, which was fifteen minutes.

ARMSTRONG AND WHITWORTH GUNS.

87. Built up guns, like the Armstrong or Whitworth guns, although capable of enduring heavy charges, fail with rapid firing; not always by an explosive bursting, but by ruptures or enlargements that disable the guns. More than 1,400 Armstrong guns or parts were returned for repairs up to 1862, at which time but about 2,000 guns of this kind had been fabricated.

AMES GUNS.

88. Guns forged solid, like the two guns on the United States steamer Princeton, and the Ericsson thirteen-inch gun burst because it is impossible to attain uniformity of fabrication, and because of the unequal expansion. The Ames gun, although somewhat more uniform, cannot be absolutely so, and will either burst or enlarge in the bore.

89. Of wrought-iron guns that at present are most conspicuous is that of Mr. Ames. He claims three qualities for his guns. First, that it is made of a superior, strong and tough, or ductile iron, the Salisbury;

secondly, that it is homogenous ; and thirdly, that it has fibre transverse around it, in the direction best disposed to resist the pressure of the powder. It is made by welding disks or cross sections together by end blows of the steam hammer. Guns were made in this manner as long ago as the year 1716, by M. Villons, of Porte de Marle, France, but they failed, and the process was abandoned. With regard to the iron it is not as good as the iron used by Armstrong for his large guns; the quality of toughness or ductility is the one sought for by English gunmakers, and undoubtedly obtained. But the Armstrong 110-pounder will endure but about forty rounds before it has to be repaired if fired rapidly, from the distension caused by unequal heating, although the same gun will stand very heavy charges without injury, if fired at long intervals so that the heat becomes uniformly distributed.

90. The Salisbury iron used by Ames cannot compare with Krupp's steel for ductility, a cylinder of which four inches in length and two in diameter was pressed down cold in a hydraulic press to a lozenge of half of its original length, without cracking in the slightest degree. Its tensile strength is much greater than the Salisbury iron, yet guns made of this fine Krupp's steel burst when fired rapidly, but do not explode from excessive charges of powder.

91. In large masses of wrought-iron, as in cast-iron, the strongest metal does not make the strongest gun, as seen from the quotation already made from Rodman's work, pages 137 and 138. The reasons being from want of uniformity in cooling; one part of the mass is straining either to compress or rupture another part. And the more dense the metal the more severe the strain.

92. Fibre in wrought-iron is only possible, or is only attainable by extending a block or bloom to from ten to sixty times its original length, under pressure as between rolls. If a bloom four inches by four inches, and twelve inches long were heated to a welding heat, and by the rolling process drawn out into a half-inch square bar, it would be near sixty feet in length, and would exhibit well defined fibre. If sufficient quantity of such bars were provided, cut into lengths of five feet each, and, after being polished on the surface to remove all oxide, made into a pile eighteen inches square, being five feet long, for which it would require 1,296 bars, held together with a strong band shrunk on each end ; upon raising the temperature of the pile to a welding heat, in a most careful manner, it would be found firmly united throughout, without a defective weld, without either hammering or pressure, but upon breaking the block so made in two, it will be found to have no fibre.

93. A new crystalization having taken place, under a law not well understood, regulated by the size of the mass and the outside form, fibre could be re-established in this metal only by rolling it out again to fifty or sixty times its original length. Fibre could not be established under the hammer without extending its length at least twice as much as with rolls.

94. As this is an experiment I have conducted many times, I speak of the facts with confidence. I have now twelve wrought-iron guns made in this manner, from bars a half-inch square, each block having been extended under the hammer, continuing the square form (*i. e.* without rounding the

block, the central fissures are usually attributed erroneously to rounding the block,) to twice its length in the large pile, yet there is no fibre; in fact, the crystalization closely resembles the crystalization in other masses of the same material, made up in the ordinary manner by welding the original blooms, from which the small bars were made and massed together.

95. The only advantage got by this laborious process is in being assured of more perfect homogeneity, there being no extensive planes of weakness. I have also noticed very little difference in the transverse or longitudinal tensile strength, except at the centre, subjected to the cooling strains that promote fissures, which can be partially avoided by extremely slow cooling, but by leaving the whole mass porous.

96. Having thus shown the fallacy of adhering to the present received systems, and the difficulties attending the fabrication of large wrought-iron guns, I will now show how I have endeavored, as a first effort, upon an entire new system, to make a gun not liable to failure from any of the foregoing causes, and will give the description as found in Holley's Work on Ordnance, page 327.

THE WIARD GUN AS DESCRIBED IN HOLLEY'S WORK.

97. Mr. Wiard's Plan.—Mr. Norman Wiard, whose ingenious and important speculations on the bursting of guns by the heat of firing have been referred to in the foregoing chapter, has received a large order for heavy cannon, based upon the endurance of either one of two test guns. The engravings, to be found in the Transactions of the American Institute for 1862, on pages 430, 431, illustrate the general features of his plan, but not the exact proportions; these are the subject of extended experiments and calculations not yet perfected.

98. The gun is said to have the same diameter and length of bore as the navy 15-inch gun, and about nine inches greater external diameter, and is to weigh 43,000 pounds. The interior parts may be cooled uniformly by water passing through the cores between the ribs, and in the bore, upon Captain Rodman's plan. The exterior part or reinforce being thicker than the other parts, will cool last after casting, and is by this means intended to compress the barrel with such force as to bring all parts of the metal into equal strain at the instant of firing, according to Professor Barlow's formula. The ribs are curved in both directions, from front to rear, and from the inner barrel to the outer hoop or reinforce, so that they can spring enough to allow the inner barrel to expand both longitudinally, and the intention is, radially, by the heat of firing, without straining the structure. The ribs also yield, during the process of casting, under unequal contraction, due either to unequal cooling, or to chemical difference in the metal. They are proposed to be stiff enough to resist the pressure of the powder, and sufficiently flexible to bend under the greater force of expansion, a force limited only by the ultimate strength of the metal. The elasticity of the whole structure would be greater than that of guns without ribs.

99. This gun will undoubtedly cool without serious initial rupturing strains. The whole practice in founding, especially in founding car-wheels, (which a cross-section of the gun resembles,) warrants this conclusion. A plain disk wheel, not annealed, can only be stretched or compressed,

and so broken or greatly strained in cooling, and therefore goes to pieces under service. A gun, when so corrugated as to bend in cooling at some thin part intended to be bent, instead of breaking or being severely strained at some part that cannot be bent, endures more hard service than would be ordinarily expected of cast iron.

100. For the foregoing reasons the strongest iron may be employed. It has already been shown that a pure, high iron, of great tenacity, shrinks too much to make a safe casting by other plans. But car-wheels are cast as sound from the highest and strongest iron as from a weaker iron, because ample provision is made for it to change its figure more or less, as required, without strain.

101. Upon the proper tension and strength of the reinforce as modified by its large diameter, the heat of firing, and the elasticity of the parts within it, depends, after all, the chief strength of the gun.

102. Comparing the reinforce with an equal thickness of metal on the exterior of Captain Rodman's gun, the former is cooled on all sides to prevent, as far as possible, unequal shrinkage, and is carried in two directions to prevent unequal and injurious strain due to what unequal shrinkage there may be. The latter is cooled (in practice) only from the inside, so that its exterior surface is strained and weakened. It appears, then, that the former would be in a better condition to stand the tension, in which case too the tension can be the better regulated.

103. The official report, already quoted (376), is evidence that the outer part of the Rodman gun is drawn into compression by the subsequent shrinkage of the intermediate metal. It can not be put into the desired tension except by cooling the gun exclusively from within; and this can only be done by keeping the mould at a temperature of 2,700 degrees—a process so difficult that it has not been realized in practice. But there is nothing to draw the corresponding part of the Wiard gun—the reinforce—into compression. All the parts enclosed by it have already cooled and set.

104. In other words, the part that cools last regulates the strain of the rest. The interior and the exterior parts of the walls of the Rodman gun cool independently, and without any great strain; then the intermediate metal cools and puts strains into them which are just opposite to those required. But the reinforce of the Wiard gun cools last, and if it shrinks most, must compress the inner tube, and be itself drawn into tension—the required condition.

105. As to the strain due to expansion by the heat of firing, suppose the reinforce and the barrel to be put under such respective initial tension and compression that the force of the powder would strain them equally and as much as they would safely be in service. If the ribs yield under the pressure of the powder, the barrel may be stretched to the breaking point before the reinforce is stretched to the same point. If the ribs do not yield under the pressure of the powder, then they will not yield under an equal pressure from the expansion of the barrel by heat, up to a pressure equal to the pressure of the powder, will act directly to stretch the reinforce, which had already been stretched as much as it will bear. Up to

this point the case is similar to that of a solid gun; beyond a pressure equal to that of the powder, the ribs may yield to the pressure by heat without straining the reinforce as much as it would be strained in a solid gun.

106. But the barrel will not be heated as much as the corresponding part of a solid gun, because it is exposed to the air on both sides, and presents a large radiating surface. Besides, the longitudinal expansion of the barrel is the source of the greatest strain, and this, in the Wiard gun, is provided for by the longitudinal corrugation of the ribs.

107. The largest diameter of the reinforce is not a source of comparative weakness.

108. On the whole, it is probable that the barrel and ribs of Mr. Wiard's gun can be cast without serious strains; that the reinforce can be shrunk upon them with some degree of tension; that the strongest iron can be used; and that the guns will not be seriously strained by heat. The failure of the first guns, if they should fail, ought to be attributed to the improper carrying out of the principles; for the present knowledge on the subject of cast iron, however imperfect it may be, define these principles with much clearness."

109. The experience I have attained in the efforts to produce these large guns gives me confidence now to state that I can make cast iron guns that will not enlarge in the bore except as they are worn out by long continued use, and that cannot be burst either by heavy charges or rapid firing. And I can make or re-make such guns from old guns or from the fragments of old ones, thus reducing the cost materially, while the efficiency is much increased.

110. The Dahlgren gun, of eight tons weight, requires sixteen tons, or more, of iron to produce it, because more than one-half of the iron is wasted by being cut away into chips of little value.

111. It is proved by the preceding argument that Rodman or Dahlgren cast iron guns can not be made of the strongest iron, consequently such guns can not be made from fragments of bursted or rejected guns (for iron is improved by re-melting.) Upon my system the strongest iron will make the strongest and best gun.

112. Upon my system the walls may be made equally strong with any other by thickness; I can have the proper initial tension upon it to restrain the pressure of the powder, and no other detrimental strain, which is not possible in any other gun ever proposed ; while I provide the necessary elasticity both longitudinally and radially to prevent the unequal expansion from the heat of firing. In fact, I am confident I have discovered the true and only system upon which guns can be made to endure the strains of actual service, and I charge the Ordnance department with having practiced a studied system of oppression to prevent me succeeding in getting my guns introduced, resulting in incalculable loss of money, life and prestige to the government under which they occupy sinecure positions.

113. I append hereto an extract from a letter from Ed. N. Dickenson, Esq., of New York, and take the liberty to state that I can procure such or stronger letters corroborative of the theories and statements affecting the

endurance of guns and the effect of heat upon metals from seven-eighths of the eminent practical mechanics of the country.

"I believe your views to be entirely correct on the subject of bursting of guns.

I was much struck by the coincidence of the result at Fort Fisher with your prophecy to me that the 15-inch guns would burst whenever fired rapidly. Of course I knew the Parrott guns would, and I always have given them a wide berth when fired in my presence. They are liable to burst at short notice.

In ordinary machinery we have illustrations of your theory on guns, by the spontaneous bursting of wheels and other castings.

I believe your large skeleton gun will be successful in preventing these accidents."

In the course of the debate which followed this paper, Mr. Wiard gave the following interesting account of the effects of unequal strain:

Explosion of a Pile Hammer.

"Some years since I cast a pile hammer weighing four tons. The man for whom it was cast arrived at my place just after the mold was filled, and wanted to take the hammer away that night. I told him that was impossible. He was in a great hurry, and arranged with two of the men to sit up with him all night to draw the sand away from the casting as it hardened, in order to cool it as rapidly as possible. The next day we hoisted it out and got it upon the deck of a canal boat, the deck being protected from the heat by two layers of brick. The man started off with his hammer, but before night he came back and ordered another one cast. It seems that the heat remaining in the casting set fire to the deck, and in throwing water on the fire a little fell upon the hammer; seeing that this hastened the cooling, the owner threw on more, when the casting burst with a report that was heard two miles. One half flew forward, killing a horse, and the other went towards the stern, falling through the bottom, and sinking the boat."

Bursting of a Large Plate.

"In making the mold for my large cannon we cast a circular plate ten feet in diameter, and three inches thick. To hasten the cooling we removed the cope from the mold, when the large surface of hot iron made the shop intolerably warm. To diminish the heat, the foreman threw sand upon the plate around the edge, leaving the middle uncovered. This caused the middle to harden first, and the outside, cooling afterwards, was, of course, drawn by its contraction into a state of tension upon the interior mass.

"We had been at work upon this plate several days, drilling a series of holes through it near the edge, and had it on a drill press over a pit which communicated by a trench with the outer air. A very warm blast of wind passed over Trenton, and the next morning when I went to the shop the watchman said that the shop had been struck by lightning in the night. I went in and saw that the great plate had burst in two halves, one crashing inward among the machinery, and the other flying outward and falling into a pile of valuable castings.

"I suppose that the current of warm air had struck against the center of the plate, slightly expanding it, and thus increasing the tension of the rim sufficiently to overcome the tenacity of the metal. This diagram exhibits the form of the crack. When the pieces are in contact in the center they are considerably separated at the edges."

Effect of Cast Iron on Wrought Iron.

In the course of his remarks, Mr. Wiard said: "It is well known that a half-inch rod of the most fibrous iron, by being dipped endwise into a vessel of molten cast iron, has its fiber entirely destroyed, while if it is dipped in sideways the fiber is not injured."

Defects of Solid Wrought Iron Guns.

"The contraction of the metal in cooling offers an insurmountable obstacle to the construction of cannon of large caliber by the process of forging solid. As the outside cools and hardens first it forms an unyielding hoop, and when the interior cools and shrinks it must be pulled asunder, forming fissures. These fissures are generally formed at the welds. Where the welds are across the piece, as in the Ames gun, the fissures will run around the bore. I saw in Washington the wax mold of the bore of the Ames gun taken before it had ever been fired, and the grooves around the bore were as large as my finger."

Hardening Wrought with Cast Iron.

Dr. Parmelee remarked that wrought iron may be case-hardened by dipping it in molten cast iron. Horse shoes are hardened in this way in large quantities.

Musical Instruments.

In discussing this subject some interesting facts were stated by Mr. Maynard regarding improvements in the brass instruments used in military bands. The Chairman having stated that the so-called saxe-horn was first made and used in this country—the peculiarity of that class of instruments being the construction of the rotary valve, invented by Robert Kerrison, of New York city, by means of which the passage of the air is lengthened or diminished, Mr. Maynard said that Mr. Allen Dodworth, of this city, first turned the mouth or flaring end of the horn backward, so that the sound would be heard more distinctly by the soldiers who followed.

The following statements were made regarding

THE CYCLOID PIANOFORTE.

There is no article of home luxury to the improvement of which such earnest attention and such costly experiments have been directed as to the pianoforte. During the past twenty years great changes have taken place in the internal construction of the instrument, especially as regards the scale, which has been enlarged so as to admit of a greater length of string. The instrument is now strung with heavier wire, an increase of nearly double over the old style of stringing; the case is also, generally, larger both in depth and length. It would be useless to chronicle the thousand small inventions which were claimed positive improvements upon the piano, but which were radically of but little importance. Sound boards have been crumpled up on the plea that increased vibratory surface was obtained; plates have been insulated and completely detached; bottoms have been taken out, a second sound board has been added; hammers have been made to strike downward; the case has been half filled with blocks of wood, and again the case has been left entirely empty; the oblique strain of the strings is claimed to have been remedied; iron has been substituted for wood for the cases; the key-board has been arranged with a semi-circular sweep; tuning forks, or metallic tongues, have been substituted for strings; but none of these infinitesimal inventions have succeeded in establishing their claims as permanent improvements. The improvements which have really been accomplished in the past twenty years are: First, the enlargement of the scale; second, the increased length of the string; third, the heavier stringing; fourth, the increased area of the sounding board; fifth, the increased power of the action and heavier hammers; sixth, the scientific adaptation of the iron plate, combining the utmost possible strength with lightness, and seventh, the system of over-strings in the bass.

These accepted and permanent improvements are now adopted by every maker, and the superiority of any one instrument is dependent upon fortuitous circumstances, such as the best seasoned material, the most skillful artisans in the various departments, and the amount of honest care bestowed upon the manufacture. The belief that the best instruments (we speak, of course, of square and upright pianofortes) can only be made by the largest manufacturers, is a popular fallacy that should be exploded. There are many small makers in this city, whose instruments are eminently beautiful and whose work is faithful and sterling in every respect. There is another fallacy which is rapidly exploding itself, namely, the value of professional testimonials. So long as professional players and teachers, whether for a consideration or not is a point between themselves and the manufacturers, gave their testimonials, or written opinions, to all good makers, they were of value to each according to his use of means to advertise the facts to the world; but as soon as certain players and teachers bind themselves to certain houses, and declare that what they have testified to for other houses before is all fol-de-rol, or a tissue of no-such-things, their so called testimonials become of less value than the paper on which they are written, and their motives are left open to very grave suspicion. The public begins to understand the value of testimonials! Good wine, they say, "needs no bush," neither does a good piano need testimonials from professional gentlemen, four-fifths of whom are profoundly ignorant of the construction of the instrument, or of what constitutes its real merits.

The cycloid piano, made and patented by Lindeman & Sons, of this city, presents a radical change in the form of the piano, and while adopting all the improvements which have resulted from past experience, exhibits a novelty in construction which adds a value to all that has gone before, and presents increased advantages of such importance that they cannot be overlooked. The form of the cycloid may be described as a square piano, with the back corners rounded off. The sweep is very graceful, and the ugly square box is transformed into an elegant piece of furniture, beautifully finished all round, forming an ornament to the parlor, and taking up much less space than the ordinary square piano.

The object designed to be obtained by this change of form is elegance, compactness and strength. In the square piano the sides and back are glued together, and to strengthen these weak points heavy blocks of wood are inserted so that the whole space of the two back corners is utterly useless for reverberating purposes. They are simply wasted wood, and are only valuable inasmuch as the blocking they contain strengthens the inherent weakness of the square case.

The cycloid piano achieves the form of the arch, which is recognized as the type of strength, and is in fact a solid case, in one piece, with no weak spot about it. By the system of constructing the case, more strength is obtained than could be got from a solid block, either cut out, or bent to the cycloid form. The case in fact consists of from twenty-four to twenty-six veneers, one-fourth of an inch thick, of maplewood, glued together; these are placed in a press of the cycloid form to which are affixed screws of great power. This force is applied equally to every part, which forces out the superfluous glue, and, when cold, these veneers come out a solid mass, having the required cycloid form, with all the strength of an arch, and capable of sustaining any strain of strings that can be applied to it, without "giving" a hair's breadth. The scale of the instrument follows the circle of the case, so that not an inch of space is lost; and there is not an angle in the interior to break the continuous flow of the sound. The theory of acoustics in its general laws, as laid down by Chladni and others, may be looked upon as exact and thorough, but individual cases seem to defy all rule and set the most well considered theories at defiance. Whether the cycloid form or the square form is the better in theory is a point for savans to decide upon, but the result of the two forms is palpable to every ear, learned or unlearned. The tone of the cycloid is as solid as that of a grand pianoforte; it is not merely loudness, which is always liable to impure and loose vibrations, but it is the largest amount of sonority, with the greatest purity in quality of tone. A powerful player can use it as he would a grand, and he cannot break the tone; he cannot thin it or confuse it by forced diverging vibrations. Gottschalk tested it in every way to the utmost, and acknowledged that it triumphed over the test that he had applied.

After further remarks relating to various musical instruments by several members, the subject of "Tanning" was selected for the next discussion.

Adjourned.

AMERICAN INSTITUTE POLYTECHNIC ASSOCIATION,
March 30, 1865.

Prof. Samuel D. Tillman in the chair. Benjamin Garvey, secretary.

STARTING RAILROAD CARS.

Mr. Lawton exhibited a model of his plan for assisting horses to start cars. The most severe labor and consequent injury to horses on railroads arises from the violent straining in their efforts to start a heavily loaded car, particularly on an up grade. This plan consists of a ratchet-wheel fixed on the center of the axle, into which a lever having a short and long arm catches when the car is stopped. On starting again, the horses pull on the long arm of the lever, which turns the wheels a short distance, just enough to give the car a start. The contrivance is simple, and acts on well known mechanical principles.

The chairman read the following items of scientific news:

INFLUENCE OF SOILS IN THE PRODUCTION OF AMMONIA FROM AIR AND WATER.

M. Decharme, of France, in order to determine whether arable soil under ordinary conditions is capable, simply by virtue of its porosity and the influence of humidity, of transforming part of the atmospheric nitrogen which penetrates and traverses it, into ammonia or ammoniacal salts, made the following among other experiments:

He passed 200 litres of air (at the rate of ten litres per hour) freed from its natural ammonia, over 250 grammes of ordinary vegetable earth previously calcined and washed or estimated relatively as to its total of nitrogen, then restored to its usual state of humidity, and raised progressively from 10° to about 50° C. He found that part of the nitrogen of this air had been transformed into ammonia, into carbonate and nitrate of ammonia. The total amount of ammonia produced by what is distinguished as the catalytic force of the earth used, averaged 0 139 gr. A small amount, but relatively large when comparing the ammonia of the atmosphere to that in rain water. The result explains the good effect of airy drainage, plowing and fallowing; the formation of nitrates in the soil; cultivation without manure, and the presence of nitrogen in plants growing in artificial soil, deprived of nitrogenized matter and watered with pure water. It also shows how natural causes, winds, rains, temperature and pressure of the air, assist in bringing about more rapidly the contact of air and soil which results in the production of ammonia.

SLOW OXIDATION.

Schonbein has lately given to the public new facts in proof of the existence of oxygen in two opposite states of chemical polarity, and that in cases of slow oxidation the ozonized atom and the antozonized atom act simultaneously. For instance; in the slow oxidation of lead the oxygen is halved and as much is taken up by the metal as by the water. He finds the best amalgam to employ in order to get the greatest amount of the peroxide of hydrogen is composed of 200 parts of mercury to one part of lead. Rich amalgams give too little of the peroxide. The water used should contain one five-hundredth part of sulphuric acid. 100 grammes of this should be shaken with 200 grammes of the amalgam and pure oxygen in a flask holding two litres. It is impossible to obtain a full equivalent of peroxide of hydrogen for the sulphate of lead formed, but it will be found that when the shaking lasts ten seconds the amount will be sensibly nearer the theoretical quantity. The peroxide is not found in the water in the presence of coal dust or spongy platinum, owing to their decomposing action. He has observed lately that there are many bodies in the animal and vegetable kingdoms which like platinum, coal and blood corpuscles, have the power of destroying the peroxide of hydrogen. No peroxide is formed in the blood after respiration, nor is it shown in the slow oxidation of organic matters, but it does not follow that none has been formed. These opposite conditions of oxygen play an important part in oxidations of ordinary oxygen at common temperatures; and particularly in the decomposition of organic matter and the respiration of animals, in comparison with which all other oxidations which take place on the earth are insignificant.

Thermo-electric Batteries.

Bunsen has constructed thermo-electric piles of kupferkies and an alloy of two parts of antimony with one of tin, which are ten times more powerful than the bismuth and antimony series—he also finds that the mineral pyrolusite is superior to bismuth, although inferior to kupferkies. When the pile is to be subjected to high heat copper is substituted for the antimony and tin alloy. Ten pairs of the kupferkies-copper elements are equal to a Daniel's battery, having fourteen square centimeters of copper surface. Pyrolusite and platinum have the one-tenth the electro-motive force of Daniel's battery. Pyrolusite is chiefly composed of binoxide of manganese. Kupferkies is copper pyrites containing one atom of copper, one of iron, and four of sulphur. It is easily fused at a high temperature and thus loses much of its power. In a thermo-electric series the native mineral must be used. It is found in Massachusetts, Connecticut, New Hampshire, New York, Virginia, Michigan, and in large quantites in Wisconsin.

Aluminium.

Mr. Corbéllé's process for extracting this metal from clay consists in first purifying it from foreign matter, then drying it, and treating it with an acid to remove the iron. About six times its weight of sulphuric acid will answer for this purpose. The clay which has settled is then dried, and mixed with twice its weight of prussiate of potash; the quantity of the latter being increased or diminished according to the amount of silica in the clay. To this mixture, one and a half times the weight of the clay is added of common salt; the mixture is then placed in a crucible and subjected to a white heat. After cooling the aluminum will be found in the bottom of the crucible.

Prof. Joy stated that he had tried this process in the laboratory.

Thallic Alcohols.

Lamy has described the compounds formed by substituting the metal thallium for one atom of hydrogen in wood spirit, common alcohol and potato-oil, or amylic alcohol. The first, methyl-thallic alcohol is a crystalline solid. The second, ethyl-thallic; and the third, amyl-thallic alcohols; are oily, colorless liquids, which are decomposed on boiling.

The Grape Vine Disease.

Drs. Desmartis and Bouché de Vitray of Bordeaux, have published a brochuré, in which they announce the startling fact that the vine disease is inoculable into the human system. There is nothing improbable in this should it ultimately prove true, and it may result in the abandonment of the grape culture in many parts of Europe, with a corresponding increase of the vine on this continent. It has long been supposed that intractable skin diseases are of the nature of parasitic plants. Nothing in the advance of natural science to which the microscope has mainly contributed, is more remarkable than the knowledge of the nature and strange transformations of external parasites and internal ones or entozöa. The latter in the human subject have been traced to animal food, and were doubtless carried into the animal through their drink and food. These investigations regarding parasitic life are becoming of paramount importance.

Thermo-electric Piles.

In consequence of the announcement of this subject by Bunsen, M. E. Becquerel has presented a paper before the French Academy of Science, in which he states that his father, as early as 1827, made the discovery that copper wire covered with sulphur, was strongly positive in relation to ordinary copper, and in consequence constructed a pile of two copper wires—one covered with sulphur, and the other not—which, at from 200° to 300°, developed a force capable of effecting chemical decompositions. He proceeded to state that sulphur profoundly modifies the electric properties of all metals rendering the positive more positive, and the negative more negative. A mixture of sulphur and bismuth which can be easily melted together, for example, is strongly negative to bismuth itself. A couple formed of sulphured bismuth and copper gives three times the electric force of the ordinary bismuth-copper couple. Protosulphide of copper, under certain molecular conditions, is eminently positive in relation to other mineral and metalic substances; and the author has constructed a pile composed of ten cylindrical bars of this substance, ten centimeters long and one in diameter, with copper wire rolled around each extremity with which when raised to 300 deg. or 400 deg. of heat, he is enabled to decompose a solution of sulphate of copper, and work a telegraph. He is still engaged in experiments in this direction.

Fermentation.

M. Menard has introduced a new method of fermenting grape juice, consequent on observing that by exposing a very large surface of liquid in the vats, some of the alcohol and much of the bouquet was lost. He, therefore, allows the fermentation to take place in a close covered vessel, and carries the gases and volatile matters evolved through a cooled washing apparatus, which detains the last. The wine thus made has a superior flavor, and contains one per cent more alcohol.

The Art of Tanning.

Mr. Thomas Small opened the discussion on this subject by some general statements regarding the importance of the art. The processes used have not generally kept pace with scientific knowledge, relating to the chemical re-actions employed to produce leather. In England, and in some parts of this country, the same methods have been used for the last fifty years. Col. Edwards was the first to introduce the mode of pumping and heating the liquid extract of the bark. This increases the action, but heat above the boiling point, injures the leather. Within my own time the plan of obtaining the extract of hemlock bark and transporting it to this city and applying it to hides, was thoroughly tried. It did not make good leather, and was not economical, because the dry hide increases in weight when turned into leather, and it is cheaper to take the hides to the neighborhood of the hemlock forests and return them to the city, than to bring the bark to the city, or to subject it to the process of boiling down in the forest, and bringing it in barrels to New York. It requires about 2,000 pounds of bark to tan 170 pounds of leather.

Some six or eight years ago, a gentleman by the name of Steel, came from the West to this city, with an idea that in the ordinary mode of leaching, there was a certain amount of tannin still left in the bark. He took the spent bark that used to be thrown away, and extracted from it some fourteen degrees by the barkometer, of extra strength. This result was so extraordinary that no leather manufacturer would believe it. About a year and a half ago, Mr. Pinkney took up the matter of using spent bark. He made a tank with a false bottom in it, in which he placed the hides, and poured the hot liquor down on them, and produced very astonishing results. By the process of Edwards, however, the best results have been obtained. One hundred and ninety pounds of leather are made from ninety pounds of hide. The average of Buenos Ayres leather will make for every one hundred pounds, one hundred and eighty pounds of leather. The leather trade in this country, particularly the sole leather, is as good as any made in the world, and although we make more leather than any other nation, still we import considerable. Sole leather can be tanned in three months, but a longer time is considered advantageous. The amount of hemlock bark is decreasing rapidly by the cutting down of forests, and it is an interesting question whether the spent bark can be used over economically. A patent obtained for it has been sold for twenty-five thousand dollars, and the process is said to be profitable.

About 10,000,000 of sides of leather, weighing 180,000,000 pounds are annually made in the city of New York. It may be interesting to know that this city buys more hides and sells more leather than the cities of London, Liverpool and Paris together. Hemlock bark is principally used in this country, the trees from about 70,000 acres of land are cut every year to supply this demand. As the hemlock does not grow again on the same land, it becomes important to know from what quarter this supply is to come in the future. Hemlock bark is limited to the States of New York, Pennsylvania, Maine, Michigan, Wisconsin and Iowa. The hemlock forests in these States are estimated together at about 200 miles square. In 40 miles square there are 1,024,000 acres. Allowing for the annual increase required, it is safe to say the hemlock forests will all be consumed within two hundred years. The object of the speaker was to direct attention to the importance of introducing economies in the use of bark, and of finding substitutes for it which can be used with success.

The Chairman remarked that tanning embraced essentially two operations: 1st, the preparation of the skin; 2d, the application of tannin to it. The oldest and most common method of removing the hair from the skin is to place it in a vat containing a solution of lime, and to let it remain until the epidermis or cuticle of the skin is so softened and loosened that it and the hair can be removed very readily. The sulphide of calcium has also been used to effect this object. But the process adopted in the great tanneries of America is to hang the skins in a long, close room, where the air is very moist, and kept between 44 and 56 deg. Fah. This low temperature is maintained by allowing a stream of cold water, usually spring water at about 50° Fah., to pass around the ceiling of the room, and at certain points to be let out in fine jets, which have the effect of cooling the air below the temperature of the water. At the expiration of about one week the hair is loosened. By this method less of the skin is lost in the removal of the hair, and it is said hides unhaired in this way make from twenty to thirty per cent. more leather than where the liming process is used. The object of the tanner being to increase the weight of the manufactured article, which is sold by the pound, "the sweating process," as it is called, is certainly more profitable, but whether the leather thus made is more valuable than that carried through the liming process, is not yet determined.

The application of the tanning liquor or ooze extracted from oak, hemlock, or other bark containing tannin, results in a chemical combination of the tannin with the gelatin of the skin. Tannin is composed of 54 equivalents of carbon, 22 of hydrogen, and 34 of oxygen. Gelatin is composed of 12 equivalents of carbon, 10 of hydrogen, 4 of oxygen and 2 of nitrogen. It does not exist in a free state but can be extracted from skin by means of boiling water. Gelatin swells up in cold water, may be dissolved by hot water, but is insoluble in alcohol and ether.

When the gelatin of the skin has combined with the tannic, or rather gallo-tannic acid contained in the ooze, the process of tanning is completed, and the product is leather. As it is interesting to know the relative value of barks and vegetable products containing tannin, the following table is presented, giving the percentage found in each substance mentioned:

Kino	.75
Butea gum	.73
Chinese nut galls	.69
Bark of sassafras root	.58
Bombay catechu	.55
Bengal catechu	.44
Terra japonica	.40
Alder bark	.36
Apricot bark	.32
Pomegranate	.32
Cherry bark	.24
Oak bark from .14 to	.20
Hemlock bark from .14 to	.20
June berry	.18
Sicily Sumac	.16

Willow bark	.16
Sycamore bark	.16
Cloves	.15
Virginia Sumac	.10

Tannin is found in tea and many other vegetable products, but thus far hemlock bark has been the most economical source for obtaining this article. The Chairman concluded by saying that several years ago he spoke at length before this Association, on the manufacture of leather in this country. His remarks at that time will be found in the volume of Transactions of the American Institute for 1859, from page 527 to page 536 inclusive, and for fear of repeating what was then said he would yield the floor to those who would doubtless be able to throw new light on the subject.

Dr. J. W. Richards remarked that many years ago he had some experience in the manufacture of leather, and had learned among other things that pure soft water was essential in obtaining the bark solution. Skins are prepared for use, in the manufacture of leather gloves for instance, without being subjected to tannin. The most common tanning process, as it is called, is to submit the skin to the action of alum. Skins may be also cured and prepared by means of oils. Very fine sheep skins are tanned with sumac. Hemlock bark, having considerable resin in it, requires more time and heat to yield its tannin than oak bark. The sooner the tanning liquor is used after being made, the better. It was his opinion that the best leather does not always weigh the most. He once had a pair of shoes made of leather which had the hair of the skin on, and found them impermeable to water.

Dr. D. D. Parmelee stated that a great deal of information on this subject could be obtained in Dr. Campbell Morfit's work on tanning.

On motion adjourned.

American Institute Polytechnic Association,
April 6th, 1865.

Prof. Samuel D. Tillman, in the chair; B. Garvey, Secretary.

New Petroleum Lamp.

Mr. Griswold exhibited his improvement, designed to facilitate the perfect combustion of petroleum in lamps, by bringing into nearer relations the carbon of the oil with the oxygen of the air. This is effected by means of two plates of mica placed on either side of the wick, which are designed to keep the oxygen of the air in action for a longer time, and for a greater distance than could be done without them. As the mica is transparent and not easily broken by heat, like glass, its adoption in the manner proposed by Mr. Griswold, is claimed as a decided improvement.

The Chairman read the following interesting summary of scientific news.

Aniline Black.

This new derivative from aniline, completes the series of brilliant colors derived from aniline. The mode of production, the way of fixing it on fabrics, and the insensibility to physical and chemical changes which it presents, are points on which it differs, essentially from the red, blue and violet, of aniline. Mr. Lauth's process consists in printing, with the mixture of hydrochlorate of aniline and chloride of potassium, an insoluble oxidisable salt, which will become soluble on the fabric, sulphide of copper for example. By the oxidizing action of the chloric acid (or the chlorine which is set free by the reaction of hydrochlorate of aniline on the chlorate of potassium,) the sulphide of copper is transformed into sulphate. The color is very permanent, and is fixed at from 20° to 40° C. and its composition allows of its being printed with all sorts of colors. Aniline black has a very rich velvety appearance. It is insoluble in water, alkaline or acid, and is unaffected by soap. Acids change the black to green, but the original color is restored by an alkali.

Removal of Bisulphide of Carbon from Gas.

Mr. Lewis Thompson has published a simple process for purifying gas from bisulphide of carbon, based on the fact that the vapor of water and the bisulphide cannot exist together at a red heat; mutual decomposition taking place with the formation of sulphuretted hydrogen and carbonic acid. The gas as it leaves the main, is mixed with a certain portion of steam, and passed through a tube heated to a cherry red having a length proportioned to the velocity of the current, so that the whole gases will be heated before they leave the tube. The sulphureted hydrogen and carbonic acid, are removed by the usual processes for purifying gas.

New Bituminous Substance from Brazil.

Prof. Archer submitted to the Royal Society of Scotland, an analysis of a substance under the name of coal, from Brazil, which showed that it contained a much larger percentage of oil than any bituminous coal in Great Britain. It had little of the appearance of coal, but seemed to be an indurated clay. It was very light, extremely buoyant in water and extremely inflamable, burning at a low temperature. From this description, we may conclude that this substance does not differ essentially from similar formations which have been exhibited to this Association.

Separation of the Cotton and Wool in Mixed Woolen Fabrics.

Most of our readers are aware that the wool can be recovered from woolen rags, and worked up again into articles which, if not equal to those into which it was originally manufactured, are yet of great utility. In the same way cotton and linen rags may be utilized in the manufacture of paper, &c.; but the rags of mixed fabrics are of but little value, and can scarcely be used at all without the destruction of one of the constituents, so as to leave the other as unmixed as possible. This is of course a waste to be regretted, especially at a time when the scarcity of cotton presses hardly on paper manufacturers. A process has, however, been recently invented in France, by means of which the flax or cotton can be separated for the use of the paper manufacturer, and the wool for that of the manufacture of prussiate of potash, or Prussian blue, or for the use of the agriculturist as manure. It appears that it is particularly valuable as manure, since it is so broken up by the process that it is far more effective than wool in its natural state, which is acted on with difficulty by air and moisture—requiring about two years to render it effective as a manure. It is found that from 1,000 lbs. of the mixed fabric there may be obtained 300 lbs. of cotton, 75 lbs. of prussiate of potash, and 50 lbs. of ammonia, and, in addition to these, sufficient gas to light the factory and partly heat the retorts used in the process.

New Asteroid.

M. Tempel, of Marseilles, has just discovered a new planet, which makes the eighty-first of the group existing between Mars and Jupiter. Its brilliancy is that of a star of the 11th and 12th magnitude. The discovery has been confirmed by the observations of M. Luther, at Bilk.

Preservation of Wood.

The following method is used in Germany for the preservation of wood: Mix 40 parts of chalk, 50 of rosin, 4 of linseed oil, melting them together in an iron pot; then add 1 part of native oxyd of copper, and afterwards, with care, 1 part of sulphuric acid. The mixture is applied while hot to the wood, by means of a brush. When dry it forms a varnish as hard as stone.

Honor to Prof. Bond.

The royal astronomical society at London has this year awarded, for the first time to an American, its highest honor, the gold medal of the society, to Professor George P. Bond, lately director of the observatory of Harvard University at Cambridge, for his eminent services in the advancement of astronomy, and especially for his volume on the comet of 1858.

Stability of Gun-Cotton.

M. Morel, who claims to be the inventor of gun-cotton in France, affirms, in contradiction to the assertions of M. de Luca, that he has specimens of that substance which he has kept for eighteen years without undergoing the least alteration, and that, when properly made, gun-cotton will preserve its properties for an indefinite period.

Gauge of American Railways.

As to gauge, there are three classes of railroads in the United States. The New England and New York roads are four feet eight and a half inches. In Ohio and south of Philadelphia they vary from this width to four feet ten inches. The Canada gauge is four feet six inches, of which gauge also are some of the roads of Maine. The broad gauge is six feet, of which the Erie, the Atlantic and Great Western, and the Ohio and Mississippi are examples.

Turpentine at the North.

There is a company at Freedom, N. H., engaged in manufacturing tar from pine stumps. They produce forty barrels of tar and seven or eight of spirits of turpentine every week. The stumps are drawn and cut up as for stove wood—put into a retort and their essence fried out. A cord of pitch wood gives three barrels of tar worth $14 per barrel, and 18 gallons of spirits worth some $7 or $8 the gallon.

Torpedoes for Petroleum.

A submarine torpedo was exploded four hundred and sixty-three feet down in an oil well near Titusville, Pennsylvania, on Saturday, making the oil and water shoot thirty feet into the air. The well had ceased to yield, but as soon as the disturbance subsided oil appeared on the surface as fast as it could be dipped off with a hand-pump. The theory is that the oil veins got stopped up with paraffine, and the torpedo blew them open again.

Pianos made in the United States.

The yearly product of pianos in the United States has increased from 2,000 to 20,000 in the last fifteen years, the latter number being the estimated manufacture of the present year.

E. P. Needham's Pneumatic Way.

This novel invention was exhibited in practical operation on a small scale before the association. The tubes used were each about ten feet long and made of glass so that the effect of the air upon the cork balls could be readily seen.

Mr. Benjamin Garvey.—Mr. President and gentlemen, I have much pleasure in bringing before you this evening "Needham's Pneumatic Way," as I believe it to be a great invention and one calculated to revolutionize railroad travel. To develop its principles and show wherein its excellence consists, it will be necessary to recall some of the earlier attempts to substitute stationary engines for locomotives.

As soon as the locomotive began to be generally used, it was found to possess many disadvantageous points which ingenious men strove to obviate. These were dearness of first cost, a locomotive costing more than five times as much as a stationary engine of equal power; expense in working requiring the undivided attention of a fireman and an engineer, whereas one man can attend a stationary engine; expense in fuel, needing a superior and costly quality of fuel, while any kind can be used with a stationary engine, and the latter can economize its steam and fuel, while the former is necessitated to waste both; expense in repairs, the jar of travel soon deranging and wearing out its parts, all of which are very costly; then the life of a locomotive is not one-fourth as long as that of a stationary engine. Also the locomotive being very heavy—from 60 to 120 tons—necessitated the building of a more expensive road than would be required for passengers or freight cars only, for so heavy a body moving at a high velocity, strikes every obstacle with incalculable force, and the minute fall from one rail to another produces such an effect that the rails are soon battered and rendered dangerous, and would not endure this action for even a short time if not massive and firmly fixed; even the oscillating of the locomotive from side to side strains the rails and they must be secured to crossties or they would be torn apart. Again, the locomotive cannot ascend steep grades, so that moderate hills must be tunneled and gentle valleys bridged. Nor is it free from danger. It is liable to explode, to run off the track, to be thrown from the track by stray cattle, fallen trees, drift from rain, snow, &c. It is also liable to cause accidents by frightening horses, and its smoke, ashes and dust are offensive in cities and intolerable in long tunnels or underground roads.

The stationary engine possessing so many advantages above the locomotive, it was to be expected that great efforts would be made to substitute the one for the other. The great difficulty was to convey its power to a train of cars in motion, and of all the means proposed for accomplishing that end, the only one now approved by engineers is the use of atmospheric air in tubes.

An endless band has been used on the London and Blackwall, and some other railroads. A rotating endless screw has been proposed; so has a tube of india-rubber to be filled with water behind the driving wheel or roller; and other plans which were simply abortions.

The employment of atmospheric air in different ways has been more successful. Between Dublin and Dalkey, in Ireland, an atmospheric railroad was used for a short time. A tube having a slit along its upper side was laid between the rails. A piston to travel in this pipe was fitted with a bent arm, which, passing through the slit in the top of the tube, was attached to the car. The slit was closed by a valve of leather strengthened with metal strips across it, which was fast along one side and was sealed to the other side with pitch so that the bent arm in passing along tore up the sealed side of the valve, and a hot roller following resealed it. Motion was given to the car by the pressure of the air acting on the piston in the tube, when a partial vacuum was produced in front by air-pumps worked by a stationary engine. The valve was very imperfect, and whilst traveling in the car, I have heard it hissing throughout its length as it leaked in air. Some ingenious improvements in the valve were proposed, but the great defect in this plan was that the lateral strain on the tube, as the car oscillated from side to side, distorted the tube so that the piston could not fit it and the leakage was too great.

To dispense with the slit along the tube it was proposed to have a piston travel in a perfectly enclosed tube, and by means of a toothed rack on top, give motion to a double set of rollers, half within the tube and half without, those within being connected with those without by pins passing through air-tight holes, so that the outside rollers should grasp a rack on the bottom of the car and thus give motion to it. This was very ingenious, but that the car and piston should travel at the exact same rate, was not under complete control. This plan was consequently abandoned.

It was next proposed to have holes at intervals along the tube, and to have these closed by valves which could be operated by a traveling slide valve, so as to make a communication, at the moment of passing, between the inside of the tube and an air engine in the car, the car being, in fact, an air locomotive. This plan has been lately revived, but it seems too complicated, and could hardly have rested twenty years, if it be really practicable.

In all these methods of employing stationary engines, the cars were carried through the air and were exposed to all accidents from weather, stray cattle, etc. A totally different plan has been invented by Rammel, of England. Instead of a small piston, requiring intense pressure, he employs a large piston, requiring only such pressure as a stiff breeze exercises on a sail. To do this he builds his railroad within a tube, and makes the front of the carriage a large piston fitting the tube loosely, a brush of hog's bristles being the only packing used. He then obtains his current of air by means of an atmospheric ejector or huge centrifugal wheel, the air being taken in at the center and ejected at the periphery to exhaust air from the tube, and the air being taken in at the periphery and sent out at the center to produce compression in the tube.

The experimental pneumatic railroad at the Crystal Palace has demonstrated that this mode of locomotion is very agreeable, being a gentle gliding motion without jar, smoke, dust, or noise; that it is capable of very high velocity, say one hundred miles an hour; that it is perfectly safe, there being no danger of explosion, of running off the track, of encountering stray animals or fallen trees, etc.; that it is practical and pleasant in all states of weather; that the ventilation is perfect, as fresh air is constantly supplied to the car by the propelling current, and that in case a car should break down there would be merely a stopping of forward motion without danger to life or limb.

Is Rammel's pneumatic railroad then perfect? Does it meet all requirements of economy, speed, safety, etc.? By no means. It requires an American inventor to perfect the "pneumatic way."

Rammel, to move a carriage from one end to the other of the tube, must put twice the full of the tube of air in motion, and must therefore overcome a double amount of inertia and friction. His stationary engine must remain idle until a car is ready to start. He must have a telegraph from station to station, to notify when the engine is to be set to work. He can have only one car in motion in the tube at one time, and must bring the whole column of air to rest to stop the car, thus losing a large amount of accumulated force. To return a car he must stop and reverse his air wheel, thus losing another large amount of accumulated force.

Now, by attending to a description of the annexed diagram, we will see in what a simple and masterly manner Needham overcomes all these objections and perfects the pneumatic way. A, fig. 1, is a rotary air pump which is connected with a continuous circuit of tube. B, B, C, D and D are stations, each having two gates for isolating a section of the tube. These gates are shown both open at B, B, both closed at C, and one open and the other closed at D, D. When both gates are open as at B, B, the current of air, produced by the pump A and indicated by the arrows, passes straight along through the station, and a car going with it would not be stopped. When both are closed, as at C, the current passes the station through the bent tube shown beside it; the car, however, can not pass round the bent tube, but must stop in front of the gate. When one gate

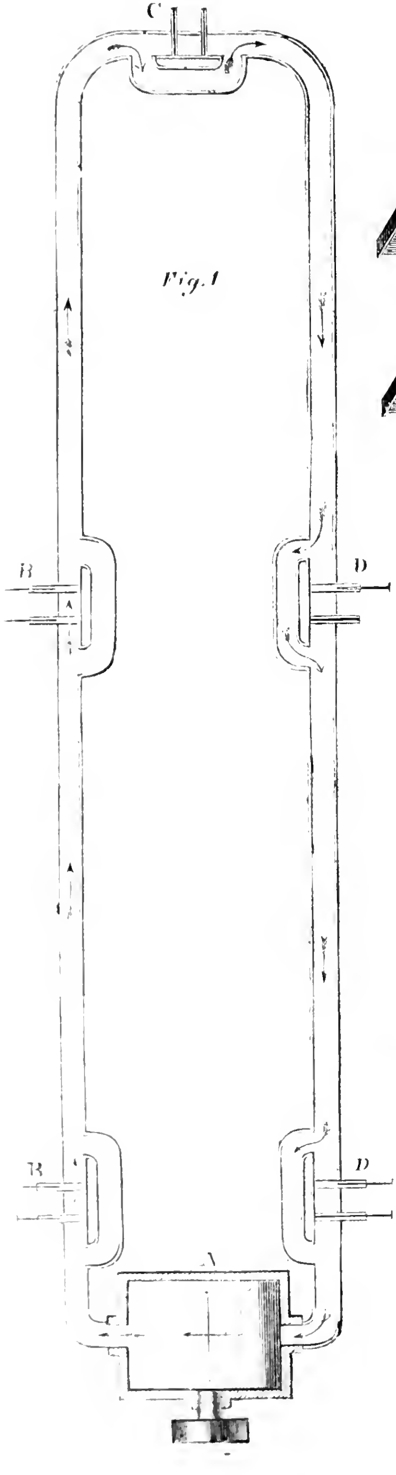


Fig. 1

Fig. 2

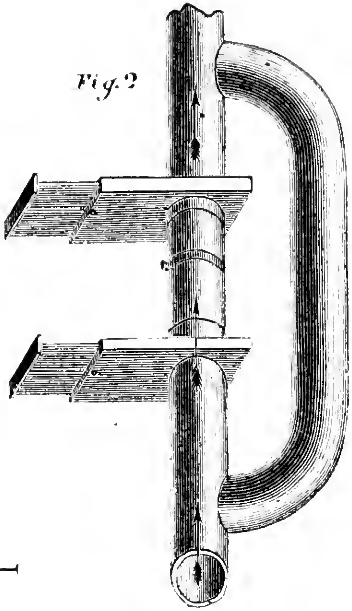
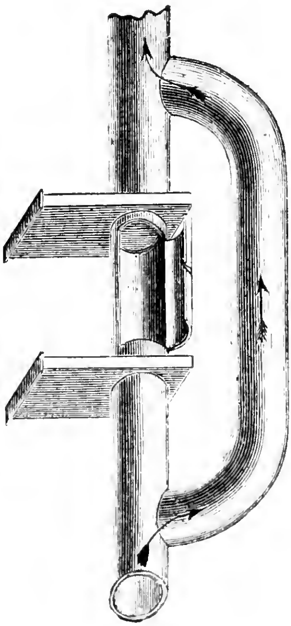


Fig. 3.



is open and the other closed, as indicated at D, D, the current must also go round, but the car will stop within the station, after which the other gate may be closed, and the state shown at C will be attained. Fig. 2 shows both gates open and the current going straight along, while fig. 3 shows both closed, the current going round and the station open to the external atmosphere, so that cars may load and unload, passengers get in or out, without interfering with the working of any other part of the rout.

It is evident, from a careful view of this diagram, that the whole power exerted by the air pump is available in generating a current of air within the tube. There is no air drawn in from the outside to keep up the current, nor is any air in motion thrown away into the atmosphere, but the air taken from one end of the circuit of tube is driven into the other, thus giving at once compression and exhaustion by the one action of the pump. Since there is a double line of tube there may be travel in both directions at once without the possibility of collision. When a car approaches a station it can be made either to notify the station man or to operate automatic divices, so that the farther gate will be shut and the car be stopped in the gentlest manner by impinging on a cushion of air, after which the other gate is closed and the station is opened to the outside. Several cars may move along the track in the same direction, at the same time, without fear of interfering, for they would be, as it were, attached to an endless band of air and have to maintain their relative distances. A car may be transferred from the up to the down tube at any station, and the current of air may consequently be maintained always in the one direction.

The tube may be made of an inexpensive material—wood, burned clay, Roman cement, or anything of which a tube can be made. The stationary power may be steam or water, provided only the engines or water wheels be at suitable distances along the track, at say from five to ten miles apart. We see, then, that Needham has perfected this new style of locomotion. Its economy of construction and working can not be surpassed. For safety and speed it is more desirable than any other style of travel for passengers, and its speed should make it the great means of carrying and distributing mail matter, newspapers and parcels. Its peculiar suitableness for city locomotion, as not interfering with rights of way or of property, and giving an admirable means of passing from the business centers to the suburbs, points it out as the best means yet proposed for relieving Broadway and the other crowded thoroughfares of our city.

Mr. Needham's address is 97 East Twenty-third street, New York, and I am confident that any gentleman calling upon him for information upon this plan of locomotion will be allowed a sight of his working model.

After selecting "City Sewerage" as the next topic for discussion, the Association adjourned.

American Institute Polytechnic Association,
April 13th, 1865.

Prof. S. D. Tillman, in the chair; B. Garvey, Secretary.

The Chairman opened the meeting by saying, that during a recent trip to Albany, he visited the Dudley Observatory, under the direction of Prof. G. W. Hough. He examined there the following instruments:

1st. The Olcott Meridian Circle, made by Pistor and Martins, Berlin. Object glass 8 inches; Focal length 10 feet.

2d. The Transit Instrument by the same makers.

3d. The Equatorial Refractor, made by the late Henry Fitz, of New York. Object glass 13 inches; Focal length 15 feet.

4th. The Comet Seeker, made by Mr. Alvin Clark, of Boston.

5th. The Declinometer, invented by the late Prof. Mitchel, and made by Messrs. Foster and Twitchell, of Cincinnati.

6th. The Charting Machine, made by Mr. Fasoldt, of Albany.

7th. The Sidereal Clock, No. 1, movement by Dent, pendulum applied by Bond and Son, of Boston.

8th. Sidereal Clock, No. 2, by Howard and Company, of Boston.

9th. Chronograph, invented by Professor Mitchel, made by Foster and Twitchell, Cincinnati.

10th. Barometer, by Fastre of Paris.

Also a magnetic Mean Time Clock, by Mr. Farmer, of Boston; Chronometer, by Johnson, of London; Clocks for the Observing Rooms, and other minor apparatus needed or useful in an observatory.

The speaker was most interested in the Calculating Machine of Scheutz, first exhibited at the International Exhibition in London. The following description of it is from the pen of Prof. Hough:

The Swedish Tabulating Machine of Mr. George Scheutz.

It is a well known fact that Mr. Charles E. Babbage was the first to attempt the construction of a Difference Engine; but owing to some misunderstanding between the Inventor and the English Government, under whose patronage the work was carried on, it was never completed.

About the year 1834 or 1836, Mr. Scheutz, a printer at Stockholm, heard of Mr. Babbage's Machine, and at once conceived the idea of building one himself.

The present machine, which bears the impression "Stockholm, 1853," is the product of his labors, continued with unwearied diligence and at great pecuniary sacrifice through nearly twenty years. It is the only one ever perfected, and although based on the same mathematical theory, is yet essentially different in its mechanism from that contemplated by Mr. Babbage. It was purchased for this observatory in 1856, and was put in operation for a short time in 1858.

It was found to be in a very disordered condition, and the greater part of the labor expended upon it was required by adjustments and repairs. Of the details of its mechanism, no satisfactory conception can be given without illustrations, and without more space than can here be afforded.

It possesses a twofold power, with mechanism appropriate for each; not necessarily connected, though simultaneous and automatic in its entire action. These functions are, first, the production of certain numerical results; second, the conversion of these results into a permanent legible record.

The theory of the machine is based on the mathematical truth that in any series of numbers, the nth order of differences may be regarded as equal to zero, where n may be any number whatever. To produce such a series by mechanical means, the only condition necessary is that there be as many variable wheels indicating the numbers as we have differences. If n was a very large number, the mechanism would become cumbersome and unwieldy. It is found in practice that for the great majority of useful computations, four orders of differences are sufficient.

This machine is constructed for that number, and will consequently compute any series, in which the fourth (or any inferior) order of differences are equal.

This will be more easily understood by a simple illustration. Suppose it is desired to tabulate the series of square numbers beginning with unity. Let us first see how these numbers can be produced by means of successive differences. We arrange them for convenience in the following table:

Number.	Square.	1st diff.	2d diff.	3d diff.
1	1			
		3		
2	4		2	
		5		0
3	9		2	
		7		
4	16			

Having given the number (1) square of 1, and the first difference $3 = (2^2-1^2)$ and the second diff, $2 = (3^2-2^2)-(2^2-1^2)$, the squares of all successive numbers may be found by continued additions.

The difference between $(2^2 - 1^2) = 3$ is the first diff.; the second diff. (2) is constant. Then,

$(3)^2 = 9 = (2)^2 +$ 1st diff. (3) + 2d diff. (2),

or $9 = 4 + (3+2)$,

or $9 = 4 + 5$, (5) being the second number in column of first differences

And the same process may be repeated to any extent.

What now is required in a machine, is, first to be able to produce the first order of differences, having given the first difference 3, and the second difference (2) constant.

Suppose we have a wheel, on the circumference of which is inscribed, at equal distances apart, the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. If this wheel should be set so that the figure 3 should coincide with a fixed mark, and by means of any simple mechanism, it should be made to advance two divisions at every motion of a lever, we should successively cause the numbers 3, 5, 7, 9, to coincide with the mark; and if when the wheel has made a complete revolution, it should cause another wheel placed by its side to advance one division. The process may be continued so as to form the series of first differences, in which every successive number would be greater by 2 than the number preceding.

This principle of successive additions is exemplified in an ordinary clock; for at every oscillation of the pendulum the second-hand advances one division, and after this has made a complete revolution, the minute-hand has also advanced one division. By a slight change in the escapement wheel, the second wheel could be made to advance 2, 3, or 4 divisions at every oscillation. Hence it will be readily understood how, by simple machinery, any *constant* quantity may be added.

Now suppose we have three wheels, placed one above the other on a vertical (shaft) axis, on each of which is inscribed zero and the nine digits, corresponding with the like number of divisions on their surfaces. If the number 1 on the upper wheel, 3 on the second wheel, and 2 on the third wheel, be brought opposite a fixed or zero point; and the nature of these wheels be such that when set in motion by a lever from right to left, the second wheel adds its number to the upper wheel, and by a motion of the lever from left to right, the third wheel adds its number to the second (being in this case constant and always equal to 2); from this arrangement, we will be able to compute a table of square numbers.

We begin by moving the lever from right to left; when 3 (the number on the second wheel) will be added to 1 (the number on the upper wheel), making 4 the square of 2. On moving the lever back, 2 on the third wheel is added to 3 on the second wheel, making 5. Moving our lever back again from right to left, 5 is added to 4 on the upper wheel, making 9 the square of 3. Repeating the process, we next get 7 on the second wheel; which added to 9 on the upper makes 16, the square of 4.

It is evident from the above statement that the series of squares is developed by a process of addition, in which the constant significant difference, increased by each preceding first difference, generates the order of first differences; and with the sum of the preceding first difference and square, produces the series of squares. This principle is true for any series, whatever number n may be.

It will now be readily understood, should we have a series of wheels, ranged under each other, the nature of which should be such that the series below should add its number to the one above, we could produce any series of numbers in which the fourth order of differences should be equal.

In case any difference is negative, we get the same result by adding the complement, or difference between the number and 10. Suppose we wish to subtract 2 from 3, our result would be 1. If we take the complement of $2 = 8$, and add it to 3, we get $(10+1)$, or the same result on the first wheel as before.

Having given the fundamental principles on which the machine is constructed, we will add a few particulars. This machine can be used to 15 places of figures, of which 8 places are printed, at the time of making the computation. Thirty seconds is the time necessary for a complete result.

Before starting the machine for any computation, it is necessary to set the proper wheels, after which it needs no further attention; for so long as the last order of differences is constant, it will continue to produce the required numbers. Thus for producing a table of squares, it is only necessary to give the machine three numbers, 1, 3 and 2; and from these data we can compute the squares of all numbers up to 30 millions. In the same manner, by giving the machine the numbers 1, 7, 6, 6, we can produce a table of cubes, the limit being 15 figures. The same principles apply in the computation of logarithms, or any series of numbers whatever.

By changing the position of the carrying post on one of the wheels, we at once obtain the nearest whole number, no matter how many decimal places be used. By inserting different sets of wheels in two of the vertical columns, the computation can be made by the sexagesimal system; that is, the results will at once be converted into degrees, minutes and seconds.

It is found, from our own work as well as that previously done with the machine, that it is occasionally liable to an accidental error, from the failure of one or more wheels to perform its office. These errors are purely mechanical, and are not to be confounded with the principles on which the machine is constructed. The question naturally arises, can these errors be obviated? The thorough examination of the source and cause of the difficulty leads us to conclude that by a slight addition to the mechanism, the possibility of accidental error from this source may be reduced to so small a limit as to make the machine perfectly reliable for any computations included within its capacity.

The success of our improvements has been satisfactorily demonstrated in the use of temporary mechanism constructed for the purpose. It was found that those wheels which before were frequently liable to error, worked perfectly after the proper mechanism was applied.

We propose to apply motive power to the machine, so that when once set, it shall be a complete automaton, making its computations without the assistance of any person. As soon as one set of constants are exhausted, the machine will stop, and will also be made to give notice of the fact by ringing a bell; upon which a new set of constants may be introduced, and the computations continued.

The following interesting items of scientific news were then presented by the chairman:

A New American Silk-Worm.

Mr. L. Trouvelot, of Medford, Mass., has been engaged for several years in rearing the *attacus polyphemus*, and in preparing from its cocoon a silk having great lustre and strength, and superior to all other silks except the best Chinese. The insect is found throughout the Northern States, and feeds upon the leaves of the oak, maple, willow and other common forest trees. Mr. Trouvelot has now seven wagon-loads of cocoons, the entire progeny of which he proposes to raise during the coming summer. For opening this new and important field of industry, this gentleman is entitled to the thanks of all who are interested in the increase of our domestic manufactures.

A Buried City.

It is said that a photographer, who has been employed by the Dutch Government to take views of the most beautiful points on the Island of Java, has discovered an entire city buried beneath the lava of a volcano close by, which has been extinct for several centuries.

Steam Engines in France.

In 1850 there were in all France but 6,832 steam engines; in 1860 there were 22,516, representing a force of 617,890 horse-power. Certain restrictions have lately been removed by the government which will doubtless result in greatly increasing the number of steam engines in that country.

New Bridge across the Hudson at Albany.

Mr. Julius Adams, C. E., of Brooklyn, has charge of the construction of the railway bridge at Albany, crossing the river at right angles from a point sixty feet north of Lumber street and passing the upper end of Van Rensselaer Island, and resting upon a pier built out therefrom and touching the opposite shore a few hundred rods north of the Western Railway depot. The total length of the bridge will be one thousand four hundred feet. It will be of sufficient width for a double track, and the distance from the floor to the roof will be 22 feet. It is to be finally constructed of American wrought iron, upon what is known as the lattice system. A temporary wooden structure will be laid upon the piers which will be used by railway trains while the iron structure is being completed. The principal permanent spans will be 172 feet each, and the two draw-spans will be 110 feet each, swinging horizontally upon one pivot-pier 32 feet in diameter.

Yosemete Gorge and Big Oak Grove, in California.

The General Land Office has received the returns of the survey of these wonderful developments of nature, probably the greatest natural curiosities on the globe. The "Yosemete" is a cleft in one of the lateral spurs of the Sierra Nevada. By some volcanic convulsion the mountains have been torn asunder to the extent of some nine or ten miles in length and a width varying from three to five miles, forming stupendous walls of granite, with a valley at the bases of the same, through which flows the Merced river. By a wise and munificent act, Congress by a special law has granted this cleft to the State of California, to be forever dedicated as a public resort for health and recreation. By the same act there is also granted to the State what is known as the "Big Oak Grove," some thirteen or fourteen miles south of the cleft. The grove contains 427 trees, from 275 to 400 feet in height, covering 2,589 acres. These mammoth trees are the cone-bearing evergreen of the redwood genus, and known as the sequola gigantea, with bark on the largest of them of 18 inches thickness, and bear two different kinds of leaves. One of the largest of the species which has been hewed down indicates an age of from two to three thousand years.

The Public Domain.

The United States own upwards of 1,000,000,000 acres of public lands susceptible of cultivation. They own at least 2,000,000 acres of gold and silver-bearing lands. The arable lands are worth at least $1,200,000,000, and the mineral lands are worth at least $8,000,000,000, making together a total of $9,200,000,000.

Metals of Michigan.

Michigan yields about $7,000,000 worth of copper and $2,000,000 of iron annually.

What Cashmere Shawls are Made of.

The cashmere shawl wool consists of the fleece beneath the undercoat of the hair of the shawl-goats. The shearing is performed at the commencement of the summer, which, in those Alpine regions, though short, is very hot. "The hair is first cut short with a knife, the shearer beginning at the head and following the direction of the fleece toward the tail. The animal is then rubbed in the reverse direction with a sort of brush or comb, which detaches the fine wool from next the skin (the asuli) nearly free from hair. When the animals are not shorn, they relieve themselves of these winter vests of delicate down, by rolling on the ground or rubbing against the rocks." Seeing that the original possessors of the asuli are nearly as wild as the winds, materials for thousands of shawls must be annually blown about and utterly wasted amongst the pinnacles and crags of those desolate regions. M. Gerard thinks that at present a very great quantity of the genuine asuli is lost by being mixed with the coarser hair and common wool, and thus indiscriminately manufactured into bushmeena.

Sewerage.

The regular discussion was opened by Mr. Woodward, of the firm of Knights & Woodward, of Brooklyn, who exhibited specimens of their hydraulic cement sewer pipe. Mr. Knights followed, and said the pipes were made of cement, gravel and sand, precisely the same as concrete. They are very durable, and being made on polished cores, they are true throughout the whole bore. The proportions are two parts of sand and gravel and one of cement ; this is kept damp for seven or eight weeks and made to set very slowly. They can be made much cheaper than ordinary clay pipe, and they never get out of shape. The size here exhibited is twelve inches in diameter, and is sold at 50 cents a foot; and that of three-inch bore costs 14 cents a foot. We make some twenty-four inch pipes ; they are made in an egg shape, and sold at $1.30 per foot. These pipes are specifically adapted for distribution and drainage in cities and villages. They will stand the most severe tests, and improve in strength with age and use, and are now extensively adopted by eminent hydraulic engineers. The sewer-pipes are in use in New York, Brooklyn, Central Park, Hartford, &c., and also under heavy railroad embankments. They stand the most severe test of acids. In the city of Brooklyn over forty miles of this pipe is used for the street sewers.

Mr. Woodward read some extracts from a report of an English commission appointed to examine the sewerage of London, showing that in their opinion small pipes are less likely to be obstructed than large sewers which are several times more expensive.

Mr. Enos Stevens gave the results of some experiments he had tried to find the descent required for water to carry along stones and other substances. The conclusion was that in a V shaped trough, after it has become smooth, a descent of one foot in fifty-eight feet of length was sufficient to wash away all obstructions.

City Sewerage.

The following paper was presented by Mr. Samuel McElroy, C. E., of Brooklyn :

The attention of the Polytechnic Association, which is directed to the various public and scientific improvements of the age, and to the various means and processes of improvement, may properly be asked to the discussion of some of the prominent characteristics of city sewerage.

It has pleased the creator of man to endow him with a compound element of earthly existence, having a spiritual and immortal nature in combination with a human form, which is constantly troubled with necessities of the hour, and in need of constant care. The glory and dignity of the soul, and also of the body, is here chastened and humbled by the recurring wants and weaknesses of human nature, which are imperative in their demands, and find their only cessation in the rest of the grave; and the greater part of man's existence is a struggle with these infirmities.

Out of this obvious law of existence have come all the methods and appliances for social comfort and the general welfare. The upward tendency of the higher existence carries with it the subordinate organization, and every effort for the general welfare of those masses of individuals who form our communities is a valuable contribution to the law of charity and the offices of kindness. Improved construction of dwellings, conveniences of public conveyance and travel, street pavements, public institutions of charity and of learning, food supply, water supply, sewerage, gas supply, and the like, are prominent sources of social amelioration and are indices of progress in civilization.

Of human infirmities, or laws of bodily existence, the necessity of adequate disposal of hourly and daily accumulations of matter, also pertains to that law of the continued existence of matter, which has attracted the earnest study of the most profound thinkers of the race. In the natural world nothing is lost, whatever transformations each particle may undergo. Among all the food-consuming plants or animals, or inhabitants of the earth, nothing is taken within the organization which is not also, in some form or other, given up. So far, then, as the human race is concerned, this law of restitution places the question of adequate disposal in the same class with that of adequate supply. The air we breathe, the water we drink, the food we eat, must also not only be properly used, but properly accounted for.

The infringement of any physical law, or of any moral law, brings an inevitable punishment. Science has demonstrated, in its sublime analysis, that the body was not created to suffer, and that it always does suffer through the infringement of certain laws and conditions of its existence. Precisely so with regard to our special subject of discussion. Any community which neglects the proper disposal of its constant accumulations must, in theory, and does, in practice, suffer grevious injury in individual comfort and health. The instances which testify to this law are so abundant and so conclusive as to indicate this theory beyond dispute.

From lessons taught by experience, that preceptor which human nature is always prone to challenge, it has been found all over the world, and from its earliest ages, that the upward progress of civilization is marked by provisions for the more effectual supply of general necessities, and for the health and comfort of the masses. In some ages and countries these provisions have assumed a luxurious expansion, and have resulted in public works which, like the aqueducts of the Incas of Peru, or of the emperors of Rome, have stood the test of many centuries in their eloquent witness to special regard for public welfare, and which, to this day, rebuke the mistaken parsimony of ages and lands which arrogate to themselves specious pretensions of social rank. Parts of buried cities on the shores of the Mediterranean, brought to light after ages of seclusion, put to shame, in their sanitary appliance, the costliest mansions of our proudest modern towns.

In the school of hydraulic engineering it is understood that any proper arrangement of water supply involves an equally complete system of sewerage. The latter generally follows the former, though it should properly precede it. But cities like those of modern times, rapid in growth and uncertain in local development, are rarely built up with proper regard to civic necessities, and only adopt plans of public works when forced into it by pressing sanitary conditions of existence and progress. The ancients were wiser than the men of this generation in these respects, and did not leave their prospective cities without careful provision for necessities which may be better provided for in advance of their occurrence.

The accumulations of a city which require adequate disposal may be classified as street dirt, house sewage and rain-fall.

Street dirt, so far as it is made up of garbage, ashes, and other matters of a perishable or solid character, which can be conveniently carted, should not enter the sewers; and the horse manure and street wash, which rapidly accumulate on the pavements, may or may not be carried into the sewers, as the character of the pavement itself, and the method of carriage, will properly determine. The quantity of manure dropped in the streets of a large city is much greater than is generally supposed. A London report of 1850, on this point, says:

"It is considered that the horse dung which falls in the streets of the metropolis, cannot be less than 200,000 tons a year. Much of this, under ordinary circumstances, dries and is pulverized, and with the common soil is carried into houses as dust, and soils clothes and furniture. The odor arising from the surface evaporation of streets when they are wet is chiefly from horse dung. The surface water discharged into sewers from the streets and roofs of houses is found to contain as much filth as the soil water from house drains."

With close laid block pavement, which admits the use of a water jet for street cleansing (which experience has proved to be much more economical than the street sweeper and dirt cart), this part of the street dirt may properly be washed into the sewers; but the ordinary cobble stone pavement will not permit a strong, scouring jet, without risk to its bed, and where in use, indicates the need of dirt carts for all kinds of street dirt, with their attendant imperfections, annoyances and expenses. Among other benefits of the trap block pavement, now being extended through New York, will be its superior cleanliness, when subjected, as it should be, to the periodical water jet, of adequate power.

House sewage, discharged from the various household appurtenances, in a liquid, semi-liquid, and solid state, requires underground disposal. Investigation has shown the singular fact, in our own cities as in Europe, that water supply, for daily consumption, forms a very correct measure of daily sewage flow, and any attention to the quantity of water waste in daily household experience readily explains this connection. The amount of water actually used in New York has exceeded ninety gallons per day, for every person in the city, while the quantity it is possible to use, for drinking and cooking, is less than ten per cent. of this amount. Consequently we find that, in addition to the ordinary house sewage proper, vast quantities of water, as it comes from the supply pipes, are rushing into the sewers, bearing comparatively slight impregnation of sewage matter. It is also observed, in corroboration, that the periods of maximum daily sewage flow correspond with those of water supply; about fifty per cent. of the daily flow being between 9 A. M. and 5 P. M.

In addition to these conditions of ordinary discharge the sewers must be able to dispose of rain-fall, ordinary and extraordinary.

From the varied character of surface in all cities, with gardens, parks, areas, and other retarding parts, it follows that the rapidity of rain-fall or storm-fall discharge is much impeded, so that it rarely happens that sixty per cent. of the fall enters the sewers within six hours of the commencement, in closely built districts, while suburban districts have given forty per cent. within twenty-four hours. Nor does the entire rainfall enter the sewers, by more than twenty-five per cent.

London observations in 1852, show that "a rainfall of half an inch in three hours, took twelve hours in discharge, that is to say, twelve hours elapsed from the commencement of the rain before the flow of the sewer resumed its ordinary level. In a second case, a rainfall of 1.11 inches in about an hour, with an addition of 0.33 inch in the next two hours, being nearly an inch and a half in three hours, occupied in discharge fifteen and three-quarter hours from the commencement of the rain."

Observations made for the Brooklyn sewerage, show that "in a period of seven years, but three days occur in which the rainfall in *four* hours is as high as one inch, and but three days in which the whole rain during *twenty-four* hours was as much as two inches."

This condition of storm-flow, so much exceeds the ordinary house-sewage flow, that adequate provision for the first, fully provides for all other conditions of service, and among hydraulic engineers, a basis one-inch storm-fall per hour, has been adopted for trunk sewers, which receive the supply of lateral systems, the basis for the latter being two inches fall per hour. From what has been experimentally shown under this head, it is evident that such a basis of computation and arrangement is in abundant excess of all contingencies; and as this basis is the key to a very radical defect in sewerage systems in general, it deserves special attention, as will more fully appear, in remarks on the principles of arrangement.

The nature of sewage flow, has an important connection with its processes of flow, and is shown by analysis of its contents.

As may be expected from the various imperfections of sewers, which have been analyzed, the results vary largely in dissolved and suspended matter; the proportions of solid matter vary, in cases, from 1 in 142, 1 in 330, and 1 in 420, to 1 in 1,000; advocates of utilization having assumed 1 in 600, as a reliable mean. The results confirm the deductions from the remarks on house-sewage as to the entire fluidity of the flow, demonstrating the facility of removal, while it is found in some instances that the sewer discharge may be actually purer and more wholesome than wells, maintained at public expense for public use, in more than one modern city.

In a report of Major Douglass, the Engineer to whom the Croton supply should be properly accredited, dated November, 1833, analysis of the Bleecker street and Thirteenth street wells show 80 grains of solid matter in the first, and 64.4 grains in the second, per gallon. A previous report makes the Manhattan well 125.8 grains per gallon.

During the preliminary examinations for the Brooklyn Water Works, various city wells were analyzed, as being most generally used, and gave 43.2, 46.4, 58.6, and in one case 77 grains per gallon.

The Beacon Hill well at Boston gave 50 grains per gallon; the Capitol Park well at Albany, 65.5 grains; wells at Detroit gave 116.4 grains; at Indianapolis, 60 grains.

In London, St. Paul's Churchyard well gave 75 grains; and the Lamberth Shallow well, 110 grains.

Six samples of Thames water, reported in 1857, gave an average of 2.059 grains organic and 23.281 mineral contents, or 25.34 in all.

Three prominent London sewers, analyzed in 1857, gave the following results:

Locality.	Organic.	Mineral.	Total grains.
Earl	2.738	46.110	48.848
Falcon Brook	3.987	40.146	44.133
King's Scholars' Pond	17.750	47.230	64.980

While this analysis presents a singular contrast with sources of common public use, and furnishes a severe comment on the delays common to all projects of sanitary improvement, it must be understood that the same sewers, at other periods of flow, would give very different results, more in keeping with those from other sewers in a more active state of organic discharge.

Sewage flow, taken in London, in a district affected by the intermittent water supply, in vogue, gave 96 grains soluble and 28 grains insoluble matter on days of water supply, and 127 grains of soluble and 40 grains insoluble matter at intervening days.

A qualitative analysis of two sewers, in 1850, gave the following results:

CONSTITUENTS.	Dorset Square.			Barrett's Court.		
	Soluble.	Insoluble.	Total.	Soluble.	Insoluble.	Total.
Organic matter and salts of ammonia	57.32	23.00	80.32	121.50	180.32	301.82
Street sand and detritus	0.78	44.50	45.28	1.39	19.30	29.69
Soluble silica	1.16	12.09	13.25	1.57	10.91	12.51
Phosphoric acid	2.53	1.64	4.17	7.71	2.73	10.44
Sulphuric acid	0.28	3.63	3.91	10.71	4.02	14.73
Carbonic acid	10.58	1.99	12.57	11.62	3.97	15.59
Lime	7.40	8.37	15.77	7.50	17.03	24.53
Magnesia	.07	Traces.	.07	2.87	Traces.	2.87
Peroxide of iron and alumina	Traces.	2.66	2.66	Traces.	6.20	6.20
Potash	2.60	0.72	3.32	46.91	1.22	48.13
Soda	....	....	....	....	1.51	1.51
Chloride of sodium	27.27	2.10	29.37	31.52	1.72	33.24
Total	109.00	100.70	209.70	213.30	218.96	492.26

The imperfect action of brick sewers, with sizes entirely disproportioned to their ordinary flow, which deposit their solid contents a portion of the time and discharge them under the impulse of rainfall or unusual water supply, must affect any analysis of their flow, in proportion to their special conditions of action. An analysis of Edinburgh sewage water, which is under constant supply, gives 62 grains of soluble and 244 of insoluble matter per gallon. This is equivalent to 1 grain in 229, while 1 in 600 has been assumed as a general mean, or 116.7 grains per gallon.

Examinations of this class, which have been extensively made, tend to correct the general idea of difficult sewage flow, and entirely divest the subject from any doubts on this point. Sewage matter may be carried through pipes or elevated by pumps, about as easily as water, under proper regulation.

The proper utilization of sewage matter, pertains to the doctrine of restitution, alluded to in the introduction, and involves the consideration of what may be taken as a duty on one side, and a serious waste on the other.

Experimental science has shown that the nitrogen and other valuable constituents, annually produced by each person in any community, amounting to an average of fifty-seven pounds, solid matter, is sufficient for the supply of not less than two pounds of bread per day, or over 800 pounds of grain per annum, the estimated value being $1.91 in gold. Similar researches have shown the value of sewage water, which includes and increases this source of value, to be about 4.39.100 cents per ton. On this basis, the value of the New York sewage, estimated from the water supply at 200,000 tons per day, is $3,204,700 per annum in gold.

It is stated from a reduction of the analysis of the Dorset square sewer, with a solid content of 209.7 grains per gallon, that in 100 tons of similar solid matter 57 are of no value, the remainder being 30.10 tons organic matter, 1 ton potash, 2.63 tons soluble phosphate of lime and 1.27 tons insoluble, and 8 tons ammonia, valued at $3,006, and of this value the ammonia makes $2,235.

Here, then, we have but 8 tons in 100, of high value, to produce the ammonia and the phosphate of lime, or 11.81 tons, of concentrated manure, worth $2,811, it is necessary to reduce 31,638 tons of sewage water or 6,960,360 gallons.

Various attempts have been made to concentrate sewage water, so as to make its manure merchantable, but the enormous dilution of water has hitherto prevented their commercial success. The quantities of useless matter to be moved and disposed of have proved too formidable, in weight, in space and in expense to justify any extensive operations in utilization of sewage by the process of concentration.

The city of Paris provides for the removal of all its cess-pool contents to Montfaucon. The estimate of cost, in 1850, for the removal of 230,000 cubic metres, was $414,000, and the income from the poudrette manufactured was considerably less than the cost of simple transportation. We have here another practical illustration of the mechanical difficulties which surround the process of artificial concentration, and which go to show that the cost of reduction is not justified by the prospects of income.

These results have been verified by an expenditure of £40,000 at the Stanley Bridge works in London, and by experience with processes of reduction by lime, sulphate of alumina and charcoal, by agitation with or filtration through charcoal, and by magnesian salt, detailed in the Metropolitan Drainage Report of 1857.

The mechanical obstacles to the solution of this problem of utilization assume a very different aspect, in all cases which admit of processes of direct agricultural irrigation by sewage flow. In cases of extension and long continued application, very favorable results are reported.

The Vettabbia, a canal which receives the sewage water of Milan, discharging into the river Lambro, ten miles distant, is arranged so as to irrigate a large extent of meadow land, with a remarkable result in productiveness. These meadows yield a net rent of $40 (£8) per acre, beside paying taxes, &c. They are mowed four times a year for stable feeding, and yield three crops of hay, with pasturage after August.

At Edinburgh, for forty-five years, several hundred acres of successive plateaus have been irrigated from ponds or tanks which receive the Old Town sewage water, in part. "The practical result is that land which let formerly at from forty shillings to six pounds per Scotch acre, is now let annually for from thirty to forty pounds, and that poor sandy land on the seashore, which might be worth two shillings and six pence per acre, lets at an annual rent of from fifteen to twenty pounds; on lands near the city twenty-five pounds per acre is the net annual income due to the sewage water; 17,920 gallons, containing five hundred weight of dissolved and suspended matter, are equal in fertilizing power to two and a half hundred weight of guano, or fifteen tons of farm yard manures, and cost in application twelve shillings and nine pence in comparison with three pounds for the latter, the economy being greater with an increased scale of irrigation." *Drainage and Sewage of Towns.*

At Mansfield, Willeston, Ashburton, Chatsworth and other English towns; at Berlin, in Sweden, Tuscany, Switzerland, Flanders, and in various other countries of Europe; in Asia, Africa and South America, irrigation has been practiced from time immemorial for agricultural purposes.

A valuable paper on this subject was contributed to the Farmers' Club of the American Institute by R. L. Pell, Esq., and is given in pages 336 to 360 of the Transactions of 1863. On the application of liquid manure Mr. Pell says:

"Not only is the produce increased, but offensive emanations are entirely prevented by a greater dilution with water, and more frequent applications of the liquid to plants. These conclusions were early corroborated by an able agriculturist, the late Mr. Oliver, of Lochend, who held a portion of the irrigated meadows near Edinburgh, and who complained that the sewer water, as there obtained, was far too highly charged with manure for its best application, and that such tenants as himself were prevented from improving the system by the want of water for proper dilution and of means necessary for more frequent applications of liquid manure. He was so convinced of the necessity of greater dilution that he caused water to be pumped by steam for the purpose.

"It will be found that after six tons of night soil and urine, diluted with about forty tons of water, have been applied to an acre of land, in an hour no offensive smell will be perceptible.

"A large portion of the valuable properties that are lost from decomposition and evaporation, by the retention of manure in the dry state, or in its application as top-dressing, is saved by its being diluted and carried in water under the surface of the soil, among the roots of plants."

In the same paper plans and estimates for farm irrigation, by the use of a steam engine, with a system of pipes, hydrants and hose, are given in detail.

The arguments in favor of sewage irrigation are forcible in themselves, and confirmed by the lights of experience. A principle deduced from correct theories is often doubted and delayed in application, if such application is novel in character; but experience adds force and conviction to every theory, experimentally. The valuable character of sewage flow; the deodorising effect of water which dilutes it; the superior processes of application to the roots and fibers of the vegetable kingdom, are not only clear in the chemists' laboratory and the engineer's library, but are demonstrated on a scale of most conclusive experimental testimony, which "he who runs may read."

The engineering question of irrigation by gravitation, as at Milan and Edinburgh, is simple in its details of application. It may also be confidently asserted that in those cities, with adjacent farming lands so located as to be easily accessible from a central elevation, which will admit the construction of a sewage reservoir and its supply by pumping power, the resultant benefits will largely exceed the outlay for engine power, pipage, and reservoirs; but in those cases, like New York, where vast quantities of sewage flow must be discharged, at points far distant from cultivated lands, and at tide level, the item of cost in transportation becomes formidable, and cannot be overlooked.

The conclusion under the head of utilization is that a due regard to a matter of public duty and profit requires the careful study of the local characteristics of every city and town, in arranging its plans of sewage flow, so as to make it available in all proper cases which admit the process of irrigation, by gravitation or by pumping, within the limits of prudential expenditure. In the case of Brooklyn, it is not improbable that the sewage flow into Gowanus bay might be elevated to the easterly ridge and distributed over the Flatbush farms, in part, with valuable results. The possibility justifies a careful examination, in this case, as in all others which seem favorably located. Two important benefits are secured by this process; the soil, depleted by its crops, receives back again its chief sources of production, and yearly renews its vigor; and the vast flood of contamination pouring from the intestine ducts of a densely populated town, is deprived of its noxious effects on the rivers which must otherwise receive its flow and the atmosphere, otherwise charged with its exhalations.

The principles of arrangement, which should govern an engineer in any general plan of sewerage, involve several important questions of practice.

The ancients, in their magnificent public works, which include expensive drainage construction, as at Rome, Salopia, Genoa, Agrigentum, Herculaneum, Jerusalem, Nineveh, Carthage, and many other cities of Europe, Asia, Africa and America, very frequently adopted a combined system of large trunk sewers, with tubular house connections, and availed themselves of excessive water supply, for flushing the main lines. Some of these arterial sewers (as the *cloaca maxima*, at Rome, fourteen feet wide and thirty-two feet high), were of enormous size, and the manner in which they have gradually filled up, while the tubes are still available, furnishes a striking comment on the general practice of modern cities, which, as in London, Paris, and New York, have, until recently, ignored the use of the tubular system and abound in examples of inherent defects. The positive and negative testimony on this point, establishing and confirming theory by long continued experiment, has led to the more recent adoption of the combined trunk and tube method of drainage, which, in time, will supercede all others, and which will be presented in detail after a notice of topographical arrangement.

From what has been said of the character of sewage, which requires disposal through sewers, it is evident that provision for rain-fall far exceeds ordinary house sewage and street wash. Now, as rain-fall must be disposed of through the natural depressions of the locality drained, and the quantity is determined by the natural drainage area, the sewer system of a city must therefore be adapted in its proportions to its entire drainage area, and is in this way independent of buildings or population. We refer here to the arterial arrangement, which is to be extended from time to time until the whole district is provided for and populated, and must be adapted to the greatest ultimate discharge. The lines and grades of these arteries are defined by the natural ravines for the flow of which they become substitutes.

It follows, from this law of arterial flow, that sewage discharge naturally finds its outlet in the river, or other water current which receives the rainfall, unless, for agricultural or sanitary purposes, it is artificially intercepted; and the propriety and method of such interception becomes the first study in the details of arrangement.

The arterial sewers for the primary, secondary, and tertiary ravines of the general district must be adapted in size and grade to the areas they severally and unitedly drain, and to a maximum storm-fall delivery. The following table of sizes, grades and areas, calculated for a continuous storm-fall of one inch per hour, is applicable to trunk lines, and accepted among hydraulic engineers as a reliable basis of arrangement, inclusive of house sewage and street wash.

Area in acres drained under a stormfall of one inch per hour.

Diameter in inches.	24	30	36	48	60	72	84	96	108	120
Inclinations:										
Level....................	38¾	67¼	120	277	570	1020	1725	2850	4125	5825
1 in 480....................	43	75	135	308	630	1117	1925	3025	4425	6250
1 in 240....................	50	87	155	355	735	1318	2225	3500	5100	7175
1 in 160....................	63	113	203	460	950	1692	2875	4500	6575	9250
1 in 120....................	78	143	257	590	1200	2180	3700	5825	7850	11650
1 in 80....................	90	165	295	670	1385	2186	4225	6625	......	......
1 in 60....................	115	182	318	730	1500	2575	4550	7125	......	......

It might be presumed that a study of the natural conditions of drainage, and an inquiry as to the large surcharge of water in sewage flow, would have led to the adoption of a more delicate and elaborate system for the several subdivided districts of drainage than massive and costly arterial sewers, and that the tubular or venous system would have been ingrafted on the arterial as a matter of simple induction. But, in drainage as in water supply, designors and constructors have been proved to copy the examples immediately before them, without due examination of their inherent defects in principle and failures in practice; or have lacked the courage to attempt changes which seemed experimental. The analogy between water flow into a city and sewage flow out of it has therefore been practically disregarded, and cities like London, which considered four feet water mains enormous in caliber, yet constructed Fleet sewers 18.5 feet by 12, to assist in the ordinary discharge, and classified sewers 5 feet by 2.5 as "small sewers" for subordinate districts. The city of New York, with about 200 miles of six-inch water pipes, builds no sewer less than 48 by 32 inches; and Paris, which doles out its house to house water supply by hand, builds the sewers from 4.16 by 6.25 feet to 13.41 by 15.41 feet. It is a singular fact in the history of modern engineering, that London is now expending near £6,000,000 in building intercepting sewers, designed to carry not less than twice the ordinary flow of the Thames River, and the city of Paris is following her example.

From an entire misapprehension of the fluidity of sewage flow and the causes of clogged and surcharged sewers, the order of nature has been generally reversed, in our modern cities, and the arteries have been built where the veins would have answered a much better purpose In all such cases the results have amply condemned the practice, as to sanitary evils, damages from floods, cost, and expense of administration.

The capacity of comparatively small tubes, for drainage, is fully illustrated in the following table of areas of discharge, sizes, and inclinations, calculated for a storm-fall of two inches per hour, including house sewage and street wash:

Area in acres drained under a stormfall of two inches per hour.

Diameter in inches.	6	7	8	9	12	15	18
Declination:							
1 in 240	......	......	......	......	......	5.8	10
1 in 120	......	1.2	1.5	2.1	4.5	7.8	17
1 in 80	......	1.4	1.8	2.5	5.3	9.	19.9
1 in 60	1.	1.5	2.1	2.75	5.8	10.	......

By this table it appears that under the most excessive storm-fall on record, supposing it to discharge continuously, a twelve-inch pipe will free a street 972 feet long and 60 feet wide, draining house-lots 100 feet deep on each side, with the moderate grade of one in sixty.

While the arrangement of the main arteries is controlled by the aggregate supplies they are to receive, and sewers of but five feet diameter will drain 1,000 to 1,500 acres, the arrangement of the lateral connections should be controlled by the nature of their special action. Here, where water supply from house to house is restricted in amount, satisfactory operation depends on the scouring action of this supply, and its proper concentration on the solid contents received. The whole aim of the venous system is to make the water supply effective, and this can only be attained by the use of intermediate lines, so devised in grade, caliber, tightness, and smoothness of internal form as to accomplish with certainty the desired concentration of flow; or, in other words, by the use of circular tubes, which combine the greatest power of delivery with the least frictional surface.

This system is not only incontrovertible in theory, but the history of sewerage, ancient and modern, abounds in experimental confirmation. In all those cases where trunk sewers have been erroneously built, with sizes entirely disproportioned to their service, with porous and rough surfaces and rough joints, they have proved as defective in action as excessive in cost. They have needed constant visitation and costly excavation and removal of deposits; of 69½ miles of sewers examined in the Kent and Surrey districts of London, the deposit was usually two feet in depth, and in some cases five feet, reeking with foul gases subject to explosion, and choke damp, and in a state of noxious fermentation; such sewers are spacious reservoirs of malignant accumulations, furnishing food and harbor for vermin, and exhaling pestilential gases into the air, breathed by those who work and sleep over them; bringing down storm-flow in large floods, they rapidly surcharge those larger arteries with which they connect and convey an erroneous impression of defective caliber, due only to defective arrangement; in strength and durability, they are exceeded; in cost, they are excessive; and in friction, seriously so, on the same wet perimeter. Pipes are, therefore, to be preferred as to caliber, close and firm joints, smoothness of surface, and regularity of form, strength, power of self-cleansing, transportation and laying, cost, and sanitary effects.

In 1863, New York spent $59,262 in cleansing, repairing, and rebuilding sewers, having 175¾ miles in use; the average cost of 20,315 feet contracted for was $3.90 per foot, while the average cost of 15,874 feet laid in Brooklyn was $1.41 per foot.

As an illustration of arrangement under the theory of combined trunk sewers and tubes, the following statement of the Brooklyn sewerage, built or contracted for from 1858 to 1863, is given:

Trunk Sewers.

		feet.	
72 inches diameter		2,472	
60	do	6,099	
54	do	1,425	
48	do	15,405	
42	do	662	
86	do	21,282	
			47,345

Tubular System.

		feet.	
24 inches diameter		34,123	
18	do	59,102	
15	do	112,019	
12	do	310,194	
			515,378
Aggregate			562,723

Of sewers in brick work, which can be entered and cleansed, we have here about eight and a half per cent of the system; three-fifths are twelve inches diameter, one-fifth fifteen inches, and one-tenth eighteen inches—the aggregate cost being $1,312,242, of which $455,943 is for street basins, man-holes, and other appurtenances.

In 1855, London had 934 miles of covered sewers, of which 126 miles were pipes. Liverpool, Glasgow, Carlisle, and other European cities use the combined system, while Manchester, Rugby, Craydon, Edinburgh, and other cities use pipes. In this country, Brooklyn and Chicago are prominent examples of the combined system, and pipes are being adopted at Albany, Hartford, New Haven, Elizabeth, Jersey City, and various other places, in whole or in part.

The proper materials for trunk mains, in ovals or circles, are brickwork; stonework, lined and arched with bricks, being preferable for other forms and large sections. Tubes, in Europe, are usually of stone-ware, carefully made from fire-clay; these were imported to this country for the Brooklyn sewers first laid, but have been gradually superseded by pipes of concrete, carefully made with hydraulic cement mortar in iron molds, and on polished cast-iron cores. With material of great durability, and with great perfection of form and surface, and moderate cost, there is every reason to suppose that they will eventually be adopted for general use—about twelve miles of them having been laid in Brooklyn since their first introduction, and their operation is a matter of congratulation in the annual reports of the commissioners, in common with the general pipe system.

The sanitary condition of a populous town in which damp subsoil and foundations, impregnated wells, and contaminated atmosphere are constantly exerting an evil effect on individual health, have therefore, an intimate connection with correct systems of sewerage.

It has been asserted as a matter of theoretical deduction, and of practical illustration in a number of the great cities of the world, subjected to the scourge of destructive epidemics, that the chief ravages of the disease have been confined to certain local districts within their limits, and that these districts are characterised by depressed levels and saturated ground, by improper water supply, and by defective drainage.

The victims of the cholera in 1849, at London, were taken in districts, The Health Report of 1860 says:

"On dividing the whole of the metropolis into three districts, the highest averaging 63 feet above high water mark, the intermediate 30 feet, and the lowest four feet, we find that the deaths were in the highest, 1 in 346· in the intermediate, 1 in 256, and in the lowest 1 in 93.

This report abounds in illustrations of effects from damp foundations, impure water, and vast deposits in cess-pools and sewers of sewage matter in fermentation, exhaling carburetted and sulphuretted hydrogen gas, and other deadly atmospheric mixtures. It was remarked by Dr. Grey, of London, in reference to the consequences of imperfect sewer action, that "knowing where the greatest mortality from typhus, typhoid fever, diarrhœa and cholera exist, he could map out accurately, the courses of the great sewers."

The Registrar General of London, in 1847, refers to the "disease-mist" which "arising from the breath of two millions of people, from open cess-pools and sewers, graves and slaughter-houses, is continually kept up and undergoing changes; in one season it is pervaded by cholera, in another by influenza; at one time it bears small-pox, measles, scarlet fever and hooping cough among young children; at another it carries fever on its wings. Like an angel of death it has thus hovered for centuries over London. Thirty-eight persons out of one hundred and thirty-four, die daily from local causes, and the great majority are untimely deaths."

Paris, Rome and other prominent cities, might be cited, in confirmation of similar conclusions.

In our own country and during the discussions of 1859, it was shown at that time, that New York and Brooklyn might claim the unenviable distinction of the most unhealthy cities among those of their rank, while the United States stood high in comparison with other countries. The mortality of New York, shows a gradual downward progress from the commencement, being in

1810 1 in	46.49
1825 1 in	34.78
1835 1 in	40.87
1845 1 in	37.55
1855 1 in	27.33
1857 1 in	27.15

the latter being about the rate of London two centuries ago, while in 1859, her rate was 1 in 40; as compared together, the ratio of New York being 1, that of Brooklyn was 1.242, Boston 1.739, and Baltimore 1.746. While it is to be considered, on one hand, that statistics published to sustain a special theory, may require closer investigation than general statistics, it must still be admitted on the other, that in any city a heavy proportionate loss of young or mature persons, whether by pestilence or the less emphatic action, often no less fatal, of continued mortality all the year through, and especially the preponderance of death in certain localities, does furnish ample reason for the most energetic inquiry into sanitary remedies and their prompt application.

The ratio of mortality in New York in 1856 and '57, was as follows:

	1856.	1857.
1st ward 1 in	21.04	21.96
6th ward 1 in	23.47	29.89
9th ward 1 in	42.94	41.56
11th ward 1 in	34.42	36.61
13th ward 1 in	25.20	22.36
15th ward 1 in	55.12	69.68

There can be but one inference drawn from a continued testimony of this kind, for the 15th and 9th wards show what is possible in public protection, while all the rest show what is fatal in neglect of precautions entirely within the scope of medical and engineering skill. In the universal tragedy of human misery, hereditary disease, intemperate habits and improper food have an important effect, in combination with other sources of suffering; but no incidental or individual predisposition to disease, can justify neglect of those prominent physical evils, which, in the ground we walk over, in the water we drink, and in the air we breathe, are nurtured and accumulated, as constant reservoirs of malady to those who do not "live out half their days."

With these hurried allusions to the nature of sewage matter to be disposed of, its analysis, its utilization, the principles which govern the arrangement of sewers, the comparative merits of pipes, and the sanitary evils to be remedied, this subject is commended to the earnest consideration of the members of the Polytechnic association, as pertaining to a matter of vital public welfare and of scientific research.

At the conclusion of the reading of this valuable paper, "The Manufacture of Combs" was selected for the next discussion, when the association adjourned.

American Institute Polytechnic Association,
April 27, 1865.

Prof. Samuel D. Tillman, in the chair; Mr. Benjamin Garvey, Secretary.

Metals—Solid and Melted.

Dr. Rowell gave an account of some experiments which he had made to test the relative specific gravity of solid and molten lead. He took a hydrometer tube, which is a glass tube with two bulbs blown in it, a small one at the bottom and a larger one above, and introducing a small quantity of lead he melted the metal with an alcohol lamp. The quantity of lead was sufficient to fill the lower bulb and half the upper bulb. Dr. Rowell supposed that if the metal shrank in hardening it would draw the two bulbs together and break the glass at the neck, while if it expanded it would burst the lower bulb. The glass was not broken; he, therefore, concluded that lead in hardening neither expands nor contracts, at all events not more than glass.

Another experiment resulted in the same conclusion. Having a kettle with a hemispherical bottom he filled it with molten lead and allowed it to cool. He then melted it all except a little lump at the center of the surface, and observed that the upper part of this lump was precisely at the level of the surface of the molten mass. But if the temperature of the molten lead be raised a few degrees above the melting point, the solid lump sinks; lead, whether molten or solid, being subject to the law of expansion like other bodies.

The case is different with iron. Visiting an iron foundry a few days before, he took the opportunity to drop a small ball of nearly red hot cast-iron into a ladle of the molten metal, and the ball floated with about one-tenth of its mass above the surface. One of the workmen dropped a leaden bullet into the ladle, when it went to the bottom instantly.

Mr. Blanchard said that he had tried the experiment of throwing solid cast-iron into molten cast-iron a thousand times, and it will always float.

Mr. Norman Wiard observed that there was some deception practiced in relation to the lead bullet; as every foundry man knows that if lead be mixed with molten cast-iron an explosion follows. The iron may all be thrown out of a ladle at any time by placing a little lead in the bottom of the ladle before the iron is drawn in.

Mr. Bird said that in melting lead he had tried the experiment many times of pushing with a stick a solid lump of lead to the bottom of a molten mass, and it would invariably rise again to the surface.

The Chairman explained that he was present at the experiments made by Professor Everett, an account of which was given at the time, and it was found that a pig of solid lead would sink in a kettle of molten lead, but whether the temperature of the molten lead was not considerably above the melting point, was not carefully observed. Had the solid and the molten lead been of nearly the same temperature perhaps the result would have been different.

Mr. Garvey remarked that the fact of the solid floating upon the molten metal was not conclusive proof of a lower specific gravity, as there were mysteries connected with the behavior of the substances under these conditions that had not yet been unraveled.

Dr. Parmelee observed that water, sulphur and some other substances when they change from the solid to the liquid state crystalize, and the crystals arrange themselves in such way as to have interstices between them, in this way diminishing the specific gravity of the substances. But substances which have not this property, increase their specific gravity in passing from the solid to the liquid state. If the experiment be properly and fairly tried it will be found that solid lead or iron will always sink in the same metal melted.

The Vanderbilt Medal.

Mr. Norman Wiard presented the designs and plaster casts of the gold medal voted by Congress to Commodore Vanderbilt in recognition of his munificent gift of his superb steamship, the *Vanderbilt*, to the nation in her hour of need. The design was by Leutze and the medal is being executed by Mr. Salathiel Ellis. On one side is a likeness of the Commodore in bas relief, and on the other an allegorical design: a female figure representing Commerce is kneeling to another, meant for America, standing upright, with a huge two-handed sword on her shoulder, and with her left hand resting upon a shield, while the background is filled with the spars and hull of the great ship. The medal will be three inches in diameter, and will cost $3,000. The ship is of 5,000 tons burden; she was built in the most thorough and careful manner, and cost $800,000.

The Chairman presented the following interesting items of scientific news:

The Largest Diamond Known.

This gem is in the possession of the Grand Mogul. It resembles in form and size half a hen's egg, and weighs two hundred and ninety-seven and three-sixteenths carats. It was found in the year 1552, at Colore, a short distance east of Golconda, and is valued at $2,300,000. It is cut as a rose diamond and is perfectly limpid with the exception of a slight flaw near the girdle

Chrome Alum.

A large quantity of chrome alum having been made at the laboratory of the Glasgow Mechanics' Institute, the various mother liquors were boiled to a syrupy consistence, placed in a bottle and laid aside. The solution had a pure and intense green and retained its fluidity for several months. After exposure for several days to intense cold, however, the bottle was observed to be full of a solid body consisting of minute crystals of ordinary violet chrome alum. The conversion of the violet into the green varieties is well known, but the reverse by means of cold is something new.

Vegetable Flannel.

This article is manufactured in Germany from the *Pinus Silvestris*. It is said a large number of persons are now engaged in the Black Forests in the various processes of separating the oil and the fiber, called *Waldwold*, or forest wool, from the pine leaves, and of spinning, weaving and knitting the yarn. This vegetable flannel is believed to have the important power of re-establishing the functions of the skin when they have been interfered with by accidental causes.

Comparative Value of Coals.

It is found that a pound of the best Welsh anthracite coal is capable of converting from $9\frac{1}{2}$ to 10 lbs. of water of a given temperature into steam; whereas the same amount of the best Newcastle bituminous coal will convert only $8\frac{1}{2}$ lbs. of water at the same temperature into steam. The inferior Newcastle will not raise more than $6\frac{1}{2}$ lbs. of water into steam.

Transformation of Protoxide of Nitrogen into Ammonia and Nitric Acid.

M. Peroz, in a memoir to the French Academy of Sciences, states that he passed nitrous oxide into a cooled tabulated receiver to arrest most of the water, then through a curved tube filled with hydrate of potash and lumps of lime. On heating the tube to a dull redness and as soon as the current of moist protoxide is well established, ammonia is abundantly disengaged, and after some time nitric acid may be found in the saline mass in the tube.

The Armstrong and Whitworth Guns.

A test was lately made in England of the 12-pounder gun made by Armstrong and by Whitworth. The charges used consisted of one and a half pounds to three pounds of powder, and a number of shots varying from three to six pounds. The mode of testing was most severe, an air-space being left between the shot and the cartridge. The breech-loading Armstrong became unserviceable at the forty-second round; the muzzle-loading short Armstrong at the sixtieth round. In both instances they simply cracked without a separation of parts. The Whitworth gun burst into eleven pieces at the ninetieth round. The tests applied to each gun were similar in all respects.

A Loom for One of the Nobility.

Messrs. Stewart, of Kilmarnock, Scotland, have constructed an elegant loom, of yellow polished pine, with all the necessary properties for the Countess of Eglington, who intends to manufacture her own dresses.

Substitute for the Sand-Bath.

Dr. Eloumeyer has suggested a very useful contrivance for superseding the inconvenient sand-bath in the distillation of liquids with high boiling points, which consists in surrounding the retort with short fibres of asbestos, which are held in place by wire gauze.

The Age of the Pyramids.

Mahmound Bey, astronomer to the Viceroy of Egypt, charged to investigate the positions of the pyramids, has found that the lateral faces of the great pyramid form with the horizon an angle of 51 degrees and 45 minutes, and that precisely the same angle of inclination is presented by the lateral faces of the pyramids of Memphis. The uniformity of the pyramids in this respect, and also in relation to the points of the compass, is of itself indicative of their having been built with some reference to the stars; and Mahmound Bey found that when the star Sirius crosses their meridians, its rays fell almost perpendicularly upon the southern faces. This discovery led him to calculate the date at which, supposing the pyramids to have been in existence, the rays of Sirius, at the moment of crossing the respective meridians of their localities, would fall *exactly* perpendicular to their southern faces; and the result of his calculations is, that this would be about 3,300 years B. C. According to the principles of astrology, the influence of a star is greatest when its rays fall perpendicularly upon the object. The brightest of the stars—Sirius—was dedicated by the Egyptians to the god Sothis, whom they supposed to have all funeral monuments under his special protection. The view of Mahmound Bey strikingly accords with Bunsen's calculation, that the builder, Cheops, flourished in the thirty-fourth century before the Christian era.

On the Cause of Rolling Thunder.

M. Vionnois, in a note to the French Academy, explains the cause of rolling thunder. He was at the camp at Nancy and heard the echo of the firing, not sharp and dry, but somewhat confused and prolonged. He then noticed that he was separated from the field by some trees, and concluded that the leaves of these were the reflecting surfaces. This led him to think that the explosion of the electric spark might be reflected by the vesicular vapor of the clouds, and the noise be softened and prolonged by the inequality of the distances and the successive reflections.

Cause of Rottenness of Cotton Cloth.

Dr. Calvert read a communication to the London Chemical Society, "On the Action of Silicate and Carbonate of Soda upon Cotton Fibre," containing his investigations into the cause of the rottenness apparent in some white and blue-dyed cloths which were shipped to South America about two years ago and returned to Manchester in consequence of their damaged condition. He found the goods had not been finished by the old starch-dressing, but had been treated according to the modern process, with a solution of silicate of soda, and he then expressed the belief that an oxidising action had been set up.

Prof. Abel said some experiments made by him some years ago, upon the preservation of canvas, led him to believe that oxidisation was not the cause, but he would rather attribute it to a mechanical force of crystalization. The experiments he referred to were made under conditions very similar to those described by Dr. Calvert. The canvas or tent duck was first impregnated with a solution of basic acetate of lead, and subsequently immersed in aqueous silicate of soda, which had the effect of precipitating a dense silicate of lead within the fibre. The canvas thus prepared was found to be very considerably protected against fire and the attack of mildew ; but there was a diminution in the strength of the material, and the process had to be abandoned. As a confirmation of the correctness of his opinion, Mr. Abel mentioned the result of other experiments in which flax and cotton fabrics were impregnated with the sulphate of magnesia, a neutral salt which could not exert or promote chemical action upon the fibre, yet the material became weakened merely in consequence of the deposition of solid matter within the fibre, and the unusual distension of the latter by the act of crystalization.

Manufacture of Indiarubber Combs

Dr. Parmelee being called upon to open the regular subject of the evening, the manufacture of combs, remarked that he had designed to speak only of combs made from hard rubber. Exhibiting a black mass, he said that it was a specimen of the rubber after being masticated—that is, passed between hot rollers, one of which revolves a little more rapidly than the other, and thus grinds and kneads the substance into a homogeneous mass. He then exhibited a specimen of the rubber after being mixed with the sulphur. It was a light colored, limber, elastic sheet. The speaker remarked that hard rubber differs from soft vulcanized rubber only in containing a larger proportion of sulphur, and being subjected to a higher temperature and for a longer period. It was invented by a younger brother of Mr. Charles Goodyear, the author of the great discovery of vulcanized rubber. The materials are mixed in various proportions, ranging from four to sixteen ounces of sulphur to the pound of rubber. The best proportion is that of equal parts of sulphur and rubber. After the two ingredients are thoroughly incorporated, the sheets are rolled down to about one-sixteenth of an inch in thickness, and are then subject to a temperature of 280° for eight hours. In order to keep the surfaces of the sheets smooth, they are oiled on both sides with a solution of lard in petroleum, and covered with a very thin sheet of block tin. They are then placed either in a pan of water or in a tight soapstone box, and enclosed in a strong air-tight cylinder, where they are heated to the required temperature.

The speaker stated that hard rubber may be softened by immersing it in boiling water, or otherwise raising its temperature to 212°. It can then be stamped, pressed, or molded into any desired form. Combs are made by pressing the substance into the proper form, while it is thus softened, and then cutting the teeth. There are three processes for cutting the teeth. By one process each tooth is cut separately by a circular saw. A small machine has been invented by which the comb is fed to the saw, drawn back automatically and carried forward to the next tooth till the comb is completed, when the feed motion stops, and the machine gives notice by sounding an alarm.

The machines are ranged in a row, and one girl can attend some twenty of them. By another process, a piece of hard rubber is pressed into the proper form for two combs with the backs at the two edges, and then the teeth are all formed at a single stroke of a press—each tooth of one comb coming from out the space between two teeth of the other comb. The third process is employed in cutting the finest teeth. A very thin blade of steel has a rapid reciprocating vertical motion over an anvil of block tin, and the comb to be cut is fed along horizontally under the cutter—one tooth being formed at each stroke. In this operation the rubber is kept warm, and no material is cut out—the tooth being formed by pushing aside a portion of the substance.

After the teeth are cut the combs are polished by hand—the work being done mostly by girls. The combs are first ground upon a stone, and the polishing is finished upon a buffer of cotton and oil. They are then packed and sent to market. The business is large, and great fortunes have been made from the manufacture.

Mr. Joseph Miller said, in the manufacture of large horn combs, there is great difficulty in getting large plates without cracks. To overcome this trouble the teeth are cut crooked, when, if a tooth breaks out, the horn is heated and pressed out to the required length.

CLYDONICS No. 2.

By Prof. S. D. Tillman.—The celebrated historian, Buckle, believed the most effective way of turning observations of natural phenomena to account, would be to give more scope to the imagination and incorporate the spirit of poetry with the spirit of science. By this means our philosophers would double their resources, instead of working, as now, maimed and with only one half of their nature. They fear the imagination on account of the tendency to form hasty theories. But surely all our faculties are needed in the pursuit of truth, and we cannot be justified in discrediting any part of the human mind.

These views if not applicable to methods of original research, are certainly of great moment in considering the best means of diffusing scientific knowledge; and if there is any branch of philosophy which is pre-eminently entitled to bring to its service the free play of fancy, it is that treating of the force of waves, whether propagated through liquids, æriform fluids, or more attenuated media.

The Pharos.

A discourse on the structure of the flame of the ordinary lamp might not gain general attention, yet how intense the interest as we speak of the particular light which a captain seeks when his vessel, freighted with human beings, midst storm and darkness, has nearly reached its haven. There are scattered along our vast boundary five hundred such beacons, kept in operation at an annual expense to the United States Government of more than a million dollars.

A description of one of these is given in the posthumous papers of the gifted Thoreau, just published under the title of "Cape Cod;" and although since the time of his visit a more imposing structure has arisen in the place of the old lighthouse, the account is so graphic, one feels after its perusal, the satisfaction which he would probably have experienced by a personal inspection of the premises.

The Cape Cod Light.

"The Highland Lighthouse, where we were staying, is a substantial-looking building of brick, painted white and surmounted by an iron cap. Attached to it is the dwelling of the keeper, one story high, also of brick, and built by Government. As we were going to spend the night in a lighthouse we wished to make the most of so novel an experience, and therefore told our host that we would like to accompany him when he went to light up. At rather early candle-light he lighted a small Japan lamp, allowing it to smoke rather more than we like on ordinary occasions, and told us to follow him. He led the way first through his bedroom, which was placed nearest to the lighthouse, and then through a long, narrow, covered passage way, between whitewashed walls like a prison entry, into the lower part of the lighthouse, where many great butts of oil were arranged around; a winding and open iron stairway, with a steadily increasing scent of oil and lamp smoke, to a trap-door in an iron floor, and through this into the lantern. It was a neat building, with everything in apple-pie order, and no danger of anything rusting for want of oil. The light consisted of fifteen argand lamps, placed within smooth concave reflectors twenty-one inches in diameter, and arranged in two horizontal circles, one above the other, facing every way excepting directly down the Cape. These were surrounded, at a distance of two or three feet, by large plate-glass windows, which defied the storms, with iron sashes, on which rested the iron cap. All the iron work, except the floor, was painted white. And thus the light house was completed. We walked slowly round in that narrow space as the keeper lighted each lamp in succession, conversing with him at the same moment that many a sailor on the deep witnessed the lighting of the Highland light.

His duty was to fill and trim and light his lamps, and keep bright the reflectors. He filled them every morning, and trimmed them commonly once in the course of the night. He complained of the quality of the oil which was furnished. This house consumes about eight hundred gallons in a year, which cost not far from one dollar a gallon; but perhaps a few lives would be saved if better oil were provided. Another lighthouse-keeper said that the same proportion of winter-strained oil was sent to the southernmost lighthouse in the Union as to the most northern.

"Formerly, when this lighthouse had windows with small and thin panes, a severe storm would sometimes break the glass, and then they were obliged to put up a wooden shutter in haste to save their lights and reflectors; and sometimes in tempests, when the mariner stood most in need of their guidance, they had thus nearly converted the lighthouse into a dark lantern, which emitted only a few feeble rays, and those commonly on the land or lee side. He spoke of the anxiety and sense of responsibility which he felt in cold and stormy nights in the winter, when he knew that many a poor fellow was depending on him, and his lamps burned dimly, the oil being chilled. Sometimes he was obliged to warm the oil in a kettle in his house at midnight, and fill his lamps over again; for he could not have a fire in the lighthouse, it produced such a sweat on the windows. His successor told me that he could not keep too hot a fire in such a case. All this because the oil was poor. A Government lighting the mariners on its wintry coast with summer-strained oil, to save expense! That were surely a summer-strained mercy.

"This keeper's successor, who kindly entertained me the next year, stated that one extremely cold night, when this and all the neighboring lights were burning summer oil, but he had been provident enough to reserve a little winter oil against emergencies, he was waked up with anxiety and found that his oil was congealed and his lights almost extinguished; and when, after many hours' exertion, he had succeeded in replenishing his reservoirs with winter oil at the wick end, and with difficulty had made them burn, he looked out and found that the other lights in the neighborhood, which were usually visible to him, had gone out, and he heard afterward that the Planet River and Billingsgate lights also had been extinguished.

"Our host said that the frost, too, on the windows, caused him much trouble, and in sultry summer nights the moths covered them and dimmed his lights; sometimes even small birds flew against the thick plate glass, and were found on the ground in the morning with their necks broken. In the spring of 1855 he found nineteen small yellow birds, perhaps goldfinches or myrtle birds, thus lying dead around the lighthouse; and some times in the fall he had seen where a golden plover had struck the glass in the night, and left the down and the fatty part of its breast on it.

"Thus he struggled by every method to keep his light shining before men. Surely the lighthouse-keeper has a responsible, if an easy, office. When his lamp goes out, he goes out; or, at most, only one such accident is pardoned.

"I thought it a pity that some poor student did not live there, to profit by all that light, since he would not rob the mariner. 'Well,' he said, 'I do sometimes come up here and read the newspaper when they are noisy down below.' Think of fifteen Argand lamps to read the newspaper by! Government oil! light enough, perchance, to read the Constitution by! I thought that he should read nothing less than his bible by that light. I had a classmate who fitted for college by the lamps of a lighthouse, which was more light, we think, than the University afforded."

Wave-Motions.

Let us, in imagination, stand with Thoreau on the luminous tower and amid the agitations of ocean, air and æth, consider the laws by which the Presiding Power controls these elements. The restless sea, through all its movements, from ripple to billow, obeys the same mandate; the time of each oscillation is proportional to the square root of the length of the wave. At great depths the motion of the fluid is wholly insignificant, because at a distance below, equal to the length of a wave, the motion is only one five hundred and thirty-fifths of that at the surface.

The size of the wave depends, therefore, upon the force of the wind and the depth of the sea. The largest on the Atlantic observed by Captain Scoresby were 550 feet long and 30 feet high.

Air-Waves.

The air, however, is not confined like the sea, which has only an upward and downward motion, except near the shore, where the force it contains would escape. But the whole mass of air, moving as wind, has also a vibratory or wave-motion producing sound. If the distant bell we hear is tuned to middle C of the musical scale, according to the new French standard, and the temperature is at sixteen degrees centigrade, its sound is produced by air-waves vibrating—not undulating—at the rate of 522 per second, each of which is about 2-15 feet in length. The lowest octave of this note which could be heard would, according to Savart, be the result of 16.31 waves per second, each about 68.8 feet long, and the highest octave by waves moving at the rate of 33,408 per second, each 0.492 of a foot in length.

Æth-Waves.

Turning now to the light produced by the fifteen Argand lamps, we behold still more wonderful wave phenomena. The all-pervading æth is, for miles around, thrown into undulations moving at an average rate of 582 million of million per second, having an average length slightly exceeding twenty-one millionths of an inch. These numbers, determined by repeated experiment, appal us, and we turn to that branch of the subject where results are more palpable.

The Chemistry of Flame.

All the phenomena attending the artificial production of light are not yet fully understood. Light is only one of the effects of the burning of hydrocarbons in the gaseous state. The solid candle and the liquid contents of the lamp must be volatilized, and brought into the same expanded state as ordinary illuminating gas before they can be burned. This condition is attained, in the case of the candle, by the heat of the flame; the liquid wax or tallow, by capillary attraction, is carried along the wick to the point where it is turned to gas. Yet light does not emanate from gases. Draper found that while gases heated to over 1,100 degrees centigrade do not give light, all the solids subjected began to be luminous at about 510 degrees C. and they display the several colors of the prism, and finally emit white light.

In the process of burning illuminating gas, the hydrogen is first combined with the oxygen of the air, and the solid particles of carbon, thus deserted by the hydrogen and exposed to the heat generated by the burning gases, become incandescent, and afterwards unite with oxygen forming carbonic acid gas.

It is, however, true that when the carbon is consumed at the same time with the hydrogen, no light is evolved; such condition exists when the oxygen is mechanically, but thoroughly mixed with the hydro-carbon gas before it arrives at the place of burning. This is effected by the Bunsen burner, in which the air is admitted at the bottom and mixed with the gas on its upward passage within the burner.

The result of this simultaneous burning of both carbon and hydrogen is an increased amount of heat and an almost entire absence of light. It seems, therefore, to be essential to the production of light that the combustion of the carbon should take place after that of the hydrogen.

Incandescence.

Steel filings dropped into a current of heated gases give forth brilliant scintillations. Hare, soon after his invention of hydro-oxygen blow-pipe, found that a pencil of lime held before it, in the burning gases, emitted a light of intense brilliancy. Such a light, when its rays were thrown into parallel lines by means of a parabolic mirror, has been seen in diffused daylight at a distance of more than one hundred miles. But to assert that light is generated because carbon or any other solid is incandescent, is not to explain the phenomenon.

Light is proved, beyond a doubt, to be the result of waves moving transversely to the line of propagation; the solid from which it proceeds must, therefore, have the power of producing such waves in the æth. The interesting question to be settled is whether the solid itself, or the æth within it, can be set into high vibratory action by means of waves of heat having a lower rate of velocity. Reasoning from analogy, we must decide in the affirmative.

Wave Induction.

Air waves have the power of exciting vibrations in solids which are more rapid than the waves producing them. This fact was brought forcibly to my notice many years ago, when I found the low tone in which I was conversing in a certain room was constantly followed, not by an echo, but by a musical note of very high pitch. After a search, the sound was found to proceed from a sheet of steel, six or eight feet long by as many inches wide, standing on its end and resting against the wall.

This sympathetic action can be accounted for by the laws of harmonics. The proper tone of a bell is always accompanied by harmonic sounds readily perceptible to a fine ear. It is asserted by some musicians that every sound made by a musical instrument is thus accompanied.

The vibratory action arising from periodic pulses sometimes appears to be greater than the cause. This arises from the fact that a new impulse is given just before the force of the previous impulse is expended. The same remark may be applied to oscillations. In the gymnasium, the self-swingers exert themselves only at the extremities of the arc. The danger of regular pulses where weight is sustained is well known. Soldiers in crossing a wooden bridge are required to break ranks and step out of time. I have often seen the long span of a timber bridge, which was firm under the tread of a herd of cattle, thrown into quick vibration by the rapid passage of a dog across it.

The condition required in this case is, that the tread of the dog shall harmonize in time with the vibratory action due to the elasticity of the timber. Many points connected with the subject of secondary vibrations are yet to be further elucidated by experiment.

Light from Rapid Dilations.

Only one other cause for æth undulations by means of carbon can now be suggested. It arises from the characteristics and conditions of the three important simple bodies which play the principal parts during ordinary combustion. Oxygen, the element of which more than one-half of our globe is composed, when isolated, is a permanent gas. No power yet applied has reduced it to the liquid state. Hydrogen, a gas sixteen times lighter than oxygen, has also no cohesive power. Natterer, of Vienna, subjected these gases separately to a pressure of 3,000 pounds to the square inch, when at a temperature of 106 deg. centigrade below the freezing point of water, without producing cohesion. Yet these two gases, when mixed in the proportion of two volumes of hydrogen to one of oxygen, are, by the electric spark, instantly condensed to steam, and, on cooling, to water. Carbon, on the other hand, when isolated, is always a solid No amount of heat yet applied has brought it to a gaseous, or even a liquid state. In its most condensed condition, as the diamond, it had 3.55 times the specific weight of water. It is 41,890 times heavier than an equal bulk of hydrogen, 2,618 times heavier than oxygen, and 2,992 times heavier than olefiant gas ($C_4 H_4$.)

In the process of illumination by the combustion of hybro-carbon gases, as described, the isolation of the carbon seems to be essential. It must, therefore, instantly change its volume and become a solid, and then as quickly assume the gaseous state, in the formation of carbonic acid gas. These rapid contractions and expansions of carbon may act as pulsations on the pervading æth, and thus generate the whole series of waves, which, commingling, form white light.

It is passing strange that carbonic acid gas, a resultant in generating light and heat—including the vital heat of myriads of animals—should, after its passage from the lamp or the lung to the leaf, be resolved into carbon and oxygen by a force similar to that these constituents can exert under certain conditions.

Molecular Forces.

Turning again to the Highland Lighthouse, let us estimate the power expended by its lamps. The average weight of oil consumed nightly was about sixteen pounds at the time of Thoreau's visit. Taking the mean of the results of experiments by Favre, Silbermann, Dulong, and Andrews with olefiant gas (oil gas not being given), we find that 11,943 pounds of water are raised 1°C by the combustion of one pound of oil. This sum multiplied by sixteen, the number of pounds used per night, and that product by 1,390, the number of foot-pounds which measures the force expended in raising one pound of water 1°C—that being the mechanical equivalent of heat as correctly determined by Mayer in 1842—we have 265,612,320 foot-pounds as the amount of energy expended in generating the light required for a single night.

In order to fully appreciate the power of these molecular forces, it is only necessary to refer to Dr. Tindall's admirable work on "Heat as a Mode of Motion," After calculating the mechanical value of the energy developed when the atoms of one pound of hydrogen and eight pounds of oxygen attract each other, fall and clash together, when the molecules of steam thus generated condense to water, and this water is converted to ice, the author says:

"Thus our nine pounds of water, in its origin and progress, falls down three precipices. The first fall is equivalent to the descent of a ton weight, urged by gravity down a precipice 22,320 feet high; the second fall is equal to that of a ton down a precipice 2,900 feet high; and the third is equal to a descent of a ton down a precipice 433 feet high.

"I have seen the wild avalanches of the Alps which smoke and thunder down the declivities with a vehemence almost sufficient to stun the observer. I have also seen snow flakes descending so softly as not to hurt the fragile spangles of which they were composed. Yet to produce from aqueous vapor a quantity of that tender material which a child could carry, demands an exertion of energy competent to gather up the shattered blocks of the largest avalanche I have ever seen, and pitch them to twice the height from which they fell."

Such is the impressive estimate of the force expended in the formation of a pound of ice from its component elements in the gaseous state; yet it will be observed, by the figures already presented, that the energy developed in one nocturnal display of the Highland beacon was sufficient to have thrown the fragments of five such avalanches to the same height.

Thoreau, the student and lover of nature in her wild moods and original garb, doubtless, with mingled feelings of awe and delight, beheld from that beacon tower the surging of the sea, and heard, in sullen sounds, the threatenings of a tremendous force; but as he turned toward the light, which fixed the gaze of many an anxious mariner, he did not realize the truth that art had there trained nature to perform the common service, which must ever be regarded as one of her greatest miracles; and that, to guide the sailor along the dangerous coast, she sent forth her messengers of light amid the ambient æth, whose undulations, in each and every minute of time, outnumber all the ocean waves that have culminated since man first ventured on the deep.

On motion the Association adjourned.

PROCEEDINGS OF THE HORTICULTURAL ASSOCIATION.

Horticultural Association of the American Institute.

This association met at the rooms of the Institute on Wednesday evening, April 6, 1864, for the purpose of completing its organization.

Peter B. Mead, editor of the *Horticulturist*, called the meeting to order, and moved that Nathaniel C. Ely take the chair, which was unanimously adopted.

P. T. Quinn, of New Jersey, read the proceedings of the previous meetings, which were approved.

Mr. Mead, from the committee to select a list of officers, said the committee had attended to the duty confided to them, and had nominated for officers, gentlemen who were well known in the community as taking a deep interest in the cause of Horticulture, and who would attend the meetings of the association, viz :

President, B. C. Townsend, Bay Ridge, L. I. *1st Vice President*, Dr. Isaac M. Ward, Newark, N. J. *2d Vice President*, J. W. Barrow, New York. *Corresponding Secretary*, James Hogg, New York. *Recording Secretary*, John W. Chambers, Brooklyn, L. I. *Treasurer*, Isaac Buchanan, New York. *Botanist*, Professor J. W. Thurber, New York. *Entomologist*, Doctor Isaac P. Trimble, Newark, N. J.

Committees.

1. *Large Fruits*—William S. Carpenter, P. T. Quinn, Isaac M. Ward.
2. *Small Fruits*—Peter B. Mead, R. G. Pardee, Francis Brill.
3. *Plants and Flowers*—John Henderson, William J. Davidson, William Fitzpatrick.
4. *Vegetables*—Peter Henderson, Alfred Bridgeman, William Cranstoun.
5. *Floral Designs, Ferneries, &c.*,—Andrew Bridgeman, James Hogg, J. W. Wood.
6. *Executive and Premium Committee*—The Presidents, Treasurer, Chairman of Committees 1, 2, 3, 4, 5, and the committee on horticulture of the Institute.

The officers and committees were unanimously elected.

P. B. Mead presented to the Association, on behalf of Mrs. Barrow, the first bouquet ; and after complimenting the lady for the taste displayed in the selection and arrangement of the flowers, took occasion to utter a protest against the usual mode of smothering flowers in paper, which he termed the strait jacket system, in which the symmetry of the leaf and flower is lost, and only an arrangement of colors preserved.

Mr. J. W. Barrow one of the Vice Presidents followed:

I will detain you only a few moments with some remarks on a dry subject; one, however, which has a direct interest for a Horticultural Association, as it is based upon that which is now, unhappily for us all, a purely vegetable production, limited in extent only by the quantity of fibers fit for the manufacture of paper, now known and yet to be discovered. The subject is Finance, its basis Mr. Chase's pets, Greenbacks.

We are engaged in establishing a society, the objects of which we all appreciate; the success of which will be useful to the science of which we are all votaries, and creditable to our city, our State, and ourselves. It ought to succeed. We have all the advantages we could desire. If we fail, our failure will be a disgrace to us; and we must therefore place failure beyond the bounds of possibility. To ensure success, however, something more is wanted besides enthusiasm for the science and a love of the beautiful.

We desire to found a lasting institution, one which shall outlive ourselves, and prove a benefit to future generations. We should aim at nothing less than the collection of the best botanical library on the continent, the ownership of a model garden and glass houses, and the establishment of a society whose approval shall be a stamp of sterling merit. How is this to be done? Not by outbursts of spasmodic enthusiasm, but by quiet, continued, prolonged, increasing efforts; by taking such measures as shall ensure us a permanent and increasing *income*. We must not rely upon the generosity of individuals, but upon a widespread basis of small subscriptions.

We must increase our numbers to such an extent that the falling away of a few will be more than compensated by the accession of others. We must render ourselves independent, and we shall then merit the public support. All this will require much time, but it can certainly be effected. Look to what has been done at Boston, and then say whether *we* ought to fail. I have not the figures before me, but I believe that I understate the case when I say that the Massachusetts Horticultural Society is possessed of real and other property worth not less than $100,000. Part of this is certainly the result of liberal donations and bequests, and of judicious investments; but the donations and bequests came after the society had shown itself worthy of liberality. "Heaven helps those who help themselves."

Let independence and self-support be the watchword of this Association. We shall have scientific and practical men among us well worthy to vie with those of all other cities and countries. They will support the credit of the Association in the fields of scientific botany and practical horticulture. Let those among us who have not the same qualifications remember that there is work for us to do, less distinguished, but not less practically useful. It is for us to set the machine going, and to keep it steadily at work, by supplying it with the necessary motive power in the shape of subscriptions. Each one of us can bring in at least one more member. Let him do so, and our numbers will soon increase in a geometrical ratio.

Those who take an interest in horticultural pursuits are much more numerous than we may think at first. Every one who occupies a respectable room may grow a flowering plant in it, and we all must know, from our own experience, that the possession of a single plant gives us the desire to collect more, and to procure all the information we can about their culture.

Finally, as a commencement of the good work, I beg leave to hand to the secretary the names of some candidates for membership; and I trust that each one of us will consider himself a special committee of one on recruiting service.

R. G. Pardee spoke of the influence of horticultural societies in elevating the taste and exciting a generous rivalry among those who grow fruits and flowers. These associations are the means of combining and concentrating individual influence and effort, so that the whole may be brought to bear in the collection and diffusion of information. Every one who raises a flower confers a benefit upon his neighbor. He had lately passed a magnificent conservatory, and the thought then occurred that its owner, instead of gratifying his own circle of intimate friends, might be the means of giving delight and instruction to immense numbers had he an organ like this Association, through which he might hold communication. He hoped this was the beginning of a new era.

Isaac P. Trimble said he had been honored by his appointment as Entomologist, but he must tell them at the outset that he was acquainted with the peculiarities of comparatively few of the 400,000 insects which are known to exist on our globe. In looking at the beautiful models of fruit which adorn these rooms, he did not see specimens of Plums, Apricots, or Nectarines. These fruits are gradually disappearing from this section of the country. No doubt many of you are aware of the cause. It is the effect of an insect called the curculio, of which it takes four to weigh a single grain, and we are cowardly letting it do as it pleases. He was asked by a gentleman what he should do to destroy the lady bug; his garden was full of them. He told him to let them alone until they had eaten all the plant lice, and then they would die of starvation. He had occasion lately to count the eggs of the Dusty Vapor Moth, and the average was four hundred, and this is nearly the average of all our moths and butterflies. Arithmetic will easily tell the story of how long we could live if any one of these was permitted to multiply without being checked. Among the insects, nearly half are feeding upon the other half; and we should have the knowledge to know which half are our friends. The birds are important aids in holding in check our insect enemies. Lately, in examining the crop of the Chick-a-dee, (Black-capped Titmouse,) one of the little creeper birds of winter, he found five of the larvæ of the apple moth, and the apple moth, next to the curculio, is the most fatal enemy of apples and pears. All animated nature is a cycle of complexity to those who do not study it, but there is a movable harmony in all things. If his friend could have killed all his lady bugs, he would soon have found his mistake. When the small birds have been shot off, noxious insects have increased fearfully.

Wm. S. Carpenter said he should fill but a small niche in this Society, but would do all in his power to make it valuable to the country. Pomology had been a subject to which he devoted many years; in fact, it was a specialty with him. The celebrated Van Mons, of Belgium, had done much for the cause of Pomology, especially in the improvement of the pear. Mr. Knight, of England, had devoted a lifetime to the improvement of small fruit, also to the apple and pear. Such enthusiasts deserve well of their fellow-men. There are a great many fine fruits which are unknown outside the orchard in which they grow. He had picked some apples from a tree 100 years old. He had propagated trees from it, the fruit of which he sent to England, where it was preferred to the Newtown Pippin. Improvements are being continually made in the quality of our fruits. Many varieties that stood high in favor twenty years ago, have given place to the improved varieties of the present day. These Societies are of incalculable benefit to the country, as a means of encouraging and disseminating information in relation to the various improvements made.

The Chairman, Mr. Ely, spoke of the influence of flowers. Their cultivation has a moral and refining effect upon our natures. He remembered in his young days those young ladies who cultivated flowers were more refined than others. Painting and the arts have a refining influence, but the flowers have a still higher, because they lead the mind upwards to the Creator. He spoke of his country home at Norwalk, where every house and garden is adorned with flowers and shrubs. He loved the country, and passed all the spare time he had there. He never knew a man or boy but was elevated in mind by the cultivation of flowers, and one that was always ready to do a kind action by his neighbor.

A. G. Burgess said he was early advised never to look for a wife in a family who did not cultivate flowers.

Mr. Nash said it was very important that correct reports of the meetings should be published in the newspapers, and urged that a competent stenographer should be employed for the purpose. This association, as I understand it, is for the purpose of bringing forward practical Horticulturists. The remarks of such persons will be of great value, as they will be the results of experience, and not mere theories.

He said he was born and lived in the midst of an orchard of about 20 acres, and was educated in the midst of good fruit. Many of the trees would yield well for a time, but would soon become diseased. He suggested a Committee on Seeds be appointed, and recommended that an orchard should be set out where forest trees had been cut down.

Mrs. J. W. Barrow exhibited choice cut flowers.

Wm. S. Carpenter exhibited eleven varieties of apples from his own orchard, viz: Northern Spy, Newtown Pippin, Swaar, Pennock, R. I. Greening, Seek-no-further, Dominie, Baldwin, Hubbardston Nonsuch, Greenwich, Roxbury Russet.

Wm. A. Burgess, Rosevale, Roslyn, L. I., exhibited two varieties of his new seedling strawberries, viz: four pots of "Garibaldi," and one of "General Grant." The plants were in fine condition, and covered with clusters of ripe fruit.

Adolphus G. Burgess, East New York, exhibited two new varieties of variegated leaved plants, viz: Ageratum splendens, and Salvia elegans.

Mr. Burgess said he was willing to offer a premium of $15 for the best seedling Rose to be exhibited during the year 1864.

It was resolved that the regular meetings of the Association be held semi-monthly.

On motion, "Flowers" was selected as the subject for discussion at the next meeting, and Mr. John Henderson was appointed to open the discussion.

On motion, it was resolved, that the ladies and others be invited to send written communications.

Adjourned. JOHN W. CHAMBERS, *Secretary*

HORTICULTURAL ASSOCIATION OF THE AMERICAN INSTITUTE.

The second meeting of this Association was held at the rooms of the Institute on Wednesday evening, May 4, 1864.

Mr. Peter B. Mead called the meeting to order, and, after a few remarks, introduced the newly elected President, Mr. B. C. Townsend, who, on taking the chair, said:

Ladies and Gentlemen,—I rise with feelings of great embarrassment to thank you for the honor which you have seen fit to confer upon me; an honor the more highly appreciated, as it was unsolicited and unexpected. At the time of your last meeting I was out of the city, and knew nothing of your action until my return. I feel embarrassed from the consciousness of my inability to worthily fill the position to which you have elected me. You will therefore permit me to occupy it only temporarily, until another more capable of discharging its duties can be found. At the same time, allow me to say that I take a great interest in the art of horticulture, and feel mortified, as a citizen of this city, in being so long without a society like this. With the influences and advantages around us, of our Central Park, and many other public and private parks and gardens, it is not very creditable to us to be without a well-organized Horticultural Society. The salutary effect on the occupants, of embellishing the surroundings of houses, is well known, and surely those who do not cultivate a taste for this art, lose much enjoyment. It should, therefore, be our aim to awaken an interest in this matter. See the innumerable gifts of God that crowd our pathway, which he has made common to us all. Our endeavors should be to foster a love for the simple pleasures of the garden; and, as far as I am concerned, my aid shall be cheerfully given. I will not take up any more of your valuable time from the discussion of the subject for the evening, but merely tender to you again the expression of my esteem and ardent good wishes.

Mr. Mead reported from the Committee appointed to prepare by-laws for the Society, that they had not fully accomplished their labors, and on motion further time was granted to them.

Mr. Mead suggested holding a horticultural exhibition in the month of June, when a fine display of flowers, and some of the early fruits, could be had. This matter was favorably received, and, after a brief discussion, the subject was postponed for action to the next meeting.

FLOWERS.

The subject for the evening was then taken up, when Mr. John Henderson read the following Essay:

Subject, "Flowers." Why I proposed it. Because the culture of flowers is the highest attainment of horticulture; consequently they ought and do take precedence in all Horticultural Societies. For this reason, I considered it the most fitting subject for its first discussion; but in proposing it, I did not expect to be called upon to speak of it myself, for I am well aware there are not only among my own profession, but also among amateur florists, many more capable of doing so, more especially at this season of the year, when, so distracted with business, I have no time to think the subject over, although dwelling, as it were, among flowers. But it is a subject so intimately connected with our future existence as a society, and of so great a scope, that I trust it will afford us very many more discussions, when others more able will favor us with their views.

Flowers have been more or less connected with man from the earliest period. Indeed, the opening chapters of the Bible inform us that when God had created man, he planted a garden in Eden, and caused to grow every tree that is pleasant to the sight and good for food, and therein he placed Adam, our first parent, thus typefying what is necessary for man's most perfect happiness. Nor has this changed in our day. Although man has so degenerated, yet, when he emerges from his sunken state, and strives to regain his original lofty nature, he does it in the garden; for here he finds in the cultivation of flowers, that true happiness which the highest honors of the world cannot give him.

Let us take man in his most degenerate condition, and we shall find that when he arrives at the highest point of civilization, it centers, as in our first parents, in a garden. For instance, the savage, when emerging from his wild state, commences with agriculture; that is, growing corn and cereals, and getting together herds of animals. Then, in order to facilitate the more easy culture of the earth, he fashions rude instruments of husbandry, thus bringing the mechanical arts into use. This very soon leads him to barter and exchange, when commerce begins, and commerce we all know by its wealth; when ambition shows itself in building splendid mansions, and adorning them with the most costly paintings, and beautiful pieces of sculpture, art and science can bestow.

When these are all obtained, horticulture asserts its sway. He surrounds his mansion with magnificent groves of trees; he plants an orchard, and makes a vegetable garden; but yet it is not perfect. He still feels a want, and that want is only supplied by flowers. He adds these to his otherwise beautiful dwelling, and his Eden is perfect.

As I before observed, flowers have been more or less associated with man in all ages. The ancients paid great attention to their culture. Flower markets existed in ancient Athens. India, China and Mexico have been famous for the cultivation of flowers from the earliest periods to which their history can be accurately traced. They were in great request by the ancients at all their entertainments. They scattered them before the triumphal cars of returning conquerors. They adorned the brows of their gods with wreaths of flowers. They constituted the mystical language of poetry, and in our day, they are the testimonials of our gratitude. They add brilliancy and luster to our festivals. We present them to those whom we love. We place them on the coffins and graves of our departed friends. We use them in decorating our churches on all joyful and religious occasions. But, above all, we use them to adorn our homes; and who has not felt their softening influence on his spirits? What pleasure they afford us when placed in our dwelling rooms, and how grateful and pleasant their odor. And who is there when going to a strange house, and perhaps not knowing any of its inmates, when ushered into the parlor, has not felt a load, as it were, taken from off his shoulder, as his eyes glance on a little vase of flowers? for his heart tells him that here a genial spirit dwells. We read that the celebrated Lord Bacon, while composing his sublime philosophy, used to have a vase of fresh flowers placed on his table every day. And what is there so lovely, after the cold blasts of winter, as the flowers springing from their earthy beds. With what delight do we not welcome the Primrose and modest Violet, gently telling us of the more gorgeous flowers that are following in their steps as summer advances. But there is a pleasure attached to the culture of flowers that never tires. They soothe our mind, and cause us to forget the cares and toils of life. Many of the most celebrated men the world has ever produced, have ended their days in the quiet and happy pursuit of horticulture. And this is easily accounted for, as flowers are ever changing, and showing us new beauties. We sow the seed, and after a few days or weeks are gratified in seeing the young plants springing from the ground, and then observing them from day to day increase and develop their growth until they arrive at perfection in blossom. Indeed, they are as it were our second children. They require constant care and attention, and that care and attention are so pleasing to us that we never tire of it.

Look at that masterpiece of painting or of sculpture. It is beautiful; it is everything desirable as a painting or as a piece of sculpture; but it is the same to-day as yesterday, and will be years hence. But not so with flowers. They each have their season of flowering, and each year, as the returning season advances, we look forward to it with as much delight to see a particular flower as though we had never seen it before.

But let us turn for a moment to the commercial value of flowers. Few are aware how important a part the products of flowers assume in our every-day life. Whence come all the delicious perfumes of the toilet-table? What would be the manufacture of pomades and soaps without the extracts from the fragrant flowers to destroy the rancid and disagreeable odors inseparable from all articles made from fatty substances? In Italy and France, in Asia and Africa, and more recently in America, thousands of acres are wholly used for the culture of flowers for their perfume. But at present France and Italy take the precedence over all other nations in this particular branch of manufacture; and in order to give you some idea of the extent to which this art is carried, I will give you the amount of flowers that one manufacturer of perfumes at Grasse, in the south of France, annually makes use of. This house alone consumes over 80,000 pounds weight of orange blossoms, 60,000 pounds of Cassia, 60,000 of rose-flowers, 30,000 pounds of jasmine flowers, 40,000 pounds of violets, 30,000 pounds of tuberose flowers, besides thousands of pounds of lilac, mint, thyme, rosemary, and other fragrant plants. In giving this estimate, you must understand it is for the flowers free from stalk, leaves or wood; and this is the consumption of only one out of the hundreds of manufacturers in France and Italy.

Have you ever been in a city noted for any particular branch of manufacture? If so, you will have observed that every other house appears to be a factory. Chimneys are sending up their volumes of smoke. The rattling and hum of machinery surround you on every side. If you go to Grasse, in the south of France, there every one appears to be employed in the manufacture, or rather the art of extracting the odors from flowers. The whole town smells of flowers! Walk in the country, and almost every wagon you meet, or every peasant girl or boy, is carrying baskets of flowers to the different laboratories in the town. Indeed the whole air is so impregnated with their fragrance, that for miles before you come to their vicinity you can smell their delicious fragrance, as it is wafted along by the breeze. But it is not my intention of here giving in detail a full statistical account of the quantities and value of flowers used for this purpose, but only to observe that the remarks I have just made are from personal knowledge, from having resided for many years in the immediate vicinity of Grasse and Nice. But this is a branch of commerce only just opening up in America; and who can foretell to what an extent it will not some day arrive at; for America possesses every degree of climate necessary for the production of flowers, the same as Italy and France. Already there are hundreds of acres under the cultivation of lavender, peppermint and wintergreen, which are extensively exported to Europe.

But I will not detain you longer on this subject, for it is of so much importance as a branch of commerce to this country, that I feel the growth of flowers in America for the manufacture of perfumes, to be a fitting subject for another discussion. I will therefore turn to the cultivation of flowers for the decoration of our dwellings, either as plants or as cut flowers. Perhaps there is no city in the world where cut flowers are so extensively used as in New York. I say this from a personal knowledge of the consumption of London and Paris, the former a city with more than double the population of New York; yet I think I am correct when I say the consumption of cut flowers for bouquets is nearly double in New York to what it is in London. And in order that you may judge somewhat of that consumption, I will give you the quantity of flowers I have myself cut for that purpose during the past season, say since September last. Of that beautiful carnation called La Purité, of which there is a specimen on the table, I have cut 50,000 blossoms; of Bouvardia, 30,000; of the double Chinese primrose, 70,000; of tuberoses, 30,000; besides about 50,000 of other flowers, such as roses, camelias, heliotropes, &c.; and yet I am only one of the many engaged in the cultivation of flowers for the bouquet makers of New York.

I may here observe, that although New York takes the precedence over the cities of the old world in the matter of cut flowers, it is not so in regard to plants in pots; for there the consumption is far greater than here. In the vicinity of London, almost every house has its garden belonging to it, and almost always filled with flowers. Flowering plants are also much more extensively used for the decoration of rooms, and especially for windows ; a system I hope to see more extensively adopted in New York; for window gardening adds a charm even to the abode of the wealthy, and also the poor have the delight of tending a few choice plants, and of becoming acquainted with their habits and flowers. Horticultural societies have also done much for the encouragement of the cultivation of flowers, and particularly among the humbler classes, with an evident increase of amenity within and around the dwellings, as well as an unquestionable tendency to refinement of habits and feelings. In almost all European cities there were floral markets specially devoted to the sale of plants and cut flowers. Who has not heard of the Marchee aux fleurs, or flower markets of Paris, or of Covent Garden in London? These markets have become world renowned, solely from their being the great depots for flowers, whether grown in pots or cut for bouquets and for the table.

But let us turn for an instant to artificial flowers. It may be said, what have they to do with the present subject? I answer, very much. We are so constituted that we will have flowers at all times and seasons if possible; for what greater adornment for the person? How would a lady's hat or bonnet look without them? but as we know natural flowers would fade too soon for this purpose, art has imitated nature, and there is not a new flower, or a new shade of color introduced by the florist, but the artist in flowers is ready to imitate it; and to give you some idea of the extent to which they are used, I have only to mention that France annually exports over $200,000, over and above what is consumed in the country itself. Then again, the colors of flowers. What more varied or beautifully brilliant? Art has never attained to them, but must ever be an imitator. The painter attempts to portray their brilliancy on the canvas; but how feeble the attempt. Let any one take the most beautiful painting of flowers by a Van Huysen, or a Cuyp, and let him compare the flower on the canvas with the natural one, and he will at once perceive how great a difference there is. Indeed, in many instances we have no means of describing a color except by naming the plant. For instance, the Rose, Lilac, Peach, Lavender, Violet, and many others. The manufacturer of silks for dresses or for ribbons, studies the colors of flowers, in order to imitate them as near as possible in his manufactures, so that no lady can adorn herself in the most costly dress or the most lovely ribbon, but its coloring is derived or imitated from the humble and lovely flowers.

In the year 1636 a flower mania prevailed in Holland, chiefly in reference to the Tulip, in which people speculated as in stocks and railway shares in our day. At that time a single Tulip called the Semper Augustus, sold for 13,000 florins, about, I believe, $6,000 of our money, the ownership of a Tulip being often divided into shares.

Artificial means have been employed for the produce and rearing of flowers far more generally than for the cultivation of fruits and vegetables. Those who can only afford a small green-house, almost always devote it to flowers; and those who cannot attain this have often favored plants under a frame or in a window of a room. I need scarcely mention what the amateur and florist have done for flowers, in the production of new ones, or the improvement given to the form and shape of old varieties. We have before us some beautiful new Verbenas, raised by Mr Peter Henderson, who has become somewhat identified with this flower. There are also some pretty Pansies raised by myself; also a Heliotrope, which I call the Belle of Jersey; and also the Double Chinese Primrose, raised by me 25 years since. It will perhaps be interesting to you, sir, to see the silver medal awarded to me by the Horticultural Society of London, as I was not much more than a boy then.

In conclusion, there is one other flower I would call your attention to. It is the Lily or Calla Æthiopica. This is probably the flower alluded to by our Saviour, when he compared it to Solomon—Solomon the greatest potentate the world ever knew, whose wisdom has never been equaled, living in a superb palace, surrounded and adorned by the famous hanging gardens; and yet, with all these attributes of royalty, our Lord said he was not arrayed as one of these little lilies of the field. And who can look at it without feeling the full force of the remark! What more artistically beautiful, whether we consider the chasteness of the form of the flower or its general appearance, taking blossom and foliage together. I will only further add, that flowers are so associated with us in our every day existence, that life would be monotonous without them.

On motion of Mr. R. G. Pardee, a vote of thanks was passed to Mr. Henderson for the very interesting and instructive manner in which he treated the subject.

Mr. Isaac Buchanan exhibited a choice collection of rare flowers. Among them were several very choice Camelias, Cacti, Rhododendrons, an Australian plant called the bottle washer, Lilies, Lælia, &c.

The President said that the Rhododendron is a plant that has been singularly neglected in this country. In England it is called the American plant, and much attention is paid to it there; yet, strange to say, we know very little of it here. It is a wonder that we have neglected such a beautiful ornament even for our city residences. It is a plant that is well adapted to stand the heat of our summers and the cold of our winters.

Mr. Buchanan said that it was an evergreen, and would grow in almost any soil; but in a stiff soil it would stand the heat better than in a light one.

Alderman Ely spoke of the profuse display of flowers that were on the tables. The massive bouquets presented by Mr. Wm. R. Prince, of Flushing, L. I., were worthy of particular notice. He called upon Mr. Mead for some remarks upon them.

Mr. Mead hoped that those who had favored them with such a floral display would be present and give an account of them; but as this time of the year was their busiest season, they could not, perhaps, well attend this meeting. He would, therefore, in compliance with the flattering request of Alderman Ely, say something in relation to a few of them.

We have here some fine specimens of the Pansy. This plant exhibits, in a peculiar manner, the advancement of horticulture in this country. He well remembered when it was called the Johnny Jumper. It then stood up something like the ladies' bonnets did about a year ago. The florist has improved them very much. He had seen some that were almost perfectly round, so that, if laid upon a circle, they would exactly fit the whole circumference. In flowers of this class, the border color should be pure and distinct, and go entirely round the plant. In this respect this flower is a little imperfect. The great trouble in our country is that it is too hot and dry. The pansy can only be brought to perfection here by artificial means, except in the early spring. If a cool place in the garden is selected, pansies can be grown with a good deal of perfection; that is, if good seed is obtained. Good seed is hard to be got. That usually sold at the stores will give only some 15 per cent of good flowers. He spoke somewhat doubtingly, as latterly they gave him good seeds. With good seed there was little doubt that they would yield 75 per cent. If we desire to propagate it, the best way is by cuttings. The amateur will tell you this is difficult, and can be done best by the florist, who is surrounded with all the appliances necessary. Now this is not exactly so; for here is a cutting, and if always cut in this way, there will generally be good plants. (Mr. Mead here took a slip and cut it in the proper way.) After this is done, if the plant is placed in a cool, shady part of the garden in the month of September, and covered with a newspaper, or if the plant is put into a box with some sand and a glass placed over it, it will generally take root. Mr. Buchanan would say that forty-nine out of fifty would be raised, with all his facilities for propagating this plant; in fact, it is the only way to perpetuate a choice kind, for we cannot depend upon the seed to reproduce it. It is a great satisfaction to a person to be able to say that he raised such a plant from a cutting, and it greatly enhances his pleasure; but, notwithstanding this pleasure, it is cheaper to buy the plants from the florist. For about twenty-five cents we can buy such fine plants as we have here. The pansy is a free-blooming plant, and comes early into flower. I have seen flowers on them before the leaves had attained the size of a ten-cent piece. This flower is not only intrinsically beautiful, but it is prized by the ladies quite as much as the Pink is by the men.

The large bouquet which we have here he supposed was made up in accordance with a suggestion that he made at a previous meeting. He took occasion then to say that our professional men made a great mistake in the formation of their bouquets; they are simply an arrangement of color, without form or good taste. He well remembered, many years ago, being on a committee with the late A. J. Downing and some ladies, at the Lyceum of Natural History, where an occasional exhibition was held. On this occasion, Mr. Downing said he did not like the style in which the bouquets were put up, and the ladies entirely agreed with him; but one of the ladies picked out a bouquet which she said was well arranged. Mr. Downing looked at it, and said that it was so; and turning to another placed at the other end of the table, said: "Here is a mate to it. I wonder if it was put up by the same person." But as there was no name to either of them, we could not tell; we therefore gave to those two simple bouquets the first prize. But he had not since seen any done up in that way. He had ever since declared war upon them. What have those innocent flowers done that they should be bound together like criminals? Which is the most beautiful, this or that? (holding up examples of each.) He would always condemn this strait-jacket mode. If any exhibition is got up as suggested, he would request that a set of prizes be given for bouquets made up in the natural way, and in this manner we would do away with the strait-laced style. The flowers should not be crushed together like a crowd in the street, but they should be arranged in their individual beauty, so as to be seen under as well as on the surface.

Here are some two or three kinds of the Magnolia; one of them is the *M. soulangiana*, slightly striped; another, *M. obovata*, purple; and *M. Alexandria*, deep crimson, striped. The trees on which these grow are of the Chinese variety, and are generally of medium height, but he has seen some of our native species, macrophylla and others, nearly 100 feet high. The great fault with the Chinese Magnolia is, that its flowers appear before the leaves. If it could be made to flower when the tree is in leaf, it would be magnificent; but it is very beautiful as it is

The next flower in the bouquet is the *Mahonia aquifolia*, from the Rocky Mountains. The seeds of this plant were originally brought home by Lewis and Clark. It is a very beautiful evergreen plant. This is a double white flowering Peach from China, one of the best of recent introductions. There are also double crimson, double rose, and double carnation striped varieties of the Peach, all of them handsome objects for the lawn. Here is a species of Ilex, the English holly, which is very pretty to look at, but very bad to handle, as its leaves are armed with sharp spikes. It is a splendid evergreen, but usually needs winter protection with us. This is the *Dielytra spectabilis*, sometimes called the bleeding heart, a name which he hoped would be discarded. He asked if there was anything pleasant in the idea of a bleeding heart, yet the flower is exceedingly pretty. It is a hardy herbaceous plant from China. Here is the *Cydonia Japonica*, or Japan quince, a beautiful scarlet flower that opens early in the spring. It is perfectly hardy, and every way desirable.

He wished to speak of the Orchids. This is a Laelia. It is a common notion with many that orchids can only flourish in a high temperature, but he had seen Lycastes, Oncidiums, &c., blooming finely where the temperature was allowed to go down to 45 degrees every night in winter. If this can be done, considerable fuel can be saved at least.

One great drawback to the advancement of Horticulture in this country, is that plants, to sell well, must have a foreign name and reputation. If Mr. Henderson, who raised this beautiful Heliotrope, the Belle of Jersey, had imported it from Europe under the name of the Belle of Lancaster, he would have sold five thousand where he has now sold one. He had seen a great deal of this. He had seen fine flowers in the hands of our florists year after year that could not be sold for want of a proper endorsement. The late George Thorburn was forced once to resort to the expedient of exporting and importing the same flowers to make them saleable here; and where he could not sell a few dozen before at 50 cents, he then sold hundreds of the same plant at a dollar ! and now this is done over and over again. We must raise our own seedlings, and seek some means to beget public confidence in them. The best Verbenas, Heliotropes, &c., now in cultivation have been raised in this country.

The President alluded to this desire for foreign plants, and gave as one reason the lack of any recognized standard or body to endorse a variety before it is sent out. Not so in England. A plant is put on trial for one or two years, and if it stands the various tests, it then receives official endorsement, and every purchaser knows he is buying a good thing when he secures it.

On motion of Mr. Jireh Bull, a vote of thanks was tendered to the gentlemen who have so kindly favored the Society with such a tasteful display of flowers.

The subject of "Early Fruits" was selected for discussion at the next meeting.

Adjourned to Tuesday evening, May 31st, at 8 o'clock.

JOHN W. CHAMBERS, *Sec'y.*

May 31, 1864.

A meeting of this Association was held on Tuesday, May 31st, 1864, at 8 o'clock P. M., at the rooms of the Institute, B. C. Townsend, Esq., in the chair.

After the usual preliminary business was transacted, the President remarked that he noticed a very beautiful bouquet on the table, and its style clearly indicated from whom it came. He called on Mr. William R. Prince for a few remarks on the flowers of which it was composed.

Mr. Prince said the flowers were cut promiscuously that morning, at the suggestion of the Secretary. They are all herbaceous plants, which are now beginning to bloom. The principal part of these flowers are the pæony, of which there are a great many varieties, but the majority of them are natives of Tartary, Japan, and Pekin, the northern part of China, which is nearly in the same latitude as this city. The cultivation of these flowers here does away with the impression that gorgeous flowers appertain to the tropics. There are few better flowers than the Chinese pæony. There are perhaps one hundred kinds of them that have odor. Some may suppose they are roses. Most of the old pæonies are scentless. One variety is called *endulas*, in consequence of the root being used as food in the southern parts of Europe, particularly in Spain. There are two or three species of the pæony in the Levant, and also in California.

The tree pæony is supposed by many to be too tender for out-door culture, and is thrust into pots, whereas it ought to be put in the coolest place in the garden. It will flourish as well on the ramparts of Quebec as here, and the reason it fails with amateurs is that they take too much care to put it in a sunny place.

Mr. Mead said he noticed some desperate looking branches on the table, and suggested that Dr. Trimble say something about them.

Dr. Trimble said he had no doubt that most of those present were aware that the cherry crop, that is, of the very fine kind of cherries, will be very deficient this year. The trees blossomed as usual, but the long-continued wet weather, and heavy showers, caused the petals of the blossoms to decay and fall off. This, with the lengthened wet season, giving them no chance to dry, they rotted, so that the crop of good cherries is entirely destroyed. The pear and apple were in blossom at the same time, and much of these fruits will also fail; but there are some good apples that have been saved. This is a branch of a very fine kind of French cherries that have been destroyed in his neighborhood this season. The apple trees this year, of which we have here a specimen, at one time were in this condition. On examining closely the leaves, the aphis, that scourge of the rose bush, was found there, and their destruction of the early leaves has diminished the crop very materially. Here are two branches of the apple tree, and they all present this appearance. This is due to the ravages of the well-known canker worm. In New England nearly all the leaves of the early trees have suffered from them; but the worms have since fallen to the ground, as this season there were more leaves than the worms wanted.

The aphis, which is the most universal of insects, and one that increases the most of any, has an enemy in the lady-bug. You can scarcely take up a bud but you will find some of these bugs in search of the aphis. He had sometimes fed these lady-bugs with the aphis placed on the point of a knife, and this season he was enabled to discover that these insects have a particular fancy for the snowball flower. When this flower does not flourish, if the leaves are examined, they will be found to be perfectly alive with the aphis. There is a prevailing opinion that the different color of these insects is owing to the food they eat; but microscopic examinations showed them to be of different species. Birds are very fond of them, and I have known of an instance where the snowball appeared to be almost entirely destroyed, when the birds came, and they picked off all the insects, and after that they flourished very luxuriantly. The birds that feed on these insects are very numerous; all those charming birds that remain with us but a few days, and then go further north, such as the warbler, oriole and cedar bird, are their enemies. If our public parks are visited, the shrill notes of the cedar bird are heard. They are great friends to us in destroying these insects.

He had here, in this bottle, some three or four specimens of the curculio, that enemy of the fruits of our country. He did not know of many bugs or birds that fed on them, but he found that the oriole does, and they are probably the food of those kinds of birds that feed on beetles.

Mr. Wm. R. Prince then read the following:

The grass specimens sent to the Society by Mrs. Mary Treat, of Iowa, are:

Hierochloa borealis, Seneca grass or Sweet Summer grass, described by Torrey & Gray, and in Eaton's Manual of Botany. It is perennial, and found abundantly in the Newark and Hackensack meadows, in the environs of Seneca lake, and in many localities in the Western States. It is remarkable for its sweet and pleasant odor. It is a native, creeping species, and spreads rapidly. In the eastern hemisphere, however, they possess a grass of a distinct genus, which presents a counterpart of our own Seneca grass, as to character.

The *Anthoxantum odoratum*, or Sweet scented Vernal grass, has a similar sweet and agreeable perfume. It is a native of the northern countries of Europe, and for the simple circumstance that it is an exotic and far-fetched, it is much cultivated in the flower borders of our gardens, while acres of a native grass, of a similar and in some respects of a superior character, which absolutely surround this city, are passed by daily, unnoticed and unknown.

The subject of the evening was then considered.

Early Fruits.

Mr. Wm. S. Carpenter said he was passionately fond of fruit culture, and took a deep interest in the improvement of flowers. We see every season what great improvements have been made in flowers all over the country by the different horticulturists, and the improvements of different kinds of fruit that were originally worthless. This would go to show that they were left by the Creator for man to cultivate and improve. Some persons, who see the bouquets on the tables, may think that the flowers were made so originally by nature, but they would scarcely be recognized as belonging to the original. It was so with the wild crab apple and native strawberry. These fruits were made what they are by cultivation and by crossing. An advantage we have over former times is, that we are not now confined to fruits that grow in our neighborhood. Who is there now that is satisfied with tasting fruit raised in his own country? We have before us flowers, most of them came from Europe; some from Japan and China. This latter country has contributed largely in flowers, but little in fruit. Perhaps France has done more for the cause of horticulture than any other country. He had within the last few years endeavored to collect the fruits of that country, and now had in his possession most of the fruits that are approved there, and the possession of which is ample compensation for all his labor in collecting them. He felt a pleasure in working among the trees that are yearly producing their luscious fruits, not only for the good they afforded him, but for the pleasure he derived in distributing them among others.

Mr. P. B. Mead then made some remarks on the strawberry. There is a class of cultivators who look upon its culture entirely with reference to profit, while with the amateur it is a matter of pure taste. An amateur who grows strawberries only for his own table, wants a tender, juicy, high-flavored berry; and if size and beauty are added, so much the better. For his own part, he would prefer a moderate crop of Burr's New Pine, to bushels of Wilson's Albany. He was becoming rather nice in his taste, and would choose a little that is good to a great deal that is bad. Amateurs would select high-flavored berries, and turn over the Wilson to those who grow for the market. Now is it good policy for horticulturists to pander to uneducated tastes, or should they not rather aim at a higher standard? One of the objects of a horticultural society, like this, is to establish a standard of taste. The public buy fruit with the familiar names without much regard to quality, and are often imposed upon

The Bartlett is a good pear, and people know it to be so; but the uneducated are often imposed upon by persons selling inferior pears under the name of Bartlett. The people need information such as they can only obtain by attending horticultural meetings and fruit shows. Dealers in fruit constantly deceive, instead of instructing the people. The summer Bon Chretien, an inferior pear, is often sold in this city under the name of Bartlett. People need to be educated by the eye and taste. He gave half of a pear to an individual, telling him it was the Bartlett, which he pronounced to be very fine; then he gave him the other half under another name, which he said was not near as good as the first. He ventured to say that examples of this kind are very common.

There is a great diversity of opinion in regard to the foreign strawberry. He was inclined to think that they are not adapted to our country. The Triomphe de Gand, La Constante, and a few others, he had seen grown very successfully here, but there was no foreign strawberry that will compare with our own native varieties for hardiness. It is not underrating foreign strawberries to say that they will not suit our climates. He had at one time 360 different kinds of strawberries. Many of them were from abroad; but he found that most of them required a great deal of nursing, more than he wished to give them, and after two or three seasons he threw many of them out, and he would advise others to do so, and replace them with our native varieties. The soil that he found best adapted to the strawberry and fruits generally, was one abounding in carbonaceous matter, such as muck, decayed leaves, &c. This is Nature's pabulum; it is that on which she nurses her first-born; it is that upon which she builds her forests, and upon which she feeds her choicest productions. What is wanted is a light, carbonaceous soil, and a little manure with it. The carbon can be got into the soil in the form of muck, leaves, charcoal dust, etc.; the manure should be old and well rotted. With such a soil there would not only be an abundance of fruit but also of good quality.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

June 14, 1864.

A meeting of the Association was held at the room of the Institute, at 8 o'clock P. M., the president, B. C. Townsend, Esq., in the chair.

During the miscellaneous business quite an animated discussion arose on a motion of Mr. Peter B. Mead to appoint a committee to endeavor to secure a location, in the Central Park, for holding the spring exhibitions, in which General Hall, Messrs. Mead, Hogg, Carpenter and the President took part. The motion was finally laid over.

THE STRAWBERRY.

Mr. Peter B. Mead said he occupied some little time at the last meeting in discussing some general points of strawberry culture. He then spoke of there being two kinds of strawberries, one for the epicure and another for the market. The time would come when there would be no distinction of this kind, as the cultivation of the finer kinds of strawberries and fruits generally would become more popular. It is not quite so now, as the public taste is not yet educated to that point. In reference to the preparation of the ground for the strawberry bed, he would remark, in the first place, that the ground could not be too thoroughly prepared. It ought to be worked at least two feet deep—two and a half feet would be better—a soil somewhat like light loam would be best. With that he would incorporate a large quantity of carbonaceous matter in the form of muck, leaves, charcoal and things of that kind. These peculiar substances have the character of attracting from the atmosphere the elements that are required to nourish the plant. They not only give color to the soil, but also flavor to the fruit.

Let a piece of ground, twenty feet square, be prepared, one-half with carbonaceous matter in the soil and the other half withcut it, or in the ordinary way, and it will be found that the fruit in the half that contains the carbonaceous material will be very high flavored, while the other will be very inferior. He spoke confidently, as he experimented in this matter for years, and he therefore would recommend this carbonaceous matter for all kinds of plants and soil, whether it be a clay soil or pure sand, and if stimulants are to be used they should be of light manure that has laid for years and become very rotten. Soil prepared as he indicated requires very little stimulants to grow strawberries in great perfection. The Hooker, La Constante and Triomphe de Gand are good kinds of strawberries to plant, and there are some few other kinds that will probably take a place by their side. In selecting plants we should discard every kind of acid fruits. The strawberry should contain the sweetness within itself. It should not be that to make it palatable it must be smothered with sugar, particularly as the present price of that article forbids its liberal use. The true strawberry should be sweet without any sugar at all. They ought to be the same as the apple that you can make one or two bites of, according to the size. He would then discourage the planting of strawberries that possess a large amount of acid. There are many kinds that are as full and productive, and some a good deal better. They are sweet and very palatable. The Wilson is a very productive kind of strawberry, and he would not exactly discourage its cultivation; but there are many kinds that are better, and more that are a good deal better. Select strawberry plants for flavor alone, and be sure to get those that will endure the heat of summer and the cold of winter. The foreign varieties will not do this, as he found them to fail in this respect. The Triomphe de Gand and the Bonte de St. Julien are good for hardiness, and are very suitable to plant in a garden.

Now, as to the best time for planting, some will tell you the spring is best, and others will say the fall; and again, some will tell you to plant whenever you can get them. In the main they are all right; but in a certain measure they are wrong. If a strawberry plant is taken up in the fall, with ordinary care, it may be transported 400 or 500 miles and bear in the spring, but we should prefer to cut the fruit stalk out. They can be planted in the early spring with the certainty of having ninety-nine per cent of them thrive well, and they may be planted in the fall, say the middle of September, provided that on the approach of winter the plants are covered with a litter of some kind to prevent them from being thrown out of the ground by the frost, for the roots of new plants do not attain a hold in the ground during the first season to prevent this from taking place during the winter, and, for the want of a little straw placed over them in winter, many fine plants have failed. There is no reason why even one in a hundred should die. For his part, he preferred the month of September to any other month of the year. He had planted strawberries until the ground was frozen. For years past he had done this, even in the month of December, but he always covered them with a litter of straw, and whenever, by accident, this was neglected, they would be sure to fail, and he deserved to loose them. He planted last season eighteen different kinds, and those planted during the last week of November are the strongest of any planted throughout the whole season; but it so happened that last winter was very favorable for this purpose. Select kinds that are noted for their flavor, and do not plant straight in the ground, but spread out the roots and get the soil well about the roots, and there is no reason why they should not grow to four and five inches in circumference. A strawberry plant that throws out a massive head will always be sure to be very productive and fine. This is a noted fact that good plants are distinguished in this way. A strawberry that has made some noise, and a very good plant, called the agriculturist; he had seen a bed of them a few days ago, and he found, by counting, that the first plant contained 294 berries, the second plant 248, and the third 223, and these were mere infants, not quite a year old. Now if they do this in the green state, what will they do when they are full grown? He did not think he was betraying any secret if he told where he had seen these plants. They were on the grounds of Mr. Wm. S. Carpenter, who deserved great credit for his perseverance and skill in horticulture.

In answer to the following query: "Shall strawberries be planted in rows or hills?" His practice was to plant in beds, the rows one foot apart, and four rows in a bed, and to plant from fifteen to eighteen inches apart, according to the kind of plants, and so arranged that a person could walk between the rows without treading upon the beds. As strawberry beds are usually made, it is impossible to pick them without injuring the beds and destroying a great many berries, in which case the beds in a few years run out. Here is a box of strawberries placed on the table this evening that did not require much to be said of them, as they spoke for themselves. They are from seedlings raised by myself eight years ago. They thrive under a great variety of circumstances, and are a very good fruit. These were grown in pure sand, and under very unfavorable conditions, and they show clearly what can be produced without hardly any culture. The flowers have been imperfectly developed, and hence the berries are somewhat out of shape; but they are very good. Some are hardly ripe enough to show their true flavor, and their size could be much increased. He had grown some six and six and a half inches in circumference.

Mr. James Hogg then read the following paper on

The Principles of Taste Applied to Floral Decorations and Designs.

Mr. President and Ladies and Gentlemen:

The aphorism, "*de gustibus non disputandum,*" I have no doubt is familiar to you all, and although it is often quoted to prove that the principles of taste are not governed by any fixed rules, but are dependant upon the whims and fancies of each and every individual, yet, I think, upon a proper analysis, and careful study, it will be found to admit of a more stringent and elevated interpretation, and really to mean that the rules of taste are predicated upon principles as fixed and rigorous in their application as those of mathematics or any of the exact sciences.

While on this occasion I do not intend to go into an elaborate and detailed analysis or examination of all of these rules and principles, for your time would not permit of my doing so, yet I propose to glance at such of them as have a direct bearing upon the subject of this evening's consideration.

To many perhaps the theme may not be thought worthy of much consideration, as not being sufficiently practical and utilitarian in its bearings; but it must be borne in mind that whatever tends to elevate our thoughts, to render our homes more elegant and attractive, and exercises a refining influence over us, is as much a matter of utility and has as much practical bearing on our lives and happiness as subjects which have for their object the increase of crops on a given area, or the enhanced values measured by the price currents of the markets.

I shall more particularly address myself to the ladies, as it is a subject which especially commends itself to them, for I have never known a lady of taste and refinement who was not delighted with, or could not appreciate a tastefully arranged bouquet or floral design.

One of the greatest faults in the present fashion of arranging floral designs is their stiffness and formality; bouquets are made in the form of a stone-cutter's mallet, and exhibit a ponderosity almost as great; the centre piece for a dinner table exhibits a solidity of form almost if not quite equal to that of a sirloin of beef, or any other "piece de resistance" which the culinary artist may find necessary to introduce. Does a gallant send a basket of flowers to his inimorata, it will often be found arranged in ribbons of color, perhaps with a five or six pointed star in the centre, or may be a spread eagle; do we attend the obsequies of a deceased friend we find the coffin literally covered with crosses, anchors, harps, crowns and similar designs, as though such things could ever be appropriately made out of anything but wood, irón, or other metal, or precious gems. At our floral exhibitions we find spades or plows made of wood smothered in Dahlias and marygolds; or, as such occasions frequently occur near election time, we find temples of liberty, suggested by the first political poster, posted on the nearest dead wall, made of verbenas and chrysanthemums, and what is worse we find premiums awarded to their manufacturers as for floral designs. All such things are execrably devoid of taste, and should be kicked out of the exhibition rooms as outrageous impertinences.

The fundamental principle of taste is creative power, and it must always be exhibited if we would command respect or consideration for our work. It is this which distinguishes genius from talent; genus in works of art imitates nature—talent copies her. The one paints a picture; the other makes an anatomical or scientific drawing. He who creates or produces the greatest effect from the smallest amount of material has the greater genius, as showing the greater creative power, and his works give greater pleasure than do those of him who has to bring in a larger number of accessories to produce the same or similar effects. For this reason sculpture always ranks higher than painting, and is of a higher order of genius, and is the rarer of the two gifts, for comparatively there are sculptors few and painters many. One has to depend entirely upon beauty of form and simplicity of material to produce pleasant emotions in the beholder; the other has to call in the aid of colors and certain accessories of light and shade to produce the same or similar emotions.

For this reason floral designs made of fern leaves or other foliage, always to a cultivated and critical taste, produce the most pleasant emotions, as the effects produced always indicate greater creative power than if they had the accessories of color and the greater variety of lines to be found in flowers. Some of the exquisite designs of the silversmith, wrought in bright and frosted silver of palm leaves or fern leaves, or similar foliage, will exemplify what I mean if contrasted with the elaborately wrought and colored work of the choicest Sevres or Dresden China. The exquisite beauty of well arranged phantom bouquets is referable to this source; the material itself is almost despicable, yet the wonderful creative power displayed in the marvellous traceries and wondrous variety and grace of form, fill us with astonishment, and call into play the highest and most delightful emotions of the mind.

Success in such designs depends much upon the objects in view, which necessarily can be but two and they the opposite of each other, and yet according to the character of the artistic treatment will equal degrees of pleasure be given. Either we must use the simple and delicate forms to ornament some other object, when they become subordinate, or we must make them the principal objects to the eye and so make them of primary importance. In the first case the object decorated must be of more value intrinsically than the material used in the decoration; in the second case the object containing them, or to which they are attached, must not appear to be of as much value as the material used. For instance, if you have a beautiful vase or other central piece of silver, you may arrange fern leaves of the more common or familiar species around its foot, or upon its stem, or in its cup, and so produce delightful effects of beauty by contrast, by contrasting the elegant lightness of the foliage with the more massive elegance of the silver, while beauty by harmony is preserved by the foliage being all of one color though in different shades. In the other case you require more rare and less known species and of greater variety of curious forms and shades of color, as in this case they are presented to the eye on account of their value as rarities as well as for their beauty; we must be careful that the object which contains them, or to which they are attached, appear not to be of greater value than themselves, hence a fine glass or simple porcelain vase or ornament is the more suitable for our purpose. But care must be had that we do not go to an extreme; the glass or vase must be of sufficient value either in intrinsic quality or workmanship as to aid in suggesting the idea of the value of its contents by showing them to be worthy of such a support. This brings me to the consideration of another principle, viz: that the material must be worthy of the labor bestowed upon it. There ought to be in all productions of art a certain nobility of character which should show that they are the products of intelligence or mental effort, and not the products of mere mechanical skill; and the embodiments of such intelligence or thought should be of materials correspondent in value thereto. I recollect some years ago seeing some pictures exhibited in this city which were made of tufted wool dyed of the necessary and suitable colors to render them, not copies, but representations of some of the noble paintings of the old masters. They had cost the artist, if such he could be called, an infinity of labor and manual skill, and yet for all that they were not pictures, they were simply tufted wool dyed and skillfully arranged. So, too, you may see disgracing our park a statue cut in red sandstone, which no doubt cost the workman who made it much manual labor, but it is not a statue, it is an effigy, and would be so if it had been cut by Powers or Crawford. I have often seen at our fairs and exhibitions premiums offered or given for bouquets of wild flowers, and have never yet seen an instance of an elegant bouquet or design made of such materials. There is among plants as among all other forms of created objects a certain nobility or aristocracy of class. Some are created no doubt simply to provide for the sustenance or similar needs of mankind, for others we can find no other use, but that a noble use, to please the eye or gratify the olfactory sense of men, or looking further they may be the gems which the Creator has employed to decorate his footstool withal.

Therefore, eschew all the sentimentalities and poetry so called of the woodland and forest, for while they are all proper enough in their place they are not suitable for the object we have in view; and if a beautiful thought or design suggests itself to your mind, work it out in the best flowers you can procure. Let them be cultivated flowers, suggestive of care and skill in their production, and suggesting also the sacrificing of the material for the intellectual.

Fitness of purpose is another principle which must be attended to in floral decorations. As such decorations are used on so many various occasions, each having a more or less remote significance, it is necessary to carefully avoid incongruity of purpose. A design intended for a festive board, when its elegance or beauty would be suggestive of the most joyous emotions, would be out of place at the funeral of a friend, as its tendency would be to attract attention to itself and away from the considerations suggested by the mournful occasion. At a funeral the flowers should be subdued in color, should be arranged in a more careless and unartful way than on other occasions. They should simply be accessories to the occasion, not prominent features of it; should be suggestive of affectionate regard, and be a simple token of our love and esteem for the deceased. Elaborately wrought designs of anchors, harps, crosses, &c., are not to be tolerated. They are simply impertinent displays of vulgarity varnished over with a sickly sentimentality. Simple wreaths, as for instance of lamarque or safrano rose buds with their own foliage, are not only elegant, but appeal to our better feelings through their simplicity. Aside from these bouquets of choice and fragrant flowers, such as we would offer to the deceased if in life are appropriate. Convenience requires that they should be made flat if to be laid on the coffin.

It is the custom among us to decorate the fonts and chancels of our churches on Easter Sunday, in commemoration of the resurrection of our Saviour, and ignorant fashion requires that the flowers used should be white. From time immemorial, in all countries of the earth, there has been a symbolism of colors, which, especially in religious ceremonies and decorations, has been strictly observed and practiced. According to this symbolism two principles, light and darkness, produce all colors. Light is represented by white, and darkness by black; but as light does not exist without fire, red is also used to represent it, and on this basis symbolism admits two primitive colors, red and white. Red is the symbol of divine love; white the symbol of divine wisdom and uncreated right. Red, in its various shades, was continually used as a prevailing color in the vestments of the priests, as it is to this day in the Roman church, and by a tradition of practice the cushions of our pulpits and the covering of the communion tables are of this color. In the great mysteries of Eleusis a child was always initiated and performed a character emblematic of death, hence he was called the child of the sanctuary, and to this day choir boys in our churches wear red vestments The artists of the middle ages always gave to Christ, *after* his resurrection, robes of red and white. Yellow was a symbol of the revelation of the love and wisdom of God. Azure was the symbol of divine eternity and of human immortality. From this it will appear that if we undertake on such occasions to emblematize, we should do it with studious care, or else we shall be apt to commit anachronisms. In placing flowers on the communion table, or in the font, on such a festival, we should not choose white only, but should choose such colors as are befitting to express the ideas we wish to symbolize. As those who so use flowers believe in the divinity of Christ, the flowers should, in their prevailing colors, be red, white, yellow and azure. Red, as indicating his divine love; white, as indicating his divine wisdom and emanation from the Father; yellow as a revelation of his love in dying for us, and azure, as emblematic of his immortality and divine eternity. I could pursue this interesting subject much further, and explain the symbolism of other colors and their various shades, and also the ideas conveyed in their combinations and use, but it is not necessary to do so at present.

Stiffness and a regular formality are especially to be avoided in arranging bouquets for vases. Lightness and gracefulness are especially to be sought for; but if heavy solid flowers, such as camelias, or roses, or pæonies, or similar flowers are used, they ought to be used by themselves with their own foliage, and not intermixed with lighter flowers or foliage. Such flowers, however, are better adapted for baskets where massiveness of effect is not so much out of character. I would especially call your attention to using as much as possible the foliage properly belonging to the flowers themselves; it invariably harmonizes better with the flowers than the foliage of any other species. As a general rule it will be found, upon close examination, that the foliage belonging to every plant suitable for decorative purposes, has a certain beauty, either by harmony or contrast, with the flowers it produces. Take the rose, for instance, in its full blown state. Its petals are rounded and involved in their lines of arrangement, whilst the foliage is pointed; in this state it produces beauty by contrast of lines. But the buds are pointed, the swelling curve of the outline being similar to the beautiful curve of the leaves; in this state it produces beauty by harmony of lines. Again, take the camelia. Alone, without foliage, it is a cold, unimpassioned flower; but when combined with its rich, glossy foliage, with its acute termination, it produces a magnificent effect, through the beautiful play of light reflected from its leaves, and the contrast of their noble curved lines and their yet harmonious substance with the regular, dull, wax-work appearance of the flower.

Bouquets for the hand should be of the choicest flowers gracefully arranged; heavy solid flowers, or massive arrangement should be as much as possible avoided. Such bouquets are necessarily brought under the closest inspection of the eye, and should be composed of flowers of delicate structure, or great rarity, or exquisite fragrance. The present style of immense size, composed of solid flowers, scarcely if at all relieved by foliage, is only suggestive of some enormous variegated or pied fungus, hung with silk fringe, or put up in lace paper. I have often noticed at evening entertainments, that they literally became a burden to their fair possessors. For successful effect in floral decoration, much depends upon the judicious arrangement of color; violent contrasts are especially to be avoided, as is also the sameness, produced by having too much of one color.

In producing harmonious contrast of colors, it should be remembered that there are only three primitive colors, red, blue and yellow, from these arise what are called binary or secondary colors, namely, orange composed of yellow and red, purple composed of blue and red, and green composed of yellow and blue, these form contrasting colors to the primary three with which they are in harmonious opposition, as the orange with blue, purple with yellow and green with red. From the combination of these secondaries arise three tertiary colors, olive from purple and green, citron from green and orange, and russet from orange and purple. These tertiary colors harmonize with the primitives, as they stand in the relation of neutral tints to them, but are in harmonious opposition to the secondaries from which they were combined. Red, blue and yellow, harmonize with each other and may be placed in juxtaposition, but purple should not be placed near red or blue, as it is composed of those two colors; for the same reason orange should not be placed next to yellow or red, or green next to yellow or blue. The rule being that no primary color should be brought in contact with a secondary color of which it is itself a component part, nor any secondary color brought in contact with a tertiary color of which it is a component part. Another rule is that the secondary and tertiary and the neutral hues arising from the tertiaries, such as brown, maroon, puce, slate, lavender, &c., should be used in the greatest quantities, and the primaries used in smaller quantity for heightening the effect. If you lack the proper shades for producing the necessary harmonies and find that two colors do not harmonize well, separate them by some white flower. Again, you should always place your brightest color in the centre of your design, and gradually decrease the intensity of the tints as you approach the exterior. This was the almost invariable practice of Van Huysen, so celebrated as a painter of flowers; he was also in the habit of using but one prevailing color, so as to avoid spottiness or patchiness in his groups.

But, Mr. President, I fear that I trespass on your time and patience, and will therefore conclude my remarks. I trust that we shall see at our exhibitions specimens of the taste of our lady amateurs, especially in floral decorations for the table. Such decorations impart an air of elegance and refinement to an apartment or to a festive occasion, and if the desultory remarks which I have had the honor of offering to you should afford any instructive hints, and aid any of my hearers to carry out some pleasant or beautiful idea, I shall feel pleasure in the thought that I have been the means of affording any assistance to them.

Mr. Bull moved that a vote of thanks be tendered to Messrs. Mead and Hogg for the interesting remarks made by them, and that they be requested to furnish copies thereof for the Transactions of the Association. Carried.

The Secretary called the attention of the members to some bunches of the *Wistaria alba*, a seedling from the *W. Fortescue*, brought by Mr. A. S. Fuller, of Brooklyn. This plant he received last year from Messrs. Ellwanger & Barry, of Rochester, who produced it from seed.

On motion, adjourned to Tuesday, the 28th of June, at 8 o'clock.

JOHN W. CHAMBERS, *Rec. Sec'y.*

June 28, 1864.

Mr. Benjamin C. Townsend, President, in the chair.

Mr. Wm. R. Prince read a paper on Garden and Orchard Fruit, particularly the strawbery, embracing most of the matter presented by him at the Farmers' Club in 1862.

On motion of Mr. A. Nash, the thanks of the Association were given to Mr. Prince for his very interesting remarks.

Mr. Nash said that it seemed to be a desire of Nature that the human family should live on the fruits of the earth. We are informed that our first parents lived in a garden, and subsisted on the fruits thereof. Animal food was then unknown. So we see that fruit was the original food of man. It is a diet that the sick person longs for, and which aids very materially in his recovery when animal food is forbidden.

As to the strawberry, it is the only fruit that will grow within the Arctic circle. It is found even at Spitzbergen on the south side of the line. But in order to have the fruit sweet, a certain heat is necessary, hence it is that our sweet fruits are found only further south. The remarks of Mr. Prince have been so very interesting and instructive, he moved that he be requested to address the Association at some future meeting on the subject of the grape. The resolution was adopted.

THE STRAWBERRY.

Mr. Prince, in answer to several inquiries by the President, said that the strawberry failed in England on account of disregarding the law of the sexuality of the plant. Prof. Lindsley, who for twenty years past, has been the editor of the London Horticulturist, a journal widely circulated in England, has always warred against the sexuality of the strawberry. Some two years ago he (Mr. Prince) took up this subject and wrote an article, which was published in the New York Horticulturist, in which this subject was treated at length, and which was copied into the London Technologist, occupying some twelve pages. Yet, notwithstanding all that has been said and written on this subject, the English still adhere to the idea of the non-sexuality of the strawberry, and say that nature had made a mistake in making two kinds, so that for the last sixty years it has been a common practice in Europe to eradicate the male strawberry plant, so that now a perfect crop of this fruit is unknown there, and in order to produce any kind of a respectable crop all the flowers but one or two have to be taken off. The inferior yield of this fruit in Europe is solely in consequence of the destruction of the male plant. If we here destroyed the female plant it would have the same result. The European and American strawberry can never be hybridized, but the South and North American species can. Some fifteen years ago Prof. Huntsman and himself succeeded in hybridizing them, they produced most beautiful flowers but bore no fruit.

Mr. R. G. Pardee said his experience in raising strawberries seemed to be somewhat different to others. He had been given some plants to try in his garden, merely as an experiment, and at that time he knew very little about their culture. He plowed the earth some 2½ to 3 feet deep, and put in the plants, and in the following spring they produced monstrous heads; but having succeeded so well at the commencement he thought he would try and improve on the next. With this view he commenced raking in the manure, and he thought he had the ground in the best possible condition for the following spring. In due time they came forth, and their foliage was of the most massive kind, but the result was that they did not have hardly any fruit. This perplexed him very much, and for 8 years he tried to solve the problem. He consulted the late Mr. Downing and others, and at one time he had a man employed for two days on a bed of some 20 feet square. After thoroughly plowing the soil and mixing the old with the new, he found to his surprise that they bore profusely. His error was in feeding his plants too highly, in which case they would bloom beautifully, but would bear no fruit. With less stimulants and the application of bark and ashes he got his soil to its original productiveness. He then kept a record of what it cost to raise them, and found that his strawberries cost him fifty cents a bushel, and on a bed of fifty by sixty feet he picked fifteen bushels. The strawberry is one of the most delightful fruits that can be cultivated. He raised some of four and four and a half inches in circumference. Next to good soil is having fine plants. To get these is very difficult. Barren plants are not only unproductive but they also destroy whatever good ones near which they may be placed. He used ashes very largely and also swamp muck, which he decomposed with salt. A proportion of a bushel of lime to a bushel of salt will decompose manure very quickly.

A very large display of cut flowers from the nursery of Mr. Wm. R. Prince, adorned the tables. Their names and peculiarities were explained by him, after which they were made up into bouquets and presented to the ladies.

After selecting fruits of the season for the next discussion, the association adjourned. JOHN W. CHAMBERS, *Secretary.*

August 2, 1864.

Mr. J. W. Barrow, Vice-President, in the chair.

The Association selected the following gentlemen to be submitted to the American Institute, as their choice for the committee on horticulture: Messrs. B. C. Townsend, J. W. Barrow, James Hogg, Peter B. Mead and John Henderson.

On motion, the following gentlemen were appointed a committee to confer with the board of managers in relation to holding a fall exhibition: Messrs. Townsend, Mead and Hogg.

On motion of Mr. Mead, the following delegates were nominated for appointment by the Institute, to attend the National Pomological Society to meet at Rochester: Messrs. B. C. Townsend, Peter B. Mead, Wm. S. Carpenter, Nathan C. Ely, Isaac M. Ward, John G. Bergen and Isaac Buchanan.

Fruits in their Season.

The subject selected was then taken up.

Mr. Wm. S. Carpenter said he brought some specimens of this season's fruit for exhibition. As will be seen, they are very small, owing to the remarkably unfavorable season; he feared many kinds of fruit will hardly come up to fair. In some the quality of the fruit is not well developed, and again there are others that have ripened before their time. When we see no larger specimens than those on the table, there must be something the matter. The drouth this season has been more severe than he had ever known it before. He had lost a great number of trees that have been standing out several years. That day he noticed twelve that had perished; also several shrubs. This convinced him that it was a most severe drouth. The fruit has nearly all fallen, but where there was any dampness in the soil it held on the tree. Such specimens as these are as fine as we can get them. This is the Prince apple, one of the finest kinds we have, but should be much larger than this. The fruit this year is very fair, but very small; he would place the Prince among the best of our fruits; and although it is a very old apple, there are very few that know anything about it; he supposed not one in a thousand that ever saw it. He had a tree which is at least fifty years old, and perhaps a hundred, and yet it is not to be found with the nurseryman. He would advise everyone that wishes a good apple to plant the Prince. The next best apple is that sent from Germany some twenty-five years ago, called the Gravenstein; it is a long time ripening, which makes it more valuable. The next apple is the Red Astrachan, also from Germany, which is very saleable in market, but he would not recommend it as a table apple. Here are some Middleton pears originally brought from France, although they have been cultivated here for over a hundred years. He took a great interest in fruit culture, and was now making it a study to procure all new varieties, with a view of determining their true value. He had some three hundred varieties of pears, and nearly the same number of apples, and he had learned that each variety was valuable for particular purposes. To stimulate improvements in this direction, he would suggest that a standing premium be offered for the best apple, pear, grape or strawberry. There are many new seedlings being introduced here which are much sought after. We have the Clapp's Flavor, which are sold at five dollars a tree, and mere whips at that. An increasing interest is growing in favor of improved fruits. Some eighteen or twenty years ago the first Bartlett pears were sent to Washington market, but no one could be got to bid for them; this year he thought they could easily command 25 dollars per barrel. Hundreds of acres could be set out with the Bartlett pear, and still the market would not be overstocked. The thousands annually sent to market does not supply the demand. The millions of acres now planted with fruit in this country is not sufficient for the wants of the people. To-day there are not enough Isabella grapes in market to supply the demand. He would therefore urge everyone to plant orchards with fruit. There need be no fear of an over supply, for the increasing taste for improved fruit, experience has taught us, has always been greater than the supply.

Mr. James Hogg said he had seen fruit ripen and color beautifully by being placed between blankets in a dark room; the blankets he found much better than wool or cotton. Fruit-growers have observed that the blankets give a particular bright red color, and it does not appear to take anything from the fruit like the cotton or wool. By its not absorbing moisture from the fruit, the blanket makes the best for this purpose.

Mr. Mead exhibited some fine specimens of blotched and edged petunias, presented by Mrs. Barrow. They were raised in her garden in this city.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

August 16*th*, 1864.

Mr. J. W. Barrow, Vice-President, in the chair.

The Secretary reported that the gentlemen named at the last meeting of the association were duly elected the committee on Horticulture of the American Institute. He also reported that the gentlemen nominated as delegates to the National Pomological Society had been appointed.

On motion of Mr. P. B. Mead, it was resolved that the Horticultural Association of the American Institute hold an exhibition of fruit and flowers in their rooms, at such time as may be selected by the committee having charge of the exhibition.

On motion of Mr. Hogg, it was resolved that the committee on Horticulture of the American Institute have charge of the exhibition this fall, and that they fix the days for the same.

On motion of Mr. Hogg, it was also resolved that the premium committee of the Horticultural Association be requested to make out the premium list for the contemplated exhibition, and report the same within ten days from this date to the board of managers of the American Institute for their approval.

FRUITS IN THEIR SEASON.

The subject for discussion was then taken up.

Mr. Wm. S. Carpenter—Pomology, although in its infancy in this country, has made rapid strides within the last few years, and we are glad to know that the public taste has been improved, which will cause many of the worthless varieties of fruit to be discarded, and the luscious progressive seedlings of this country and of Europe will take their places. One of the most prominent objects of this society is to disseminate knowledge, so that the amateur and the orchardist may plant such varieties of fruit as will carry on the good work in which we are interested.

I propose to-night to speak of the pear and its improved European seedlings. The following varieties, I think, possess sufficient merit to recommend their introduction into general cultivation:

The Doyenne de Commice.—Fruit large, yellow. Season October and November. This is one of the most promising new pears, and will, I think, become popular when it is better known.

The Henkel.—Rather large, yellow, slightly russeted, buttery, melting and fine. One of the best of Van Mons' seedlings. Season, October.

The De Tongres.—A very large and beautiful pear of excellent quality. It has been fruited in this country about four years, and is a promising variety. Ripening in September and October.

The De Nonnes.—A good sized pear. I have fruited this variety for several years. It proves to be a pear of the first quality, coming early into bearing. Season September and October.

Duchess de Berry d' Ete.—A medium sized pear, very handsome and of first quality. Ripening the last of August.

The Beurre Hardy.—A large pear of first quality. This pear may be safely introduced into general cultivation. Season last of September.

Fondante de Charneuse.—A very beautiful and excellent new Belgian variety, as large as the Bartlett. Ripening in October.

Manning's Elizabeth.—A medium sized pear, ripening in August. This variety should be introduced into the smallest collection. It is one of our best summer pears.

Doyenne de Hiver d'Alencon.—A good sized pear of excellent quality, keeping until April.

Beurre St. Nicholas, Beurre Kennus, Madam Eliza and Willomoz are varieties promising to be of the first order.

The pear tree is a native of Asia. It is found growing wild with the apple, but it is hardier and a much longer lived tree. There are trees on record of great size and age. Several in England are known to be over 400 years old. They are natural seedlings, or wildlings, which produce what is called the perry pear. The fruit is worthless except for making perry, a pear cider. From one of these trees more than fifteen hogsheads of perry was made in one year. We have some remarkable pear trees in this country. There is one in Illinois the girth of its trunk one foot from the ground, is ten feet, and it is enormously productive; it yielded in one season 184 bushels of pears. We have a most remarkable pear tree not more than a hundred yards from this building, the seed of which was planted more than 250 years ago, by Peter Stuyvesant, Governor of the Dutch colony. It is quite vigorous and bearing annually a crop of pleasant Summer pears, quite attractive in appearance. When we look back to the days of Duhamel, Miller, Forsyth and others, who cultivated the Bonchraton, Martin Sec, Messire Jean, Blankets, and pears of that sort, and compare them with the Beurre Superfine, Beurre Hardy, Doyenne de Commice, Henkel, Detongres, and others, which have been produced in our day by Van Mons, Porteau, Diel, Bivort and others, we are led to inquire whether these gentlemen have exhausted the subject, or whether we are to look for the same relative progress within the next twenty-five years as has already been made in the production of the fine varieties alluded to. Van Mons who spent a life time in ameliorating the condition of the pear, adopted the theory that the pear must be improved by degrees, or by progression, commencing with the wildling and planting the seed of each successive generation, and training the tree so as to induce it to fruit, rather than to vigorous growth. He discovered that in the fifth or sixth generation all the excellence of that variety had been fully developed, and any further effort to improve it caused it to return to the condition of the wildling.

Although Van Mon's theory is repudiated in this day, yet his name will be handed down to future generations, as one zealously engaged in improving the condition of the pear, and it will be a long time before his seedlings such as the Buerre Bosc, Buerre Diel, Paradise d'Automne, Henkel, Mannings Elizabeth, and a host of others, will be discarded.

The improvement of fruit has resulted from scientific culture. The pollen of the Flemish Beauty is carefully transferred to the blossom of the Bartlett, and the result of this union is the Clapp's Favorite, a pear of great excellence and beauty. Is there any reason why we cannot produce winter varieties of pears of the finest quality; as beautiful and smooth as the Bartlett? Why cannot we have, instead of the rough exterior of some of our late sorts, those of fair skins, ruddy colors, and of a rich character like the Seckel and Belle Lucrative? The impossible has no place in progressive science. And it is but fair to conclude that after the combined efforts now being made to improve the condition of all our fruits, the next generation will look back on the result of our labors as only the beginning of the great work; and the varieties we now recommend will then only be retained to prove that to man has been given the power to perfect the various fruits of the garden and the orchard.

In conclusion Mr. Carpenter suggested as subjects for some future discussion, the growing and ripening of fruits, and best methods of retarding the ripening of fruits.

On motion flowers were selected as the subject for the next meeting.

Adjourned.

JOHN W. CHAMBERS, *Secretary.*

August 30, 1864.

Mr. Benjamin C. Townsend, President, in the chair.

Mr. Mead, from the Committee on Premiums, submitted a list of premiums to be awarded.

On motion, it was

Resolved, That a Horticultural Exhibition be held in the rooms of the American Institute, beginning Tuesday evening, September 27th, and continuing until Friday, the 30th, competition to be open to persons in any part of the country.

Mr. Mead then made an address, in which he spoke of the interest generally felt in the recently organized society, and had no doubt that a creditable exhibition could be held, which would delight the people of New York. What is now wanted is something to give it a permanent character, and to do this funds are needed, which shall be sacred to horticultural purposes. With ample funds liberal prizes can be awarded, and these will always secure good shows. The great success of the Massachusetts Horticultural Society lies in its ample resources, much of which has been donated to it from time to time—$10,000 by a single individual.

On motion, a committee was appointed to take the subject into consideration.

The following gentlemen were appointed the committee: Messrs. P. B. Mead, J. W. Barrow, John Henderson, James Hogg, Isaac Buchanan

New Grapes.

Mr. Mead exhibited well-ripened clusters of Israella, Iona and Allen's hybrid grapes, which he spoke of as follows, remarking that his chief object was to show the relative time of ripening. They were from vines two years planted.

ISRAELLA.

A seedling by Dr. Grant, sent out by him last season, and one of the earliest grapes, ripening at least five or six days earlier than the Hartford Prolific, and is much superior to that sort. So far it has proved a good grower, perfectly hardy, and will probably succeed both east and west. The cluster shown was below medium size, berries round and nearly black, containing very little pulp. It is a very sweet grape, and will doubtless make a passable raisin.

ALLEN'S HYBRID.

Called a *white* grape, but Mr. Mead thinks the color *green*. A seedling raised by J. Fiske Allen, of Salem, Mass., the first person who succeeded in crossing our native grape with a foreign sort. The difficulty in effecting a cross is owing to a difference in the size of the pollen. The Allen's Hybrid ripens with the Delaware and Iona, and will please those who like the foreign varieties. He does not recommend it as a grape for vineyard culture, as it shows some disposition to mildew, though its leaf is so thick and tough that it resists the disease better than many other sorts. For the amateur, in gardens and sheltered situations it promises well. Berry medium size, light green color, with scarcely any pulp, sweet and very good, partaking largely of the quality of the Golden Chasselas, one of its parents, with a perfectly hardy vine. Mr. Mead here remarked that it was not owing to their being tender that we could not succeed with the foreign varieties out of doors, but because of the mildew not only on the leaf, but also on the fruit and wood, which will not allow the shoots to ripen, hence they are killed by freezing.

IONA.

Another seedling sent out last season by Dr. Grant. Clusters of about half-pound size, loose, or at least not so compact as the Delaware, whose berries have no room to grow larger. Color about like the Delaware, berry size of the Isabella, tender, juicy and vinous, and Mr. Mead thinks destined to occupy a large space in the horticultural community, and will probably supersede that popular grape, the Delaware, as most persons will prefer it on account of its larger size. It ripens a little before the Concord, but not quite as early as Hartford Prolific, and he hesitates not to recommend its extensive planting both in garden and vineyard, being sufficiently hardy for the climate of Maine.

In response to the question what age is best to transplant the vine, Mr. Mead said one year from the cutting, and furthermore he considered a vine raised from a single eye infinitely superior to a layer,—would sooner pay five dollars for a vine one year from a single bud, than one dollar for the best layer ever made. He replied to the early ripening of the Isabella, that he had found single berries colored by the 11th of August, and whole clusters, on the 22d.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

September 20, 1864.

Mr. Benjamin C. Townsend, the President, in the chair.

Mr. Wm. S. Carpenter exhibited some bunches of a new seedling grape, which was tested by the members.

Mr. Mead suggested that Mr. Carpenter present a bunch of these grapes, when fully ripe, to the Committee on small fruit for a critical examination.

Mr. Mead, from the Committee on Horticulture, stated for the information of the Association that the responses to the circular are very flattering, and no doubt the exhibition to be held in these rooms next week would be a very fine one. If any of the members had not yet made preparations he hoped they would commence at once.

Mr. Carpenter gave a very interesting account of the nurseries at Rochester.

The Chairman spoke of the neatness displayed by Messrs. Ellwanger & Barry in the arrangements of their nursery. A green lawn as a walk to their houses, with a border of choice flowers and shrubs, such another he doubted could be found in this country.

The preservation of winter fruit was made the subject for the meeting on the first Tuesday of October.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

October 4, 1864

Mr. Benjamin C. Townsend, President, in the chair.

EXHIBITION OF FRENCH PEARS.

The President said he regretted very much that the splendid contribution, of apples and pears, which were displayed on the tables that evening, did not arrive here in time for exhibition at our Horticultural Fair last week. This collection embraces 150 different varieties of apples, and 100 distinct kinds of pears. They were intended for our Fair, and sent to us by Mr. Andres Leroy, of Angiers, France.

Mr. William S. Carpenter was delighted to see such fine specimens of foreign fruit. They are not only beautiful samples of what are old, but also many varieties that are new. He was quite familiar with most all of the fruits grown in this country, and he saw here some varieties that were entirely new, and which seem to possess qualities of much excellence, and well worthy of our consideration. We have almost all those varieties of fruit, accounts of which have been published in England and France. At our exhibition last week, which was said to be one of the finest that was yet held in this country, we had many fine specimens of our own production, but in this French collection he saw many that appeared finer, both in color and quality. Many of our fruit growers are turning their particular attention to this matter, and some have been very successful in producing many fine colored specimens, that can compare with any in size and weight. He took a deep interest in fruit culture for the last twelve years. There has been a marked improvement in the same fruit; they are better grown, and generally speaking better varieties are everywhere observable; we are every season getting some new varieties, and we can go on cultivating new species for many years yet, without coming to the end. One of the means by which fruit has been improved is by increasing its size, and this has been done by thinning off the fruit. He, like many others, had not the courage at first to take enough off the loaded tree, especially as a loaded pear tree is one of the most beautiful things in nature, yet he ventured on and continued thinning, and he found it to be a great advantage, and he observed that he got the same amount of fruit, and probably more; if one-half of the fruit is taken off before ripening we get as much in bulk, and more than if the whole crop was allowed to remain on the tree. When a tree is permitted to retain its whole fruit, it is impossible to expect it to ripen whole, and a pear tree if left to itself will wear itself out. There is the Bartlett and the Louise Bon of Jersey, which require much attention in this respect; of thinning, he thought that hardly enough was ever taken off in thinning, when they are about one-third grown it is time to commence thinning off the fruit; it is very well in the first instance to leave on a little over crop, and when we take off the second thinning to leave just enough to have them properly grown. It is frequently required to take off a third crop, and in this case we may not get the same weight but in market we can get double the price. We can take off one-third of our pears before ripening, and those that remain will almost double in size; and if again there is a thinning, the last crop will be still better, and hold on the tree much firmer.

It was highly gratifying to see such a fine display of foreign fruits; we had before us some of the improved varieties, never before seen in this country. He had himself over one hundred of these new varieties of French pears.

We feel proud, however, of our own native seedling, the Seckel; there is no pear that can equal it in this country. Mr. Clapp, of Massachusetts, and Mr. Dana, have lately introduced many varieties in this country, and some of their trees are now being altered to produce many fine varieties. He had seedlings sent to him almost every day.

The President said it was due to Mr. Carpenter to state that it was through his instrumentality that this society has had the opportunity of witnessing this really fine display of foreign fruits, and he would suggest that the horticultural committee be requested to take the proper action in regard to testifying our appreciation of Mr. Leroy's munificent contribution to our exhibition.

Mr. Jireh Bull said he felt happy in seconding the motion as suggested by the President. This was the second gift of Mr. Leroy to the Institute, and he was informed that Mr. Leroy would be very happy to send whatever might be of interest to us here. The motion was adopted.

On motion of Dr. John B. Rich, the committee on large fruit were requested to make a critical examination of the fruit sent by Mr. Leroy.

On motion the President of the Association was added to the committee.

Mr. W. S. Carpenter exhibited a seedling pear from the estate of Mr. Beekman, in Westchester county, and said there was but one tree of this variety in this country; the tree is perhaps thirty years old. The fruit was known as the Beekman pear, and should be named such by this Association. The pear seems to be most prized—more so than the apple—but the latter, in a commercial point of view, is more valuable. Some of the farmers in the western country would scarcely live but that the millions of bushels of apples raised annually by them aids materially in supporting the population of the country; so the apple must be considered the more valuable fruit of the two, and then it is adapted to a greater variety of uses than the pear, and an article that is largely exported; yet, as a luxury, the pear is more highly esteemed. There are millions of trees now being grown, which, in a short time, will yield immensely. There are thousands of acres of pear trees alone, and yet the supply is not equal to the demand. He hoped that the day was near when we shall have the pear in this country in something like abundance, and so cheap as to be staple in every household. He was informed that the pear in France commands now a greater price than it did in ten years. There need be no fear of an over-abundance of fruit being grown, as it has always been found that the greater the supply the demand will be in accordance.

The Beekman pear he would esteem quite equal to the "Bartlett," but it does not possess so high a flavor; the Bartlett is objectionable on account of its musty flavor. This pear is about second rate, but equal to the Bartlett, quite juicy and very productive. There is but one tree of this kind, so we cannot judge it very thoroughly. It is a medium size pear, of yellow color, with red cheeks, and ripens first of October.

On motion the pear was named the "Beekman pear."

Mr. W. S. Carpenter exhibited a seedling apple raised by Dr. Scribner, of Bedford, Westchester county, N. Y. It was, he said, so tender as to scarcely bear transportation, and almost melts in the mouth like a pear. It seems to possess many merits.

This apple would be considered by some as first rate, in consequence of its mellow flavor. The tree is very thrifty, and highly esteemed by the family of Dr. Scribner, and is used both as a table and cooking apple. It probably would not reckon more than second rate; it is a very large medium, ripening in September and October, and striped red.

On motion the apple was named the "Scribner apple."

On motion of Mr. Henderson, a vote of thanks was passed to Mr. John W. Chambers, Secretary, for the careful and efficient manner in which he arranged and conducted the horticultural exhibition of the Association.

On motion Mr. R. H. Williams was appointed a committee to visit the Pleasant Valley Fruit Growers' Association, at Hammondsport, N. Y.

The Preservation of Fruit was made the subject for the next meeting.

Adjourned. JOHN W. CHAMBERS, *Sec'y.*

October 18, 1864.

Mr. Benjamin C. Townsend, President, in the chair.

Mr. P. B. Mead, chairman of the committee on premiums, reported that Dr. Grant, to whom the award was given, sent the committee a letter declining the premium, and wishing the prizes to remain open for further competition. The committee have sent a copy of Dr. Grant's letter to Mr. Greeley, the donator of the prize, and he has published it. The premium for grapes is therefore still open, and the committee are ready to give their full attention to any new grapes that may be presented.

Mr. Nathan C. Ely moved that the thanks of the Association be tendered to Dr. Grant for his liberality in desiring the prize to remain open for another year, and that the Association approve the decision of the committee in doing so.

Which was carried.

Mr. Mead moved that the thanks of the Association be presented to Mr. Horace Greeley, for his very liberal offer of $100 for the best grapes, $100 for the best pear, and $100 for the best apple.

Unanimously adopted.

Mr. Wm. S. Carpenter said the prizes offered by Mr. Greeley, of $100 each for the best variety of grapes, pears, and apples, were not properly competed for, as the time specified was so short that very few could gather up their choice varieties. We had some three varieties of pears presented, but no apples. A half barrel of Hubbardston's "Nonesuch" apples had been received a few days ago. The committee have had several meetings in regard to extending the time for keeping open the prizes, and have come to the conclusion to have four exhibitions from now till the first of February—on the first of November, December, January and February. We have no doubt but we will receive large contributions for these prizes, particularly in apples and some rare varieties of pears.

On motion,

Messrs Charles Downing, of Newburgh, and Wm. L. Ferris, of Throg's Neck, were added to the committee on the Greeley premiums.

Mr. Wm. S. Carpenter read the following paper

ON NEW NATIVE PEARS.

The following varieties are mostly of recent introduction, and possess sufficient merit to warrant their introduction into cultivation :

Coil's Beurre originated in Northern Ohio. A variety of great excellence; fruit of medium size; color, cinnamon russet; ripening in September and October.

Jackson originated in Vermont. Large, yellow, sweet, juicy and fine flavored. Season, September.

Pratt originated in Rhode Island. Large medium, yellow; quality, best.

Lodge, from Pennsylvania. A russet pear; quality good. September.

Mirium originated in Roxbury, Mass. Large medium. A russet pear of very fine quality. October.

Wilmington, a seedling of Dr. Brinckle, of Philadelphia, medium size, russet. This is one of the most promising new pears; season, September.

Richards, originated by Mary Richards, of Wilmington, Delaware. I fruited this pear for the first time this season. It is nearly as large as the Bartlett, and a fine variety. Season, September and October.

Leggett, originated in Westchester county; a medium sized, excellent pear; ripening the last of August.

Church—This also originated in Westchester county. Medium, yellow, Bergamotte shape; a pear of first quality. October.

Clapp's Favorite—This fine pear was originated by Mr. Clapp, of Dorchester, Mass. A variety of great excellence, as large as the Bartlett, yellow and very handsome, ripening in September.

Halsted's Beurre originated in Westchester county. I fruited this new pear for the first time this season. It is a large, handsome pear, keeping until April; promising well. Dana's Hovey originated in Mass. Introduced to the public by C. M. Hovey, of Boston. A medium sized pear, of great excellence, keeping into January.

It is most gratifying to know that pomology has not been stationary in this day of progress. It is now only about thirty years since the establishment of the first Horticultural Society in America; there are now several hundred in this State, working together in harmony, and aiding in developing new and improved varieties of fruit, which must be regarded as among the great interests of the age. Fruit is rapidly becoming one of the most valuable products of our country. The crop of last year was estimated at nearly $100,000,000. Thirty years ago it was not deemed worthy of a place in our national statistics. This progress should cheer us onward, and encourage us to greater perseverance. I would prefer the honor of introducing an apple, a pear, or a grape of decided merit, to the proudest victory which has been won on the battle-field. But the production of new and improved varieties of fruit is not the only work for the pomologist. He will discover that fruit trees will not take care of themselves. We must realize, therefore, that without care and skill in the orchard no satisfactory results can be obtained.

Experience has taught us the importance of thinning our fruit. Many varieties have a tendency to over-bearing, and unless a portion of the fruit is removed, we fail to get any good, well-developed specimens. An overcrop of fruit is most injurious to the tree, exhausting its energies and producing premature decay. How few appreciate the beauty of a well trained tree, which should in itself be a link to bind us to our homes. Our highest aim and ambition should be to make the inmates of our dwellings happy

To insure this, all the appliances and additions to secure such a result should be attended to, and perhaps there is nothing in horticulture more conducive to this than a well kept fruit garden. It should be the duty of every one who has a home, to beautify and adorn it, so that our dwellings may be the happy abode for ourselves and our families.

The regular subject was then taken up.

Preservation of Fruit.

Mr. C. C. Williams, 316 Dean-st., Brooklyn, presents some jars of pineapples and pears for the inspection of the Association, and gave the following interesting account of the manner of preserving them:

In the first place, I have deemed it of the utmost importance to obtain a jar, or can, that is not only simple and easy to manage, but perfectly reliable when put to the test.

Secondly, I am particularly careful to select only sound, ripe fruits, as none other are suitable for canning, and having previously made a syrup, of say one pound of sugar to one quart of water, boiled together and allowed to stand until cooled and settled, and then having prepared my fruit, and placed the same in a raw state in the jars or cans, I fill them, or nearly so, with the cold syrup, and place them in a kettle of cold water (with the usual caution against breaking), and bring the water in the kettle to a boil. After boiling about five or ten minutes I remove the jars or cans to a table, and cover them with a cloth to prevent cooling too suddenly. In this condition I let them stand about five or ten minutes, during which time the evaporation and consequently shrinkage is very rapid. At this point I remove the cloth from each jar or can, as I want them to seal up. Before doing this I fill up with boiling syrup or boiling water, and immediately apply the cover or fastenings, and when cold, other things being equal, all is right, my fruit is safe.

I have only to add that I have to my own mind fully demonstrated the fact that the old plan of sealing up as soon as removed from the kettle, is a mistake, inasmuch as no time is given for evaporation or for shrinkage. Hence it is that they who follow the old plan find, when their fruit is cold, their jars are not full. It may be asked, "is there not danger that air will enter the jars, if allowed to stand five or ten minutes after removing from the hot water?" We answer, no; because so long as the heat in the jar predominates over the pressure of the air without, there need be no fear that air will be shut in when sealing up.

Mr. P. B. Mead said that in presenting this subject to the Association, and through it to the public, it should be our endeavor to popularize it. The most prominent method of preserving fruit in its natural state is by placing it in an ice house built for that purpose. Now it is not to be expected that every one can build an ice house for this purpose. But for keeping apples, an ice house is not absolutely necessary, although good in some respect; still it can be dispensed with. To preserve apples it is very essential that they should be properly gathered. He tried the process of rubbing them clean, and found that apples treated in this way kept better than when this was not done. We all know that apples of the same kind differ much in flavor; some will have hardly any, while others will be highly flavored. This he thought was on account of the different way they were gathered. They should be entirely free from moisture, and those that are taken from the tree in the early morn should not have any night dew on them, but should be let dry naturally, and very little handled after that. And now as to keeping them during the winter. It so happens that he is possessed of a cellar having peculiar qualities. This cellar is built under ground with the exception of one foot. It is in sandy soil, and has two windows, nine inches wide. There is no ventilation at the bottom, and there is no communication with the outside atmosphere except through these windows and a very narrow inside door. The atmosphere in this cellar is comparatively dry, and is not surcharged with moisture at any time, and the temperature varies but little during the winter and is at an average of forty-two degrees, and even in summer it is very low. He had kept vines in this cellar till July without starting buds; this he attributed to the low, dry atmosphere. In a moist atmosphere it has been found that fruit cannot be kept well, neither does it retain its flavor. But such a cellar or room as he described would keep fruit long and well. The apples are sometimes placed directly on the floor, which was raised some eighteen inches from the ground and made it quite dry. In other cases the apples were placed in barrels, which method he found best. He also kept fruit in an ice house, which was ten feet wide and eighteen feet long; it was surrounded with ice on three sides, or on two sides and the top. The inside was insulated from the ice by a wall one foot thick, filled in with charcoal dust, and there was an opening to admit the cold air from the ice. But the objection to this plan was that the atmosphere was at times a little damp. For remedying this they now use lime, and he understood with much success. In France they use chloride of lime; this he thought desirable in all fruit houses. In this country, where we can so easily command almost any temperature, we should have fruit preserved all the year. All that is required is a dry, cool cellar, and apples can be kept there both in form and flavor. He attempted to keep apples in the house when he had more than would fill his cellar, but he found in the house the apples became too dry and became wilted, and the fruit lost that desirable quality that makes them palatable. Fire should never be kept in houses used for storing fruit. He also recommended when taken directly from the tree to be wrapped in paper when the fruit is gathered from the tree at midday, and done up in paper they will preserve with their original aroma, and will be found good to eat at the end of the winter. After trying various methods he found that a dry atmosphere is very desirable, and the plan here described best calculated for general adoption.

Mr. David Thompson, of Green Island, Albany county, N. Y., exhibited several varieties of grapes produced from seedlings obtained from Prussia some fourteen years ago; one variety was a large white grape, which was very hardy, so much so, that it has never been laid down during the winter. The vine is some five years old now; the season of ripening is in the middle of September, or about ten days earlier than the Delaware; it has a cotton down on the leaves and very short-jointed, and the leaves very smooth on the bottom side, and holds its leaf well. He never had any of these varieties to "scald." A large sized grape on the table he said were but the third year from the seed. The leaves and wood could not be distinguished from the Delaware. The wood is green first, and after, a deep brown. There was no mildew on any of these varieties, but some split open after being attacked by the fly, and that was all. This variety originated from the Delaware and the Pope Hamburg; the vines were very strong with a large cluster, so much so, that they had to be tied to keep them from breaking from the vine; the leaf looked like the white grape, and had a little down on the under side, and is as hardy as a piece of hickory. It ripens about three weeks earlier than the Catawba. These varieties he said could, with due care, be made very fine; they are very hardy, short-jointed and very delicious.

On motion of Mr. Nathan C. Ely, the thanks of the association were presented to Mr. David Thompson for the fine specimens of grapes presented by him this evening.

Mr. Peter B. Mead, from the committee on small fruits, made the following report, which was accepted, on

Mr. Thompson's Seedling Grapes.

No. 1. Four bunches on stem; in all respects like Isabella; either it, or nearly a reproduction of it; not in quite as good condition as a ripe Isabella.

No. 2. Another Isabella seedling, resembling it in form, but with little of the buttery character about it.

No. 3. Catawba seedling (not ripe). If a seedling, it resembles the Catawba so closely as to be of no special value, unless it should ripen earlier.

No. 4. Said to be a seedling from the Delaware and Black Hamburg, but presents no evidence whatever of being a hybrid. Bunch solid, berry round, black flesh, juicy, thin and wanting in flavor. Undoubtedly a pure foreign seedling.

No. 5. Said to be a seedling of Delaware and Pope's Hamburg, but like the above seems to be a pure foreigner. Bunch loose, berry oval, flesh meaty, sweet and rather tender; very much better than No. 4 in quality, but apparently smaller in bunch.

No. 6. Seedling from a German grape, apparently a Chasselas. Bunch compact, berry round, amber green, translucent, juicy, tender with a Chasselas flavor; a grape of good quality; the best grape of the lot. The committee recommend the appointment of a committee at the appropriate season to visit Mr. Thompson's grounds and examine the plants in habit, foliage, growth, and to ascertain the native characteristics.

On motion of Mr. Carpenter, the Rev. Dr. Osgood was invited to address the association at the next meeting on "Horticulture."

Adjourned. John W. Chambers, *Secretary.*

November 1, 1864.

Mr. J. W. Barrow, Vice President, in the chair.

Mr. W. S. Carpenter exhibited some choice varieties of apples, also some varieties of pears from Andre Leroy's celebrated nurseries at Angiers, France.

Mr. W. S. Carpenter from the committee on large fruits, acknowledged the receipt of a bushel of Hubbardston Nonesuch apples from Mr. Asahel Foot, Williamstown, Mass., in competition for the "Greeley Prize."

Mr. Isaac Buchanan exhibited a fine speciment of "Bilbergia Thrisoides," the cochade plant in bloom, and several splendid Cactus.

The Chairman said in compliance with the invitation extended to him at the last meeting, the Rev. Dr. Osgood is present, and I have the pleasure of introducing him to the audience.

The Garden as an Educator.

By the Rev. Dr. Samuel Osgood.

I confess to having been moved to throw out these stray thoughts on the wisdom of the garden not in the usual way of the poets and essayists who have made the subject so charming. Not in blooming June nor ripe September, but in dull November, after quitting the country for the city, and in the midst of the bustle and passion of the great electioneering campaign, the fit comes upon me while looking at the luscious apples and brilliant flowers upon the tables of our Horticultural Society; and my remarks upon the Garden as an Educator are thrown out *impromptu* at request of friends, while the Democracy are listening to their pet orators in the great hall below, and thundering out at times applause so deafening that the prize Nonesuches on the table seem to deepen their blushes, and the radiant cactus to tremble in its sensitive petals at the din, as if spirits of Paradise were appalled by an outbreak from the pit below.

It is very pleasant to go among the farmers, florists, and fruitmen—and I will not forget that November réunion now—they are so full of love for their soothing delightful pursuit, and so ready to give the help of their experience to every kindly seeker as to be quite winning to us men of books. I confess, however, to some little misgiving when asked to enlighten them, in view of my small doings as an amateur cultivator. I am afraid that our few acres have been more a sink of money than a mine, and that our crop of health and pleasure, when compared with our account of outlay and income, would bring more than a smile to the faces of the thrifty husbandmen who are willing to hear a scholar talk of flowers, fruits, and trees with great respect, and take it for granted that his practice is as good as his theory, and his thrift keeps pace with his taste. I am afraid to say how much our potatoes and eggs cost us as compared with the market-price; yet sure I am that we get our money's worth, for health and enjoyment that are priceless come into the estimate, and no money could tempt us to part with the harvest of delights that every year yields from our garden. The most thrifty farmer or nursery-man is always ready to forgive an amateur a considerable share of improvidence if he has only the true love of nature; and on that ground I am able to hold up my head among these good people, and talk and write as one of their gentle craft. What is said will have more point if we consider the philosophy of the garden as a school of science, a workshop of art, and a gallery of beauty and sociality.

Consider, first, the school that is opened to us among the plants. The place itself is a marvelous lesson, for it sets before us the first form of organic life, and teaches us how nature rises in vegetation from the earths of the mineral kingdom through the world of plants up to meet the realm of animal organization with man at its head. The garden is thus mediate between the mineral and the animal world, and has a wonderful chemistry of its own that transforms soils of sand, loam, gravel and clay into the juices and fibre of flowers, shrubs, and trees. The last great discovery of chemistry brings out this power in clearer light by teaching us to see that all atoms of organic existence consist of but two general classes, the crystalloid and the celloid; and it is with vegetation that nature passes from the crystalloid to the celloid, and begins to build up her wondrous architecture of living things. How this is done we do not know. We see that the crystals of sand and limestone are dissolved and transformed into the starch and gluten of wheat and corn; but our chemical laboratories vainly try to make the change with all their science and art; and all their retorts and acids and blow-pipes have never been able to make bread or breadstuff—not even an atom of starch or gluten—out of earth. Plants are ordained of God to work this transformation from crystal to celloid, from mineral to vegetable, and each plant has its own line of succession from the beginning, and it does its wonderful work in its own way, and with the same costume and implements as at the beginning.

The study of the various soils themselves becomes most interesting in itself and its correspondences. A man of observation may learn wisdom for himself and his children by considering the qualities of his land and what they stand for. The mind is sometimes thick and clayey, or light and loamy, or drifting and sandy, or hard and gravelly—and in each case needs as specific treatment as the soil. Sometimes, too, the good yield of most forbidding soils gives us most encouraging hopes for unpromising children and youth. I once had five hundred loads, chiefly of clay, carted from a dirty swamp-hole to fill up a bog, and was frightened to see such an unsightly vacancy in the first locality and such a cold, barren surface in the second. But the empty hole soon became a pretty pond, and the dismal clay smiled and laughed itself into a green and luxuriant meadow. Who will despair either of soils or souls after such an experience?

Then what a lesson a man may learn from the marvelous variety of growths in his garden. Saintine, the author of that charming story of a flower in a prison-yard, has lately died, and the grateful earth might fitly bloom out violets, lilies and roses upon the grave of so loyal a lover of nature and man. If his prison-hero found a world in that one plant that pushed its way up between the stones, and became the subject of that lovely prose-poem, we surely are more favored, and we all have field enough for our survey and our pleasure. The little plots of a few square feet with vine and roses behind our city houses, or the broad acres of our great park, give us all our botanic garden, where we may be wiser with Ray, and Goethe, Linnæus, and Jussieu, if we will. If the naked eye soon exhausts its range in our little field of vision, try the microscope, and what wonders disclose themselves beneath our feet and give enchantment to the very dust we tread! I once passed the rambling hours of a week in the country in this way, peeping into the grounds at the risk of being thought crazy, and was ashamed of my old ignorance and astounded by the new-found wisdom. Even in the hard paths under our feet there was a world of hidden beauty—

flowers of most exquisite tint and form; and never more reverently did I quote Wordsworth's lines that tell us, "Wisdom is ofttimes nearer when we stoop than when we soar."

When we walk through a garden of any magnitude we are surrounded with such a multitude and variety of growths as to be almost oppressed with those riches, and we find it hard to classify them under one dominant law. The lichens and mosses, the ferns and funguses, the trailing and climbing vines; the flowers of all hues and forms, the esculent plants so various, some ripening their fruit under ground and others lifting it into the air and light; the clover and the grasses, the trees deciduous and evergreen, of all sizes and shapes, from the low juniper to the soaring elm—what a world is thus set before us! and how shall we bring all this motley crowd of growths to any sort of order, and arrange them under any satisfactory system? This question has not only perplexed simple observers of nature like ourselves, but even the shrewd masters of botanic gardens; and it is still not wholly clear by what marks plants are to be classified. It is still the ruling habit of popular speech to classify plants under the heads of trees, shrubs and herbs, according to their mere size. But careful observation shows the folly of this arrangement, by showing that plants of the most various dimensions belong to the same organic family; the bamboo, thirty feet high, being a kind of grass, and the lowly hearts-tongue being of the same general division as the great tree-ferns that rival the palm. But, when the error of this superficial system was seen, it took years for naturalists to hit upon the true criterion. The system of Rivinus, in 1690, was based upon the formation of the corolla or circlet of flower-leaves. The system of Kamel, in 1693, depended upon the characteristics of the fruit alone, while Magnol, in 1720, looked to the calyx or outer envelope, as well as to the corolla; and at last Linnæus, in 1731, drew his system from the variations in the stamens and pistils or the reproductive organs of the flower. We were brought up to believe in this last system, and some of us remember well how we used to plod over its pedantic terms, and write them again and again from set copy in our writing-books at school. Before Linnæus, however, a sagacious Englishman, Ray, had a glimpse of the better science of vegetation, and in 1703 had grouped plants either as flowerless or flowering, and had subdivided the flowering into dicotyledons and monocotyledons, according as the germ is nourished by two or one seed-lobe. The idea of Ray waited for its complete development till the time of Jussieu, who presented the first principles of his natural system to the French Academy of Sciences in 1773, and finished his great exposition of this system in 1789, eleven years after its commencement. His system, with some modifications, now prevails, and plants are divided into the *asexual* or flowerless and the *sexual* or flowering. Without puzzling our readers with learned terms, it is better to take them out into the garden and teach them how to see for themselves the leading characteristics of plants. Consider, first, such as are asexual or flowerless. These are of two kinds: first, those that have stems and leaves undistinguishable, such as the sea-weed, the fungus, the lichen; secondly, those that have leaves and stems distinguishable, such as ferns and mosses. There can be no difficulty in understanding at once these two classes of the first order of plants; for any toad-stool or mushroom shows us a plant both flowerless and without distinguishable leaves and stem. Pluck, moreover, a leaf of fern of any kind, and, instead of flowers or seeds, you will note on the back of the leaf little elevations that look like barnacles, and from these come the spores that propagate the plant. Thus you have the two classes of flowerless plants.

I am willing to be laughed at for quaintly simplifying the second and principal order of plants, the sexual or flowering; and once amused an intelligent and good-natured audience by producing a cornstalk and a stick of sassafras as specimens of the two orders of the second of the two great divisions. All the plants that are most important to us are either of the cornstalk or the sassafras family. Perhaps it is best, however, to take a more familiar specimen than the sassafras, and we will hold up the corn-stalk and the maple branch before our readers as specimens. The cornstalk is a somewhat homely creature, but has the most distinguished relatives, and is of the family of the grasses, lilies and palms. All our cereals are of this family, and without its help man and beast must come near starving. The characteristic marks are obvious. The cornstalk grows from within and is *endogenous*, and, moreover, the germ is fed from only a single cotyledon or seed-lobe. In this, as in other plants of its class, there is no clear distinction between the wood and the bark.

Pass to the other or *exogenous* class of the same grand division of flowering plants, and we have, as in the maple and all our forest trees, and most of our fruits and flowers, the constant mark of the formation of the wood from without inward, so as to record each successive season of growth in the rings of the trunk or branch beneath the bark which is distinct from the wood. The germ, moreover, in growing is nourished by two seed-lobes instead of one. It is interesting and instructive to carry these simple principles in our mind as we ramble through our groves, and orchards, and garden, with pruning-knife and microscope in hand. We soon find ourselves becoming tolerable botanists without crazing our heads with a catalogue of outlandish names. We can train even our little children to read this grand yet obvious alphabet of nature, and tell whether a plant belongs to the flowering or flowerless division; whether to the family of toad-stools, mosses and ferns, or to the family of grasses and trees; and to decide to which branch of this last great family it belongs—whether to the grass and cornstalk tribe, or to the tribe of maples and roses. When we have found the place of a plant in the grand division, and its general class, it is interesting to hunt up its especial order and tribe, and say exactly what it is in common phrase. Here, for example, we have a clump of oaks of various kinds, big and little, that have colonized that corner of our ground; cut off a branch or twig from each; ascertain by the wood that it belongs to the grand division of flowering plants, and to the first class exogenous and dicotyledonous, and then trace it out to the second subdivision of plants without corolla, and to its order, according to Loudon, among the *urticeæ* with rough points or stinging hairs, and see its odd affinity with the nettle that gives the order the name; or, as other botanists have it, we may rank it with the *cupuliferæ* or cup-bearing trees among the chestnuts and beeches and hazels. Thus we have fixed the place of the oak according to the natural system. Then we can compare the leaf and wood with those of other oaks described in the catalogues or plates, and tell just what kind of oak it is. Every such search will teach us a great deal, and if we have a good botanist at hand great is the gain. A plain farmer who has learned the trees and shrubs by heart is an admirable colleague to the botanist, and may tell us at once what a plant is before the scholar can study it out, and may rid us of a vast deal of trouble by teaching us by its common name where to look for our full scientific description. I am half ashamed to say that in our own little domain there are still many wild plants that I cannot call by name, nor identify with any of the descriptions and plates in my books. Very likely that solid farmer or his buxom wife or pretty daughter, whom we sometimes pass on their way to the village, might wholly dispel our darkness by a word as familiar as any in the kitchen and herb garden to the rural population.

We know very well that the knowledge which is generally sought from the garden is not of the scientific kind, and gardening is a very different thing from botanizing. It is not safe, of course, to base our cultivation upon learned classifications; and he would be a funny horticulturist who should portion off his grounds after the system either of Linnæus or Jussieu, and insist on keeping by themselves all plants not found in the same botanic classes. This rule would compel us to keep the cucumber and pumpkin away from the corn, and forbid the rose to show its lovely head near the green turf which best sets off its beauty, or to mate with the lily that so completes its charm. We must bring economy and taste as well as science to bear upon our garden before we combine all desirable variety with unity, and integrate the differences of our vegetation by a judicious singleness of aim. In this way we reach the practical economy of gardening, and are able to bring our science into the service of our art. The true economy must of course have in view both utility and beauty, for there can be no good garden without both elements; since the potato-patch and currant and raspberry bushes are none the less profitable by being neatly and even prettily arranged, and the winding paths through fresh lawns or under shady trees are full of healthful influence, strengthening the limbs by inviting exercise, and cheering the spirits by various aspects of loveliness.

As to the complete idea of the garden, the estimate must differ as our point of view or aim differs. If we were writing for a prince with ready millions at command, we might perhaps take Lord Bacon's estimate, and say that thirty acres are not too much for a prince-like garden, without including the forest park or farm. It is easy to see how his plan might be adapted to modern taste, and made quite charming, by doing away his absurd Dutch squares, and set circles, and cumbrous carpentry. If laid out literally by his plan, his thirty acres would become a magnificent baby-house, and confirm his own remark, "that when ages grew to civility and elegancy, men come to build stately rather than to garden finely, as if gardening were the greater perfection." His four acres of green in the entrance, with two long walks in covered alleys on either side, would be a dismal affair without trees or shrubs to cheer the eye and relieve the loiterer from the necessity of hiding under the covering of carpenter's work, twelve feet high, to escape the glare and heat of the summer sun. Nor do we see much charm in his artificial mound (in the middle of the twelve acre garden proper), thirty feet high, for "some fine banqueting house, with some chimneys neatly cast, and without too much glass." His heath of six acres in the rear, which he would have "formed as much as may be to a natural wildness," is more to our modern taste; and the only trouble with this portion is, that instead of our having all the wild beauty by itself, and all the regular beauty by itself, the two should be intermingled, and the broad lawn should border on charming flower beds of various growths, and romantic shrubbery in studied freedom; and art and nature should do their best to help each other.

The case with us, however, is that we are not to devise princely methods of magnificence, but republican plans of economy; and the garden that we have in mind must needs be one that comes within the average means of lovers of nature in America. Any man of moderate means may own a few acres, and treat it according to the most approved principles of economy and taste. We who are not farmers, wish, of course, to do as much as we can with our little domain, and expect, if possible, to unite the advantages of park and orchard—flowers for the eye and vegetables for the table. We wish to have the largest crop of market value and landscape beauty. Our rule of utility may be summed up in a single sentence, and be said to be that method of gardening which secures the most products of the best quality suited to our needs through the year, and so produced as to draw out, without exhausting, the various and alternate powers of the soil. To carry out this rule, even in a kitchen garden of half an acre, will be no small study and discipline to the shrewdest calculator and economist. Books have been written on "Our Farm of Two Acres," "Four Acres," and "Ten Acres." I shall be glad to see as good a book as these on "Our Garden of One Acre," or "Half," or "Quarter of an Acre." I have so humble a sense of my own attainments in these economics of gardening that I will not pretend to be overwise, but be more ready to remember the constant comfort and health of our unfailing supply of fresh vegetables through the season, than to school our readers in the art of money making out of carrots and potatoes, strawberries and grapes.

The economics of the beautiful I am more free to speak of, and am quite sure that beauty is far nearer to us, if we will seek it, than is commonly supposed. The great secret is to follow the lead of nature, and try not to overlay nature by ambition, and not to fall into poor artifice in our search for art. The idea of God in nature is obvious. He unites every difference with unity, and always brings together a large array of various elements around some central purpose. The great universe, our solar system, our earth, or any large prospect on its surface, or, if we specify particular objects, we may say that a tree, a bird, an animal, or above them all, a human body, these manifest wonderful diversity of parts in unity of aim—and the study of creation opens an inexhaustible school of beauty. The nearer the garden comes to the variety and unity of nature, so much the better for its completeness. There, as in nature, the lines of beauty and utility should be mingled; and while we should not be ashamed to plant our esculents, and even our fruit trees in straight rows, we should study to secure the curve of grace wherever we can consult taste, and allow the generous eye and the easy foot to move in the line of beauty. He is happy who can have enough of flowing or living water in his grounds to help him to dream of the lake, the river and the ocean; enough of rise and fall on the surface to relieve the scene from monotony, if not to suggest the images of the hills and cliffs of his romantic rambles or reveries; enough of lawn and grove to unite the charms of the open meadow with the forest shrubs; flowers, shrubbery and orchard enough to present the useful and the beautiful in judicious harmony, and to help the master and his friends to discern distinctly the hand of God—the All-wise and the All-lovely—in the domain. I believe most sincerely in making the garden thus a microcosm, an epitome of nature, a chapter out of the great Cosmos. We read that Father Adam heard the voice of God in the midst of the garden, and our faith is that the same God is with us; and with all our illumination we are wretched scholars if we have not learned to hear His word as it speaks to us amidst the flowers and trees. Lord Bacon well says, "God Almighty planted a garden, and indeed it is the purest of human pleasures." Base surely is the mind that forgets Him in this purest of pleasures, or fails to see His wisdom and goodness in its riches.

One glance at the science of horticulture prepares the way for looking at the art, and so we pass from the garden as a school to regard it as a work-shop. It is certainly the oldest of work-shops—older by far than the carpenter's or smith's—and the place where man learned to earn his bread by the sweat of the brow. Strength surely is born of this labor, and the working power of the race comes mainly from the tillers of the ground. Without undertaking to call farm labor wholly blessed, or to think it altogether a luxury to work ten hours a day in the broiling sun, we may surely say that no form of muscular activity is more beneficial than that which belongs to a judicious round of gardening. It compels us to take every attitude, and call every muscle into use. We read of, and sometimes see, ingenious calisthenic exercises that are so contrived as to bring the whole body into healthy motion, but no artificial ingenuity can compare with gardening as a gymnastic exercise. What variety of implement, posture, and movement there may be in a single morning's work! We may sit, or stoop, or walk, or stand, with rake, hoe, trowel, spade or plow. I certainly never knew what muscles I had till bringing them out in this various work. There is a great deal that a gentle hand may do, and grace as well as health attends the fair woman who plays the Flora or Pomona of the domain, and tends her flowers, vines and trees as a good housewife only can do. Beauty is lovelier at this task than at any play; and a rational man on the way to matrimony might be more readily won by the charming contrast between the delicate hand and foot of the fair amateur gardener, and the brown earth and useful trowel or pruning-knife, than by the brilliant belle of the ball-room, with its surfeit of splendors and its monotony of unbroken display. There is nothing, moreover, better for a sedentary man, or student of delicate habit, than moderate practice in the garden. There is variety enough to keep his attention, and effort enough to stir his blood, quicken his senses, and point his purpose. He may profitably try once in a while the harder forms of labor, and learn from experience what hard work is. Let him go at the stones of the little or large quarry with sledge-hammer and crow-bar, or try his hand with the axe at felling some dead or doomed cedar or sycamore, and his aching flesh and bones, and panting breath, and swelling veins will soon teach him his limitations, give him new respect for his rough comrades at the business, and read him a new version of the old Latin saw, "*Non omnes omnia possumus*," or, "We cannot all do all things."

Skill as well as strength is found in tilling the ground, and the horticulturist who is master of his art, need not hang his head before any adept in accomplishment. To be able to adapt each plant to its soil and conditions, to train and prune, to bud and graft, and perform all the nice offices of gardening, with the attendant supervision of fowls, cattle and horses, and the due prevention of blights from the elements and ravages from noxious insects, requires a rare union of aptitudes and crafts, and seems almost to call for all handiworks and vocations in one. Some persons have a charmed touch for trees and flowers. A good nurseryman has his own gift of nature as well as training, and there is something more than superstition in the legend of St. Rosa of Lima, one of our few American saints of the canon, who is said to have had such witchery over vegetation that the roses and lilies bloomed out at her approach. Some temperaments are certainly in peculiar harmony with plants, and seem to be loved by them as well as to love them. Perhaps there may be something in the influence of animal electricity over the growth of vegetation that may explain the apparent marvel, though I am not one of those who insist upon explaining all faith away by the materialist's creed or no creed.

If we add the skill of horticulture to the rugged health that belongs to out-door labor in the wholesome air of the country, we certainly have a work-shop worthy of the school which should prepare us for it. Little as the rural population come up to the proper standard of their privileges, we may be quite sure that we need them to recruit our exhausted city vitality, and that our great towns would miserably degenerate without constant reinforcement from the bone and sinew, the fresh blood and brain of the green fields. So far, indeed, as the science of health and the art of living are concerned, the city has the advantage; and were it not for our better knowledge of medicine, ventilation, bathing, cooking, etc., we might all languish and die, until a fresh migration came in from the bush. Undoubtedly the best science as well as art is to be found in the great centres of life, and if we, therefore, receive much from the country, we are bound to give much in return, and carry our culture and knowledge into the villages and fields.

There is probably no piece of ground in the whole land better worth seeing than our Central Park, that work-shop of so much labor and studio of so much art. We ought to rejoice in it not only for its direct pleasures, but for its influence as a model garden upon the whole nation. Every man's acres ought to be lovelier for that careful and magnificent enterprise and achievement. There is something there for every man to learn, whether for the millionaire bent on laying out his princely acres wisely, or the thrifty workman who would know what is the best vine to trail over his cottage or the best shade trees to set before his door. The element of beauty is evidently becoming more and more a popular study with us, and the taste for landscape-gardening is making more general advances in America than any other art except music, which goes so well along with it and seems to call for it as the song of the bird calls for the grove and the flowers, "whose breath," says Lord Bacon, "is far sweeter in the air (where it comes and goes, like the warbling of music) than in the hand."

The beautiful arts are brought before us by this illustration in their two classes—the arts of the hand, that appeal to the eye, and the arts of the voice, that appeal to the ear. Now surely the garden is the *atelier* for both classes of arts, and on the one hand invites architecture, sculpture, and painting, and on the other hand rewards music, poetry, the drama and eloquence. We must have some kind of building there, and any man of the least taste can play the architect upon some rustic bower, even if he has too much good sense or modesty to venture upon planning his own house or stable or conservatory. One may be well amused at the effect that may be produced by a little money, where there is plenty of rustic timber. I built two rough arbors several years ago, which cost but twenty and thirty dollars, and now that the vines have covered them they have risen into romantic beauty, and no costly summer-house of the old, artificial pattern can compare with them for a moment. My favorite retreat in the heat of the summer days is the least costly of the two; and the pomp of millionaires seems ridiculous when I sit with some noble book in hand under the shelter of my twenty-dollar study, with stately oaks and walnuts around, with chirping birds and chattering squirrels, keeping company with the ceaseless murmur and rustle of their leaves. Last year I tried my hand at a statelier structure, under the spur of a generous gift, and with the help of a young student of architecture, who is now winning honors in the great school of architects in Paris. His drawing was charming, but the thing itself is more so; and the rustic tower with five pointed arches, on its stately rock foundation, is a picturesque feature of the whole neighborhood, and is intended to bear aloft our sacred flag with the holy symbol of our faith. The cost was only about two hundred dollars at the worst of all seasons for building, and in common times it might have been built for little more than half that sum. Who will laugh at me for erecting three handsome buildings for two hundred and fifty dollars? Let him laugh who wins. I am willing to be laughed at by any body who will get more beauty and enjoyment for less money. Our acres are enriched for our lifetime, and our summers are idealized for a sum of money which might be easily spent upon a ball-dress or a dinner.

Sculpture as well as architecture belongs to the garden. It is well to have means to set up fountains, vases and statues, for these do much to fill out and integrate the landscape. But little wealth is needed to bring the sculptor's eye, for mass and form and light and shade, to bear upon the prospect. Every grove and clump of trees or shrubs is a study in form and grouping. Swedenborg says that trees represent men; and whether he is right or not, we know that the finest statuesque effects may be produced by due selection and massing of trees and shrubs, so as fitly to combine and contrast the drooping willow or elm with the spire-like fir or hemlock, or the rounding maple or oak. At night the eye, in some respects, enjoys still more the sculptor's art of giving beauty and grandeur to mass and form. In our little domain it was a new revelation to me years ago, when I began to walk at evening in our groves of cedars and maples and oaks, and to note the sky-line of shadow and light which so brought out their expressions. The place had a solemn, grand, cathedral look; and two or three cedars that had no particular charm in the daytime rose up into romantic beauty then, and their tips seemed to be ready to volunteer to be built into the walls of some old minster, in order to complete or repair the work of the glorius dreamer among the builders of the ancient times. The landscape-gardener must needs be a sculptor in taste if not in talent, and so arrange buildings, walks, lawns, trees, water, shrubbery and all things in the view as to give all the true measure and proportion, and bring out new power and charm under all the changing lights and shades of nature. Every man of common sense practices the same art, however, when little conscious of it; and he who trains a woodbine upon a stately tree, or an ivy upon a solid wall, belongs to the illustrious craft that ranks Phidias and Michael Angelo among its princes. He is a sculptor not in dead wood or brass or stone, but in materials quite as ready to obey the call of taste and imagination, and give those effects of form and light and shade that lend the handiwork of the chisel its power and charm.

And who shall tell the capacities of the garden for the painter's art, with its display of figure, color, and perspective. Landscape gardening is landscape painting, with a stouter instrument than the pencil, indeed, and with richer and more living colors than any on the pallet. It may be that the material is so near at hand, and often so ample as to leave little to the invention of art; and he sometimes treats nature most generously who most scrupulously lets her alone in beauty unadorned, and thus adorned the most. But generally the loveliest ground needs clearing and arranging. In fact, rural art is never so perfect as when it brings out nature; and culture of the soil, as of the soul, reveals the fairest of its capacities, and lights up the face with its best expression. You must first be able to see your ground properly, and so also to see from it into the distance. If your garden is a wilderness of nature, where you can hardly see a rod before your face, you are not master of your domain; for you cannot, either by sight or imagination, take in its extent or richness, nor own it with your eye, that most imperial of the senses. True art will not show the whole at once, but what it does show will imply the rest, as the hand or foot implies the whole body. The thicket that you let remain will combine with that which you cut away to give the due proportion of seclusion and openness and your pruning-knife or bush-hook well plied will sometimes do wonders in bringing your tangled wilderness into the proportions of a picture. One of our great painters showed me a few days ago a picture on canvas twelve feet by seven, which embodied only a week's work, and was a noble sketch of a storm in the Rocky Mountains, with all the features of snow-capped peaks, majestic cliffs, highland lakes, browsing deer, running brooks, stately trees, and gentle flowers. If he had been two months at work upon the piece the result before the eyes would be enough to show for the labor and time. Yet I have seen more marvellous transformations than that wrought by the knife and axe. Cut away a few bushes and branches within that grove on the hill, and there is a full view, a grand picture, of the sea, with its changing waters, and its rich effects of storm and calm, moonlight and sunlight, now with broad and unbroken surface, and now all alive with vessels under steam or sail. I have seen an arbor that Eve might not scorn made in a couple of hours by cleaning out the interior of a thicket of alders and young cedars, opening a lovely carpet of ground pine under foot, and preparing the way for the woodbine, the clematis, and the honey-suckle to run up the bushes of the encircling walls, and to cover them with their rich and ever-varying festoons and arabesques.

The proper application of the principles of perspective to any little domain as simple as ours may not shame any painter's art, and what has already been done there is enough to show that the pruning-knife is ally to the pencil, and both may minister to the spirit of beauty. The element of color, too, needs careful treatment, and is much under command of taste and imagination. The hues of nature, indeed, we do not create; but we find them, and not as the painter finds them, in parcels assorted and labeled at his order, but in natural combination. The rose is not of a single red, nor the pink or the violet of a single pink or violet shade. But there is great choice in the selection and grouping of flowers, shrubs and trees, so as to bring out the true melody and harmony of color. We may call color the music of the light, and, as in music, we may find in color melody and harmony. That rose, with drooping head and blushing cheek, has its own native air or melody, like the song of the robin or bluebird; and that fuchsia, with pendent and jeweled drops, seems to answer the rose's queenly air with her own gentler tones. But group the whole array of plants of color duly, and what harmony is the result! Sometimes different clusters or beds of well-chosen flowers seem to answer each other like the responsive choirs of the cathedral; and it may not be altogether conceit to say that in a well-concerted garden you may have all voices of color music, from the deep bass of the ruddy rose to the thrilling soprano of the violet. We need to take account of all the changes of season and periods of vegetation to bring out the proper effects of color, and the good gardener will sow his seed and arrange his flowers so as to leave no month uncheered from the time when the bluebird pipes on the advanceguard of spring, and pecks at the swelling buds of the maple, to the time when the sere and yellow leaf gives such glory to autumn, and the snow-bird is seen on his way to summer skies. All the hues of nature, of course, should be made to contribute their part to the pictured series of months, and great account should be made of the constant features of the landscape, such as the evergreens and the mosses and the rocks that give such charm to winter when summer life is no more.

The vocal arts cannot fail to feel the power of the haunt thus prepared for them in the landscape; and music, poetry, the drama, and even eloquence, are ready to catch inspiration from the arts of rural architecture, sculpture and painting. Nature surely gives us music enough to call out our voices; and it is no slight to the birds to practice their art on true principles, and make their wild melodies the prelude to the finer melodies and harmonies of the voice, the flute, the harp, or piano. We hear of chamber concerts and academy concerts. Why not have garden concerts more frequently? I have certainly sometimes thought even the organ-grinder a godsend in the country, and have there listened with delight to the old strains that I would have closed my ears against in the city, so much does nature set off art, and the trees and flowers ask to be interpreted into music. And as to poetry, we are all ready to be poets in the country; and if our fancy is dull of itself, and has no Pegasus of its own to ride, it is quite ready to mount upon the pillion of some favored son of the Muses, and ride with him into the heaven of ideals. How much poetry has been written in or about the garden, every library is proof, and Parnassus can never be a paved city. Even the policies and passions, the lights and shades, and follies and aspirations of city life come most to mind in the country, as they see the battle best who look upon it from some tranquil hill away from the din and smoke. The drama, too, belongs to the garden; and he who has the true eye may see tragedy and comedy all about him in the airs and attitudes, the loves and the quarrels of insects, reptiles, birds and beasts, and the various play and mien of the more rational tenants and ramblers of the domain, with their walks and talks, their work and play. It is a good place, too, for actual dramatic scenes, especially for pastoral life, and there are many parts of our great dramatists that can be charmingly enacted in groves or dells, or among flower-beds and grassy lawns. Last year a little association of amateurs of letters spent a day with us in the country, and amused themselves and us with recitations. Among other selections, they gave us the melancholy Jaques with his companions in the great scene in the Forest of Arden. The famous words "All the world's a stage" gave our little dell, with its canopy of oaks, elms and walnuts, quite a Shakespearian dignity, and we were not at all ashamed to have such a scene brought to such a theater. Nor would glorious Will himself have thought the performance altogether poor.

As to eloquence, the garden speaks for itself, and is sure to make its true friends and lovers speak; and the finest of all speech—that which calls for two parties only, and is very likely to fix the destiny of both—flows more freely and willingly there in some charming arbor or shady walk than in the city drawing-room or promenade. What sacred eloquence the garden may inspire none will deny who revere Him who bade us consider the lilies how they grow, and taught the hidden wisdom of the seed and the soil.

I have been anticipating the last branch of our subject, and have implied that the garden may be a gallery of elegant resort, a saloon of society and conversation. Why should not more stress be laid on this idea?

There is something in the place itself that favors companionship; and when left to ourselves, away from the distractions of the world, we make friends of books or find them in our neighbors. We feel our social nature more when less surfeited with society, and made to hunger and thirst for its nurture and refreshing. There is something, too, in the ready walks and various paths and scenes that invites conversation. The tongue insists on alternating with or relieving the active foot, and the eye, in time satiated with seeing, asks for the voice to give the listening ear its turn. The garden makes Peripatetics of us all, and after we have walked half an hour we are impatient to read or talk the next half hour, and keep up the balance between body and soul.

Then what socializers are fruits and flowers by their taste and beauty! The pear, peach, apple, cherry, and all the smaller fruits of flavor, seem to be half soul and half body, and to mediate between the spirit and the flesh. Who cares to eat fine peaches or strawberries by himself? We must share the treasure, like a choice poem or sparkling paragraph. All persons of gentle culture have this feeling, and every good-hearted man, however rough his hand, is no stranger to it. How obvious it is in all fruit-growers at their gatherings! and although the quantity of the choice fruit under view may be small, they insist upon sharing it in good fellowship. It may be a single choice apple or pear for the whole dozen of amateurs; but out comes the pocket-knife, and all have a fair portion. I believe that the growing of fine fruits has introduced a new element into society, and has made the taste of good things to educate the higher taste that feeds on the beautiful, and brings men together in the fellowship of refinement and intelligence. The strawberry, the raspberry, the peach, and the pear have been great civilizers in America, and their work is not done as yet.

The more express beauties of the garden carry out this work, and there is something wonderfully assimilating in all scenes and objects of pure taste. Flowers are wine to the eye, and they who enjoy them find themselves won to genial companionship, that softens and exalts and does not inebriate. When combined with the various charms of the landscape they have a certain enchantment, and the rose or the honeysuckle is a precious poem when it interprets our old homestead or our pet haunt. Then how comparatively small the cost of much of this rare beauty. Buy a dozen or two of roses or phloxes of choice kinds, as you can for some two or three dollars a dozen, and see what will come of them. What exquisite bloom in those bush-roses, in that splendid *Chateaubriand*, that luxuriant *Mrs. Elliot*, that stately *Pius IX!* and what witchery in those climbers that run like roguish imps upon everything that will hold them, and are Puck in frolic and Ariel in aspiration! Those phloxes, I confess, amaze me by the perfection of their color and the continuance of their bloom. For two months that *Valery* has charmed us with its rich Magenta clusters, and that *Alba perfecta* has soothed and even evangelized us by those petals of exquisite white, with its interior of pink, as if love and purity were blending together, and the pure in heart were flaming into rapture as they begin to see God. Yet the twelve phloxes cost less than a good bottle of wine, and for two months their cups have been full of nectar, and now are filling again.

The eloquent speaker in conclusion gave a brief description of his own country residence. Eight years ago he purchased eight acres of land, still unreclaimed and the fit abode of snakes and crows; but upon reducing it by cultivation and bringing out its picturesque points, by an application of some of the well known principles of landscape gardening, he had succeeded in making it one of the most beautiful spots in the town.

On motion of Mr. Bull, the thanks of the Association were tendered to the Rev. Dr. Osgood for his very interesting address, and a copy was requested for their use.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

November 15, 1864.

Mr. J. W. Barrows, Vice President, in the chair

Mr. Wm. S. Carpenter presented six varieties of apples, viz: Fall Pippin, Rhode Island Greening, Newtown Pippin, Dominie, Wine and Hawley's Sweet, and spoke of the qualities of these apples both for the table and for shipping. He alluded to the fact that handsome looking apples bring the best prices, and that other varieties, beside the Newtown Pippin, sell well in Europe.

Dr. Hawes asked if the Hubbardston Nonesuch was more liable than other kinds to be molested by the apple moth?

Mr. Peter B. Mead—Apples in this respect may be divided into classes, such as sweet, sub-acid and acid, and it will be found that sweet apples are most of all liable to be attacked by insects, the sub-acid less, and the acid least. The Hubbardston Nonesuch, therefore, is not more liable than others to the attack of insects, at least this is my experience.

Mr. Mead then spoke of the apple in an economic sense. The Newtown Pippin is a good apple, and sells for a high price, not less in some seasons than $15 per barrel. When perfectly ripe its flesh is tough. The Esopus Spitzenburg is also a fine apple, but its flesh is rather tough. I prefer apples with a tender flesh, such as the Early Joe, and the Swaar.

Mr. Wm. S. Carpenter—I place many varieties of apples before the Newtown Pippin. As a cooking apple the Hubbardston Nonesuch is of first quality. The Rhode Island Greening is a good apple, but it will not make cider; it has no distinctive quality. A number of persons are, however, planting this variety for that purpose. The Mother and the Wagner possess fine qualities. The Jonathan is also a fine apple of the Spitzenburg quality. The Primate is one of our finest varieties, approaching the character of a good pear. The Early Joe alluded to by Mr. Meade is a very excellent apple; it is buttery and you may squeeze it as you would a pear.

Mr. Meade—I hope our committee on large fruits are taking notes and making a record of all the local fruits they meet with. I have seen many kinds that are very superior, both for cooking and eating. I presented one variety grown in New Jersey, called the Cheeney apple, to the last Pomological Society, held at Rochester. It was deemed by the fruit committee to be of a very good quality.

Dr. C. W. Grant—I expected Mr. Carpenter would have extended his list of apples. Mexico I consider a good apple, also the Cogswell, Westfield Seek-no-further, and Melon. The McClennan is a vigorous grower and should not be passed over. Peck's Pleasant is a Connecticut apple, surpassing the Newtown Pippin. Dr. D. S. Pardee of New Haven, originated one hundred varieties of pears, many of which are of good quality. Governor Edwards also originated a large number of excellent pears. Primate is an excellent apple. I saw it growing in Connecticut thirty years ago, and think it must have strayed to the western part of this State.

The early settlers of New England had a great variety of English apples, and seedlings are constantly coming up, which is one reason for finding such good apples there.

Mr. Wm. S. Carpenter—The Tompkins County King has been put high on the list by our western friends. I think it over-rated. It is a showy apple, but its great weight renders it liable to drop from the tree.

Dr. C. W. Grant—The Baldwin I think one of the best apples. I do not know where to find a better orchard apple.

Mr. Wm. S. Carpenter.—I cannot put the Baldwin above a second class apple, but still it is a valuable tree for our orchards. It keeps well, but there is a greenness about the Baldwin that I do not like. It will not compare with many of the apples I have named.

Dr. C. W. Grant.—When the trees are properly thinned, the flavor of the apple is greatly improved. We have been shipping it to England as one of our best apples. Sometimes from the effects of the sun it becomes spotted, which injures its flavor and appearance.

On motion of Mr. Carpenter it was resolved that an invitation be extended to the Rev. Dr. Campbell to address the association on the subject of Botany at its next meeting.

On motion the following committee was appointed to invite gentlemen to lecture or give addresses before the association during its winter meetings. Messrs. Carpenter, Mead and Henderson. Adjourned.

JOHN W. CHAMBERS, *Secretary.*

December 13, 1864.

Mr. Benjamin C. Townsend, President, in the chair.

Mr. E. Williams, Montclair, N. J., exhibited several varieties of apples which he said were sent him by a gentleman formerly a neighbor of his, but now living in Ohio. Two specimens of Fall pippin that had been kept in an open room with plenty of air circulating around them. They are well preserved, and will keep so until January. These are called the Romanite of the West, and are very sweet and pleasant to the taste. Spitzenberg apples from Ohio, and Rhode Island greenings, and a variety called the Hartley pippin. Here is an apple that is so different in shape, size and appearance, that he did not recognize it. It is one of the hardest apples that he ever saw. The apples of this tree are inclined to flatten on the lower branches, while those on the top are more conical. This was the prevailing feature of the specimens grown in Ohio.

These specimens are Jersey cider apples. They can be made a football of and not be injured, and where they become bruised, the spots dry up and never cause them to rot. This is the Canfield apple which makes the famous Newark cider. Twenty or thirty years ago there was no apple so well grown as the Canfield; it has now greatly deteriorated on account of the vast increase of insects every year, and the soil becoming exhausted. The young trees are not what we should expect. Apples this year do not keep so well on account of the very dry summer we have had.

FRENCH FRUIT.

Mr. Wm. S. Carpenter submitted the following report, which was accepted:

The committee appointed to examine the collection of pears and apples, sent to our last exhibition by M. Andre Leroy, of Angers, France, beg leave to report—

That the collection, as a whole, was very fine, and considering the number of new varieties, was more interesting than any previous exhibition of foreign fruit ever shown in this city.

We naturally look for new and superior varieties of pears from France, where the greatest attention is paid to hybridizing and producing seedlings, and in the detailed report of the separate varieties accompanying this paper, you will notice several new pears ranking best.

To our great regret, the pears more especially were in so many varieties so much decayed as to render it impossible to judge of their merits, and out of the large number of varieties, only those which were in a condition to test have been noted.

The secretary has a list of all the varieties, and it is to be hoped that we may have a subsequent opportunity to test them. Unfortunately, nearly all the fruit which was sound, was more or less tainted with the odors of the ship's hold, and on this account the ranking of some of the varieties must be considered as perhaps subject to some modification, when specimens grown here may rank higher. Those however which, under this disadvantage, are judged to rank as good, very good, or best, may be safely recommended as desirable for trial. Of course they must be tested in our own climate and varied soils, before being recommended for general cultivation.

Your committee were not prepared to expect such a splendid display of apples as was found in the collection. The size, beauty and quality of many varieties were superior.

In conclusion, we beg to call the attention of the Association to the obligation we are under to Mr. Leroy for the opportunity given us of examining his fine collection, and it would be ungracious not to acknowledge it.

In the French catalogues we can read of the new varieties of fruit for years before we have the visible evidences of their qualities, but here we had the privilege of testing the fruit itself, including most of the new varieties, of which, if there are in this country any young trees, they have not yet borne fruit, and possibly in this collection were specimens of seedlings which have fruited in France for the *first time this year.* Those of us who know the long delays required to determine the rank and value of new varieties, must appreciate the great advantage which such opportunities afford, and we regret that the fruit-growers of the country could not all have availed themselves of the examination of this collection.

Leaving out of view therefore the gain to accrue to us by stimulating Mr. Leroy to continue his contributions, we trust that the Association will see fit to send Mr. Leroy some suitable testimonial in acknowledgment of his courteous response to our invitation to exhibit, and we beg that you will at once take some action upon the subject.

WM. S. CARPENTER,
NEW YORK, *Dec.* 13, 1864. B. C. TOWNSEND,
Committee.

PEARS.

Royale d'Hiver—Large; pyriform; second rate.

Bezy Sanspareil—Medium; Bergamot shape; yellow; good.
Fondante de Malines—Large; yellow; fine melting; very good.
Souvenir d'Automne—Large; yellow; melting; good.
Neuf maisons—Large; yellow; handsome; good.
Doyenne Goubault—Large; flattened pyriform; cinnamon russet; very good.
Princess Royale de Groom—Medium; yellow; Bergamot shape; very good.
Fourcroy d'Hiver—Medium; russetty; handsome; good.
Belle de Noel—Medium; Bergamot shape; yellow; best.
Serrurier d'Automne—Large; yellow; specimen too much decayed to test.
Prevost—Very handsome; difficult to ripen here; specimen tested in perfection; quality good.
Colmar des Invalides—Large medium; yellow; handsome; inferior.
Casserole—Very large; pyriform; yellow; very handsome; good.
Franc Real d'Orleans—Large; quality third rate
Leon le Clerc—Very large; handsome; cooking.
Bon Chrétien d'hiver—Very large; very handsome winter pear, possessing fine characteristics; specimen not ripe.
Bon Chrétien de Vernois—Very large; very handsome bright yellow; third rate.
Bon Chrétien d'Auch—Very large; yellow; barrel shape; very handsome; second rate.
Bon Chrétien de Rance—Very large; green; second rate.
Bon Chrétien de Fondante—Large; green; unripe.
Emerald—Very large; pyriform; resembles Bartlett; yellow; first quality.
Fontaralie—Large; pyriform; winter; specimen not ripe.
Belle de Troyes—Large; pyriform; cinnamon russet; red cheek; very good.
Grain de Corail—Medium; elongated; very beautiful; nearly covered with bright crimson on yellow ground; very fine grain; juicy, melting; quality best; supposed to be the "Forelle," but this specimen was without spots or specks, and if that variety, this specimen was unique.
Joloy—Very large; resembling Glout Morceau; yellow; very good; winter.
Rateau Gris—Very large; bronzed russet; winter; specimen not ripe.
Gros Lucas—Very large; yellow; winter; specimen not ripe.
Beurre Bachelier—Extra large; yellow and crimson; juicy; very handsome; flesh fine; should think very good; specimen too much decayed for quality.
Beurre de fais—Large; very handsome; yellow; second quality.
St Florent—Very large; yellow; marked russet; specimen unripe
Beurre de Knops—Very large; yellow; elongated; winter; specimen unripe.
Bezi de Caen—Large; elongated; dark russet; winter; very good.
Uvedale St. Germain—Well known; specimen weighs two pounds; very fine in appearance.
Gustave de Bourgogne—Very large; handsome; cinnamon russet; juicy; specimen decayed.
Marechal de la Cour—Large; russetty.
Belle Julie—Medium; green; juicy; good.
Cavernier de Boullangier—Large; yellow; winter; unripe.
Bezi de Veterans—Larg; yellow; winter; unripe.

There were also a larger number of varieties than here enumerated, which were entirely decayed, doubtless of early varieties. The tickets upon which the names were written were so stained that the names could not be deciphered in many cases; those that were at all legible, the Secretary will attach to this report.

APPLES.

Unique—Large; rich yellow; tender; very good; like our fall pippins, but higher color.
Lanterne—Large; yellow, with ruddy cheek; very good; nigh flavor.
Belle fleur—Very large; skin bright green; quality second rate.
Reinette de Chine—Very large; green; very good.
Gaumonte—Very large; ribbed; bright yellow; very good.
Calville des femmes—Very large; green; good.
Archduchesse Sophia—Small; very beautiful; striped vermillion on yellow ground; quality best.
Buncombe—Medium size; striped vermillion; yellow ground; good
Bedfordshire—Very large; yellow; very tender; good.
Rosa blanc—Very large; yellow; crimson cheek; flesh very white; quality very good.
Reinette Suisse—Very large; bright yellow; quality best
Cœur de Bœuf—Very large; red and green; second rate.
Colville blanc d'hiver—Very large; very ribbed; yellow; high flavor; good.
Menagére—Extra large; four and three-quarter inches across; very handsome; whitish yellow; second quality.
Reinette Dolbeau—Very large; yellow; red cheek; good.
Gros Vert—Very large; yellowish green; good.
Riezen Szerdsica—Large; green; dull red cheek; good.
Doncklair—Large; bright yellow; high flavor; good.
Grosse face d'Amerique—Large; greenish yellow; tender; good.
Genéral—Medium; whitish yellow; tender; very good.
Metayer—Medium; light green; red bottom; good.
Surpasse Imperiale—Medium; sweet; good.
Calville Rose—Medium; bright yellow; tinged rose; good.
Reinette pepin—Large medium; yellow; red cheek; tender; good.
Surpasse Reinette—Large; yellowish green, with rosy blush; good.

And a large number of varieties not in condition.

A seedling apple from Orange county, N. Y., some Tompkins county Kings, and Fallawaters from Pennsylvania, were on the tables in competition for the Greeley $100 prize.

W. S. Carpenter recommends the following new pears: Doyenne du Cornier, season October and November; Henkel, season October; De Tongres, September and October; Des Nonnes, September and October; Duchess de Berri D'Ete, last of August; Beurre Hardy, last of September; Fondant de Charneuse, October; Manning's Elizabeth, August; Doyenne d'Alencon, keeps till April. The following he spoke of as promising: Beurre St. Nicholas, Beurre Kennes, Madam Eliza.

History says that the pear tree is a native of Asia, long lived, hardy, and often attains a large size. A tree growing in England is said to be over four hundred years old, while another is reported to have yielded fifteen hogsheads of perry (pear cider) in a single season. There are some remarkable trees in our own country. One tree in Illinois is ten feet in circumference one foot from the ground, and said to have yielded one hundred and eighty-four bushels of fruit in one season. A noted tree, the Stuyvesant pear tree in this city, was planted two hundred and fifty years ago.

In looking back to the old sorts of Bon Cretien, Martin, Jean, &c., and comparing them with Beurre Hardy, Henkel and other modern sorts, we are led to inquire whether the subject has been exhausted, or whether we may not expect equal progress in the next twenty-five years.

Adjourned JOHN W. CHAMBERS, *Secretary.*

November 29, 1864

Mr. Benjamin C. Townsend, President, in the chair.

Messrs. Carpenter and Mead, from the special committee appointed at the last meeting, reported that they had called upon several prominent speakers who had agreed to speak before the Association They suggested that the committee have power to prepare a programme and print the same.

On motion of Prof. Tillman, the committee were requested to prepare a programme of the lectures and have them printed for circulation among the members.

On motion of Mr. P. B. Mead, the regular business of the evening was suspended in order to hear Dr. Campbell's lecture on botany.

The chairman then introduced to the Association the Rev. Dr. Campbell.

BOTANY.

By the Rev. Dr. James K. Campbell.

I propose to address you this evening on that branch of Natural History termed Botany. It derives its name from a Greek word which signifies an herb or grass. It is a branch of science every way fitted most amply to reward the careful student. It opens up sources of enjoyment which cannot be explored without rewarding the explorer with the purest satisfaction. The whole field of scientific pursuits is covered with objects of highest interest to intelligent beings. The light of science reveals to the eye of man objects which have lain in concealment, and, without it, much that is at once beautiful and useful would have remained unknown to the human family. The great author of nature has made nothing in vain; and it is equally true that it is the interest and duty of his intelligent creatures to search out his purposes of mercy and goodness, that are inscribed on every object which his hands have made. The pleasure with which the person engaged in scientific studies pursues his delightful course, can never be fully set before the mind by anything like a mere description. We may descant on the amazing and prodigiously important discoveries of the chemist, which have at once gratified the taste and wonderfully lightened the labors of man, but can never convey an idea of the thrilling emotions that gladden him, as from step to step he goes onward in his analysis until he attains the results. Actual experience alone can make us acquainted with his joy. So it is with the pursuits of the Botanist.

There are few who cannot admire the beauty and variety of the many flowers that cloth the meadows, or enjoy the fragrance which they send forth; but this is a mere drop of pleasure from that stream that flows in upon the soul of the botanist as he treads the fields of nature. The superficial observer may indeed be filled with admiration as he contemplates the bright and many colored plants that grow around his pathway, and his spirit charmed with the scene, may say, with the poet Thompson,

> "Who can paint
> Like Nature! Can imagination boast
> Amid her gay creation, hues like these;
> And can she mix them with that matchless skill,
> And lay them on so delicately fine,
> And lose them in each other, as appears
> In every bud that blows."

But the botanist, as he examines the structure and functions of plants, lifts his soul in the language of inspiration, and says, "In wisdom hast thou made them all"; or, with Milton,

> "Thou sittest above all heavens,
> To us invisible, or dimly seen
> In these thy lowest works, yet these declare
> Thy goodness, beyond thought and power divine."

It is not, however, a superficial observer of anything who discovers merits or detects faults, it is the close and careful observer. This is peculiarly so with the plants that cover the fields of nature. The science of botanical arrangement first assumed a regular form under the auspices of Conrad Gesner and Cesalpinus, but it was reserved for Linnæus, a native of Sweden, to place it before the world in a systematic and attractive form. His great mind systematized the science, and opened up a pathway which leads the student pleasantly onward in his researches into the arcana of vegetable nature. He saw and unfolded to view the fact that every plant has distinct characters by which it can at once be classified. He also discovered and expounded the generic or family character of each plant, and demonstrated how the various species may be ascertained. A much surer and easier method for the attainment of a knowledge of the science was by him pointed out, and a great impetus was given to the study of botany by his discoveries and zeal in teaching this branch of natural science.

Upsala, once the capital of Sweden, where he taught, became a place of great attractions. The students attending his lectures increased from 500 to 1,500. It was not, however, his fame alone as a naturalist that caused this great increase. It was also the interest and importance connected with the science. Nor was it only in his own country, and among his countrymen that he did so. He awakened the whole civilized and educated portion of mankind, and sent many forth zealously to explore the whole vegetable kingdom. Young men, animated with the spirit of their great teacher, explored every country. Many, indeed, lost their lives in pursuit of their favorite science, but many returned bearing with them, the seeds and plants of other lands, which they valued more than the gold of Peru. The return of a pupil from foreign countries bearing their productions with them was an event that conveyed pure and lofty enjoyment to their great teacher. The results of their researches were always presented to him. The cultivation of the seeds and the arrangement of the plants afforded him the highest satisfaction, while it powerfully advanced the interests of his favorite science. But there were many mighty minds at that time engaged in cultivating the science of botany. Drs. Rudbeck and Celsius were eminent for their knowledge, and early discovered the genius of Linnæus, and powerfully assisted him to rise above the difficulties that beset his pathway to greatness. Frederick Adolphus, too, the then reigning monarch of Sweden, himself a botanist, showed great kindness for him, and the friendship of such men, in connection with his own talents and industry, soon placed him among the most conspicuous in Europe. There were also highly distinguished naturalists in Holland, France, Great Britain and our country, engaged in botanical pursuits, and by their united efforts the science rose into high repute, and ever since it has been the favorite pursuit of some of the greatest minds that have acted their parts on the theatre of life.

The great author of Nature has beautifully adapted every plant to the soil, situation and climate in which they are found. If we travel from the tropics to the polar regions, we find that every zone has its peculiar plants, and they flourish only in that particular climate.

But this abstract truth is not the only one taught us by the vegetable world, the character of him who made them is inscribed, as it were, on the leaf of every plant fanned by the wind of heaven. The plant called Nepenthes distillatoria, may be fitly mentioned as showing his goodness and his bounty. Its leaves bear a covered pitcher full of water by which the thirst of man may be quenched, and how often has the weary, parched traveler, been refreshed by this kind and merciful provision in Nature under the rays of a tropical sun. The Peruvian bark, Gentian, Senna and an endless variety of others, eminently useful in restoring and preserving the health of the human family, all attest the goodness and the mercy of the great Father of our race. The Lapland moss is another plant that furnishes a striking evidence of this truth. The Reindeer, an animal so useful to man in these regions, is provided with the means of sustenance by it, amid the bleak and inhospitable country which it inhabits, without it it would cease to live. Man would thus be deprived of the flesh to nourish him, the skin to cover him, and its strength to bear him, almost with the fleetness of the wind, over the frozen snows of his Arctic home.

There are two systems by which a knowledge of botany may be acquired. The one is called the linnean or artificial, the other the natural system. Linnæus founded his system upon the consideration of the stamens, as more or less numerous; upon their proportion, connection and their absence. Linnæus did not overlook the natural system, but he was persuaded that it did not meet and provide for all the wants of the botanist in order to the attainment of a correct knowledge of the science. Other eminent botanists have sustained this opinion, especially with regard to American plants. But botanists of the highest character, both in this country and in Europe, now in the more advanced state of the science, altogether prefer the natural system. It is not, however, my intention to enlarge on this subject, or to give an opinion. Let me briefly speak of the advantages of the science of botany, first from the important uses that may be made of plants. I have already referred to the medical properties of some plants, I may now add that probably every plant has some such property, which if known might add materially to the health and comfort of the human family. Many plants too are noxious to man, consequently a knowledge of their peculiar properties is highly necessary, in order, that we may know what to choose and what to avoid.

By the aid of Chemistry their valuable qualities have been extracted and given to us in a form at once useful and pleasant. But for the researches of the botanist the properties and uses of many plants would have remained in concealment from us, and many of those medicines that contribute so largely to soften the woes of suffering humanity would have been unknown. To discover the useful properties of plants is the great object of the intelligent botanist. It is not merely to enlarge his own acquaintance with nature and her productions; not merely to drink of that stream of pleasure which flows through the whole of nature's domain. No, his aim and object is higher and nobler! It is to direct the rich provision of nature to the grand end for which the Creator designed it, the promotion of the welfare and happiness of men.

The history of the botanist will probably furnish as much evidence of the feeling of benevolence as that of any other in the whole range of scientific labors. It is true his pursuits are in themselves attractive. The objects that meet his eye are indeed lovely; the scenery through which he passes enchanting; but he is urged onward by the thought that his discoveries may tend to lighten the woes of some suffering fellow mortal, and restore the joys that disease had taken away. This motive alone is fitted to sustain him amid the hardships and dangers that meet him under the burning rays of a tropical sun, or amid the cold of the Arctic snows. Wherever he wanders, he finds that the Author of nature has fitted the plants of every climate to meet the wants of his creatures. Many of them have distinctly stamped upon them the merciful purposes of God in their creation. How often has the juice of the poppy, *papaver somniferum*, when administered in the shape of laudanum, relieved the sufferings of the sons and daughters of men. How often has it changed the bed of suffering into a place of comfortable repose. How often has it disappointed the fears of fond friends, and restored to health the victim of disease. Botany not only reveals the virtues of plants, but also their hurtful qualities. The researches of the botanist inform us that the poisonous plants generally have five stamens and one pistil, with a corolla of a dull, lurid color, and a disagreeable smell.

The umbelliferous plants, which grow in wet places, usually have an aromatic smell and are not poisonous, as caraway and fennel.

Plants with labiate corollas, and containing their seeds in capsules, are often poisonous, as the foxglove, *digitalis;* also such as contain a milky juice, unless they are compound flowers. Such plants as have horned or hooded nectaries are most poisonous.

Among plants that are seldom poisonous are the dandelion and boneset, such as have labiate corollas with seeds lying naked on the calyx, are seldom or never poisonous; the mint and thyme are examples of such plants. The papilionaceous flowers, as the pea and bean; the cruciform, as the radish and mustard, are seldom found to be poisonous.

Such plants as have their stamens standing on the calyx, as the rose and apple are never poisonous; neither the grass-like plants with glume calyxes, as wheat, rye, &c.

But it may be said that the qualities of plants, to some extent at least, are known even to the rude children of the forest. This is true, but the acquiring of this knowledge is often attended with painful circumstances, and it is lost with individuals. Science proceeds on sure and safe principles, while without it knowledge is the result of accident. It is well known that the Indians, who once possessed this land, obtained all their medicines from plants. The Indian women accompanied their husbands when they penetrated the deep recesses of the forest, or climbed the rugged mountain side. While the husband was in pursuit of game, to nourish or clothe his family, she was collecting plants to preserve or recover their health. Their properties, or the likelihood, that they would answer her purpose, she sought to ascertain by smell, or taste. This was the uncertain and unsafe way that she acquired her knowledge of the medicinal qualities of herbs. She had no system, and no written language in which to preserve the knowledge she had acquired, consequently it was lost with herself or was preserved only in tradition; but the botanist accumulates and classifies, discovers and experiments, and thus transmits to succeeding generations the results of his researches.

Take for example the digitalis purpurea, or foxglove. An eminent botanist, Dr. Withering, says, regarding it, "The history of this plant might afford a practical answer to such as sneer at the pursuits of the botanist, for, digitalis grew neglected, until a botanist made known its virtues and gave to medicine one of its most valuable auxiliaries. It is most beneficial in dropsical and inflamatory complaints and diseases of the heart, and of the lungs, but great caution is required in its use. This single reference is amply sufficient to show us the value and a right use of botanical knowledge to the human family.

After adverting to the pleasure arising from viewing nature at different seasons, the speaker concluded with the following:

I have endeavored briefly to present to you some of the many inducements for the study of botany. Yet enough I trust has been said to impress upon us its importance. Even if circumstances may render it unlikely that we can ever pursue it to any very great extent, the smallest degree of knowledge regarding it will convey a corresponding degree of pleasure. The happiest hours of life may be spent in wandering through fields of nature, collecting and classifying the wild flowers, and contemplating the evidences of skill and goodness written on each by the finger of the great creator. It is a mistake to suppose that there is anything insuperably difficult in the study. An ordinary mind, with ordinary industry, may soon acquire a sufficient acquaintance with it to make it at once pleasant and profitable. With even a limited degree of the knowledge of botany, nature reveals her attractions. The meadow and the forest teem with objects of interest. Wherever the foot carries us we are brought in contact with something to interest and instruct. The fields of nature instead of being to us a barren wilderness, become a large store-house of knowledge and a source of pleasure.

In conclusion let me say to the young that the pursuit of botanical studies will bring them in contact with some of the best and grandest minds who have lived before them, and this may prove a mighty shield against many of the temptations which destroy, and many of the sorrows that afflict others. Let me assure them that the enjoyment it gives far transcends that which the gayest scenes of folly can impart.

When from the botanical excursion they return to the bosom of their families, carrying with them Flora's choice gifts, with serenity of mind they can enjoy the sweets of social life and woo "kind nature's sweet restorer" while wearisome nights are appointed to the votaries of pleasure. And when at last the weight of years may unfit them for such pursuits, sweet reflection, springing from the knowledge they may have acquired, will bless the evening of their days, and sinking into the too often cheerless winter of life, they will draw comfort from memory and find their faith strengthed in the yet higher lesson of religion—that a spring time will come, when, like the lily and the rose of nature, they too will burst from their confinement in the grave to enjoy an endless spring in the paradise of God.

On motion of Prof. Tillman it was resolved that a vote of thanks be presented to the Rev. Dr. Campbell for his interesting discourse this evening, and that he be requested to furnish a copy for the use of the Association.

Mr. William S. Carpenter.—The three varieties of apples on the table this evening are sent in for the Greeley prize.

Mr. Ambrose Stevens.—I present to the Association a seedling apple. It is a very hardy sweet apple, and will keep until July. They never rot, but dry away, and they never become mealy. The orchard in which the specimen grew belonged to my father. I never knew the orchard cultivated; the tree has been utterly neglected, and has not been pruned or trimmed for twenty years. The tree bore two barrels of apples last season, and bears a crop every year. Insects have not been known to affect the fruit.

It is said that the Newtown pippin will not grow in Western New York. That is a mistake, for I have them growing on my place; the fruit is of the medium size. Twenty miles from Rochester, on a strip of land underlaid with limestone, the Newtown pippin grows with great luxuriance. If this tree is removed South it becomes an autumn apple. In Tennessee its character is all gone, while in Kentucky it is neither an autumn or winter variety.

It is an astonishing fact, but nevertheless true, that more apples are grown in Western New York south of 44 deg. than on any other section of the same size on the face of our globe.

The Vanderveer, a well known apple, grows well with me. It seems to have the power to resist the effects of climate as far south as 36 deg. This apple is very digestible. If grown in Pennsylvania it is in perfection from November to Christmas, while those grown in Western New York last from Christmas to March. Early Joe and Sweet Bough do well with us. The Fall pippins picked before frost will keep until February; they must be kept in a dry cellar. Latitude has a great deal to do with the preservation of fruit.

If you desire fruit to keep do not let the frost ripen it. As soon as the tree becomes dormant, say about the 23d of September, the sooner the fruit is gathered the better.

Mr. Carpenter asked in relation to the Tompkins County King, an apple of which we hear so much praise.

Mr. Ambrose Stevens.—Unless grown upon shale, it loses character. It is an apple that ripens early. The Northern Spy retains all its character if grown in about 43 deg., will not stand 44 deg. It is a very delicious apple, and sells in the London market equal to the Newtown pippin.

On motion of Prof. Tillman the apple was named "The Stevens' Sweet."

On motion of Mr. Carpenter Mr. Stevens was requested to furnish the Association with grafts.

Mr. Ambrose Stevens.—While in Western Pennsylvania I found a new apple, called the Hornet. It originated near Meadville.

Mr. Mead.—About three weeks since Mr. Stevens brought me several of these apples. They are of medium size; flesh very tender, resembling the Swaar; very spicy in flavor. The apple made such an impression upon me that I requested him to send me some grafts.

Mr. Isaac Buchanan exhibited a bouquet of choice hot house plants. The varieties were fully explained by Mr. John Henderson.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

December 27, 1864.

Prof. Samuel D. Tillman in the chair.

Mr. William S. Carpenter, from the committee on lectures, reported that in consequence of the holidays it was thought best that the course of lectures should not commence until this night two weeks. The report was accepted.

Mr. Mead said that the committee would report a full programme at the next meeting.

Mr. William S. Carpenter spoke in relation to the effect of hemlock boughs for the protection of half-hardy plants. He had tried the experiment the last winter, and had succeeded in preventing a number of plants from being winter killed.

The Chairman said no doubt the hemlock boughs were a non-conductor, but he could not discover why hemlock boughs were better than any other evergreens.

Mr. E. C. Frost, Highland Nursery, Schuyler county, N. Y., exhibited a bushel of the Tompkins County King, for the Greeley prize.

Mr. William S. Carpenter placed upon the table a number of samples of winter pears, just received from Hovey & Co., Boston, which exhibit their keeping qualities at this season.

Mr. Carpenter remarked of these to the following effect: The Vicar of Winkfield, you see, is beautifully ripened up to a rich gold and crimson color, notwithstanding it is said by many in this vicinity that it will not ripen. It certainly does when grown near Boston, where it is in high esteem, owing to soil, climate, or cultivation, being different from ours. Here is another very valuable pear, Beurre Langlin, which has a high reputation in Europe, and in this country where grown upon aged trees. It is, as you see by tasting, a pleasant sub acid, very juicy, and should be in all collections. Here is the Doyenne d'Alencon, a good sized pear, that keeps as well as a russet apple. The fruit, when well ripened, has a high character. The tree grows thriftily. This is a fair specimen of Easter Beurre, not well ripened, and not at all equal to the same sort grown in Europe. This is the Betterman, a good-sized fruit, but nothing particular to recommend it. This is the Egwood, originated by Knight, of England, and is, with one or two others, all that are considered worthy of cultivation, out of all of his seedlings. This handsome russet pear is the Caen du France, a new and very promising sort, of fair size and a long keeper. This, the De Solis, is only second rate in this country. Here is a large, fine-looking pear, an accidental seedling of Westchester County, but is not first rate.

He, Mr. C., lately imported a great variety of Rhododendrons and Azaleas. These are superior shrubs for ornamenting lawns and grounds. Among the plants were several new varieties of Clematis. Many have been lately introduced into England, and are highly spoken of.

Mr. E. Williams alluded to the growing taste in the ornamentation of our houses. He was glad to see it. A small amount of money spent in hardy flowering shrubs is well laid out.

Mr. Kidd, of New Jersey, made some interesting statements of his experiments in farming and raising of fruit in that State.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

January 10, 1865.

Mr. Benjamin C. Townsend, President, in the chair.

Mr. Mead, from the committee on the testimonial to Mr. Andre Leroy, of Angers, France, reported that the board of managers, on the recommendation of the committee on horticulture, had awarded to Mr. Leroy the large gold medal of the Institute.

Mr. William S. Carpenter, from the committee on lectures, reported the following programme of lectures to be delivered during the winter months in these rooms:

Hon. Horace Greeley, "Talk on Trees."

James Hogg, Esq., "Trees of the Bible and the Classics."

John Henderson, "Winter Flowers."

Rev. Henry Ward Beecher, "Horticulture."

Mason C. Weld, Esq., "Soils."

Isaac M. Ward, M. D., "Pear Culture."

Peter Henderson, Esq., "The Market Gardens of New Jersey."

Isaac P. Trimble, "Insects."

The Chairman then introduced the Hon. Horace Greeley, who entertained them for nearly one hour on the subject of

Forest Trees.

In place of a full report of this address from the pen of the speaker himself, we can only present the principal points, which were very fully and clearly elucidated.

Mr. Greeley said that he was opposed to the recklessness shown by many farmers in the indiscriminate destruction of trees. In Westchester county there were trees which God intended should never be cut down, and yet many farmers there are too prone to clear their forests away to make what they call land for cultivation. At the same time it was a well known fact that there are many farmers who will persist in attempting to cultivate seventy-five acres each, when they cannot till twenty acres in a proper and thorough manner. He believed that if agriculture in the State of New York were confined to one-third the number of acres now cultivated, the produce would be much greater than the present yield.

The great fault of American farmers lies in their disposition to cultivate too much land, to do which they carry on a war against the trees which are so necessary to render the arable land rich and available for purposes of agriculture. Still, while he reprobated the indiscriminate destruction of trees, he knew, what every intelligent farmer knew, that it was sometimes necessary to cut down some in order to preserve others. This, however, should be done with great care, and only those of no especial value should be destroyed.

In Europe the forests were poor, compared to those of America. The foliage of the latter, with its rich summer beauty, and the glory of its variegated autumnal tints, finds no parallel in any other portions of the globe. It constituted the principal beauty of American scenery. He believed that if one-half of the forests which were standing on this continent at the time of its discovery by Columbus, were still standing, the country would be much better off. This could be easily proven. Trees were necessary to the enriching of the soil and the prevention of long droughts. It was a fact to be deplored, that so much land was now devoted to pasturage. Farmers permit their cattle to browse in their forests, and thus eat up a portion of his prosperity.

It was a great mistake for him to permit this to be done, for the barbarism of pasturage, it could be shown, was sadly destructive to his prosperity in more ways than one. It would be well if all the forests within one hundred miles of New York were so inclosed that cattle could not get into them, to browse on the bud and the young leaf of the sugar-maple and other valuable trees. In Westchester, Putnam and Rockland counties, in Fairfield county, Connecticut, and in many portions of New Jersey there were many places where trees were intended to grow, and where they would grow, if the farmer would permit them to do so. Wherever there was a rock a tree should stand by its side, and it was an easy matter to plant trees between clumps of rocks in soil which could not and was not intended to be used for any other purpose.

No land was fit to be ploughed out of which the rocks can not be taken.

It was bad economy to make land by blasting rocks and pulverizing them into what some farmers call soil. Stone, no matter how fine it might be pulverized, could not be transformed into ground. It was a mistaken idea to suppose that it could be done, and he desired the farmer to see it in that light. In Westchester county there were thousands of acres, now devoted to cultivation, which should be covered with forests. The farmer could not make a better investment than by planting them with locusts, sugar-maple and other valuable trees. In Europe this planting of trees was understood, and in many portions of Scotland it is done with great advantage to the farming interests of the country. Trees are valuable, not only for their immediate product, but they are highly valuable for the moisture which they retain and shed upon the soil during the period of drought.

By the wholesale destruction of them the farmer intensifies our summer drouths. If it were desirable to have a long drouth annually, let the country be denuded of forests, and it will not fail to pay us a visit. Wisdom, it was true, dictated the policy of cutting down many trees that are of no value, so that our forests might be improved in beauty and value. There should be combined enterprise for increasing our forests. He deprecated the running of a railroad through John Brown's tract, which he denominated the great park of the State of New York. The enterprise had "broken" two or three men, and he hoped it would break every man who ventured into it. We could not afford to have that lovely region cut bare of its trees. He believed that if it were done there would be immense floods annually on the Mohawk and the Hudson, which would sweep away whole streets in Albany and Troy. That tract should be preserved for the benefit of all who desired to leave the city and all its conventionalisms in summer, and go to that place to breathe the pure air of Heaven, and enjoy a season of freedom from the restraints of society.

Mr. Greeley urged the establishment of forest parks in various parts of the country. These could be found within a distance to be reached by a five hours' ride from the city, and they could be filled with animals like the antelope of the west, and others equally as valuable. There was no reason why we should not have parks of this kind in this country which would throw those of Europe far in the shade. In conclusion he hoped that the farmers of the country would adopt measures to prevent the destruction of birds on their farms. The preservation of the birds was an absolute necessity. They destroyed insects which were becoming more numerous year after year—a fact which could be attributed to the great scarcity of birds as compared with the great abundance of former years. He hoped that if the murderous desired to shoot anything, they would shoot the insects, and not the insectivorous birds.

On motion of Mr. Jireh Bull, it was

Resolved, That the thanks of this Association are due, and they are hereby presented, to the Hon. Horace Greeley, for his interesting, instructive and practical lecture delivered this evening.

Adjourned. JOHN W. CHAMBERS, *Secretary*.

January 24, 1865.

Mr. Isaac M. Ward, Vice-President, in the chair.

The Chairman introduced to the audience Mr. James Hogg, of Yorkville, who delivered the second lecture of the series.

THE TREES OF THE BIBLE AND THE CLASSICS.

Ladies and Gentlemen:

I confess to a feeling of embarrassment in appearing before you this evening, for I can not but feel that in addressing you immediately after the distinguished gentleman who opened this course of lectures, anything that I may say will appear comparatively insignificant and uninteresting to you; yet wishing to give my small mite to the furtherance of the objects which our Horticultural Association has in view, I do not shrink from the duty imposed upon me, asking only your clemency for any short comings which may appear in the discourse which I have the honor to deliver before you.

I have chosen for my subject the "Trees and Shrubs of the Bible and the Classics," not intending to go into any scientific description of them, or to give any very learned dissertation in regard to them, but only to speak of such as are most generally known to you, and are most familiar to your minds as embalmed in holy and poetic associations.

To me trees have a peculiar charm. I can not stand beneath a noble pine and hear the sough and sighing of the winds through its leaves and branches without a feeling of almost superstitious melancholy. If I stand before a noble oak, who for centuries has been contending with the warring elements, whose branches bear witness, by their scars, to the many combats they have had with the lightning and the tempest, and whose sturdy trunk, gray with the moss of centuries, still stands firm and erect, still bidding defiance to the elements, I can not resist a feeling of deep veneration and of momentary insignificance.

Our American people are greatly lacking in poetical feeling in this respect. They have, as a general rule, no love for trees—nay, they rather hate them, and ruthlessly destroy them. In all other lands trees have, during all ages, been highly esteemed and frequently almost idolized, but here, where nature has given us the most magnificent flora on the globe, we despise her glorious gifts. It has frequently come under my observation that a person of opulence will purchase a country seat, and will then most deliberately and barbarously cut down its principal glories, seeing nothing more to interest him in them than the price they will bring in the ship yard. The same person will perhaps plant some comparatively worthless exotics, highly prized because rare, and only admiring them as a reflex of his wealth.

In the ligneous flora of our own country, we have a superabundant share of the grand and the beautiful, yet we are wanting in trees whose names are clothed in poetic imagery and association. It is true that our magnificent sylva is equally as beautiful if not more beautiful than that of Palestine or of Greece; our trees are equally with theirs "the tents which the Lord has spread;" our forests are vast and age-lasting, but they are unconsecrated; from them, though so beautiful and grand, comes no whisperings of an antiquity loved and dwelt upon; their glories have scarcely yet been sung in verse to endure to the end of time.

I doubt not that the thoughts which, as I proceed, my subject will suggest to you, will lead your minds back to some of the holiest and best days of the world, and recall to your memory some of the finest passages in its history; some of the greatest actions, some of the holiest and sweetest spots in its antiquity; and I hope that a remembrance of what I may say this evening may induce you to plant some of the trees I shall allude to, if not for their own intrinsic beauty yet for the delightful associations connected with them, which will always be a theme of pleasure.

The Cedar of Lebanon is one of the first trees in sacred association; the stateliness of its form, the disposition of its branches, its depth of green, its magnificent aspect, render it surpassingly beautiful among trees. On the mountains surrounding Jerusalem it could be seen casting "a weight of glory" upon them. On Lebanon it formed a fit accompaniment to that glorious view which embraces the waters of the Mediterranean and the confines of the Persian gulf.

The Jews believed that God loved it more than any other tree. It was the fruitful source of metaphor and illustration to the Hebrew poets: did they speak of the prosperity of the righteous, the simile was "He shall grow as the Cedar of Lebanon;" were comeliness and majesty to be expressed, love and reverence to be excited, the Cedar of Lebanon afforded apt illustration.

In ancient times it was accounted a great privilege to have Lebanon and its cedars. So Moses, with earnestness of feeling and language, exclaims, "I pray thee, let me go over and see the good land that is beyond Jordan, that goodly mountain and Lebanon."

From its wonderful durability, it was extensively used in building the temples of the Gods. The temple of Solomon was inlaid with cedar; "in it was no stone seen." The principal portion of the wood-work of the temple of Apollo at Utica, and of the temple of Diana at Ephesus, was of this wood, as was also the statue of Diana at Ephesus, "whom all Asia and the world worshiped;" and the statue which fell down from Jupiter.

It was the emblem of eternity; of its wood was the scepter of Jupiter made, and also the statues of their kings. Virgil alludes to this in the Æneid, saying,

> "Before the gates, a venerable band
> In cedar carved, the Latin monarchs stand."

I cannot forego the pleasure of quoting from Shakespeare the beautiful allusions to this tree. In the 5th act of the 3d part of Henry VI, he says, alluding to the fall of Warwick,

> "Thus yields the cedar to the axe's edge
> Whose arms gave shelter to the princely eagle,
> Under whose shade the rampant lion slept,
> Whose top branch o'erpeer'd Jove's spreading tree,
> And kept low shrubs from winter's powerful wind."

And again, in the last scene of Henry VIII., Cranmer, in speaking of James I., says:

> He shall flourish,
> And like a mountain cedar reach his branches
> To all the plains about him.

Of other coniferous trees, the Pine is frequently mentioned in the classics By the Egyptians it was considered an emblem of the soul. Homer tells us that the residence of the Cyclops was "brown with o'erarching pine." Ovid speaks of Polyphemus carrying a lofty pine as a walking staff. Ceres carried a flaming pine, torn from Etna, in each hand when seeking her daughter Proserpine in the infernal regions. A grove of sacred Pines is spoken of as being among the trees moved by the music of Orpheus. The ships of Eneas were made of pine trees sacred to Cybele; these ships were afterwards changed to nymphs, and Virgil, alluding to the mournful sounds of the wind among the pine branches, calls them the singing pines.

"The pines of Menelaus were heard to mourn,
And sounds of wo along the groves were borne."

There are two legends as to the origin of the pine tree. One states that when Atys, the favorite of Cybele, was about to destroy himself, she changed him into a pine tree. The other runs thus: Pitys, a nymph, was beloved by Pan and also by Boreas, but she not reciprocating the passion of the latter, he in a fit of jealousy killed her by dashing her against a rock. Pan, commiserating her sad fate, and in loving remembrance of her, caused the pine tree to spring from her remains.

Permit me to suggest that the mysterious sighings and moanings of the pine tree in the winter wind may be the moanings and sighings of the poor Pitys, when thus so roughly embraced by rude Boreas. If not a scientific, it is at least a poetical way of explaining a hitherto unexplained phenomenon.

The upright cypress is supposed by many to be the Gopher wood of which the ark was made. Allusion is made to its peculiar growth in the Book of Ecclesiasticus: "I am exalted like the cedar of Lebanon and like a cypress on Mount Zion."

The Egyptians made their mummy cases of this tree, and the Greeks who died for their country had their ashes preserved in cypress wood cases. The tree, esteemed as an emblem of immortality, was dedicated to the dead and held sacred to Pluto and Proserpine, because when cut down it never throws up any suckers or gives any signs of remaining life.

From its durability it was like the cedar of Lebanon, used to make the statues of the gods. Pliny speaks of the statue of Jupiter in the capitol as made of this wood, and as being in his day perfectly sound, although six hundred years old. The doors of the temple of Diana at Ephesus were made of cypress wood, and appeared as though quite new when four hundred years old.

The inhabitants of the island of Crete boasted of the magnificent specimens of cypress planted on the tomb of Jupiter. But of all localities there is none so deserving of notice as the neighborhood of ancient Rome. Southward of the capitol on the Latium plain, forty miles in diameter, may be seen the Palatine Hill, covered with the ruined palaces of distinguished ancients, the remains of the baths of Titus, the vaults of the Temple of Peace, the sepulchral pyramid of Caius Cassius, the tower of Cecilia Metella, the Calian Mount, the temple of Minerva, the baths of Caracalla, the Appian way—all waited upon by this gloomy tree, truly appropriate to such scenes of desolation and fallen greatness.

An ancient myth states that the cypress trees were the daughters of Eteocles, who, when dancing in imitation of the goddesses, fell into a well, whereupon Terra, the earth, taking pity upon their misfortune, produced flourishing plants like the damsels, forming them for the delight of man and for perpetuating their memory.

Another mythological story tells us that Apollo had a beautiful and favorite stag who was accustomed to be fed, either by Apollo himself, or by a favorite attendant of his named Cyparissus. One day the youth, exercising himself in practice at hurling the spear, unfortunately struck and killed the stag, who had unexpectedly bounded from a neighboring grove, expecting to be caressed as usual. The grief of Cyparissus was so great at this untoward accident that he threw himself upon the ground in despair, and refused the consolations of Apollo, whereupon,

"Praying in expiation of his crime
Thenceforth to mourn for all succeeding time,
And now of blood exhausted, he appears
Drained by a torrent of continual tears;
The fleshy color in his body fades,
A greenish tincture all his limbs invades,
From his fair head where circling ringlets hung,
A tapering bush with spiry branches sprung,
Which stiffening by degrees its stem extends
'Till to the starry skies the spire ascends.
Apollo saw, and sadly sighing cried:
'Be thou forever what thy prayer implied,
Bemoaned by me—in others grief excite—
And still preside at every funeral rite.'"

The juniper is the last of the coniferous trees to which I shall allude in this connection. It was consecrated to the furies, and the ancients threw its berries on the funeral piles of the dead in order to protect the departing spirit from their evil influences. They also burnt its wood in their dwellings to keep away demons. It was also offered in sacrifice to the infernal deities, as it was thought they were fond of its perfume—an idea which I wonder has not been taken hold of by Mr. Gough and other apostles of the total abstinence movement—for it indicates that the infernal deities were fond of gin, or of Wolfe's Schiedam Schnapps, which latter beverage Mr. Wolfe assures us is flavored with the best Italian juniper berries, the identical classic berry, which if true leaves no doubt but that Schnapps is a classic beverage.

Next to the cedar in classical and biblical association is the oak. A chain of exalted remembrance is connected with it in the minds of all who have read classical authors. It was held sacred alike by the Hebrews, the Greeks and the Romans.

In the scriptures we read of the groves of oaks planted by Abraham at Beersheba, also of the oak of Moreh and the oak of Mamre in connection with the history of Abraham. I would here observe that the Hebrew word allun, elon or eilon, is by the best scholars now interpreted to mean the oak tree, and not the plane tree as it is generally translated. One of the most absurd and inexcusable errors is committed both by our English and American Bible Societies in their editions of the Bible in this respect. Finding the word "allun" in some of the older English editions so translated as to mean the plane tree, an Eastern species of our buttonwood, they appear to have arrived at the conclusion that it was a typographical error, and so have made it read "the plain of Moreh" "the plains of Mamre," as though the idea to be conveyed was level stretches of land, instead of trees.

The oak tree, one of those which composed the grove of Mamre, under which Abraham stood when the angels announced to him the birth of Isaac, was long an object of veneration, and was said to be still in existence in the time of Constantine, and Eusebius speaks expressly of the oaks of Mamre as being a place where idolatry was committed by the Israelites. Deborah, Rebecca's nurse, was buried under an oak tree at Bethel, "and the name of it was called Allen-bacheeth," which literally means the oak of weeping. Under an oak tree Joshua set up the tabernacle of the Lord, so that the congregation might comfortably perform divine service. The oaks of Bashan were highly prized by the Jews as may be gathered from the reproaches of Ezekiel when prophecying against Tyre, "of the oaks of Bashan have they made their oars" intimating that the Tyrians had been guilty of sacrilegious acts in destroying such fine trees and using them for such inferior purposes.

The oak groves of Dodona, in Epirus, formed the most celebrated and ancient oracle on record. All the trees in the grove were said to be endowed with the gift of prophecy, which they not only possessed in their living state, but also when hewn into timber, for the ancient legend runs that when some of them were cut down to build the ship Argo, the beams and masts of that ship frequently spoke to warn the Argonauts of approaching danger. The oracular powers of this grove are frequently alluded to by the ancient poets, and even by some of modern times.

Cowper, addressing the Yardley oak, says, also alluding to its great age:

—— Oh! couldst thou speak
As in Dodona once thy kindred trees
raculur, I would not curious ask
The future, best unknown; but at thy mouth
Inquisitive, the less ambiguous past,
By thee I might correct, erroneous oft,
The clock of history; facts and events
Timing more punctual, unrecorded facts
Recovering, and misstated, setting righ

The Athenians particularly looked upon this tree with intense delight, and planted it around their dwellings for the sake of its cool umbrageous shade. It grew chiefly, and in the greatest abundance, on the slopes and heights of Hellas, and formed the basis of many a Hellenic legend.

Jupiter at his birth was said to have been sheltered by an oak tree which grew upon Mount Lycæus in Arcadia. One of their myths states that he derived his might from the oak, and with a generous disinterestedness, upon feeling its power within him, taught mankind to live upon acorns so that they too might be puissant.

It was esteemed an imperial plant and was consecrated to Jupiter. Virgil speaking of it, in the Second Georgic, says:

—— "'Tis Jove's own tree
That holds the woods in awful sovereignty,

Requires a depth of lodging in the ground,
And next the lower skies a bed profound,
High as his topmost boughs ascend,
So low his roots to hell's dominion tend;
Therefore, nor winds, nor winter's rage, o'erthrows
His bulky body, but unmoved he grows.
For length of ages lasts his happy reign,
And lives of mortal men contend in vain;
Full in the midst of his own strength he stands,
Stretching his brawny arms, and leafy hands;
His shade commands the plains, his head the hills commands."

And also in the Æneid he says:

"As when the winds their airy quarrel try,
Jostling from every quarter of the sky,
This way and that, the mountain oak they bend,
His boughs they shatter and his branches rend;
With leaves and falling mast they strew the ground,
The hollow valleys echo to the sound;
Unmoved the royal plant their fury mocks,
Or shaken clings more closely to the rocks;
For as he shoots his towering head on high,
So deep in earth his fixed foundations lie."

The civic crown of the Romans was made of the oak, and was especially bestowed upon those who had been instrumental in saving the life of a Roman citizen.

Lucan alludes to this in his Pharsalia:

"Straight Lelius from amidst the rest stood forth,
An old centurion of distinguished worth;
An oaken wreath his hardy temples bore,
Mark of a citizen preserved he wore."

Shakspeare, in his play of Coriolanus, also notices this custom. In the second scene of the second act, Cominius, in describing the merits of Coriolanus, says:

——— "At sixteen years
When Tarquin made a head from Rome, he fought
Beyond the mark of others; our then dictator,
Whom with all praise I point at, saw him fight,
When with his Amazonian chin he drove
The bristled lips before him; he bestrid
An o'erpressed Roman, and in the Consul's view
Slew three opposers; Tarquin's self he met,
And struck him on his knee; in that day's feats
When he might act the woman in the scene,
He proved best man i' the field, and for his meed
Was brow bound with the oak."

Sophocles also describes Hecate as crowned with oak leaves and serpents. Socrates swore by the oak, as did the women of Priene, a town in Ionia. To say "I speak by the oak," was a most solemn form of asseveration among the Greeks, on account of the sacredness of the tree. To be born of an oak was a form of speech applied to a foundling, it being customary for the poor to expose their children in the hollow of an oak tree when they could no longer support them, thus putting them under the immediate and direct charge of Jupiter or the Gods.

Boughs of oak with acorns were carried in marriage ceremonies as emblems of fecundity. They were also used in the Eleusinian mysteries.

"Then crowned with oaken chaplets marched the priest
Of Eleusinian Ceres, and with boughs
Of oak were overshadowed in the feast
The teeming basket and the mystic vase."

One of the most beautiful fictions in Greek mythology, is that of the Hamadryads or wood nymphs, each "doomed to a life coeval with her oak." The Greek poets frequently refer to them, and our much admired ballad of "Woodman Spare that Tree," finds its counterpart in one of their poems, where a Hamadryad is represented as imploring a woodman to spare the oak, upon whose existence her life depended.

"Loud through the air resounds the woodsman's stroke,
When lo! a voice breaks from the groaning oak:
Spare, spare my life, a trembling virgin spare,
Oh, listen to the Hamadryads prayer;
No longer let that fearful axe resound,
Preserve the tree to which my life is bound.
See, from the bark my blood in torrents flows,
I faint, I sink, I perish from your blows."

The oak was also sacred to hospitality which arose in this wise: Jupiter and Mercury travelling through Phrygia, entered the cottage of a poor old couple named Philemon and Baucis, and were by them treated with great kindness and hospitality; in reward therefor, Jupiter turned their cottage into a splendid temple, making the old couple priest and priestess, and granting them the only request they had to make of them, viz: that they might die together; accordingly when they had become so aged as to wish to die, Jove transformed Philemon into an oak tree, and Baucis into a Lime or Linden tree, the two trees entwining their branches together, and shading the portals of the temple. Living monuments of hospitality and conjugal affection.

The Greeks were particularly fond of the Lime or Linden tree, and planted it so as to form wide spacious avenues, and when in bloom, clouds of fragrance were wafted on every breeze that blew, and as swarms of bees are allured by its flowers, the musical hum of the insects and the fragrance together might well call up poetical emotions in the mind of the Greek, and in fancy lead him to thymy pastures of his much loved Hymettus. The legend connected with it I have already given.

The oriental Plane tree (or Eastern Button wood), was also a favorite tree with the Greeks; they planted it profusely, particularly around Athens, in the neighborhood of the gymnasia and the public schools. The groves of the Academus where Plato delivered his discourses, and the groves of Epicurus where Aristotle taught, were planted with this tree, and so highly was it esteemed that Socrates sometimes swore by it, as well as by the oak, but some considered it impious to swear by a tree of such beauty.

It is related of Xerxes, that when on his celebrated expedition, he found in Lycia a Plane tree of such beauty, that he halted his army of 1,700,000 men for several days, not permitting the importance of his expedition, nor the necessary movements of such an army to interfere with his admiration of it; and when finally obliged to leave it, he had a figure of it engraved on a gold medal which he afterwards continually wore.

Probably no tree has holier associations connected with it than the olive.

From the earliest ages it has been the emblem of peace and of the bounteous gifts of Heaven. It was exceedingly plentiful in Judea, and was frequently used in the poetical imagery of the east. Of the righteous it is said, "his branches shall spread, and his beauty shall be as the olive tree." The most endearing reflections connected with this tree grow from its having given its name to the Mount of Olives, just outside of the city of Jerusalem, and which has become so famous through its connection with the history of our Saviour. Thither our Redeemer was wont to retire after a laborious day spent in the endeavor to lead a crooked and perverse generation into the paths of truth and righteousness. Reclining under the boughs of its olive trees, He gazed upon the ill-fated city, prophecied its destruction and wept over it. In the garden at its foot, He commenced the scene of last sufferings, and from its highest elevation he ascended into Heaven. Eighteen hundred years have rolled away, and still on that mount stand trees under which, no doubt, he has reclined; trees which have overshadowed Him and sheltered Him from noontide heats or evening dews; trees which were witnesses of his debasement for our sakes, as they were also witnesses of His exaltation and all-glorious ascension.

In the mention made of this tree in our translations, we have another notable instance of the ignorance of the cloister and of the schools. If their theology is no better than their knowledge of science and of nature, it is of little worth to us. In translating many passages of the Psalmist and the other sacred writers, they are made to speak with rapture of the green olive tree. Now it so happens that the foliage of the olive is rather dingy-looking, as though it had been covered with dust from a neighboring well travelled road, and is far from conveying the idea of freshness and beauty of verdure. The word which our translators have rendered green, really means flourishing or vigorous, and the seventy have so translated it in Daniel, where Nebuchadnezzar says : "I was at rest in my house and flourishing in my palace." It would be absurd to say that he was "green in his palace." Such passages as "I am like a green olive tree in the house of God," should be translated "I am like a vigorous olive tree in the house of God ;" as the metaphor has not relation to simple beauty of appearance, but to a robust and healthy growth in righteousness through the grace and favor of God ; implying cultivation and care taking on his part.

In Greece the tree was very highly esteemed, and rich harvests of it were gathered on the plains of that country. The Grecians thus accounted for the origin of the olive : When the earth, which in the beginning was covered with water, first appeared, the most prominent point was where the city of Athens stands. Neptune and Minerva, both being enamored of the situation, contended as to which of them should there build a city bearing their name. Jupiter, desirous of putting an end to their contests in regard to it, decided that whichever one of them bestowed the most useful gift on the city should have it. Neptune thereupon bestowed ports and naval depositories, but Minerva raised an olive tree in the citadel, flourishing and fruitful, and being crowned with it and by all admired, she obtained the victory, and they called the city Athens after her name. Hence it was the custom to crown those who overcame in difficult contests with a chaplet of wild olive leaves. The Greeks also inscribed the word Athena on an olive leaf, and affixing it to the head with a thread, believed it to be a sovereign cure for the headache.

In the apple we have another instance of ignorance on the part of our schoolmen. When it is said in the Canticles, "Stay me with flagons, comfort me with apples, for I am sick of love;" or that "A word fitly spoken is like apples of gold in pictures of silver," and similar expressions. A person aware of what the apples of Palestine really are, cannot but smile at the absurdity of the idea. Imagine a love-sick person deriving comfort from a little hard crab-apple, whose flesh is only surpassed in acerbity by a green persimmon. Imagine a poet, whose eyes with frenzy rolls, using the simile of a little hard green fruit, not much larger than a cherry, to express the idea of soft, mellifluous words.

The fruit which our translators have rendered apples, is really that of the orange or citron tree, for these trees flourish finely under oriental skies, becoming large and beautiful trees, having a perennial verdure, and filling the air with perfume of exquisite odor.

Among the Thebans, Hercules was worshipped under the name of Melius, and apples or citrons were offered at his altars. This custom originated in this wise: On a certain occasion the river Asopus overflowed its banks to such an extent as to render it impossible to bring a sheep across which was to be sacrificed to Hercules, whereupon the worshippers, calling to mind that the Greek word melon signified an apple as well as a sheep, took an apple and sticking four little pegs in it to represent legs, offered it at the altar instead of the sheep.

The trees in the garden of the Hesperides were supposed to be apple trees, but modern scholars are inclined to the belief that oranges and not apples were the trees meant in that legend.

The Orange also flourishes in matchless beauty in lower Egypt, where particularly beautiful specimens shaded the temple of the Sun in Heliopolis, but it appears to have been of comparatively recent date in Greece, for Antiphanes in his Boetian speaks of its introduction.

The Mulberry, Ovid informs us, was at first of a white color, but became of a red color through the following tragical circumstance, which shows the folly of hard-hearted parents interfering with the heart affairs of their children; instances of which, as you are aware, are of every day occurrence with us, showing that human affairs are ever the same, tender-hearted youth and stony-hearted age, ever in opposition:

"Pyramus and Thisbé lived in Babylon, he a very proper young man, she, of course, a beautiful angelic creature; they naturally fell in love; their flame was mutual; but their parents would not consent to their marriage, so the lovers managed to exchange sentiments through an opening in the wall, which separated their houses—the old story.

"They agreed to meet at the tomb of Ninus, outside the walls of Babylon; this tomb was overshadowed by a white mulberry tree. Thisbé was first there, but a lioness coming unexpectedly, as was natural frightened her away. As she fled she dropped her veil, which the lioness found and, in some unexplained way, left covered with blood. Pyramus arrived soon after, and, finding the bloody veil, very hastily concluded that his dear Thisbé had been destroyed by wild beasts, and so without further ceremony, stabbed himself. Thisbé, in the meantime, having recovered from her fright, returned to the triste-trysting place, and when she saw her faithful Pyramus in the last agonies of death, she fell upon the sword with which he had destroyed himself, and died likewise.

"The poor mulberry tree, witness of such a melancholy catastrophe, being sprinkled with their blood, ever afterwards bore red fruit instead of white. Whether this change was produced by grief on the part of the poor mulberry tree, or from some natural change incident to the absorption of the blood in the soil, I am unable to say. Suffice it to say, that the story is poetical, and as a natural consequence I fear lacks truth; though be that as it may, I trust that if any of my young hearers should eat red mulberries this coming summer, they will bear in mind their origin, and if miserably happy will not do anything as rashly as our two lovers."

The Sweet Bay or Laurus was the emblem of victory among the Greeks and Romans, who crowned their victorious generals with wreaths made of its leaves. They also bestowed similar wreaths or crowns upon their greatest poets, hence the term poet-laureate. Mythological story tells us that Daphne, a daughter of Peneus, flying to escape the embrace of Apollo, who was smitten with her and pursued her, finding that she could not escape from him, supplicated her mother earth to receive her, which she did, and produced a tree in her stead. This so astonished Apollo that he called the tree Daphne, and crowning himself with a sprig of it the plant afterwards became a symbol of divination. It was also called Sophrosune, for divination proceeds from chastity, and they believed that where a bay tree was planted demons would betake themselves to flight. The tree was also consecrated to Apollo, and the first temple raised to him at Delphi is said to have been made from the branches of this tree.

The ancients also considered the bay tree good for the health, and had a practice of making presents of dried figs and bay leaves on the first day of the year; and it is to be noticed that in the packages of the choicest figs which we now receive from abroad there are always some bay leaves on the top.

Maia, the mother of Virgil, dreamt that she was delivered of a bay tree, and we are told that one of these trees sprang from his ashes and is still growing over his tomb.

Unmarried men take their name of bachelor from the bay tree. As I have already stated, poets were crowned with it, and so also, in the middle ages, were students who had taken their degrees at the Universities, and were thence called in french bacheliers, or laurel-berryers, from the berries being intermingled with the leaves in the wreaths; the word bacheliers being derived from the latin word bacca laureus, a laurel berry. These students were not allowed to marry for fear that the duties incumbent upon them as husbands or fathers would interfere with their studies, and hence in time all single men came to be called bachelors.

In holy writ the almond is called Shakad, a Hebrew word, signifying to watch or awake, in allusion to its early blooming immediately after the rigors of winter have passed away.

Jeremiah says: "The word of the Lord came unto me, saying, Jeremiah, what seest thou? and I said, I see a rod of an almond tree. Then said the

Lord unto me, Thou hast well seen; for I will hasten my word to perform it," or in other words, "I am hastening or watching over my word to fulfill it." The rod of Aaron was of the almond tree, as were also the rods which the princes of Israel bore, and representations of its fruit and flowers were introduced into the sculptured ornaments of the temple.

The poet Moore makes a very beautiful allusion to it in one of his poems:

> "The hope, in dreams of a happy hour,
> That alights on Misery's brow,
> Springs forth like the silvery almond flower
> That blooms on a leafless bough."

And Virgil, in his Georgics, welcomes it, when flowering profusely, as the sign of a fruitful season.

The mythological legend attached to the almond is very pretty. Demophoon, son of Theseus, returning from Troy, was wrecked on the coast of Thrace, where he was most hospitably entertained by the beautiful Phyllis, queen of that country. They became mutually enamored, and were united in marriage. Soon after, through the death of his father, he was recalled to Athens, but promised Phyllis to return to her within a month. His affairs detaining him beyond the expected time, the unfortunate queen became melancholy and wandered daily on the sea-shore, watching in vain for the return of her husband. The months rolled on and yet he came not; and one day, whilst she was gazing out upon the sea, she fell dead upon the shore in a fit of despair. The gods, pitying her sad fate, changed her into an almond tree. Demophoon returning soon after and being informed of what had happened hastened to the sea-shore and embraced the tree in his arms, whereupon the strong affection of Phyllis, unable even then to restrain itself, caused the tree, though bare of leaves, to burst forth into bloom.

The Greeks and Romans regarded the hawthorn as the emblem of hope. Its flowers were always used in the floral games of May, and were carried by the Grecian maidens in wedding processions and laid upon the altar of Hymen, which was illuminated by torches of the wood.

In England they have a curious religious legend connected with a variety called the Glastonbury thorn. The story goes that Joseph of Arimathea, after the burial of Christ, came to England, attended by twelve companions, to found the first Christian church in Britain. Guided by divine inspiration, he proceeded to Glastonbury, arriving there on Christmas day. He commenced his holy labors, intending to erect a church in honor of the Virgin Mary, but the natives, having some doubts as to his mission, he prayed God to work a miracle in his behalf, whereupon, striking his staff or cane into the ground, and it immediately shot forth into leaves and blossoms. The superstitious say that the tree is still in existence, and that it still blossoms on Christmas day.

The pomegranate is one of the oldest fruit-bearing trees with which history has acquainted us, and is one of those most frequently spoken of in the Bible. It was one of the three fruits brought by Caleb and Joshua to Moses from Eschol. It was held in great veneration by the Jews, and its fruits and flowers entered largely into the metal and other decorations used for the adorning of the temple and the vestments of the priests. Solomon speaks of it as a fruit from which wine was made, and also uses it symbolically as representing certain graces of his beloved: "Thy temples are like a piece of pomegranate within Thy locks."

Pliny informs us that it was first found near Carthage, but so well did it succeed in the climate of Greece, that that country became noted for its rich crops of this fruit. It of course figures in their mythological story. When Ceres discovered that Pluto had stolen her daughter Proserpine, and carried her off to the infernal regions, she earnestly implored Jupiter to restore her, and he consented, provided she had not eaten anything during her stay in the infernal regions. Unfortunately, whilst walking in the Elysian fields, she had plucked a pomegranate and eaten seven of its seeds. This was observed by Ascalphus, who told Pluto of it, which so enraged Ceres that she turned Ascalphus into an owl.

Another legend is, that a young Scythian girl was told by some divines that she should wear a crown. Upon this she became very proud and vain, and, by promising to give her a crown, Bacchus had no difficulty in seducing her. He soon tired of her and abandoned her, upon which she died of grief; he then metamorphosed her into a pomegranate tree, on the top of the fruit of which he affixed a crown, thus tardily and ambiguously redeeming his promise.

Still another story is that the Athenians and Boetians had a dispute respecting a place on their borders called Sidé. Epaminondas took a pomegranate from under his robe and asked the Athenians what they called it. They answered Rhoa. Very good, said Epaminondas, we call it Sidé, and as the place takes its name from the quantity of this fruit which grows there, it is clear that the place belongs to us, and the cause was decided in favor of the Boetians.

The myrtle is eminently Grecian in its associations, and among the ancients it was a universal favorite. By them it was held sacred to Venus, who was said to have sprung from the sea, crowned with a wreath of myrtle, and by some of the Greeks was worshiped under the name of myrtilla. The priests of Venus Aphrodite always wore circlets of myrtle on their foreheads, and her temples were always surrounded by myrtle plants. At the festival of Europa, at Corinth, a crown of myrtle, ten yards in circumference, was always carried in procession. It was also worn by the Athenian magistrates as symbols of their authority, and by the Olympian victors as symbols of their bloodless triumphs.

The myrtle was associated with the olive in the regards of Minerva, for Myrsine, an Attic maid, who surpassed all other maidens in beauty, and excelled all the young men in strength, had made herself very acceptable to the Goddess of Wisdom. Myrsine, being murdered from envy by some of those whom she had overcome in the palestra and in the race course, was turned into a myrtle tree, so that the myrtle is not less acceptable to Minerva than the olive tree.

But another story is that Myrsine, suffering her love to overcome her wisdom, offended Minerva, who turned her into a myrtle, when Venus, from sympathy, took the plant under her care.

The fig tree is frequently spoken of in the scriptures and in the classics. It formed a prominent article of food among the eastern nations, and was highly valued by them, so much so that the Athenians forbid the exportation of such as grew at a place near their city, where tradition said that figs first grew. This spot was called "Hiera Suke, or the place of the sacred fig tree," and the fruit here grown was very highly prized by them. Those who gave information of the fruit being sold contrary to law were called Sykophantai, or "revealers of figs," from whence is derived our English word sycophant, to denote a mean, dastardly person, for the information was given frequently maliciously and falsely.

The island of Naxos, in the Egean sea, was noted for the superior quality of its figs, which are said to have been especially cherished by Bacchus, the tutelary god of the island, who was there called "Meilechios," or "the gracious," because he first taught them to use this fruit. He was also thought to have derived his corpulency and vigor from the use of this fruit, hence the Romans carried the fig next to the vine in their Bacchanalian processions.

Adam and Eve are said to have made themselves aprons or girdles of fig leaves, but I presume that this is another wrong translation. If it is a correct one, then it is an early instance of ascetic penance, for the acid of the plant will produce blisters, and the leaves are so rough that they would produce excoriations nearly as rapidly as a sinapism. It is probably a mere legend growing out of the Hebrew name for the fig tree, viz.: Thæra, or the "tree of grief." I am tempted to relate an anecdote in relation to the fig, which, although not in any classical work, is related to the classics.

Dr. Pococke, in 1648, first introduced the fig tree into England. One was planted in the garden of Oxford college. Dr. Kennicott, the celebrated Hebrew scholar and compiler of the Polyglot Bible, was very fond of this fruit, and seeing a very fine one on the tree, attached a label to it on which was written, "Dr. Kennicott's fig." A waggish student noticed it, and when the fruit was ripe plucked it, exchanging the label for one on which was written "a fig for Dr. Kennicott."

What clusters of associations rise up at the mention of the vine. The classics, one might think, were written under its shade, their pages so exhale the sweet odor of its fruit. Throughout the scriptures continual mention is made of it. It was the emblem of fruitfulness, happiness and prosperity. Its cultivation descends from the remotest antiquity, and with the fig and apple, or more properly the orange, it is the earliest mentioned of all fruit. Judging from Noah's success as a vine grower so shortly after the deluge, it is not improbable but that its cultivation was well understood by the Antediluvians. In Judea it arrived at great perfection, and modern travelers bear evidence to the extraordinary size of the bunches there grown, fully corroborating the scriptural statements relative to those grown in the valley of Eschol. We find Solomon had an extensive vineyard at Baalhamon, which he let at an annual rental of 1,000 pieces of silver, and we also find Moses giving directions as to its cultivation.

The heathen nations had a great veneration for the vine, and it is said that Hesiod, a contemporary of Homer, wrote a treatise upon its cultivation. Among the Greeks the vine was sacred to Bacchus, who they said first taught them the art of making wine, in reward for which they elevated him to the rank of a deity; the gathering of the vintage was with them a season of Bacchic enthusiasm and excess.

The Egyptians ascribed the invention of wine to Osiris, and held the vine sacred to him.

The Romans extensively cultivated the vine, using wine at first only in the service of the Gods, but when it became more abundant, it was more freely partaken of, by men, yet for a long series of years it was forbidden young men under thirty, and to women all their lifetime to drink wine.

It is related that a Roman having caught his wife drinking wine out of a wine cask, killed her with a cudgel, and being tried before Romulus, was acquitted, it being considered justifiable homicide. It is also related of another Roman lady that she was starved to death by her own kinsfolk for merely opening a closet in which were kept the keys of the wine cellar. Cato records that the custom of kinsfolk kissing women when they met, was to detect by their breath if they had been drinking wine. Plato says that "nothing more excellent or valuable than wine was ever granted by God to man."

Permit me to remark that red wine does not appear to have been in favor with Solomon, for he expressly advises us not to "look upon the wine when it is red, when it sparkles in the cup." This would seem to indicate that the still white wines were most approved by him, and I must say that I admire his taste. Of one thing we are certain, that the Syrian grape of this date is of a light color, and makes a delicious wine. It is in all probability the grape of Eschol as it produces the largest bunches of any variety known, having been grown in vineries to produce bunches of nineteen pounds weight.

The elm was much valued by the Greeks, for its shade, and for its use in supporting their grape vines, and this has given rise to numerous allusions to the elm by the poets. When Vertumnus is recommending matrimony to Pomona, Ovid makes him say:

"If that fair elm," he cried, "alone should stand,
No grapes would glow with gold and tempt the hand;
Or if that vine without her elm should grow,
'Twould creep a poor neglected shrub below."

Among the Greeks and Romans all trees which did not produce food or fruit fit for the use of man, were devoted to the infernal gods, and were considered as funereal trees; hence Achilles raised a monument to the father of Andromache in the midst of a grove of elms, and Ovid tells us that when Orpheus returned from the infernal regions, his lamentations for Eurydice were so pathetic, that the earth opened, and the elm and similar trees sprang up to give him shade.

The poplar was consecrated to Hercules, because he destroyed Cacus in a cavern adjoining Mt. Aventinus, which was covered with these trees, and as a token of his victory, bound his brows with a branch of the white poplar. When returning from the infernal regions, he wore a wreath of the same on his head, and the fable says that from this the Abele or silver leaved poplar came, because the perspiration from his brow made the inner side of the leaves white where they touched his forehead, while the thick smoke of the infernal regions turned the upper surface almost black.

Persons sacrificing to Hercules, always wore wreaths of this tree, and those who overcame their enemies in battle, were frequently crowned with it in honor of Hercules.

Under a poplar tree at the door of Tychius, the tanner of Hyle, Homer used to sit and recite his poems.

The Highlanders believe that the Cross of Christ was made of the wood of the aspen poplar, and that consequently its leaves can never rest.

Of the black poplar, Ovid's story is, that Phaeton having borrowed the horses and chariot of the Sun, and by his careless driving setting half the world on fire, was hurled by Jupiter into the river Po, where he was drowned, and his sisters, the Heliades, wandering on its banks, were turned into poplars. Some, however, assert that they were turned into alders, and not into poplars.

The Alder is frequently mentioned by Homer, Virgil, and other poets. Virgil, in one of his Eclogues, tells us that the sisters of Phaeton were turned into alders.

> "The sisters mourning for their brothers' loss,
> Their bodies hid in bark and furred with moss,
> And each a rising alder now appears,
> And o'er the stream distils her gummy tears."

The willow does not appear to have been celebrated by the ancient poets, except in the Scriptures where the sorrowing Jews are represented as hanging their harps upon the willows growing on the banks of the Babylonish streams; but the Arabians have a strange legend as to its origin They relate that David, after he had married Bathsheba, was one day playing on his harp in his private chamber, into which he had given strict orders that none should be admitted to disturb his privacy, when suddenly two angels made their appearance and nearly in the way related in the Scriptures, convicted him of his heinous offence. David threw himself upon the floor, and for forty days and forty nights shed bitter tears of repentance, weeping and trembling before the judgment of the Lord. Moaning forth psalms of repentance, in those forty days and forty nights David shed as many tears of repentance as all the human race have shed and will shed from David's time until the judgment day on account of their sins. From his tears flowed two streams, which ran from the chamber into the garden, where they sank into the ground, and from them sprang two trees, one of which was the willow, which incessantly weeps and mourns, and the other the frankincense tree, which incessantly sheds big tears each in remembrance of his sincere repentance.

If all the poems which have been written on the rose were collected into one volume, it would be a large one, for there is scarcely a poet of eminence who has not celebrated its beauty and its fragrance which has been the theme of song for nearly 3,000 years.

In mythological legend it is almost equally rich. Anacreon makes the birth of the rose coeval with that of Venus and Minerva.

> "Then, then in strange eventful hour,
> The earth produced an infant flower,

Which sprang with blushing tinctures drest,
And wanton'd o'er its parents breast;
The Gods beheld this brilliant birth,
And hailed the Rose, the boon of earth."

Some of the poets give us a different version of the birth of the rose than that related by Anacreon. The story is that Flora, having found the dead body of one of her favorite nymphs, whose beauty was only equalled by her virtue, implored the assistance of the deities to aid her in changing her into a flower, whom all should acknowledge to be their queen. In response to her request Bacchus bathed it in nectar, Aurora caused her dews to fall thick upon it, refreshing its roots, while Apollo's beams shone with invigorating warmth. Flora crowned its stem with a diadem of bloom unsurpassed for beauty, and Vertumnus anointed it with perfumes from the vale of Tempé.

Some, however, say that the original color of the rose was white, but that when the gods were feasting above, Cupid who led the dance, with his wing upset a bowl of nectar, which showered upon the earth, caused the roses to become red. Others, again, say that Mars jealous of the favors bestowed upon Adonis by Venus, killed him, and she hastening without her sandals to avenge his death, trod on a rose, whose thorns lacerating her beautiful foot, caused the blood to flow, which staining its flowers, at once gave to it its color and fragrance.

The rose was dedicated to Aurora as an emblem of youth, from its freshness and reviving fragrance; to Venus as an emblem of love and beauty, from the elegance of its flowers, and to Cupid as an emblem of fugacity and danger from the fleeting nature of its charms and the wounds inflicted by its thorns, which are said to be derived from the stings of the bees with which the arc of his bow was strung It was an emblem of silence, because Cupid gave it to Harpocrates, the god of silence, to bribe him not to reveal the amours of Venus. Hence, it was sculptured on the ceilings of their banqueting halls, or suspended over their tables as a token that what was said in convivial moments was not to be repeated; hence the phrase *sub rosa*, or under the rose, to denote secrecy.

And still another legend relates that Rhodanthe, a beautiful queen of Corinth, to escape the persecutions of her lovers, attempted to seclude herself in the temple of Diana, but forced by the clamors of the people to leave her sanctuary, she prayed the gods to change her into a rose; which still bears the blushes that dyed her cheeks when forced to expose herself to the public gaze.

I might occupy an evening in relating the history of the rose, the various legends of it in different countries, the modes in which it had been used for ornamentation, and the different allusions to it by the poets. I close with a legend in our own language equal to any in the classics which tells of the birth of the moss rose.

The angel of the flowers one day
Beneath a rose-bush sleeping lay,
That spirit to whose charge is given,
To bathe young buds in dews of Heaven.
Awaking from his slight repose,
The angel whispered to the rose,
Oh! choicest object of my care,

Still fairest found where all is fair,
For the sweet shade thou'st given me,
Ask what thou wilt, 'tis granted thee.
Then said the rose with deepened glow,
On me another grace bestow;
The spirit paused in silent thought,
What grace was there, that flower had not,
'Twas but a moment, o'er the rose
A veil of moss the angel throws;
And clothed in nature's simplest weed
Can there a flower, that flower exceed.

Time, however, admonishes me that I must draw to a close. I could enumerate many other trees and plants with which much of the poetical feeling of the ancients is associated. Among these may be named the ash, of which Cupid made his arrows—although he afterwards made them of cypress, emblematical, I suppose, of the melancholy consequences of the wounds which the shafts of love inflict. We also have the beech, the birch, the sweet chesnut—which shaded Mount Olympus, the favorite residence of the gods—the sycamore, the alder, the larch, the yew, the spindle tree, the walnut, the laburnum, the indas tree. We may also name the laurustinus—the dogwood—sacred to Apollo, in a grove of which the trial of beauty in which Paris adjudged the prize to Venus, took place.

Among smaller plants and shrubs we might name the lavender, the rosemary, the ivy, the daphne, the laurel, the lily—which owes the purity of its color to the milk which flowed from the breasts of Juno when nursing Hercules, that which fell to the earth producing lilies, that which remained in the sky produced the milky way—the violet, the iris, and the narcissus. And among fruit trees the apple, the pear, the plum, the peach, and many other fruit trees.

Such are the more striking objects from whence emanated the odors, imagery, and poetical feeling which is so profusely spread over the classic pages either of verse or prose.

On motion of Mr. Carpenter the thanks of the Association were presented to Mr. James Hogg for his interesting lecture, and a copy was requested for publication.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

February 7, 1865.

Mr. Benjamin C. Townsend the President of the Association in the chair.

On the tables were displayed a very large and choice collection of green house plants, in bloom, from the nursery of Mr. John Henderson, of Jersey City.

The chairman introduced to the audience Mr. John Henderson, who delivered the third lecture of the course,

WINTER FLOWERS.

Mr. President, Ladies and Gentlemen:

The subject I propose calling your attention to this evening, is one that I feel assured you are all interested in. It is that of Winter Flowers. When I say winter flowers, I do not mean those flowers only that blossom naturally at this season of the year, but all plants that can by artificial means be forced or rather coaxed into producing their flowers during the cold and dreary months of winter. But in order to illustrate my meaning more particularly, I will give you a familiar example. You are all doubtless acquainted with the common lilac of the gardens, a hardy shrub or bush, which flowers naturally in the open air during the latter part of May and beginning of June. This shrub if planted in a pot in the spring, may be placed in a forcing house about November, when it soon commences throwing out leaves and blossoms and thus becomes a winter instead of a summer flower.

A forcing house is a conservatory heated to about 70 degrees of heat, and by means of which we are enabled to enjoy at this season almost all plants that do not flower generally till late in the spring or summer. Flowers are beautiful and lovely at all times and at all seasons, but how much more so during the winter months when almost every plant or tree outside is leafless and desolate looking. It is then that they give such a charm to our homes. For what can give us so great a pleasure after a walk in the outside world during this period of the year, as on returning to our comfortable dwellings, to be welcomed by such beauties as these; beauties that we never tire of, for each bud or leaf as it expands, unfolds to us new delights and creates for us an ever changing yet constant pleasure.

The adornment of human dwellings with plants and flowers is traceable to such a remote period of history that its origin is lost in antiquity. They are ornaments that the most refined art cannot even approach to, much more excel. For instance, take any one of the numerous flowers before us; what is there either in sculpture or art to equal it. It is true you may imitate a flower or a plant in wax or other material, to a nicety, but after all what is it but a poor imitation. You may pass it perhaps a dozen times a day and the eye rests upon it, without any particular emotion of delight. But place a real living Rose in its place! What an almost miraculous change comes over us. Each time we behold it, it is with a new thrill of pleasure, for now our finer feelings are interested with joy. Our sense of the beautiful, our sense of smell, our sense of care is brought into play, for we feel that in this we have a living plant that is dependent on us for its existence, and which it so amply, so sweetly repays by its beauty and fragrance.

To be a lover of flowers it is not necessary to be either a florist or a botanist or even that we should be familiar with the proper or botanic names of plants, although this latter knowledge I cannot too earnestly impress upon every one as being most useful, and I consider the possession of it adds ten fold to our pleasures in their cultivation. Indeed it is sometimes very difficult to describe a flower to another person, so that they understand the particular one we mean, for if we attempt to do so by its leaf or color of its flower, how unsatisfactory it is, as no two persons scarcely ever agree as to a particular shade of color when it is before their eyes, and how is it likely to be so when there is nothing to refer to; whereas by giving its proper name we are immediately understood; besides, while the botanic names of plants unlike everything else is universal in all civilized nations. For if you travel to France, or Germany, Russia or Italy, and have no knowledge whatever of the language of either, yet if you enter the garden of the first florist or amateur, you meet with in any of those countries and name any kind of plant by its botanic name, you are immediately understood, so that by the simple act of calling a plant by its proper name it is the talisman that opens the foreigner's heart, so that he feels a pleasure in showing you all the beauties of his garden and greenhouses, and you are able to hold a floricultural conversation with him, and when you leave his garden you part with a mutual esteem for each other. This is the true language of flowers, the knowledge of which is a kind of freemasonry that gives us the entré and a welcome to every garden and greenhouse in the civilized world.

The love of flowers is not confined to any one class of persons, for the humble as well as the rich unite in the admiration of their beauties, and we as frequently see them adorning the rooms and windows of the most lowly dwellings, as we do the mansions of the rich, receiving too from the poor inmates of the former a care and attention that those in affluence would often do well to imitate.

Many persons will doubtless exclaim that they would gladly have flowers in their rooms, could they only grow them so as to appear like these ; and I must admit there are some difficulties to be met with here, on account of the want of a sufficiency of light, and from too hot and dry an atmosphere in most sitting-rooms at this season. But these difficulties would be more imaginative than real if we adopted the same customs here as are so prevalent in Europe, for there almost every modern-built house has its conservatory or greenhouse attached to it, which not only makes a beautiful addition to a dwelling, but is at the same time scarcely any extra expense when building. And how much more desirable would such a custom be in this country, where in all large cities we are crowded together in a 25 by 100 feet, with no better view from our windows than the yards of our neighbors, which are generally the deposit of everything that is unsightly. How easily could all this be changed by building conservatories, which would give a beautiful finish to our rooms, and at the same time afford us a most healthful and recreative amusement. But in order to grow flowers in a conservatory it will be necessary to keep up a temperature within that shall be congenial to the plant, otherwise they would freeze up at this season ; fortunately, however, the means of doing this is now so simplified that it will scarcely add any extra cost to the building, for it may be done by either steam or hot water pipes, or even hot air ; in fact whatever process is made use of for warming the apartments of the dwelling can be brought into use for the conservatory, only if hot air is made use of, the atmosphere is apt to become too dry for the proper and healthful culture of plants ; this however is easily remedied by frequently throwing water on the floor of the house, and at seasonable times syringing the leaves of the plants, operations easily performed and would scarcely take a longer time to do than it does me to describe. This creates within the house a gentle moisture which plants love so much, and without which a high state of cultivation can never be attained ; and for the matter of that, if we could find the means of introducing a little more of this humidity in our dwellings, it would be all the better for us, as we should enjoy much better health than we can ever hope to do by breathing such a hot and dry atmosphere as we accustom ourselves to. Presuming, therefore, we have our conservatory, the next question is how to fill it with suitable plants. To those who possess country as well as city residences this is easy enough, as they can grow the plants in the gardens of the former during the summer, and when they have perfected themselves and are ready for blossoming, they can be transplanted to the conservatory attached to their city residence. But to those who have not such facilities, it is far better to purchase from a respectable florist plants already grown to the necessary stage of perfection—which under ordinary care, will continue flowering during the whole of the winter season—than to attempt to grow them themselves in their city yards, which under scarcely any circumstances, however skillful the cultivator may be, can he produce such specimens as these before you. In order, however, more fully to make you understand why this cannot be done, I will describe the process of growing this monthly carnation, one of the most desirable plants for winter flowering: This plant is not much more than a twelvemonth old. The season for propagating this and kindred plants among florists commences generally in October and finishes in March, consequently any time intervening during that period is favorable to the operation. The young shoots that have not formed flower-buds are taken from the plants and made into what are termed cuttings, or by some slips. The process is simple enough. The lower leaves of the cutting are pulled off and an incision or cut made near a leaf-joint by means of a sharp knife. The cuttings being made are now stuck into sand placed on benches especially adapted to the purpose, and in about a month's time they commence throwing out roots, or striking, as the technical term is among gardeners. As soon as this occurs, they are taken out of the sand and planted into small pots full of any rich and well manured mould ; they are now placed in a cool greenhouse or pit, there to remain till all appearance of frost is over, say about the middle of May, when they are planted in the open ground when they soon assume a vigor of growth that cannot, under ordinary circumstances, be obtained if grown exclusively in pots or in the yard attached to a city dwelling. When planted in the open ground, they require no attention in watering, the rains of summer, and especially of the fall, being all they need. About the latter end of September they are taken up carefully and potted, after which they are fit candidates for the conservatory, and very soon become such as you now see before you. This is the mode adopted by florists who do these things on a large scale; but, for amateurs, and those who only require a few plants of each sort, there is another very pleasing and simple process of striking cuttings, which is sticking them in saucers of sand, which should always be kept saturated with water. This mode of growing cuttings can be done in an ordinary sitting-room—merely placing the saucers in the windows during the day, so as to obtain the full light of the sun, and by keeping the sand well moistened—they will require no shading. Before you on the table are some saucers of Verbenas, Roses and other plants grown by this very interesting yet simple process. In Europe they have an excellent custom, which would, no doubt, be greatly appreciated if introduced here. It is that of employing a class of gardeners or florists who make it their especial business to supply plants in flower for the decoration of sitting-rooms, and of attending to them afterwards, by sending competent gardeners every day to see that when they need water they get it—a need, I am sorry to say, amateurs are very apt to forget—for plants require their food as regularly as we do ours, and, like ourselves, if they do not receive a sufficiency, or get too much given them, their health suffers accordingly. These gardeners also contract to take away all plants as soon as they are out of flower or otherwise become unsightly, and replace them by others, so that a constant supply of fresh and healthy plants is kept up during the whole season This is a very desirable custom, and one that I think could be well and profitably introduced into New York and other large cities of America, as the knowledge that we could always procure gardeners accustomed to the care and management of plants in cities would be a great inducement to the more general building of conservatories attached to our dwellings. For how many persons there are fond of flowers in their rooms, but have not the leisure or the necessary knowledge to attend to them themselves. But, under any circumstances, every one having a conservaotry for the first time, it would be very profitable to them to employ a regular gardener to attend to it at the commencement, and, by a little observation, they would soon perceive how little care plants actually do require to keep them in a healthy and thriving condition when that care is rightly applied. In most large cities in Europe they have what they call winter gardens, which is nothing more than a conservatory on a large scale. These, in some instances, are very elaborately laid out, with winding walks so arranged that at almost every turn you are meeting with new beauties; here, perhaps, in a secluded nook, you find a grotto, overgrown with Mosses and Ferns, with water oozing out from among the rocks, and giving to it all the appearance of one of those beautiful, quiet places we are constantly meeting with in our rambles in the country. Or, we go a little farther, and before us is an elegant fountain, overflowing into a miniature stream, with beautifully colored fish sporting gracefully about; or, hark! what are those joyous sounds we hear as we suddenly come to an aviary of sweet singing birds, which seem to show by their glad and cheerful voices that, to them, there is no winter there. These conservatories are generally planted with Camellia Japonicas, which are always covered with their beautiful blossoms during the winter months, and whatever other plants or flowers are in season or can be forced into flower are here brought together to add to the general beauty, and so all combine to make these winter gardens a very Paradise in themselves. But, if we have no public winter garden here in New York, we are not at least deprived of the pleasure of having plants and flowers in our rooms, and, in some favored places, of even having conservatories full of such charming beauties as these before us.

We have here this evening many varieties of plants which you perceive can be made to blossom at this season of the year. The first and most prominent among these, on account of its many good qualities, is the Camellia Japonica, one of the most desirable winter plants we possess, whether we regard it for the beauty of its blossoms or the lively freshness of its foliage; for even when not in flower it is one of the most useful plants for the conservatory on account of its rich evergreen leaves, which form such a handsome background to other flowers; and besides it has another excellent quality, which is, it will bear as much ill usage as almost any plant.

We next come to the Rose, most justly styled the queen of flowers, and is deservedly admired by every one, not only for the beauty of its flowers, but also for its exquisite fragrance. I regret I cannot show you this evening some more beautiful specimens than these, and further advanced in blossom, but the severe weather during the last month, with the great want of sun, has caused them to be a fortnight later than they otherwise would have been. There are two principal classes among roses; the one called monthly or everblooming, consisting of the Bengal and Tea roses, the Bourbons, and most of the Noisettes. The flowers of this class generally possess more or less of that peculiar odor or perfume called tea-scented, from its supposed resemblance to tea leaves when rubbed in the hand. Among these is to be found almost every variety of color from white to very nearly black, yellow, orange, and even green, so that a beautiful bouquet may be made of roses only, possessing every diversity of color, without the aid of any other flowers. The other class is composed of the Remontants and Perpetuals, or roses that only produce one set of fine blossoms, but afterwards are continually throwing up a few stray flowers, more especially in the fall of the year. These belong to that class of roses from which that most exquisite of all perfumes is produced, the Attar or Otto of Roses. There are other classes of the rose, such as the climbing rose and the summer or June rose—the former very beautiful for covering trellises and verandas, and among the latter are somo very showy and sweet roses, but generally they are not well adapted for pot culture or for forcing into flower at this period of the year, with however one bright exception which must be made in favor of the lovely moss rose. This beautiful rose requires to be grown in pots for a twelvemonth before forcing it, otherwise it does not flower well, but when this is attended to and the pot becomes well filled with roots, it may be forced so as to flower as early as February, and a more beautiful object than a well grown moss rose cannot be imagined.

We now come to a very different type of flower, the *Calla* or *Æthiopian Lily*, the flowers and leaves of which are equally beautiful. This plant is of easy culture, thriving perfectly well grown in a pot as you now perceive it, or it may be placed entirely in water and grown in a similar way to the common yellow and white Lily that we see in almost every pond or stream. Beautiful as the lilies are, unfortunately there are but few that will bear forcing so as to flower in winter, excepting that most lovely and fragrant little variety, the *Convalaria or Lily of the Valley*, which thrives well if taken up in the fall and planted in pots, when it may be brought into the forcing house so as to flower at this season. The Lily, like the Rose, is a very numerous family and embraces flowers of the greatest diversity of form and color, but with few exceptions, as before observed, are more fitted for garden culture than for forcing in pots.

Bouvardia.—This invaluable winter flowering plant consists of but few varieties, but those few are all beautiful and free flowering. It is also one of those few plants that the more the flowers are cut off the more it produces, for generally whenever a blossom is cut off the stem invariably produces three more shoots, which in their turn, in a short time, have flowers. Another excellent quality of the blossoms of this plant is that when cut and placed in water and kept in a cool place, they will look fresh and retain all their beauty for nearly a fortnight. This is a very desirable quality for those who are fond of cut flowers in their rooms.

This beautiful white flower, the *Chinese Primrose* or *Primula Sinensis, fl. pleno* of botanists, is perhaps of all plants the most profuse flowerer, for it commences to flower in October and continues till July, during the whole of which long period it can be kept as you now perceive it, provided each flower as it arrives at perfection, that is becomes full blown, is cut off. Now this is a most excellent quality in any plant, for thus we have a plant always covered with blossoms, yet at the same time giving us an abundance of cut flowers for the rooms. And I might here mention that all plants do better and give a much greater supply of flowers by frequent gathering the blossoms as soon as they are perfected—so that we are enabled to enjoy them not only in their growing state as plants but at the same time as cut flowers. The reason of which is that with most flowers as soon as the blossoms are fully expanded they commence producing seed, to perfect which the whole strength of the plant seems to be expended, and the flowering ceases, whereas, by constantly cutting the blossoms off as soon as they are in perfection, the plants may be made to flower almost indefinitely. Besides this double variety of the Primula, there are several others with single flowers, two of which are now on the table, they are also very abundant flowerers, but as they shed their blossoms very soon they are not of much use as cut flowers, although very ornamental and showy as plants, and deserve a place in every conservatory.

The *Heliotrope* is so universally known that it needs but little comment from me. No collection can be said to be complete without it, not so much from any peculiar beauty in its blossoms, but from the early associations attached to it as a sweet smelling flower—for as children we are taught to call it the cherry-pie plant, from a supposed resemblance to the smell of the cherry when baked. This I suppose is the reason why it is such a universal favorite with both young and old. It is also one of those ever-flowering plants that seem to thrive and blossom the more they are gathered.

We next come to the *Violet*. This beautifully perfumed little flower is perhaps, of all flowers, the most associated with us from our earliest infancy. With what delight as children have we not gathered bunches of it from the fields and roadsides of the country, and being one of the first flowers of spring, we welcome it as the harbinger of many joys to come. It is, however, one of the most difficult plants for flowering in city conservatories, as it requires to be kept much cooler than other plants, with an abundance of fresh air and light; without these contingencies, instead of flowering it grows all to leaf. But where it meets with the necessary amount of sun and air, it is one of the most abundant flowering plants we possess, producing a continuous supply of its fragrant blossoms from October till the middle of May.

Azalea indica.—This is perhaps one of the most profuse flowering plants we have to do with, and during the time it is in blossom it makes a greater display than any other plant Among them is to be found every shade of color, from white to the richest crimsons and purples, besides many striped and mottled varieties. The white variety, and a few of the others, can be forced into flower as early as December, so that with a little management a succession may be kept up until the end of June.

Of all flowers that have been comparatively recently introduced into America, the *Monthly or Tree Carnation* ought perhaps to be placed in the first rank. They are very great flowers, having a diversity of color that makes them very desirable, and many of them highly fragrant. It is of very easy culture, and being monthly, will, under proper treatment, continue flowering the greater part of the year.

Fuchsia, or Ladies' Ear Drop.—This now well known plant is universally admired for its elegantly drooping flowers, giving to it when in full blossom a gracefulness possessed by scarcely any other plant. Although it is composed of a great variety, both as regards the form of its flowers, as well as their colors, yet there are but few that blossom freely during the winter months. Fuchsia speciosa is one of the best winter flowering varieties. There is also a very pretty and elegant species called the Princess of Prussia, the outer leaves or sepals being red, and the inside, or corolla, white. Those having dark purple corollas are mostly spring or summer flowerers, with perhaps the exception of the Prince Imperial, a variety lately introduced, and which gives promise of being a winter flowering kind. If this on further trial should prove to be the case, it will make a great addition to the flowering plants of this season.

This beautifully drooping plant, with scarlet, star-like flowers, is the *Euphorbia Jacquiniæflora*, a very elegant plant, and continues in blossom during a long period. Also nearly allied to it is the *Poinsettia pulcherrima*, a plant which when in flower, as that before you, makes a most splendid display. Yet the blossom itself is small and insignificant, being that starry portion in the center. But when in flower it is always accompanied by those gorgeously colored leaves, or bractæ, as I suppose botanists would call them. The Euphorbias are a very numerous family of plants, nearly all exuding, when bruised, a milk like substance that is in some cases extremely poisonous. Other portions, again, are highly nutritious as food, as the rhizoma, or underground portion of the stem of the Mandiac, or Cassava, of tropical America, which, when freed from the poisonous juice by washing and exposure to heat, forms a kind of starch, which is the well known tapioca of commerce. Then again we have the Ricinus communis and the Croton Tiglium—the seeds of the former yielding the castor oil, and the latter croton oil. Others, again, are virulent poisons, as the Manchiveeal tree of the West Indies, which is said to be death to any one sleeping under its shade, and a drop of the juice falling on the hand produces a blister instantaneously. The hair of other species, such as the Jatropha stimulose, sting like nettles. Another and very important product is the Caoutchou, or india rubber, which is yielded by several varieties of this order of plants. So that this numerous class, called the Euphorbiaceæ, not only furnishes us with plants producing beautiful flowers, as those here represented by the Euphorbia jacquiniæflora and the Poinsettia pulcherrima, but others yield us a highly nutritious food; whilst the extracts of another portion are of the greatest importance in the arts and sciences.

To those who have conservatories there are few flowers more conspicuous than the different species of the acacia, of which we have but one representative here this evening, in the acacia linifolia. They are mostly large and rapid growers, so that they require a great space of room to themselves; but when in flower they are not only very showy but exceedingly sweet. They are mostly very profuse flowerers, and even when not in blossom are highly ornamental, many of them having, like the present, a very graceful and drooping habit of growth.

The next flower I will call your attention to is the *Eupatorium*, of which we have two varieties here, both as you perceive pure white; this is a most useful class of flowers, not only for the decoration of the conservatory, but also to the bouquet makers; there are some six or seven varieties that flower during the winter months, some coming into blossom as early as September, whilst others do not flower till April, so that the period of flowering extends over nearly nine months; and although they are all white, yet they are distinct in form from each other, the flowers and leaves have a slightly aromatic smell in several of the kinds, especially so in the two varieties on the table.

The next flower is the *Begonia*, which embraces a very great variety, some for the elegance and beauty of their flowers, and others for the singular markings of their foliage; the flowers, in general, have no great merit, except a few, among which are the two species now before us, *Begonia incarnata*, this pink-colored kind, and *Begonia Saundersiana*, this red coral-colored one. Most of the species continue in blossom the greater part of the year.

The *orange tree*, I dare say, is recognized by all by its fruit; it ought to be in every collection, the foliage being of that peculiar lively green so pleasing to the eye, and the blossom is universally admired for its fragrance, a single flower, when open, being sufficient to perfume a whole conservatory, besides which, it generally has its golden fruit on the plant at the same time as the flowers, making it of double interest, especially to the younger members of our families.

This little white flower, the *Alyssum Maritimum* or *Sweet Alyssum*, is only looked upon as a very common garden flower in the summer, but is most useful in a conservatory during the winter. It can either be grown as a dwarf pot plant like the present, or placed on a shelf, or even suspended by means of a wire, and allowed to fall over the sides of the pot, when it becomes a very pretty hanging plant; by carefully cutting off all flowers as soon as the lower portions commence producing seed, it may be made to flower almost indefinitely. The flowers are very sweet, smelling very much like honey.

Another of our common garden flowers in summer is the *Reseda odorata* or *Mignonette*, so universally admired for its fragrance by all classes of people. The plant before us is a new variety and called the tree Mignonette, by never allowing its blossoms to perfect its seed; it will continue flowering the whole of the season, and will live for years, becoming a large bush or tree, according to whether it is allowed to grow at will or is trained to a single stem. It is also somewhat sweeter than the ordinary garden species.

Besides the plants I have described, there are a vast number of others that may be flowered at this season, so as to add to the general beauty of the conservatory, although those that I have named are among the more prominent for the many good qualities they possess, unless, perhaps, I make exception in favor of the Hyacinth. This flower, you are aware, is produced from bulbs annually imported from Haarlem, in Holland, where the soil appears to be more suitable to this and kindred roots than in any other part of the world, for there they are grown by the million, thousand of acres being devoted to their cultivation, and from thence they are exported to all parts of the globe. The Hyacinth too is more specially adapted for room culture than almost any other plant. It appears to thrive equally as well whether grown in pots with earth or in glasses of water, although the latter is perhaps the most interesting and pleasing way, as we are enabled to observe the formation of the roots as well as the development of the leaves and blossoms. In order to have a succession of these flowers during the whole of the winter and spring, they should be planted or placed in glasses as the case may be, at different intervals from September till middle of December. For the first ten or twelve days after being placed in the glasses, which should be filled with water so as to cover the lower part of the bulb with about half an inch, they should be set in a dark closet, as they throw out their roots more freely than when fully exposed to the light; but when taken from the closet they should be kept in the window so as to receive as much light and sun as possible, care being taken that the glasses are well supplied with water, so that the lower part of the bulb is constantly immersed in it. Narcissus, Tulips and Crocuses can be grown in a similar way, although these latter thrive better and make more appearance when cultivated in pots.

There is also another class of plants, the flowers of which for the most part do not possess any very great beauty. I allude to variegated or ornamental foliaged plants, these have now become very numerous, the leaves of many being so beautifully marked that no conservatory can be said to be complete without them. We have but few of them here this evening, which I very much regret, as they would have added much to the display before us, but the weather unfortunately is too severe. For many of the finer varieties do best in a warmer and more humid temperature than ordinary greenhouse plants, therefore would have felt the change of atmosphere more than these. I would here observe that as the beauty of this class of plant consists in their foliage, it should always be kept from cold draughts of air, also the leaves ought to be frequently washed, which is not only more healthy for the plant but doubly repays the trouble by their enhanced beauty and brilliancy of color.

In conclusion I would call your attention to a very pretty and elegant manner of growing plants in a room by means of what are called Parlor Greenhouses, or, more properly speaking, Wardian Cases, which require very little care and attention.

It has always been supposed that plants of all descriptions must have a constant change of fresh air, but recent discoveries by Dr. Ward, a physician of London, has proved that many kinds of plants can be grown for months without any change of atmosphere. The origin of the discovery

I believe, was this: The Doctor had buried the chrysalis of a sphinx moth in some mould which he placed in a covered bottle, and after a time he observed some grasses and ferns spring up, which at first he thought nothing of, but observing that they continued growing day by day and yet remained perfectly healthy, it led him to make further experiment, which resulted in the beautiful ferneries and parlor greenhouses so prevalent among us now. At present the plants that are found to thrive best in these miniature greenhouses are the different varieties of mosses, ferns, cacti, aloes and orchids; and there is no doubt that as our knowledge extends, we shall find that almost every description of flowering plants may be cultivated in a similar way, and when that time arrives we shall see every dwelling adorned with its Wardian greenhouse or conservatory, for it must be borne in mind that when this system is fully developed it will not be necessary to have any such small arrangements as at present, but regularly built conservatories the whole width of the house, with proper means of entering them so as to arrange the plants and flowers contained within. Such a one I believe Dr. Ward has now, or had until very recently, attached to his dwelling, situated in the very heart of London. As I before observed, when the principle of these conservatories is more thoroughly understood, we shall be enabled to have plants and flowers in the greatest luxuriance in cities as well as in the country, and that too with one-half the care that is now requisite, for under this system the conservatory if necessary may be closed up for a fortnight or even months during the summer, or other period that we may be absent, as the plant will require no water, having once received their proper supply to last for a given period.

On motion of Mr. Jireh Bull the thanks of this Association were presented to Mr. John Henderson, for his beautiful exhibition of winter flowers, and also for his interesting and instructive lecture, and a copy was requested for the use of the Association.

On motion of Mr. William S. Carpenter it was

Resolved, That as a mark of our appreciation of the efforts of Mr. Henderson, in making this splendid display of flowering plants exhibited this evening, that it be recommended that the silver medal of the Institute be awarded to him.

Mr. Mead—The double White Primula on the table, which the modesty of the lecturer has prevented him from alluding to, was introduced by him. This plant has received high honors from the Royal Horticultural Society of England.

Dr. Rich exhibited some leaves, cones and seeds of the Silver tree, of the Cape of Good Hope, brought by Mrs. Fannie V. Mangum from that country. The following description of the tree was prepared by her:

Silver Tree of the Cape of Good Hope.

In the midst of so much that is curious and beautiful in the vegetable world, my attention has been particularly drawn to the brilliant and graceful Silver tree, that belts this magnificent mountain, and is at once the pride and boast of the Africandia, who declares it to be a habitant of no other portion of the globe.

I am no botanist, and therefore unable to refute this exclusiveness so boldly claimed for it. I am not even sufficiently skillful to give it its scientific position in the vegetable kingdom. I only know, from the assertions of the intelligent, that it is confined to a portion of Table mountain, untouched by frosts, and from observation, that it dwindles as it reaches its highest range, and no where seems to attain a height of over eighteen feet. It is usually seen springing up like pines, in clusters, and of all stages of growth, from one inch in height to twelve feet.

It is coniferous, bearing the finest specimen of winged seed I have ever seen. This seed is enclosed in an exceedingly hard casing, and requires to be soaked two weeks in water before it is fit for planting. The beautiful pointed leaves of this tree are thick, like cotton, of extreme toughness of fiber, very distinctly veined, and covered both upper and under sides with soft thick hairs, like down, that shine, even after drying, with a most silvery luster in the bright sunlight. With a light wind it is truly magnificent. The cones, too, are covered with this same silvery down, somewhat shorter. They, as well as the leaves, when young have an extremely delicate green appearance.

The stems of this rare tree generally branch at each intersection, in threes. The bark is smooth, reddish and silvery. We have not yet found a trunk to exceed eight inches in diameter.

I think the Silver tree highly ornamental, and that it would be found as useful an addition to our conservatories at home as many of the brilliant hand shrubs of north Africa and the East Indies.

Many ornaments are made here from the leaves of this tree that are so tough as to dry well and retain nearly all of their original brilliancy. Baskets are curiously plaited of these leaves, and besides being tastefully introduced into the bouquets of immortals, so common to every house in this settlement, they are made use of in embroidery, in ornamenting table covers, and in various other ways, with great nicety and ingenuity.

On motion of Mr. Carpenter the thanks of this Association were tendered to Mrs. F. V. Mangum for the interesting description and exhibition of the Silver tree of Cape Town.

Mr. Mead read the report of the Committee on Horticulture, to be made to the American Institute.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

February 21, 1865.

Mr. Isaac M. Ward, Vice-President, in the chair.

Mr. William S. Carpenter, from the committee on large fruits, made the following report, which was adopted:

The committee held a meeting on Friday evening, February 11, to consider whether the award of the Greeley premiums should be made at once, or left open for another season.

At the request of all the members, Dr. John A. Warder, of Ohio, and Dr. E. Ware Sylvester, of western New York, were added to the committee.

The meeting was organized by appointing Dr. J. A. Warder, of Ohio, Chairman, and Mr. P. T. Quinn, of New Jersey, Secretary.

As the premiums offered by Mr. Greeley were made known only a few days before the exhibition of the Horticultural Association of the American Institute in September last, the committee, in justice to themselves and the public, after freely discussing the relative merits of the fruits already presented, passed unanimously the following resolutions:

Resolved, That the award of the "Geeeley premiums" be postponed until after the exhibitions of the Horticultural Association of the American Institute, to be held in the middle of September, the second Tuesday in November and second Tuesday in December, 1865.

Resolved, That invitations for competition be extended to the growers of all varieties of apples, pears and grapes, except the following kinds, specimens of which have been received by the committee:

Apples.—Hubbardston Nonesuch, Fallawater, Conkling's Seedling, Swaar and Baldwin.

Pears.—Bartlett, Lawrence, Duchess d'Angouleme, Danas' Hovey.

The object in extending the time from September 15 to the second Tuesday in December, is to give persons offering late varieties of fruits an opportunity of presenting them when fully matured.

It was resolved that Mr. P. B. Mead be requested to act with this committee in awarding the premiums on the grape, which, at Mr. Greeley's request, is to be decided by that committee.

The following gentlemen compose the committee: John A. Warder, chairman; P. T. Quinn, secretary; Chas. Downing, Isaac M. Ward, Wm. S. Carpenter, W. L. Ferris, E. Ware Sylvester.

The Chairman introduced to the audience, Dr. Isaac P. Trimble of New Jersey, who delivered an interesting and instructive lecture on the nature and habits of the span or measure worm, one of the great pests of our fruit and shade trees, giving a detailed account of his researches and examinations chiefly in regard to this worm.

His remarks were illustrated by numerous drawings of these worms in every stage of their development, and of the leaves upon which they feed.

The lecture was an extract from a diary kept during the season of the insect's life.

THE EGGS.

The lecturer first exhibited a handful of branches on which were large numbers of eggs, and called attention to the fact that the eggs were nearly all on the lower sides of the limbs. He stated that no degree of cold injured the eggs, but that when ice collected on the branches it was sometimes fatal to them.

WORDERFUL INSTINCT OF THE MOTHER.

The diary commenced with the coming forth of the leaves on the 8th of May. The degree of warmth that is necessary to bring forth the leaves is also just the degree that is required to hatch the eggs. The mother knew this last July when she deposited her eggs, and therefore selected those trees which would put forth their leaves at the same time that the eggs would hatch.

It may be asked, How do these little feeble, fluttering insects know which are the right trees? I cannot answer. We call it instinct. But what is instinct? It is a word we use to answer a question, but it is not a definition. The insect world is full of such wonders. They are the manifestations of the guiding hand of God Almighty."

JARRING THE TREES.

"June 9. Visited Brooklyn to-day to see the worms. At one place I saw a negro man with a pole some twenty feet long, with a cross-piece about six inches in length, fastened to one end of it; and with this he was jarring the 'critters,' as he called them. He was the most sensible man I had ever met with on the worm question. He jarred and jarred, and I picked up till I got my handkerchief full, and then he killed the remainder."

THE CEDAR BIRD.

"Later in the day, after a shower, I visited Madison Square, to see about that flock of cedar birds. While talking with the keeper of the park about them, I heard the familiar low, whispering whistle, like a boy just beginning this accomplishment of youth, when he cannot get out the sound above his breath. Soon a few could be seen coming to a tree near us, and very soon more, and then almost continuously, until several hundreds were busily at work within fifty yards. These birds have been every day more or less for two weeks, generally coming early in the morning and towards evening, but often at other times also. To-day they grow so familiar from being undisturbed, that I could approach within three or four yards of those at work on the under branches. Here was no necessity to kill and dissect to know what they eat.

"The cedar bird has not the foot of the woodpecker and creepers; they are not so graceful in the pursuit of their game as the orioles and warblers, but they have become wonderfully expert in taking these span-worms. Sometimes they will reach out to their utmost extent from the twig they stand on to the worm on another; often the twig yields so much to this pressure in the opposite direction, that the bird misses the worm, and has quite a flutter to recover himself, but as soon as righted up, he tries again, persevering till he gets the prey. Often they would take the worm from the end leaf of a pendent twig, where there was no way of reaching it except on the wing as the fly catchers do, hovering over their intended victims like the king fisher and the ospray.

"Some few of the worms are already curling their leaves that are to be their cocoons. As soon as they shut themselves up in these houses, they begin to contract in length, the lower part of the body grows larger, and they lose their activity. This seemed something new to these birds, and I was very much amused at the difficulty they had in getting the worms out, especially where the bird and worm—or rather chrysalis—were on separate twigs. The bird, when he would take hold, would pull hard, bringing the two twigs suddenly together, and leaving no chance of purchase; then he would let go, and away the two would separate with a spring. It would now take some time to adjust matters, but he would try again. In one case I counted ten attempts before the prize was secured."

WHAT TO DO.

"June 10. I had a long talk to-day with the keeper of Union Square. He told me the birds are more numerous this year than ever before, and he has watched them carefully for years. He told me he had tried to have the parks closed during their visitation, so that they should not be disturbed by the people, especially by the children, but could not succeed. But one wet Sunday that park was closed. The birds came in a great flock, and would come to the ground, and even on the benches after the creeping worms. This was the most valuable testimony I have ever got on this question.

"Should these birds come just so another season, and the people or the city government close the parks and fill them with poultry, and then jar down faithfully, the worm pest could in a single year be placed at the mercy of the Ichneumon fly."

At the conclusion of the lecture, which lasted for nearly two hours, Prof. Tillman remarked that the audience had been highly entertained and interested by Dr. Trimble. He had chosen a topic particularly attractive to those living in cities, who have seen the havoc of the measure worm among the trees of their squares and parks. The manner in which the lecturer had commanded the attention of the audience, by giving extracts from his diary made last year during his examinations in this and neighboring cities, was novel and entirely successful.

The beautiful colored pictures of insects, leaves and birds, prepared by Mr. A. Hochstein, used to illustrate the lecture, had added very materially to a correct understanding of the subject, and the audience could say they had all the experience of searching for the greatest enemies of our trees, without the trouble of disposing of them. He hoped the lecturer would soon give to the public in a printed form the results of his researches, and concluded by offering a resolution of thanks to the lecturer for his able exposition of his subject, with a request that a copy of the lecture be furnished for the Transactions of the Association, which was unanimously adopted.

Mr. James Hogg, of Yorkville, exhibited ten new variegated leaved plants from Japan, sent to him by his brother, Mr. Thomas Hogg, now in that country.

Mr. Mead informed the audience that this was the first time these plants had been seen in this country or Europe.

Mr. Hogg stated that at some future meeting of the Association he would exhibit other varieties of Japanese plants in bloom, and the curious methods of grafting which these people adopt, and which is unknown to our nurserymen. Adjourned. JOHN W. CHAMBERS, *Sec.*

March 7, 1865.

Mr. Benjamin C. Townsend, the President of the Association in the chair.

The Chairman introduced to the audience the Rev. Henry Ward Beecher. For nearly two hours this eloquent divine held the undivided attention of his audience by a masterly exposition of the principles of Aesthetics. Unfortunately no report was made of this impromptu address. At its close Mr

P. B. Mead presented to the speaker, with appropriate remarks, two beautiful bouquets; one illustrating the natural arrangement of flowers, and the other the geometrical.

On motion of Mr. Jireh Bull, the thanks of the Association were tendered to the Rev. Henry Ward Beecher for his interesting lecture, with a request for a copy for publication.

After some remarks by the Hon. Geo. Bancroft, the Association adjourned.

JOHN W. CHAMBERS, *Secretary*

March 14, 1865.

Mr. Benjamin C. Townsend, President, in the chair

THE MARKET GARDENS OF NEW JERSEY.

BY PETER HENDERSON.

The market gardens of New Jersey, in the vicinity of New York, are embraced in a half circle of ten miles from the City Hall. The lands occupied by them now cannot be less than a thousand acres, and it is doubtful, indeed, if there is anywhere in the whole length and breadth of the land, another spot where the soil is cultivated in such a thorough manner, and with such profitable results. In many cases, the returns per acre are as high as $1,500; and it is perfectly safe to say, that the whole will average $1,000 per acre, that is to say, the receipts from a thousand acres will be one million of dollars. But this high degree of fertility is only obtained by the highest cultivation, all farm lands broken in for market garden purposes requiring at least three years to bring them up to this high productive standard. The varieties of vegetables cultivated are few in number, and for the most part are different from those of the Long Islanders, whose lands embrace a much greater extent, but are by no means so highly cultivated The vegetables grown are principally cauliflowers, cabbages, beets, spinach, onions and lettuce, as first crops, and celery, horseradish, thyme, sage and other herbs as a second; for be it known, that for old mother earth to produce such results, she must be kept active, for no sooner has she developed the spring crop in July, than the plough and harrow again invade her rest, and she is planted with the crop that is to be developed in the fall.

It may be of some interest to detail the manner of cropping. Cauliflowers, for instance, are planted out two feet between the rows, and fifteen inches between the plants; at the same time, between the rows of cauliflowers are planted lettuce plants, which are fit for use before the cauliflowers are grown enough to injure them; and being cut off, the cauliflowers have the full benefit of the space until the end of June or the first week in July, when they also are fit for market. As soon as they are cut off, the ground is cleared without delay, and planted with the fall crop of celery. Our manner of cultivating which I will briefly describe. After the ground has been well pulverized by ploughing and harrowing, lines are struck out three feet apart on the level surface of the soil. No trenches are made, as is usual in private gardens. The plants are then planted six inches apart in rows The ground is kept clear by the cultivator until September, when the plant is strong enough to allow the earth to be laid up to it by the plough. The process of blanching is then completed by the spade, but for private winter use celery may be grown yet more simply. Instead of planting three feet by six inches, it is planted, also on the level surface, one foot each way. All that is required by this method is simply to keep the space between the plants clear of weeds until the celery is strong enough to crowd them down. Being planted so close together, they have no room to extend laterally, and in the struggle for light, or, as Darwin might say, "the struggle for life," they assume the necessary perpendicular form which is necessary preparatory to the blanching process, which can best be done by amateurs by lifting the plants about the middle of November, and placing them perpendicularly between layers of sand in a coal cellar. By this simple method, a plot of ground twenty by twenty feet will give 400 roots, which will be an abundance for any family from November till May. The variety best suited for this method is known as the "French Dwarf."

Another feature peculiar to the Jersey market gardners, is the forcing and forwarding of early vegetables by hotbeds and cold frames, immense numbers of which are used, some growers having upwards of two thousand sashes, principally for the forwarding of lettuce and cucumbers in "cold frames." The process is so very simple that I will give a brief description of the "cold frame process," which is that in most general use, and that which is done with the least trouble and expense. The sash used is the common three by six sash, while the "frame" is simply two boards of nine or ten inches in width, running parallel to each other six feet apart, on which is placed the sash. The lettuce plants are planted in March, about eight inches apart, giving about fifty plants to a sash. By the middle of May the lettuce is fit for use. As soon as a few heads are cut, seeds of cucumbers are sowed in their place, which come up quickly, taking the place of the lettuce as it is cut for use. By this method, any occupant of a city lot could find a corner for a sash or two, and with little trouble could provide fresh lettuce and cucumbers at times when stale ones that had passed through at least half a dozen hands, could not be purchased at less than $1.50 per dozen.

Of the fruit market gardens of New Jersey, in this district, I am compelled to say there is nothing to boast. Of strawberries, raspberries, blackberries or grapes, there is not, to my knowledge, a single acre properly cultivated in Hudson county. The few attempts at strawberry and raspberry culture are defeated by the growers pertinaciously retaining the miserable small varieties that were in use twenty years ago; and in regard to grapes, I have yet to see the first earnest attempt with any variety. It is notorious that New York is most inadequately supplied with the finer varieties of small fruits. Even the lettuce that is seen is sent from immense distances; some of the best, perhaps, from Knox, of Pittsburgh, distant from New York over 400 miles. I had the satisfaction of seeing the opening of some cases of strawberries from Mr. Knox, at one of the commission stands in Washington market last summer. The whole lot, some thousands of boxes, was disposed of at extraordinary rates as quickly as the men could count them out, and dozens of eager purchasers had to go away disappointed, the very large daily shipments from Pittsburgh being but a drop in the bucket, compared with what was wanted. I mention this matter to show, that while we excel in the cultivation of vegetables, we are correspondingly deficient in the cultivation of fruits; and it should be our duty as a society to call attention to the fact, and endeavor in some way to remedy the deficiency. One would think that this inattention to the production of fine fruits would naturally cure itself, when it is so palpable that their cultivation is much more profitable than those of inferior quality; yet the progress of improvement is so slow, that prices to the consumer to-day are much higher than they were ten years ago, taking gold as the basis of value then and now, proof positive that the supply is inadequate to the demand.

Mr. Peter B. Mead.—I fully indorse the remarks of Mr. Henderson. The variety of celery spoken of was the very best sort, making up in breadth what it lacked in height. I have grown it weighing 3½ and 4 pounds per head. Growing this crop, particularly in trenches, benefits the soil by deep and thorough stirring. Tomatoes were little grown in New Jersey as a market crop, most of them coming from Long Island.

Mr. Nichols of Hammonton, Atlantic county, N. J., said they were going extensively into the culture of small fruits in his vicinity, having already planted from 3,000 to 4,000 acres of strawberries, raspberries and blackberries. The strawberries were mostly Triomphe de Gand and Wilson. In that more southern climate the Wilson loses its acidity—has beds of it four years in bearing with no signs of running out, though he had been told that one good crop was all it was safe to depend upon There were acres of strawberries in bearing where scrub oaks were growing one year ago.

On motion of Mr. Wm. S. Carpenter, the thanks of the Association were presented to Mr. Henderson, with a request for a copy for the Transactions of the Association. Adjourned.

JOHN W. CHAMBER, *Secretary.*

March 21, 1865.

Mr. Nathaniel C. Ely in the chair.

After some preliminary business the chairman introduced to the audience the lecturer for the evening, Mason C. Weld, Esq., who spoke as follows

SOILS.

To the plant the soil is its birth-place, cradle and grave. In part it is its food, and in part the trencher from which it feeds; it is its sole drinking cup, its anchorage as it is swayed to and fro in the gales. What is the soil, whence comes it, and will it always remain fertile? With our lenses we may examine the finest soils, and we will find them largely composed of bits of stone—the ground-down particles of this or yonder mountain chain—incorporated with which is the decayed vegetable matter so necessary to fertility. The beginning of a soil is the fine dust and bits of moss with the particles of stone cracked off by frost, and washed or blown into the cracks of rocks, or collected under the lichens attached to the frost fissured surface. This small beginning, compacted by water and acted upon by air, forms a suitable rooting place for delicate mosses and other little plants, which live their short lives while the moisture lasts on the shallow soil. This soil thus begun catches and holds the blowing dust, the wear of the rocks, and incorporates into itself the vegetation which grows and dies upon it. So it accumulates until it fills the crevices, and loose stones are covered. Many plants thrive upon the ever deepening soil, and the hill-sides are finally covered. Shrubs and trees strike deep their roots, drop their leaves, or dying, their whole substance becomes part and parcel of the soil. Acted upon by the winds and rains the tendency of all soils is to seek a level, and gradually find their way into the valleys and plains. Soils are constantly forming, and moving as they do, rarely increase to much extent save in the valleys, and here the tendency of that deeply buried is to form a hard pan, the first step in the transformation of soil back again to rock. This turning of soil to rock again is a natural result of heavy pressure, with the percolating water bearing lime, iron, alkaline salts and silica among it, thus hardening or cementing it together. Causes producing effects like these have ever been going on, and all contribute to maintain the verdure and fertility of the soil.

Some of the volcanoes afford us good opportunities for the study of soils, and where at some former period the torrent of melted lava covered whole districts, destroying all vegetation, leaving a thick crust of scoriæ, sand and ashes, or even solid rock, which within the historic period had been converted into pasture fields, vineyards and even forests

So extensive are the deposits of stones, gravel, sand, clay, &c., left there by the agencies already alluded to, that it is a comparatively rare thing to find a soil formed directly or chiefly from the rock upon which it lies. The most common rocks, being usually mixtures of different minerals, in their decomposition furnish soils, as a general thing, containing all the elements necessary for the growth of agricultural plants. Trap rock consists chiefly of feldspar, and hornblend, granite of feldspar, quartz and mica. None of these of necessity contain sulphuric or phosphoric acid, without which no soil can be fertile. But intimately mingled with these minerals, are found, in inconspicuous forms, other minerals, viz: phosphates, sulphates, iron, manganese, etc., which are of vital importance to the soil, so that in various ways the All-wise Father has provided on the surface everywhere that the earthy essentials to fertility shall not be wanting. Beside these mineral elements which give no evidence of having been a part of either animal or vegetable organization, there are organic elements, or that part of the soil which results from the decay of animal or vegetable life, or has in some manner been produced by it. If a soil in the condition of fine dry powder be put into an iron spoon and heated, it will smoke, turn dark-colored, and, perhaps, burn with flame. By this process all the organic portion is driven off, while the inorganic or mineral remains. This organic part is called humus or vegetable mold, and is the result of the action of the oxygen of the air upon dead vegetation in or upon the soil. Soils containing less than 5 per cent of this vegetable mold are considered poor in humus, those having 5 to 10 per cent are "humus soils," or those rich in organic matter, while those with more than 10 per cent are peaty soils and are found in very wet places.

Now let us look at growing plants for which agricultural soils must be adapted. These plants are found to consist of an organic portion which burns or is driven off by heat, and an inorganic portion left in the residue or ash. In its growth the plant obtains the materials which add to its bulk from water, from the air and from the soil. The earthy elements of the plant come directly from the soil, while the others, oxygen, hydrogen, carbon, nitrogen, etc., are derived from the air and from water. De Saussure, in the early part of the present century, first made known the fact that plants would not grow unless they found in the soil the ingredients of their ash. This has repeatedly been confirmed, and it now seems strange that what is at present so well established as the very ground-work of agricultural reasoning should have caused so much investigation. A soil was imitated with comminuted platinum, washed with acids, and heated to redness, consequently containing nothing which a plant could appropriate. The seeds planted in this soil germinated, and grew for a while, but when the ash ingredients contained in the seeds were used up, they died. The substances found in the ash of plants, are potash, soda, lime, magnesia, oxides of iron and manganese, chlorine and carbonic, sulphuric and phosphoric acids. These are absolutely essential to the perfection of plants. Another experimenter, Prince Salm Hortsmar, found that the oat would not thrive and perfect seed if a single ingredient of the ash was withdrawn from the soil. The plant receives these ingredients in the water absorbed by its roots; hence, nothing in the soil is available as plant-food, which is not readily soluble in water.

When these facts became known everybody saw at once the great benefit chemistry was about to be to agriculture. The plants must be analyzed and their demands upon the soil known; then the soils must be analyzed and what they lacked made apparent, and lastly, the manures must be analyzed, or at least those obtained which would make any soil exactly what the crop to be raised demanded. Agricultural chemistry was one of the most beautiful branches of science. The world was entering upon a new era in the art of cultivating the soil, and the rate at which it was making progress must have been rather alarming to the old fogies. But alas the science was in its infancy and it had been too heavily laden by these Utopians—it failed to do this work. It soon became apparent that no soil analysis when made in the best possible manner could show the fertility of a soil. Practically soil analyses do not exhibit the available constituents of a soil with any very great degree of accuracy. Charlatans who talk learnedly advise those who consult them to have their soils analyzed, and on the strength of these analyses make prescriptions for the soils—often too with excellent results. For where is the soil that bones, gypsum, ashes, etc., will not benefit?

Water is not only indispensable as a solvent of the plant-food, but it is food itself. The absorption of water takes place through the roots alone, hence all the water plants receive comes through the soil and much of it is breathed out through the leaves. The immense quantity of water thus transferred from the soil to the air is hardly conceivable. It often amounts to more than the entire rainfall. Mr. Lawes, of England, estimated that for every grain of solid matter added to the plant in its growth, it transpired 156 to 270 grains of water. A crop of grass therefore which weighs three or four tons would have transpired 600 tons of water. Soils always contain much water, even in the tropics, and the avidity with which an artificially dried soil attracts moisture from the air makes it one of the most powerful drying substances known. The vegetation which can exist on a surface of coarse gravel is very scanty. The finer the particles, other things being equal, permeability to air and moisture not being checked, the more fertile the soil. Two soils analyzed, a few years since, one from the Scioto Valley, in Ohio, the other from Vermont, gave the same ingredients, though the Vermont soil would yield only meagre crops of buckwheat once in two or three years, while the Ohio soil had produced yearly, for many years, 50 to 80 bushels Indian corn per acre, without manure. The only difference seemed to be in the fineness of the particles. Mechanical analyses, or the separation of the soil into portions of different degrees of fineness, first by sieves, then by washing, has been suggested as a means of measuring the relative fertility of soils, and in connection with chemical analysis has given some excellent results.

A finely pulverized soil worked to the depth of several feet will supply the plants with a greater quantity of water, and the plant-food contained in it, during hot and dry weather, than a shallow and less pulverized one. Water rises in capillary tubes, and the finer the tubes, the higher it will rise. Of all the constituent parts of a fertile soil, *humus*, or vegetable mold, attracts and holds the most water, and is the slowest to give it up except to the plant. It also attracts and retains valuable gases, its own decomposition affords carbonic acid, water and ammonia, besides increasing friability, permeability, and that openness and crumbly character possessed by all rich and good soils. Its increase in the soil is therefore often a matter of the highest moment. One of the properties of every fertile soil is that of arresting the most valuable kinds of plant-food in their passage through it. The humus has this property, assisted by the clay and mineral substances. Humus, like charcoal, which it resembles, is a powerful disinfectant or consumer of decayed substances, hence is useful in absorbing the valuable products of decomposition in a soil. As the passage of water through a soil is productive of no harm, while that which runs from the surface bears away much that is valuable, soils should be drained either by nature or by art. Nature often drains her soils too well—often not enough.

A soil may contain all the ingredients necessary for fertility, be sufficiently moist, and still not be fertile unless air have free access. Much of the vast amount of water transmitted through the plants, is obtained first by the soil from the air. The more open and finely worked the soil is, the more susceptible will it be to the free passage of air into and through it. Such is the soil—a synonym of filth, yet it is the most efficient purifier of unclean things. It furnishes from its never-failing storehouse the materials which, transformed, fill our granaries, load our orchards, refresh and rejoice the heart of man.

On motion of Mr. Carpenter, the thanks of the Association were tendered to Mr. Weld, for his interesting and instructive lecture, and a copy was requested for the use of the Association.

On motion of Mr. Carpenter, it was resolved, that an exhibition of strawberries, cut roses and Fuchsias, be held in the month of June, and that the committee on Horticulture submit a schedule of premiums.

Adjourned. JOHN W. CHAMBERS, *Secretary.*

April 4, 1865.

Mr. Benjamin C. Townsend, president, in the chair.

Mr. Wm. S. Carpenter called the attention to the fine specimens of Catawba grapes from the preserving house of Prof. B. M. Nyce, of Cleveland, Ohio, which were examined by the members.

Mr. James Hogg did not think that the grapes retained the rich aromatic flavor of the fruit in its proper season.

Mr. R. G. Pardee.—The specimens of grapes are in a fine state of preservation; the bloom on them looks as fresh as when first gathered. I think the method of Prof. Nyce is worthy of all praise. It is a step in the right direction; the subject is one of immense importance to fruit growers, as well as the lovers of fine fruit, and had engaged the minds of scientific men.

Prof. Tillman gave an interesting summary of the causes of decay of fruit.

The chairman then introduced to the audience Dr. Isaac M. Ward, of New Jersey, who chose for his theme

THE CULTURE OF THE PEAR.

In this series of lectures of the Horticultural branch of the American Institute, there has been assigned to your speaker the pleasing though novel duty of inviting this audience to a walk through the pear orchard. Accepting the invitation it would be natural for him to ask you whether you love the country and find delight in rural scenes. Regarding your presence here this evening as an answer in the affirmative, he will cherish the hope you will be interested in the thoughts presented for your consideration, and the scenes surveyed by the mind's eye, as we walk through the orchard, though no romance or poetry be woven in the landscape; and that this may constitute a pleasing interlude in this series of lectures.

Nature would make all men happy if they would appreciate her gifts. Rightly to do this you need not worship, only love and revere her; and confess her power over your hearts. Nature's bounties are not confined to the fruits of the earth, they are found as profusely scattered in the garniture with which she has beautified its surface; garniture that is necessary for the production of its fruits, while at the same time charged with provision for the sentiments of the soul, and in which the powers of the imagination may find scope for exercise till our better natures are purified for Heaven.

Before we go into the orchard it will be well for your speaker to tell you, as your guide, you will no sooner have entered within its portals, than you may discern the temple where the presiding deity is wont to receive the offerings of her votaries. That the goddess Pomona is so jealous of her honor that she accepts only the offerings of the heart, and the true worshiper is wont to propitiate her favor, by recognizing her right to adoration in all her works.

The tree that is destined to be majestic in form, and venerable in years, she may show you, just starting on its career of development. The tiny bud that her well instructed house-maid has caused to be inserted in a wild and barbarous stock, that is destined to change its uncouth and thorny structure into a symmetrical and graceful form; and the fruit that is to be borne upon its boughs from the acrid and puckery, into the aromatic and melting pear, you may see of stalwart form, though of but one summer's growth. Stop, and praise her work! Anon you may see its fellow, though yet in its youth having attained to the stature and form of adolescence, that has already gladdened hearts by its manly bearing. Give it your earnest commendation! While to the venerable form that for years has been yielding its golden harvests, you will do well in heart felt respect if not in very deed, to uncover your head as you walk beneath its branches. In the variety of forms which she imposes on these developing structures, there will be presented to the eye the most uncouth and the most graceful. Here the perfect pyramid, and there the most amorphous form, will proclaim her ability to please by variety; and hence on the one hand you will be delighted with the most symmetrical while strangely contrasting on the other, with the most refractory. If beauty is to be found, as is claimed by the landscape, gardener, in the surface of the earth as well as in foliage and verdure, in hills and valleys and in streams of water, much more is it found in the gentle curve with which nature marks the outline of those trees that first are to delight the eye with the profusion of snow like bloom, and then both the eye and the palate with their golden harvests.

Artists and men of taste have long acknowledged the curved line, as the line of beauty, and in the pear more especially, of all fruit bearing trees will you confess nature has exerted herself to beautify the orchard. Could I transport you to-night to familiar grounds, not where the gentle swells and undulations rise and melt away into one another, almost insensibly disappearing, views so captivating to the lover of nature; but to an orchard where your eyes could take in at a glance the outline of the scene, with a stretch of majestic evergreens in the background, enchanting by their strange contrast; while constituting a defense against the rude vernal blasts on its northern and western border; you would acknowledge in the structure of the trees of the orchard as well as in the evergreen picket line of defence, the power of the beautiful over your hearts. So wonderfully diversified are nature's beauties, that we know not where most to admire, nor how enough to praise. At a distant view it is the whole, with its pleasingly contrasted yet beautiful outline. On a nearer approach it is the leaves with which they are clothed, so strangely diversified in form and color, with every shade from the shining richness of the tropical plant to the clearer softness of the cherry and apple; and the bud in its variation of size and form; and the bark of the trunk and branches, in their changes of color and habit.

The dignity of a science is claimed for horticulture. If rightly so, there must be modes of action in accordance with established principles, to lead the engineer to certain attainments, though varying somewhat as circumstances of soil, climate and location may indicate. These principles upon which all successful operations in the orchard depend, are often obscured by the undue prominence given to a favorite mode of cultivation; a mode which under given circumstances will secure success, unless other necessary conditions are entirely ignored, if not actually condemned with the view of exalting unduly his own favorite method. With one it is special manuring; with another thorough pulverization of the soil; with a third under draining, and with another irrigation or the use of liquid manure; and the exaltation of some one condition as essential to success often embarrasses the engineer, or as an "ignis fatuus," leads him from the pathway of intelligent scientific culture. The recognition of established principles as truly exalts horticulture to the rank of a science as any other department of study. Has the infinite architect whose plans we are but working out, made every particle of matter, nay the very earth itself obedient to law; has he made the sun in the heavens and all the luminaries that revolve around it the subject of law; must even those genial rays, which alone have power to quicken dormant life, and every particle of light which often traveling its hundred millions of miles to give to every leaflet and every blade of grass its beautiful green of varying shade, move in their appointed way in obedience to law; must every drop of water that falls from the clouds, even the dew drop reflecting the beauties of the rainbow, all be creatures of law, and He not give us laws when we seek to work as nature's handmaid? It cannot be. Verily the principles upon which all these operations in the garden and orchard are conducted have laws as fixed and immutable as any other science. Nay there is not a leaf, not a flower, not the unseemly root itself, but is formed as the action of light in obedience to law, decomposing a given quantity of carbonic acid, for the production of a given quantity of gum which is to enter into its structure.

Accept these principles and the culturist can adopt his operations to the varying conditions of temperature and the hydrometric changes of the atmosphere found in our extended country, and to the quality and depth of the soil, recognizing depth as the most essential in the thin soil of the Atlantic slope; while in the virgin soil of the west, especially upon the river bottoms it will be a superfluous task.

CHARACTER OF THE SOIL.

Let us examine ts conditions with special reference to the pear If the land be of a tenacious, cloggy, or peaty nature; indeed in all land of whatever character, if inclined to be wet in winter, a thorough system of under draining must be adopted to bring it into a condition to ensure successful culture. The finer varieties will not exhibit their characteristic excellences under any other conditions: hence we may regard this as an indispensable preparative. The explanation of this necessity is found in the fact that the requisite degree of warmth in the under-lying subsoil cannot be attained without the system of drainage. The preparation of the ground for the development of the characteristic excellences of such varieties as the Buerre Diel, Glout Morceau and Buerre d'Anjou, will secure a vigorous growth of healthy, stalwart trees, and a corresponding fineness of fruit, gained under no other circumstances. The intelligent orchardist finds the rationale of this in the removal of the stagnant water about the rootlets of the tree, that wars with its growth, sadly marring its development, and often proving fatal to the tree itself. If you can find a gravelly, or even a sandy loam, with an underlying shaly sub-stratum, you have one of the best physically constituted soils nature can give for fruit culture, for it secures the requisite dryness without the expense of under-draining, its depth being increased by the sub-soil and trench plow.

To these two indispensable conditions, depth and dryness, a ld those of mellowness and richness, which can often be obtained by the character and quantity of the manure. We would make it deep, for the extension of the roots; rich, that the tree may have food enough; mellow that it may readily find and appropriate the food within its reach, and dry to prevent injury from stagnant water, as well as to guard against disaster from the frosts of winter. Very few soils are to be found in our country, more especially on the Atlantic slope, that will not be benefited by rich manuring. and I have yet to learn that its most liberal use will injure the pear tree if the climate be favorable to its growth. Unlike man it never gormandizes, but like the grazing herd it feeds upon the rich pastures, and appropriates them simply for the supply of its wants. The latter when it has done this lies down and chews its cud; the former having attained more speedily its requisite development, enters upon its fruit bearing state. The vigor which has characterized its career of development, and now proclaims its condition of perfect health, will most abundantly reward the possessor with even its first fruits, beautiful and luscious, years before the neglected one has entered upon its work. And, moreover, there are conditions that often obtain, some the result of the operation of laws that are altogether unknown to us, others that spring from climatic influences, constituting a class of causes altogether beyond our control, crossing the pathway even of the most intelligent orchardist, deranging the beautiful harmonies of nature. Trees with a vigor of constitution from being well cared for will resist these untoward influences, while the half fed, sickly and enfeebled young tree, as well as the decrepid old, will fall a prey to the diseases dependent upon such conditions.

And again the sterile soil is not only unfavorable to the culture of the pear in the diminution of the quantity of the crop, equally marked is its influence upon the quality, giving us decided deterioration in its character. Indeed, were we permitted to ascribe to any one cause the wonderful changes wrought in the character of our fruits, particularly of the pear and peach with us, in contrast with the pear of the Romans, and the peach of the Persians, we should be inclined to name that of cultivation. The florist doubles the size of the flower, heightens its color, and in some instances makes the single one double, by cultivation. Why may not we as justly ascribe to this cause the radical change wrought in the fruit bearing plant, almost insensibly effected, generation after generation, until the forced change has become constitutional habit. The writers of the earliest Roman period have not failed to describe to us the pear as it then was. Virgil and Cato were both pear growers, and as the Romans were well acquainted with the art of grafting, probably exchanged grafts of their new varieties, as we do now-a-days. According to their own account their pears were scarcely to be tolerated without cooking. Pliny we know highly commended certain varieties, particularly lauding the Costumine for its good qualities. He may possibly have over estimated it, as we are apt to do new varieties in our day. We know he commended the Falernian for its juices having nothing better to say of it, just as we do the Vicar of Winkfield, when we say it is admirable for cooking. In learning their opinions of the pear from their writings, I have been struck with one custom which we have copied; they called their pears after their own names. Instance the Tiberian after the Emperor Tiberius, as we have named the Hovey, the Cushing, the Dix, the Dearborn, the Bloodgood and even the Bartlett. The fact, however, cannot be disputed, account for it as we may, that the pear of their day was not fit in our judgment to be eaten, while our most delicious pears are prized too highly to be eaten by the common people. So the peach of ancient Persia we are told was originally a poisonous almond; its flesh used to poison arrows, and therefore introduced into that country, while the peach of our day is so universally appreciated that we wonder at the man whose gustatory sense (if he ever had any) is so perverted as not to know this the most delicious of fruits. To what else than to cultivation do we owe this transformation? But to close our remarks on this part of our subject, and by way too of recapitulation, we would say, if there be any one of the conditions requisite for successful cultivation of the pear, and which we should be inclined to lay more stress upon than any other, it would be depth of soil for the production of the finest varieties, whatever may be the nature of the soil or the quantity or quality of manure. In our varying climate of burning sun, and cloudless sky, and long continued drouth, especially with the extreme drouth suddenly broken, and the orchard deluged with water, and the air for succeeding weeks surcharged with moisture, you cannot secure the requisite conditions without it. During the prevalence of the drouth the required moisture cannot be supplied, unless your deepened soil constitutes an immense reservoir inexhaustible; or on the other hand when that drouth is suddenly succeeded by drenching rains it will be an outlet for the too abundant supply. If on the one hand the moisture be wanting, vegetation will be arrested and development cease; if on the other hand it be too abundant, and if especially that excess be in contrast with a previous deficiency, the sap vessels concerned in the formation and development of the fruit cannot dispose of that excess, the fruit cracks or is deteriorated in flavor. From this cause, under just these climatic and hydrometric changes in the atmosphere are we to find a solution of the question, why so many pears of great excellence of foreign origin have disappointed the expectation of American horticulturists; so that few of them under the trials made, are pronounced "first class;" why so few that begin to compare with our own. What becomes of the great number of French and Belgian pears proclaimed delicious in their native soil, unless deterioration results from climatic influences.

KIND TO PLANT, NUMBER, ETC.

The question as to the character of the soil, the preparation of it for the tree, having been considered, you are ready to ask, how many and what varieties shall we plant. If the embarassment in the selection of a dozen varieties of pears, is at all proportioned to the magnitude of the numbers from which that selection is to be made, it would be regarded by the uninitiated as truly herculean. Pliny in one of his letters says, "the varieties are exceedingly numerous." In modern times Van Mons, added to those previously known over one hundred and fifty, since which time there have been received from Belgium and France more than three hundred. England has also contributed to swell the number, and our own country has brought her quota of not less than two hundred, so that it is not improbable that there are at the present time over a thousand varieties known to horticulturists. Years since the numbers found in some private collections in our country exceeded five hundred, and about the same time seven hundred was catalogued by the London Horticultural society. From these facts it may be assumed that my estimate of a thousand varieties is not far from being correct. And for each of this thousand, some character is claimed, and unquestionably, more of reputation for a good character than justly belongs to it. The question is a pertinent one if not embarrassing, how many and which are deserving of so much regard as to be worthily entitled to a place in the selection of twenty or thirty of the best varieties.

Mr. Downing in his excellent work on fruit, unquestionably one of the best, and entitled to the confidence of horticulturists, undertook the task and arranged his best pears, in what he termed his first class. In the execution of this he subjected himself and his book to severe criticism, and called forth a greater number of dissenting opinions than any other subject treated in his entire volume. Indeed we may venture the remark, no one has been found to subscribe to that grouping, without making some exception or mental reservation. If this is so, it would assuredly not be becoming in me to attempt such a task with the expectation of giving any better satisfaction than my superior has done. If I should venture the remark that double that number of good pears cannot be named that are worth growing, I am well aware some jealous cultivator will think me unnecessarily severe. If I qualify the remark by adding that, though many not included in that list might be pronounced good pears, and in the absence of better would be worthy a place in such a list, but that being so much inferior to others that ripen at the same time and possess all the characteristic excellencies, with others added, that these do not, that I would not grow them, I take the edge off the insult to the feelings, but still give offence. Some culturists have reduced the number of good pears to a dozen, and said these were sufficient for any collection for profit or family use. Here we are met with the remark, if the number of good pears is after all so small, what becomes of the great number of good varieties commended to us by veteran collectors from abroad, more especially of that host of new pears from Belgium and France, that on their introduction attract and captivate tho American culturist? The answer to this we have already attempted to give by showing deterioration the result of climatic influences peculiar to our country, as well as in that other recognized fact, that should be universally accepted, that most fruits flourish best in the climate and locality in which they originate, not even excepting the pear. This is alike true of the apple, the pear, the plum, the strawberry and others we could name. Who does not know that though the Newtown Pippin is a Pippin away from its native place, it is there the best. Though the Baldwin is good in New Jersey and Pennsylvania, it is best in Massachusetts. The Spitzenberg is known away from New York; it is the Spitzenberg par excellence only when found in sight of the Hudson. The Hovey strawberry is thought as little of in Cincinnati, as Hovey himself thinks of the Wilson's Albany. Some of us too are learning at our cost what others will be taught one of these days, that the Triomphe de Gand, in the hands of the prince of strawberry growers will not be a princely strawberry at all on the Atlantic slope. So too with our favorite pear the White Doyenne; it has its climatic range, out of it, it falls a prey to its enemies and becomes the subject of disease to such an extent as to be a discarded variety. The

Glout Morceau is equally capricious, and while the Vicar of Winkfield is fair in the vicinity of Boston, it is not a vicar at all in the neighborhood of New York.

To return to the selection of the best. Since it is expected we would advise those about entering upon this branch of horticulture in the selection of their varieties, and are yet reluctant to assume the responsibility, so embarrassing is the task, I propose to compromise the matter, if compromise it can be called, by telling what with my experience and observation in the orchard over the twenty years past, I would plant were I about entering anew upon the work. And first, as to our summer varieties. We have here the Dearborn Seedling and Andrews of Massachusetts; the Bloodgood, Osband's Summer, and Beurre Gifford, of New York; the Tyson, Brandywine and Moyamensing, of Pennsylvania, with the Madeline, Doyenne d'Ete, Manning's Elizabeth and Rostiezer of foreign origin, each of which has had its turn of being lauded as the best. To name them in the order of ripening, you have the Madeline, Doyenne d'Ete, Beurre Gifford, Bloodgood, Manning's Elizabeth, Osband's Summer, Dearborn Seedling, Rostiezer, and Moyamensing.

In the Massachusetts Horticultural society's report of 1854, we find the following: "The Rostiezer, Tyson and Brandywine always good. Until we can get as good summer pears as these, no others should be recommended for general cultivation." And yet in New York and Pennsylvania in the opinion of the best growers the Beurre Gifford is superior. Barry says, if confined to one early pear, it would be the Beurre Gifford. It has been tested extensively in Massachusetts and in the Middle States, and wherever tried, has been regarded as a fruit of great promise, and in Pennsylvania as the very best summer pear. The Doyenne d'Ete also has many points of excellence to commend it to the orchardist, for instance, its great earliness, ripening with the Madeline, its attractive appearance, exhibiting a blush on its sunny side and the enormous crop it uniformly bears, that I should not feel willing to do without it. My selection of summer pears would then be the Doyenne d'Ete, Bloodgood, Beurre Gifford and Manning's Elizabeth. The Rostiezer is too fine a pear to be omitted in any collection, though confined as it ever will be to the grounds of the amateur, as will be also the Tyson and Brandywine. For their period of ripening being delayed till the Bartlett makes its appearance, with which no pear now known will compete, in view of the demand for it as an orchard fruit, detracts immensely from their commercial value. Both the Tyson and the Brandywine may be regarded by the amateur as richer, more sugary and melting, while equally aromatic with the Bartlett. The beautiful, deep yellow color contrasting with the fine crimson cheek makes the Tyson a most inviting fruit.

We are inclined to head the list of autumn pears with the one first ripening, viz: the Bartlett; too well known and universally appreciated for its size, beauty and excellence, to need any commendation. We probably assume nothing in saying the Seckel is the richest and most exquisitely flavored pear grown, and being an American seems to be at home in every part of our country, in the hedge where it originated as well as in the garden, and like the emblem of our nationality wherever known, is known but to be respected. Rivers accepts it as in full return for the Bartlett, and well may he, for in the Seckel, small as it is we have concentrated all the spiciness and honied sweetness contained in any pear, though quadruple it in size. Indeed it is not surpassed probably not equaled, and the form, habit, thrift and hardiness of the tree commend it to the American orchardist. Cultivation has been doing much for the size of the Seckel within a few years. Now when well grown it is so highly appreciated as to command quite as high a price in our markets as any other pear.

The Sterling, a pear decidedly inferior in richness of character, ripening with the early Bartlett, I esteem very highly. It grows on a beautiful upright tree, is itself so delicate looking, having a beautiful yellowish white sk.n, and a tinge of red coloring its cheek, with here and there one with a crimson blush all over its face, as we say of the maiden, coloring to the very eye lids. Ripened in the house it is one of the most attractive pears in appearance, and though not of very fine flesh it is still juicy enough and melting enough, with a sugary, brisk flavor to make it the most inviting pear of its season, though ripening later it would lose caste by the side of the Beurre Diel, Beurre d'Anjou, and other late autumn varieties.

Next comes the Belle Lucrative or Fondante d'Automne, Flemish Beauty and Onondaga. The Belle Lucrative, of Flemish origin, is undoubtedly one of the highest flavored pears. This and the Flemish Beauty are among the few that are probably as good with us as in their native locality. The period is short in which both these pears may be said to be in good eating condition, very quickly commencing to decay, the Flemish Beauty at its core, so that while they are pears of high excellence they will never be very desirable for family or commercial use, though both when well grown will ever be highly regarded by the amateur of cultivated taste. The Onondaga, of American origin and American all over, of good size, good looking and of good quality, following closely the Bartlett in its period of ripening, fills a gap that would otherwise be left till the Duchess d'Angouleme, Beurre Diel, and Beurre d'Anjou make their appearance. After ten years more observation I feel like repeating with a strong commendation, what I said of the Onondaga in 1856. Its fair size, smooth skin, of pale yellow, and when fully ripe, rich golden color, make befitting the expression, magnificent in color as well as size; of rich, juicy and aromatic flavor, flesh moderately fine grained. It is a most vigorous grower on its own stock, and uniformly an abundant bearer, but not at all adapted to the quince; in this respect resembling other American varieties. Maturing between the Bartlett and Beurre Diel, at a time when nothing is comparable to it in size, it commends itself particularly for its commercial value.

The Sheldon, an American variety, though recently introduced has already established a character for excellence that commends it at least to the amateur. It is uniformly melting, juicy, with a brisk, vinous, and highly perfumed flavor, and when well grown above medium size. If it proves as good on a more extended acquaintance, and as well adapted to other localities as the one in which it originated, we shall regard it as a great acquisition.

The Doyenne Boussock of large size, comparing favorably in this respect with the Onondaga, a pear of excellent quality, though by no means of the highest flavor, has a similar mission with the Onondaga; but like the Belle

Lucrative and Flemish Beauty, is in an eating condition but a short period, rapidly passing to decay, very often before it seems to have reached its ripened state.

The Duchess d'Angouleme, Beurre Diel and Beurre d'Anjou constitute our best late autumn pears. The Duchess is too well known to require anything more of commendation than to say, this most magnificent pear, when well cultivated will give entire satisfaction as to the size and character of the fruit, as well as proye a most abundant bearer. My trees commenced to bear some twelve or fifteen years ago, and have never failed with each returning year to give me a good crop. The Duchess is the only one of all the pears thus far named I would recommend dwarfed on the quince, though the others associated with it, the Beurre Deil and Beurre d'Anjou, seem well adapted to dwarfing; but that they will be better than on their own stock, our experiments, under the mania for dwarfs, have not been sufficiently multiplied to satisfy me. The Beurre d'Anjou on the pear stock is a thrifty and hardy variety.

Equally well proved has been that oldest and longest cultivated of the foreign pears, the Beurre Deil, so rich, so sugary, so melting in character that I do not ever remember to have heard a word spoken against it; certainly in this respect a living example for fruit growers to imitate. The Beurre d'Anjou later introduced, I think by Mr. Wilder, is one of the few that has improved upon acquaintance, so that it may truthfully be said, we think more of it now than ever. It has uniformly proved most excellent, not only equaling but exceeding our most sanguine expectations; we want nothing better as a dessert pear. It hangs well on the tree, quite as well as the Lawrence, and ripens later, after the Duchess and Beurre Clairgeau.

The Beurre Clairgeau, a splendid pear of large size and beautiful appearance, has been improving upon acquaintance, and during the past season has been quite favorably introduced to city consumers; it has been well spoken of and often enquired after. I give it a large place in my orchard.

The Columbian Virgalieu brings up the rear of the autumn pears, and is quite fond of being on hand at the holidays; and, with its clear smooth skin of lemon yellow, makes a good display and is consequently sought after when its better neighbors have had their day and been forgotten. By some it has been thought coquetish, but I think without reason. Its clear skin covering, melting flesh, not wanting in richness, and of delicious flavor, should exculpate it from such imputations.

Of the winter pears, the Lawrence, Beurre Nouveau, and the Glout Morceau, must have a place in every collection. The Lawrence, if not already, is destined to be the most popular of winter pears, as well as the most remunerating to the orchardist. The Glout Moreceau has sadly disappointed the majority of fruit growers, on account of the great proportion of knotty and deformed fruit in every crop, exciting our disgust when the fruit is gathered, but at its ripening the few specimens that are fair and well grown seem to atone for the defects of the mass, so that I am too well pleased with it to drop it from the collection. Loving a good pear as I do, I should be pained to lose that one which I have regarded the most luscious, most delicious of all.

I have said nothing of the Winter Nelis, the Easter Beurre, or the Vicar of Winkfield. As I have nothing to say in favor of the two former it is best to say nothing. The Vicar of Winkfield is a good cooking pear.

LARGE PEARS—HOW TO GROW THEM.

In *Hovey's Horticultural Review*, vol. 25, page 171, he says: The proprietor of the Pomological Gardens in Sacramento, California, exhibited at one of the meetings of the society in 1858, a Bartlett pear which measured 17 inches in the largest circumference, and 13 inches in its lateral, and weighed 27 ounces avoirdupois. Also, from that paradise of fruits a Swans Orange was exhibited that weighed 20 ounces avoirdupois. Mr. Hovey says the largest pear he ever saw of this variety raised in Boston, weighed 13 ounces, and the largest Bartlett 11 ounces. The model of a Duchess d'Angouleme described by J. J. Smith, then editor of the *Horticulturist* was represented by him as weighing $35\frac{1}{2}$ ounces avoirdupois, and measuring $17\frac{3}{4}$ inches in its longitudinal and $15\frac{1}{4}$ inches in its cylindrical diameter; said to have been grown by a New Jersey orchardist, and is believed to have been the largest pear grown of any of the good varieties, at any rate, the largest on record. Without describing the process by which the specimen before us was developed into its mammoth proportions, we would say the French cultivators who have long excelled in this department of pomology have detailed with such minuteness the process by which such results have been obtained, that we may now regard the development of large specimens of fruit, not as freaks of nature, but the result of the observation of the laws touching the vegetable, as fixed and invariable as any that obtain in the animal economy. These processes are such as training, pruning, pinching, thinning and watering, or as a substitute for it, mulching. An increase in the size of the fruit has so commonly been observed to follow the judicious pruning of an orchard, that if you would have good fruit you must prune for it, is as accepted a fact as is the declaration of our Saviour that the branch that beareth fruit if purged (or pruned) will bring forth more fruit. We need scarcely stop to say that the sap that would have gone to the support of the lopped off branches, now contributes to the increase of the developing crop of fruit. Akin to this in its effect upon the fruit, is the pinching of the shoot while it is yet tender, arresting the flow of sap that is destined to extend the shoot by the formation of wood and bud and leaf, which now by its sudden arrest is converted into fruit. By no mysterious operation then will a judicious removal of a part of the shoots of a previous year's growth be followed by an increase in the size of the fruit. It has been often observed that the largest fruit would be found upon a spar from the trunk of one of the principal branches, possibly from the trunk itself. And no marvel, for such position is in proximity to the greatest and most abundant flow of sap, and the demands of the evolving fruit is most easily met. The ox thrives most nearest the master's crib. The vegetable physiologist accepts the fact of the influence that lines and angles have upon the circulation of the fluid through the vessels, facilitating or retarding its flow, and hence prunes so as to secure the free and uninterrupted flow of the sap to the fruit distributed along the branches, freely lopping off those that start out directly and at right angles from the trunk of the tree. The overloading of the branches with fruit tends to dwarf the size, not simply by dividing the pabulum the tree can supply among too many, but by bending the branches with their weight, thus retarding the flow of sap by compression of the vessels through which it circulates. The shortening of bearing shoots, as well as removal of superfluous ones, exerts a well marked influence on the growth of the fruit. Thinning out the fruit is of no less importance in the production of fine fruit, than the skillful and intelligent use of the knife, for when a part of the crop is removed, the energies of the tree, that would have been expended in maturing the entire crop with which the tree started in the process of development are given to a reduced amount, that amount is developed into better proportions and as much better in quality as in size.

ADJUSTMENT IN THE ORCHARD, PLANTING, ETC.

Having selected your varieties, some acquaintance with the characteristic forms of trees will be required so to adjust them in the orchard in their relation to each other, to produce the most pleasing and artistic effect as well as to facilitate your operations in the culture they demand, and in the gathering of the fruit. The knowledge of the habits of the tree will enable the pruner so to guide his hand as most readily to secure the natural and characteristic form much earlier than he can otherwise do. For not only will the pruner's time be lost, when his efforts are misdirected, he too thus opposes and thwarts nature; she resists and struggles against these efforts and her energies will be concentrated to reproduce what he has ruthlessly destroyed; and thus the period of perfect development is postponed, a point that in the wood process must be reached in the great majority of trees, before we see the beginning of the fruit process. So tenacious will some varieties be of their characteristic form, that successive efforts to change that form will be followed by successive efforts in the reproduction of wood to recover what has been lost. And these efforts will only come, when as the wild colt broken in spirit meekly submits to bit and bridle, so this refractory nature is controlled, by the long continued labor of the orchardist; and thus it is that the tree that was destined to become a giant, remains a pigmy. But the process is laborious as the system is unnatural.

The Beech, the Chestnut, the Maple, the Basswood, have each their appropriate forms. You know them whenever the eye can measure their distinctive outlines. This is equally true of some, indeed of many of our fruit trees, but the pear assumes almost every variety of form. Nature gives us in the Columbia a pyramid; in the Seckel and Urbaniste a conal; in the Bloodgood and Dearborn seedling a round head; in the Doyenne d'Ete an upright, towering form, and in the Rostiezer a straggling nondescript. Others are so refractory as appropriately to be classed with neither, though under the judicious and continuous use of the knife may readily be brought to assume some resemblance to one of these forms. In this sportive habit of the pear the man of taste finds scope for the exercise of his most disciplined faculties. The orchard, under his skillful manipulation securing a symmetrical arrangement, may be made in appearance a very Eden.

Oftentimes in the season of bloom will the attention of the beholder be riveted till he is forced to exclaim, and with necessary admiration every time he beholds it, how beautiful! how beautiful! surpassing grand! exceeding all description language can portray. A sight that ravishes the senses, till overwhelmed with the vision, one is lost in the loveliness of the scene. Never do I enter the orchard at such a time, but the desire, too strong to be concealed, finds utterance in the expression, O that every one could feast on these ravishing views! These orchard views, at such a time, most truly elevate the soul and give it sublime repose. Here it is the heart, burdened with care and wearied with labor, finds rest. Here the serenity of nature in its highest types breathes upon the soul a silence, hushing all its turmoils, till peace and contentment reign supreme. It is not the grandeur of the forest that subdues into tenderness, it is not the majesty of the cataract that awes into silence, it is the sweet melting of the heart with nature's loveliest scenes, that seem too pure for earth, prefiguring the paradise above, that fills the soul with benevolence and love. It must have been in reference to this department of terraculture that the remark was made, "Agriculture is the most beneficent of all pursuits of man." In every age of the world it has been the greatest civilizer; the evidence of which is found in the fact, that whenever a tribe or nation has devoted itself to agriculture in obedience to the rules of husbandry, though in its simplest and rudest forms, it has become great and powerful, while the nation following the hunt or chase have become enfeebled and finally extinct. The nation or people alone, who have been long civilized by agriculture as a refining process, have passed on to a higher level through which they have been disciplined to appreciate the pleasures of orchard life, a type at least of the Eden Adam occupied before sin entered.

ARRANGEMENT OF TREES IN THE ORCHARD.

The pleasures of the orchard are enhanced by the artistic effect that is produced by a proper adjustment of the trees in the orchard. It has been remarked that in floriculture, more than half the art consists in bringing out and setting forth the distinctive merits of the plants, and so arranging them as to their position in the plat, relatively to other plants of the same or other variety, as to exhibit to the spectator their distinctive marks, if he would develop some new beauty hitherto unperceived, or just now for the first time devoloped under his fostering hand. Thus it is said the florist becomes an artist and an inventor. This is also true of the orchardist. Here in this department of horticulture will the mind most fertile in experiments become the most successful in expedients, in which no small share of the beauty and delight, as well as profit of the orchard consist. If nature has given to the pursuer even a spark of the love of the beautiful, it will be developed oftentimes in the orchard and garden into the strength of a passion, that he will find as a presiding genius inspiring him at every step, in his work teaching him to do this or that for its artistic impression. And so from day to day the pleasures he experiences in his work under such developed taste, most abundantly rewards him for his toil. In his efforts to produce choice fruits, he accepts the fact, that his success will depend not only on good management, nor simply on the enriching and cultivation of the soil, but also on the judicious training of the body and branches of the tree to obedience to artistic laws. And obedience to this law oftentimes seems to him to be so in harmony with those which regulate the flow of the sap, the development, formation and ripening of the fruit itself, that he is led to regard them as synchronous in their action. The artistic law forbids superfluous growth; superfluous growth sadly wars with the fruiting process. An excess in the quantity of the crop borne by its enormous weight, disturbs the harmony of relation of limb to limb, and limb to trunk; they become too pendulous and often break under their burden, thus sadly marring the beautiful structure which he has carefully reared. The excess of crop forbids growth, dwarfs the fruit, detracts from its wonted flavor, offends the eye and damages the purse. Thus he is most impressively taught to recognize the artistic and the useful as companions, if not as twin sisters. And he growingly loves the beautiful for he recognizes it in the order of the useful.

And now, as our walk in the orchard is about ended, and our talk is drawing to a close, we may, though seemingly a teacher, be pardoned for saying, that on the subject that has engrossed our thoughts, we can scarcely be said to have acquired a rudimentary knowledge. The science of horticulture is still in its infancy, while that of pear culture is yet far from being developed into even the form of a science. Though pear culture dates back to the earliest days of Rome, the pear of the earlier centuries is not adapted to the palate of the present day. Indeed, not until within the last seventy or eighty years has cultivation developed the delicious qualities which we now recognize as belonging to this most attractive fruit; and so little are these qualities known, even in our day to the great mass of the people, that the multitudes may be said to be still unacquainted with the pear. And not until the laws that govern its growth are better known by those who may be regarded as the leaders in this branch of horticulture, and that knowledge so universally diffused that the culture of the pear may be generally understood by terraculturists, will the millions know anything of the deliciousness of this fruit. Neither can they know it until its cultivation shall become so general that it is brought within their reach.

Choice pears commanded in this city from twelve to fifteen dollars per bushel for a period of at least two months last season, and this price was readily obtained for them in Washington market. If well grown from seventy-five to one hundred pears would constitute the number, all told, making the bushel. At such a price choice pears are beyond the reach of the multitude, neither will they know, and not knowing cannot appreciate the excellencies of this fruit. The Bartlett most unfortunately for the advancement of science, and most fortunately too, for pear culture, regarding it as a John the Baptist, a forerunner in the work; has such a combination of characteristic excellencies, that it produces good fruit anywhere, and everywhere in our country ; in all climates and in all soils, with all kinds of culture and with no culture at all, provided the tree be only stuck in the ground, and it does this too almost as this work is done ; as though Providence designed it to be a pioneer, stimulating and leading on or inviting to diligence, in extending our energies in this direction in horticulture.

The millions may now be said to know the Bartlett, on account of these very qualities, and it is about the only pear they do know, though a few have tasted the Seckel and have endorsed it too, because being an American, though half grown from neglected culture, it is an American still, good and trustworthy to its very core.

Were we addressing amateurs we should make no apology for saying, those that only know the Bartlett do not know what good pears are, and to prove the truth of this remark, were it the appropriate season for testing and you were with me in the fruit room—the proof of the pudding you know is said to be in the eating, you would most readily assent to it.

And now having invited you into the orchard, courtesy demands that I extend to you all even at this time a most cordial invitation to accompany me even there, and see if the mouth is not made to water first in beholding the golden colored Glout Morceau, Beurre d'Anjou, or Beurre Gris d'Hiver Noveau, and then above all in tasting those greedy morsels.

And now lest what we have said apparently in disparagement of the Bartlett, and what we are prepared more distinctly to affirm, that it is not even one among our most delicious pears, it is still in view of the very qualities we have ascribed to it, namely, its uniform productiveness, its large size, golden color, solid flesh, and almost universally acceptable flavor, possibly the best pear grown ; and not only for the present, but destined to be the most popular pear for years to come, and therefore the one to be commended above all others for general cultivation.

This commendation of the Bartlett among pears, is akin to that of the Baldwin among apples, that for its size, its brilliant red color, with its fairness of skin, constituting it altogether a most beautiful apple, with its long keeping qualities, its freedom from injury in transportation, its excellence of flavor, firmness of flesh, quite up to the time of ripeness, and then with a moderate degree of softness, combined with great productiveness, as well as vigor of growth and symmetry of form in the tree, make it altogether a king among apples. In saying this of the Baldwin we believe that we may not be charged with saying, there are not more delicious apples. Even the Dominie, scarcely known out of its favorite locality, will readily carry off the palm, compared with it in flavor. And others there are, possibly we might name a dozen higher flavored, more delicious apples, and yet in view of all the good qualities of the Baldwin above enumerated, no one in our judgment would compare with that apple, when we talk about the best. And so too with the Black Tartarian among cherries, inferior as it is in deliciousness to the Coe's Transparent.

This is but endorsing the remark long since made by Mr. Hovey. There are certain fruits which hold their place for a great length of time, and for which it is difficult to supply a better, not that they are the very best of their class, but because all qualities considered they far outnumber all others.

We have said that pear culture was still in its infancy. Half a century ago and there were but few varieties of great excellence, indeed the Seckel stood almost alone. The awakened interest in this branch of horticulture, under the labors of Downing, Hovey, Dana and Wilder, has resulted in giving us of American origin, quite a number of surpassing excellence. Indeed, there are none to be so highly commended, to those now embarking in this branch of horticulture, as those of American origin. And it is a singular fact, that but few of these are adapted in their habits to dwarfing so as to succeed on the quince.

While much has been accomplished by the labors of these and other pear culturists, very much still remains to be done. For nearly twenty years we have been engrossed with the study while making our observations in the orchard, but are obliged to confess that we seem to ourselves to be as yet in the outer portals of the temple, and with the dim light of a taper have been groping after knowledge, using as our guide for the most part, the facts accumulated by the experience of others. But when the great principles underlying this science shall be clearly comprehended, and the laws that govern each operation shall be clearly conceived, as definite and fixed, we shall be permitted to enter the inner recesses and comprehend most perfectly, the now mysterious operations of nature under the teachings of a wiser philosophy and the perfect light of truth.

On motion of Mr. Wm. S. Carpenter, the thanks of the Association were presented to Dr. Ward for the interesting and instructive lecture, and a copy was requested for publication.

The meeting adjourned to April 18, 1865, but in consequence of the national calamity, caused by the death of President Lincoln, no meeting was held during the month.

JOHN W. CHAMBERS, *Secretary.*

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