
TRANSACTIONS
OF THE
AMERICAN

ANNUAL REPORT

OF THE

AMERICAN INSTITUTE,

OF THE

CITY OF NEW YORK,

FOR THE YEARS

1861, '62.

ALBANY:
C. VAN BENTHUYSEN, PRINTER.
1862.

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AMERICAN INSTITUTE.

Trustees and Committees.

1861.

President.—WILLIAM HALL.

Vice-Presidents.—John Gray, Dudley S. Gregory, William Hibbard.

Recording Secretary.—Henry Meigs.

Corresponding Secretary and Agent.—Thomas McElrath.

Treasurer.—Benedict Lewis, jr.

Finance Committee.—John M. Reed, Thomas M. Adriance, Wm. S. Slocum, S. R. Comstock, Peter H. Titus.

Managers of the Fair.—James C. Baldwin, Wm. H. Butler, Wm. Ebbitt, Thomas F. De Voe, John V. Brower, George Timpson, John Johnson, Thomas Williams, jr., Andrew Bridgeman, John B. Peck, Isaac M. Phyfe, T. F. Engelbrecht, Wm. S. Carpenter, George Peyton, James Knight, Cyrus Mason, Wm. Cotheal, Henry Steele, George M. Woodward, Geo. R. Jackson, John D. Jersey, Chas. Perley, Clarkson Crolius, Chas. A. Whitney.

Committee on Agriculture.—A. P. Cumings, Nicholas Wyckoff, Charles A. Stetson, Adrian Bergen, Wm. Lawton.

Committee on Commerce.—Luther B. Wyman, Rush Patterson, N. B. Mountfort, Wm. T. Pinkney, Joseph Hoxie.

Committee on Manufactures, Science and Art.—*James Renwick, John D. Ward,† D. M. Reese, W. A. Bartlett, Edward W. Serrell.

Committee on the Admission of Members.—Robert Lovett, James F. Hall, John W. Chambers, Thos. McElrath, John G. Bell.

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

Committee on the Library.—Wm. Hibbard, Edward Walker, John W. C. Leveridge, Jireh Bull, James K. Campbell.

Committee on Repository.—Martin E. Thompson, James Bogardus, Wm. Close, J. K. Fisher, T. D. Stetson.

Clerk and Librarian.—John W. Chambers.

Messenger.—Wm. Christie Miller.

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* Resigned—Wm. H. Butler elected to fill vacancy.

† Deceased—Samuel D. Tillman elected to fill vacancy.

1862.

President.—WILLIAM HALL.

Vice-Presidents.—John Gray, Dudley S. Gregory, William Hibbard.

Recording Secretary.—Thomas McElrath.

Corresponding Secretary.—James Renwick.

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Committee on the Library.—Wm. Hibbard, Edward Walker, Jireh Bull, James K. Campbell, Russell Smith.

Committee on Agriculture.—James J. Mapes, Wm. Lawton, Adrian Bergen, W. S. Carpenter, Edward Doughty.

Committee on Manufactures, Science and Art.—James Renwick, John D. Ward, S. D. Tillman, Joseph Dixon, Jas. L. Jackson.

Committee on Commerce.—Rush Patterson, Joseph Hoxie, Luther B. Wyman, E. D. Plimpton, John R. Montgomery.

Committee on the Admission of Members.—Robert Lovett, John W. Chambers, Geo. G. Taylor, Wm. A. Leffingwell, Joseph Lamb.

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

Committee on Repository.—Martin E. Thompson, James Bogardus, Wm. Close, John B. Rich, T. D. Stetson.

Clerk and Librarian.—John W. Chambers.

Messenger.—Wm. Christie Miller.

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* Resigned—J. S. Underhill elected to fill vacancy.

State of New York.

No. 251.

IN ASSEMBLY,

March 28, 1862.

TRANSACTIONS OF THE AMERICAN INSTITUTE.

AMERICAN INSTITUTE,
NEW YORK, *March 27th*, 1862.

SIR—I have the honor to transmit herewith the Annual Report of the American Institute of the city of New York, for the years 1861, '62.

I have the honor to be,
With much respect,
Your obedient servant,
JAS. RENWICK,
Corresponding Secretary Am. Inst.

To the Hon. HENRY J. RAYMOND,
Speaker of the House of Assembly of the State of New York,
Albany.

REPORT OF THE TRUSTEES,

OF THE AMERICAN INSTITUTE OF THE CITY OF NEW YORK.

To the Hon. Legislature of the State of New York:

The undersigned, Trustees of the American Institute, in conformity with law, beg leave to present their Annual Report for the years 1861–62.

Since the last Annual Report, the American Institute have met with a severe loss in the death of their venerable associate and Recording Secretary the Hon. Henry Meigs, who served the Institute with fidelity in that capacity for more than sixteen years. The various addresses, translations and reports contained in the Transactions of the Institute bear witness of his indefatigable industry and devotion to the cause of Agriculture.

The Institute also sustained a further loss in the death of Dr. D. M. Reese, late one of the Vice-Presidents, and at the time of his decease, a member of the committee on Manufactures, Science and Arts.

The active operations of the Institute during the past year have been confined principally to the Farmers' Club, to the Polytechnic Association, and to the Library.

The Farmers' Club continues to be popular, and its meetings are well attended. The subjects discussed are generally instructive, and always of a practical and useful character. This Club commends itself to the favorable notice of all real friends of Agriculture.

The Polytechnic Association continues to show improvement in its manner of discussing scientific subjects brought before it; its organization is much more complete and efficient than ever before, and it promises increased usefulness. The attendance during the year has shown an increase of members, and the discussions, although mostly of a scientific character, were exceedingly interesting.

The Institute at a meeting held on the 5th day of June last, referred to the Trustees the duty of appointing a person to report the meetings of these clubs, which resulted in arrangements being made with a skillful short hand reporter for accurate reports of the proceedings and discussions of both clubs. The manner in which the duty has been performed the Trustees believe has been satisfactory.

The Board of Managers of the Annual Fair, after mature deliberation, deemed it advisable to defer holding any general exhibition during the past year, but in order to continue the encouragement which the Institute has held out to Farmers and Mechanics for more than thirty years, the Managers offered thirty special premiums for improvements in Agriculture and the Mechanic Arts, and the subjects for which premiums were offered were referred to the Farmers' Club and Polytechnic Association, the competing articles after due examination by the respective clubs, to be reported upon to the Board of Managers.

The lease of the property of the Institute, Nos. 351 Broadway and 89½ Leonard street, expires in May next.

The premises were leased in 1859, for three years, at a rent of $11,000 per annum, but in consequence of the depressed state of the country, the full amount of this rent, will not be collected the present year.

The taxes on this property for 1861, were $1,631.46, being an excess of $290.47 over the previous year. An assessment of $500 has also been made on the property for the widening of Worth street.

The lease of the rooms now occupied by the Institute in the Cooper Union, for which an annual rent of $1,750 is paid, expires on the 1st day of May next. The Institute has a refusal for three years more at the same rent. The Trustees are of opinion that if the Institute should take a new lease it should only be done at a considerably reduced rent.

The Trusteees do not deem it necessary to more than allude to the continued usefulness and popularity of the Library. The Report of the Library Committee will exhibit its improved condition.

The Transactions of the Institute and of the New York State Agricultural Society have been received by the Institute from the Secretary of State, and have been distributed to members as called for. The Transactions of the Institute have been forwarded to the various foreign societies and kindred domestic associations with whom the Institute have arranged for mutual exchanges.

The Trustees regret that they are unable to show the same improvement in the financial affairs of the Institute which they were able to present in their last Annual Report. It will be seen by the Report of the Finance Committee that while the expenses have been materially lessened during the year, the receipts for rents have fallen off nearly or quite one half.

The present unsettled state of our country has affected the operations of this Institute as well as of kindred associations throughout our land. But it is confidently hoped that when prosperity again prevails, that the Institute will feel its genial influence and again take its position among the most energetic and enterprising of the Industrial institutions of the country. The oldest of its kind in the United States, and the one from which has sprung all the Farmers' Clubs, and most of the Mechanical associations of the country, it will still seek to maintain its pre-eminence as the pioneer in all advance movements having for their object the general improvement of the Mechanic Arts, and the Agricultural developments of the Nation.

NEW YORK, *February* 5, 1862.

WILLIAM HALL,
JOHN GRAY,
D. S. GREGORY,
WILLIAM HIBBARD,
THOMAS McELRATH,
BENEDICT LEWIS, Jr.,
Trustees.

PROCEEDINGS OF THE INSTITUTE.

ADDRESS OF THE PRESIDENT.

At the meeting of the Institute held on the 7th day of March, 1861, the President, General Wm. Hall, on taking the chair, addressed the members as follows:

The members of the American Institute have again done me the honor to elect me the President of their Institution, and when I look at all the varied interests which cluster around us, and which it seems our duty to cherish, I cannot but acknowledge some misgivings as to my ability to meet them and keep up with the onward march of this age of progress.

It is not to be supposed that the whole end and aim of the American Institute is, as many of our members seem to think, to give an Annual Fair; this was only one of the means and at our first formation the most available one of raising the dignity of American Arts, Science, Manufactures, Agriculture, and in fact every branch of industry, whether the product of the brain or the hands. Through this medium we have certainly accomplished great results. We have raised a healthful competition in all these branches, and added dignity to labor. We have done more, we have awakened throughout the length and breadth of our whole country, this same dignified competition, tending to enrich and beautify our land, and each season now finds organizations tending to the same purpose, in every State, and even in almost every county. It is true that this may detract from the novelty of our exhibition, and if our objects went no farther than the speculative interests of showmen then we might feel a jealousy, but I trust that we all take wider and more liberal views, and rejoice that we have been the parent of so many sturdy sons who are pressing forward in the same direction we have pointed out to them.

It is not for us however, to stand idle because we have accomplished one purpose of our organization. The world of science and industry is daily opening new channels, and if we would lead the van and hold out new inducements to keep all such things moving forward in the right direction, we must not take our stand point from the past while the world is rushing past us, but we must try to hold the helm of the future. I would not be understood as recommending a discontinuance of our Fairs, for I believe that under proper and judicious management much good is yet to come from them, but to require a pledge from candidates before election, not to hold them annually unless such arrangements and accommodations can be had, as would tend to the dignity and well being of our institution, and further the intention of its incorporation, is simply to make it subservient to one idea, which, however worthy in itself, is certainly a very narrow sphere for us to labor in.

The efforts of the Trustees during the past year to obtain suitable grounds or buildings for the permanent use of the Institution were not succesful; whether it is possible to obtain as many lots, or as much space as is required for holding the annual Fairs, and transacting all the incidental business of the Institute, in a convenient and desirable location with the limited means which the Institute can devote to that purpose, is at the present time somewhat doubtful. For more than thirty years the annual Fairs of the Institute have attracted to the city many thousands of strangers, and the opinion has long been entertained that the city authorities, recognising the advantages which the city has derived from the Fair, would furnish the necessary grounds on which the Institute might erect appropriate buildings. This hope is not yet abandoned, the city has it within its power, to put the Institute in possession of grounds admirably adapted to its wants, and the Institute has sufficient means to erect the building. This subject will undoubtedly receive the early and careful attention of the board.

The past year has called from us one of our most active and efficient members, our late first Vice-President, Mr. J. A. Bunting; a man beloved and respected in all his social relations, a never failing friend, and safe adviser of the American Institute, and imbued with liberal views of its mission, and purposes, and while I pay this tribute to his memory, and mourn our loss, I cannot but feel that for him it is a gain.

The Library has under the present management assumed greater importance than heretofore and consequently a more valuable feature in our Institution. At the beginning of the present year not more than two-thirds of the volumes, were entered on the catalogue. A complete catalogue is now nearly prepared, adding much to the library facilities; over five hundred volumes at the beginning of the last fiscal year were missing from the shelves with no record of their disposition, neither has any clue to them been yet discovered. A more perfect system is adopted by the present Librarian which will prevent any such loss in future.

The Farmers' Club has been in existence some eighteen years, and its beneficial results to the cause of Agriculture and every interest of the Farmer, can scarcely be estimated. It has been the means of bringing together the scientific and the practical Farmer; thereby correcting whatever errors a want of practical knowledge may have misled the Farmer in his theories, and enabling the latter to make use of and properly apply such improvement to the management of his farm as the nature of the soil demanded. A fund of useful information, the result of the experience of the largest and most successful farmers of the country is thus collected, and through the reports of the Institute, and our public journals, published to the world. A careful extract of such matters of interest as relate to the various branches of agriculture, stock raising, &c., from foreign journals or scientific works, is made, and at once presented to the club, and as the discussions are free to all who choose to take part in them, the meetings are of great and varied interest, and fraught with good results.

The Polytechnic Association is of more recent organization than the Farmers' Club, but promises no less important results. It has not only become the medium of distributing scientific information, and canvassing the rights of the theories, inventions, &c., which are presented to its attention, but it brings to notice new scientific theories, discoveries, or mechanical inventions, which by having their merits and demerits freely discussed, bring to light that which might otherwise have remained long in darkness.

Congenial minds are thus brought to act in concert, and already important results have sprung from the conversational meetings of the Polytechnic Association. It seems to me, however, that there must be a higher aim and purpose in this department of the Institute, before it can claim that position of authority which is accorded to cotemporary institutions in Europe.

If a scientific bureau composed of those most competent, and skilled in the various branches brought before the Association for their deliberations, could be formed, and a monthly or quarterly report be made and published, the value would be great, and coming with authority from the Institute would command the respect and recognition of the scientific world. There are connected with the Institute or within its reach, those whose names would guaranty a recognition of its acts in all scientific circles, and the endorsement by the Institute of their judgment, would react to mutual honor and credit.

This Scientific Bureau or Faculty of the Association might organize courses of study, and lectures at small cost, sufficient only to make them self-supporting and by awarding diplomas to be issued by the Institute to such as have attained sufficient degree of proficiency; create a taste in all these matters which would greatly benefit the community, and extend our field of influence and usefulness.

The floating debt of the Institute, in February 1860, exceeded eight thousand dollars, over four thousand of which has been paid off by the current receipts, and the balance has been paid by obtaining the amount on bond and mortgage, thus relieving us from any outstanding floating debt. (See Treasurer's report.) Upwards of one hundred members have this year been added to the Institute, and our affairs show a condition of prosperity scarcely to have been hoped for in these times of business depression.

Too great care cannot be used in the admission of members. It is on a careful examination of the character of each candidate that the future of the Institute must depend, and I recommend an increased vigilance in this important branch of our affairs.

I thank you for the many acts of kindness extended to me during my past term of office, and I trust that the same consideration and kindly judgment of my acts may continue during the one on which I have now entered.

OBITUARY.

DEATH OF THE HON. HENRY MEIGS,

RECORDING SECRETARY OF THE AMERICAN INSTITUTE.

At a stated meeting of the American Institute, held June 6, 1861. President William Hall, in the chair.

Mr. Thomas McElrath offered the following preamble and resolution, which were unanimously adopted:

Whereas since the last monthly meeting of the American Institute, one of its oldest and most active members has been taken away by the hand of death. The name of Henry Meigs has been for so many years connected with the Institute that it is difficult to think of one without the other. In view of his long services it is deemed just and proper that some suitable memorial of him should be prepared for preservation; therefore,

Resolved, That Professor James J. Mapes be requested to prepare and read at the next meeting of the Institute a paper on the life, character and services of the late Henry Meigs.

At a meeting of the Institute held on September 5, 1861, Professor Mapes read the following paper:

It becomes our painful duty to record the death of the Hon. Henry Meigs, late recording secretary of the American Institute, and secretary of the Farmers' Club. All who visit this institution will sadly miss the late secretary from his accustomed place, and feel with a keen sense of loss that his kindly glance and words of pleasant greeting can be known on earth no more; yet their sadness may be relieved by knowing that the absent one, having faithfully finished his earthly task, has started fearlessly and cheerfully on the unknown journey, with the strength of a well-spent life for his pilgrim-staff, and the star of faith to guide him onward.

It is with these mingled emotions that we contemplate the death of our friend and associate, the Hon. Henry Meigs. Tried through long years of public and private usefulness—true as a man, faultless as a gentleman, and in domestic relations judicious and tender, few men have left behind them memories more honored and beloved.

Mr. Meigs was born in New Haven in 1782, and died in May last, in the 79th year of his age. He graduated at Yale College in 1799, was educated for the bar, and practiced as a lawyer for many years. Early in his career he won the confidence of many prominent citizens, and numbered among his friends and clients John Jacob Astor, Robert Lenox, Isaac Bronson, Messrs. Prime, Parish, and Gallatin, and other wealthy men of the day Some of these gentlemen were instrumental in connecting him with the United States Bank, three-quarters of whose capital of $10,000,000 passed through his hands. During this time he had occupied several important public positions. In 1807 he was appointed one of our city magistrates, and continued in that office for several years. Though exempt from military duty he volunteered in the war of 1812, and was appointed adjutant under Col. Marinus Willett, of revolutionary fame; his regiment served for city defense during the entire war.

In 1816, when the construction of our canals was resolved upon, Mr. Meigs published, in the New York *National Advocate*, articles recommending railroads, with locomotive steam engines, as being capable of an average speed of sixteen miles an hour. The idea was ridiculed as absurd by his contemporaries, in whose wildest dreams of the possible so daring a scheme could find no place. In those days of slow coaches and post horses the great spider of enterprise had not woven the first thread of the iron net work which was to encompass the land, and on which both Mr. Meigs and his sage opposers were to be whirled along at the rate of forty miles an hour.

Mr. Meigs was characterized throughout his long life by a pure public spirit. His own personal interests were but as stubble, to be trodden down whenever they arose to check him in the path of what he believed to be his duty. His career while serving in the XVIth Congress amply testifies to this. Elected by the city of New York, and without pledge of any kind to man or party, he resolved, in spite of the remonstrances of friends and clients, to leave a lucrative and growing business and meet the *Missouri question*, which was then the uppermost theme of the day. *How* he met it the public have long ago been told. "I found," said he, in a manuscript now in the possession of his family, "that the battle deserved all my courage, for I was immediately and constantly threatened with assassination! I felt compelled, in self-defense, to carry my old war pistols all the time in the Hall of Representatives and elsewhere."

Nevertheless, he stood firmly by the side of what he believed to be the right. Though tempered with extreme charity toward his opponents, his words were edged with the keenness of conviction. The Missouri compromise was passed, and he was one of the majority of *three* that carried it, after he had addressed the House upon the question with great vigor and effect. He also introduced the first resolutions ever offered to exchange our public lands for slaves, and to send the latter in families, with the Bible and the plow, to Africa as fast as the sale of the public lands would allow, declaring to Congress that if the plan were not then adopted the increase of the blacks would soon render it impossible, *and a civil war must ensue between the North and South.* He lived to see his prediction sadly verified, to see with his closing eye our Union, the great beacon-fire of liberty, whose kindling he had known, flicker dimly and fitfully in the presence of bewildered nations! Men may not coincide with him concerning the cause of the great calamity, but none will deny the purity or the boldness of his purpose.

Subsequently Mr. Meigs represented New York city in the State Assembly, and in 1832, as president of the Board of Aldermen, was a stanch servant of the city's interests. He, at that time, strongly advocated the introduction, on a grand scale, of the Croton water, and penned the first resolutions which were offered on the subject.

The American Institute elected Mr. Meigs recording secretary in 1845, and this position, in connection with that of secretary of the Farmers' Club, he occupied up to the time of his death. The minutes of the meetings and the records of the transactions of the Institute bear witness to his indefatigable industry and his devoted attachment to the cause of Agriculture. No research was too intricate, no exertion too great, provided that by any effort of his own he could add either to its dissemination or to its interests. Day after day in later years he was to be seen faithfully laboring at his post, and keenly at the present time must his co-workers of the Institute feel that the blank in their midst cannot soon be filled. His collations from the foreign journals of science, particularly those devoted to agriculture, and his published synopses of the current advancement of the day, are to be fonnd in the "Transactions," and his opening addresses at the various fairs of the Institute constitute the best history of the advance of science in America that can be found.

Judge Meigs was a man of extraordinary acquirements. In addition to his knowledge of natural law and its useful application, he was a profound and varied linguist. His knowledge of oriental literature was beyond that of most scholars of the day, and indeed his familiarity with the best writings to be found in all modern languages was remarkable.

He was an intimate friend of Dr. S. L. Mitchell, Dr. David Hosack, and other progressive men of his age. At his funeral the writer met the Hon. Mr. Dewey, the oldest living graduate of Yale College, being now in his ninety-fifth year. Mr. Dewey spoke of him in the warmest and strongest terms. Judge Meigs has left behind him children well known and respected in the community. It has fallen to the lot of few men to be more happy than he in their private relations. Blest with vigorous health, he died in the full vigor of a ripened age. His tall, commanding form and benevolent expression of kindly interest once seen were not to be easily forgotten; and strangers who have visited the Institute have turned and asked again concerning him. Well might the words of the friar in the old ballad have been recalled to mind, when men wondered to see him out, hale and hearty, on cold winter days without an overcoat, or reading with unaided eyesight at the age of seventy-nine.

> "In the days of my yonth (father William replied)
> I remembered that youth would not stay,
> And abused not my health and my vigor at first
> That they might not with age pass away."

Mr. Jireh Bull offered the following resolution, which was unanimously adopted.

Resolved, That the thanks of the Institute are hereby voted to Professor Mapes for his able and interesting paper on the life and services of the late Henry Meigs, and that he be requested to present a copy for publication in the Transactions of the Institute.

DEATH OF DR. D. MEREDITH REESE,

ONE OF THE COMMITTEE ON MANUFACTURES, SCIENCE AND ART.

At a meeting of the Polytechnic Association of the American Institute, held on May 16, 1861; the chairman, Prof. Mason having announced the death of Dr. D. M. Reese.

On motion of Mr. Butler,

Prof. Mason was requested to prepare a paper to be read at the next meeting of the Institute.

At the meeting of the Institute, held on the 6th day of June, Prof. Mason read the following memoir:

In the autumn of 1826, the newly organized Medical College, in Duane street, was opening its course of instruction by a week of popular lectures. The friends of the new movement and the admirers of the several professors crowded the lecture room. An evening came, in the course, which, partly by accident, and partly by prearrangement, brought to the desk, a young Doctor from Baltimore, of whose fame, as a public speaker, whispers had reached the faculty; and, who was announced by a cordial notice from Colonel Stone, in the Commercial Advertiser.

His subject was a general survey of the field of chemical knowledge. For a short time he proceeded cautiously over this field, but with the calm self-possession of a practiced public speaker. Gradually he approached the border of the field, where chemical science touches the verge of the old physiology, and meets the region of spiritualism, filled with the beings of the old witchcraft and the modern clairvoyance.

A few flashes of his wit into this obscure region lighted up the face of his audience, and expressed the general sympathy which sustains and inspires a true orator.

Following still his manuscript, with occasional interjections of extemporaneous illustration, he found he had complete mastery of his audience, while he drew out stronger and stronger marks of approbation.

At length his manuscript disappeared; and yielding himself up to that inspiration, which consists of the power to conceive in the presence of an audience, the happiest thoughts, more rapidly than they can be uttered, he poured out a strain of delicate wit and scorching irony on the scientific and medical quackery of the age, which left his audience nothing to desire but that he might continue when his hour was ended.

Dr. David Meredith Reese entered a section of the profession where a good partisan was welcome, and he was soon established in a large and lucrative practice.

In the spring of 1861, at his house in Union Square, Dr. Reese sat, alternately in his easy chair and his bed, laboring, in the intervals of acute suffering, to prepare for the press his last number of the American Medical Gazette. The obscure disease, which had been long growing upon him, he believed was mastered, as often as he obtained relief, for it left his appetite unimpaired, and his vital powers quite strong.

His medical friends were divided in their views of his prospect for recovery.

Some, who had been present at his first appearance in the city, were charmed with the fervid eloquence of his conversation on topics of passing interest in the social and medical world; and in a moment they would be disheartened at seeing him thrown into fearful anguish. But, as often as he got relief, he showed the same indications of strength, and cherished the unwavering confidence of his recovery. And up to the last hour he cherished the same hope. The last thing he wrote was an apology to the readers of his Magazine, promising to set all right the next month.

Thus closed the long and too active life of a man, whose genius qualified and impelled him to a great variety of labors, in any one of which he might have gained a high reputation and a competent fortune. His life deserves a memorial: not only as a record of what was well done, but also as suggestive of what more might have been done by attempting less.

Dr. Reese, (his medical brethren being judges,) was a good physician. At the bed-side, where suffering drew out the gentleness of his nature, his penetration and sagacity had full play in finding out the causes of disease, and his full knowledge of remedial treatment rendered him ingenious to find a cure.

He justly regarded disease as an enemy, which had stolen into the world, and might gradually be expelled. Wherever he heard of disease he was ready to go; and therefore he was eminently the physician of the poor. In the chambers of poverty, where all the surroundings were discouragements, he gained those untold and unrewarded triumphs over disease, which push back the pressure of evil from our race, give joy to despairing families, lengthen human life, and advance the civilization of a people.

Had Dr. Reese lost his pen and his rhetoric the day after he entered New York, he would probably have risen to lasting eminence and great prosperity in the medical profession. But, "he was made so;" and therefore he continued to write and speak.

His first school of rhetoric, when quite a boy, was a Methodist meeting; and he continued to exercise his talents, in the same way, after he was a physician. Now it is a felicity in the life of a physician to accept without a question the creed and offices of the church in which chance or fortune may place him. But, Dr. Reese took to religion rather antagonistically. In his airing of his inner man he somehow put his foot over the trace, and came to some disagreements with some of the regular clergy. And as it was not an easy thing to get the last word with the Dr. the matter was rather ungracefully referred to at his funeral.

Situated as he was in New York, it was natural that Dr. Reese should desire to be a public teacher of medicine. He was, at different times, employed as a professor in three medical colleges. He was a zealous and spirited teacher; but always in small colleges, and always to the injury of his professional success.

Indeed there was a sort of epidemical furor over the northern states for medical colleges. Gentlemen who had been educated abroad, and had seen the glory of Letsom, Hunter and Cooper, returned emulous of such glory at home. Colleges sprang up in the great cities. And when it was seen that emigrants in the north and negroes in the south needed physic, the rage for multiplying small doctors exceeded all bounds, and flooded the country with cheap men, who have anastomosed with every quackery, without apparent improvement of the public health or advancement of medical science.

Dr. Reese had a faculty and tact at controversy, which drew him away from his profession, in the contest about "The Bible in the Public Schools." The paper of Col. Stone was open to his writings, and he pursued the matter with a zeal which made him the candidate of his party for the office of superintendent. He was elected, and a subsidence in the controversy led to the assumption that the conflict was ended.

But this was only a side-issue of a much more comprehensive question, which will remain open until it shall be ascertained (at the end of our civil wars) what shall be the future relations of religion to the government, and what church will then be able to assert and prove the highest claim to the confidence and support of the administration.

Meanwhile the head of the Catholic church in the United States provides schools for all the children of his church, applies discipline to secure their attendance, pays the tax to support the public schools, and performs foreign missions of the highest order for the administration; and in this connection it is curious to observe, in an able and conciliatory article in the Edinburgh Review, a suggestion that Washington is an appropriate place for the Papal residence, while the Roman question is liable to be violently discussed.

It rarely happens that any one but a political lawyer turns aside to party controversy and public office without being pushed on farther than he intended, and gravely injuring his former pursuit and position; and so it happened to Dr. Reese.

In the offices which he filled in the American Institute Dr. Reese was sagacious, firm and faithful, and deserves to be well remembered.

If that is a happy life, which is filled up with the largest measure of agreeable and innocent emotions, then Dr. Reese probably attained it; and if his wit would sometimes, in spite of him, boil over upon a fool, he had occasion to remember the saying of Bacon, "that he that is of a keen wit had need to take heed of other men's memories." But the habitual and earnest bent of his mind and life was in the direction of doing good.

Mr. Jireh Bull offered the following resolution, which was unanimously adopted:

Resolved, That the thanks of the Institute be presented to Prof. Mason for the memorial of the late Dr. Reese, which he has this evening presented, and that he be requested to furnish a copy thereof for publication, and to be presented to his family.

FINANCES.

The following is the financial condition of the American Institute on the first day of February, 1862:

Balance in the treasury, February 1, 1861			$367 96
THE RECEIPTS of the past year have been—			
From rent of premises No. 351 Broadway, and 89½ Leonard street		$5,733 50	
Admission fees, $90; annual dues, $520; life membership, $20		630 00	
Treasurer of the State of New York, (under act of May, 1841), for 1860		950 00	
Crystal Palace—sales of old lead and brass, $67.14; case of conscience, 50c		67 64	
Library—sales of duplicate volumes, $5.47; fines, $1.11		6 58	
Sales of Transactions		1 00	
			7,388 72
Am't to be accounted for, includ'g last year's bal'ce,			$7,756 68

EXPENDITURES.

Real Estate.

Interest on mortgage ($20,000) to Aug. 1, 1861	$600 00		
Taxes, 1861, property No. 351 Bd'way & 89½ Leonard st.	1,631 46		
Repairs—new leader for roof	18 49		
		$2,249 95	
Carried forward		$2,249 95	$7,756 68

Brought forward		$2,249 95	$7,756 68
Library.			
Books	$94 13		
Periodicals	91 27		
Binding	124 75		
Newspapers	36 13		
		346 28	
On account of Thirty-second Annual Fair.			
Silverware for premiums	$125 00		
Engraving	15 00		
Cases for medals	18 00		
Filling diplomas	11 00		
Book and paper	4 75		
Expenses boxing leaves of the Victoria Regia	5 00		
		178 75	
Miscellaneous Bills.			
Rent of rooms in the Cooper Union, 9 months, to Nov. 1, 1861	$1,312 50		
Storage of articles used at the Fairs	52 00		
Storage of tent	24 00		
Insurance, property No. 351 B'dway and 89½ Leonard street	101 71		
Insurance, articles on storage	5 00		
Insurance, library	32 40		
Printing	24 30		
Stationery	33 58		
Advertising	45 00		
Reporting 59 meetings of the Farmers' Club and Polytechnic Association	295 00		
Gas	82 53		
Ice (1860, '61)	17 55		
Watering street	7 00		
Freight on Transactions	25 82		
Carried forward	$2,058 39	$2,774 98	$7,756 68

Brought forward	$2,058 39	$2,774 98	$7,756 68
Freight and expenses on books from France	9 25		
Agents' travelling expenses	10 00		
Covering tables	3 69		
Expenses of inspectors of election	5 50		
Petty Cash:			
Advertising meetings, subscript'n to papers, cleaning, postage, &c., &c	206 11		
		2,292 94	
Salaries.			
Corresponding secretary and agent	$525 00		
Recording secretary	312 50		
Clerk	1,500 00		
Messenger	267 00		
		2,604 50	
			$7,672 42
Balance in the treasury Feb. 1, 1862			$84 26

In presenting their report at the close of the fiscal year, your committee take occasion to remark that they have examined the books opened in 1858 by Mr. John W. Chambers, the efficient clerk of the Institute, down to the present time, and after a full examination of the cash account with the general accounts of the treasurer and with the members' ledger, it affords them pleasure to say, that they have found the same correct, and that every dollar collected has been fully accounted for.

JOHN M. REED,
THOMAS M. ADRIANCE,
WM. S. SLOCUM,
Finance Committee,

NEW YORK, *February* 1, 1862.

Account of property held by the Institute January 31, 1862.

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		13,404 43
Office furniture and fixtures, iron safes, case of models of fruit, &c		934 75
Property used at the fairs		1,353 60
Gold and silver medals on hand		443 08
		$41,935 86
Cash in the treasury February 1, 1862		84 26
		$42,020 12

REPORT

OF THE BOARD OF MANAGERS OF THE THIRTY-THIRD ANNUAL FAIR OF THE AMERICAN INSTITUTE.

The Board of Managers of the thirty-third Annual Fair of the American Institute respectfully report:

That immediately after their election they organized, by the appointment of Mr. James C. Baldwin as chairman, Mr. W. H. Butler as vice-chairman, Mr. Thomas McElrath as corresponding secretary, and Mr. John W. Chambers as recording secretary.

The subject of holding a Fair was discussed at several meetings, and after mature deliberation it was deemed advisable, in the present unsettled state of our country, to defer holding a general fair during the year.

The Board of Managers resolved to offer thirty premiums, consisting of gold and silver medals, for articles deemed of importance to the public, and the subjects were appropriated between the Farmers' Club and the Polytechnic Association, requesting these associations to examine and report upon the articles which might be brought before them for premiums.

It was not until the month of October that these measures were finally adopted, and immediately thereafter the following circular was issued, and distributed extensively through the country:

EXHIBITION OF THE AMERICAN INSTITUTE OF THE CITY OF NEW YORK, 1861.

In the second week of February next, the Managers of the Fair of the American Institute will make a public exhibition of such inventions and improvements brought before them as may be deemed worthy of public approbation.

To give a just encouragement to those ingenious citizens who are laboring for the improvement of Agriculture, Manufactures and the Arts, the managers have selected those subjects on which improvement seems most needed for the public weal, and now offer the medal of the American Institute for such new invention or improvement on any of those subjects as shall be adjudged worthy of an award.

To aid their judgment in this matter, the managers have divided these subjects appropriately into two classes, and referred the one class to the Polytechnic Association, and the other class to the Farmers' Club, requesting them to examine the articles or claims which may be brought before them, and to report on the same, in writing, to the managers, by the 15th day of January next; the Board reserving to themselves the right of ultimate decision on all questions relating to the premiums. No award will be made, when in the judgment of the Board the competing article or essay falls below the standard.

To the Farmers' Club of the Institute the managers have assigned the following subjects:

1. Flax. For the best mode of preparing the fibre—long or short staple.......................Large gold medal.
2. For the best seed machine for sowing cereals, drilled or broadcast.......................Gold medal.
3. For the best vegetable seed sower...........Silver medal.
4. For the best mode of packing and preserving apples and pears.......................Gold medal.
5. For the best portable mill for grinding corn, by hand power, for farm use.......................Gold medal.
6. For the best corn shelling machine that will not break the grain.......................Large silver medal.
7. For the best implement for cultivating the garden by hand power.......................Silver medal.
8. For the best novelty and improvement in horse-shoeing, Silver medal.
9. For the best improvement in heating conservatories, Gold medal.
10. For the best essay on the culture of the peach..Gold medal.
11. For the best essay on the culture of the apple..Gold medal.
12. For the best essay on the culture of the pear....Gold medal.
13. For any improvement or new implement adapted to the farm, not enumerated, and superior to any now in use, Gold medal.
14. For the best implement for field culture...Large gold medal.
15. For the best power for farm use.............Silver medal.

To the Polytechnic Association of the Institute the managers have assigned the following subjects :

1. For the best machinery for spinning and weaving flax, Large gold medal.
2. For the best lifting and force pump by hand power, Silver medal.
3. For the best invention for the amelioration of camp life, Gold medal.
4. For the best novelty in mineral building materials, Gold medal.
5. For the best machine for preparing mineral building materials ---------------------------------- Gold medal.
6. For the best novelty of practical value extracted or manufactured from coal oil or coal tar ------------ Gold medal.
7. For the best improvement in the making of iron or steel, Gold medal.
8. For any new preparation or application of India rubber, Large silver medal.
9. For the best lamp for burning coal oil without a chimney, Gold medal.
10. For the best refrigerator --------------- Large silver medal.
11. For the best novelty in railroad tracks -------- Gold medal.
12. For the best machine for setting and distributing type, Gold medal.
13. For the best farm hygrometer, to cost not more than $2, Silver medal.
14. For the best mode of heating houses ---------- Gold medal.
15. For the best original research or monograph on any subject pertaining to the science of chemistry or mechanics, or their practical applications ---------------------- Gold medal.

Two discretionary premiums (gold or silver medals,) to be determined by the Board of Managers.

Inventors and others wishing to bring before either of the Clubs herein named, any article for examination and competition, may present the same at the rooms of the Institute, to Mr. John W. Chambers, recording secretary of the Board, at any time during business hours. All communications on the subject addressed to Mr. Thomas McElrath, corresponding secretary of the Institute, will meet with immediate attention.

The Polytechnic Association meets every Thursday evening, and the Farmers' club every Monday, at noon, at which times the articles or subjects presented will receive the attention and examination of the respective Clubs.

The late date at which this circular was issued, and the public mind being almost exclusively occupied with the existing national troubles, inventors, manufacturers and others did not so promptly respond to the invitation held out to them as the managers had hoped would be the case. But within the last two weeks a number of applications have been made to compete for the premiums, and your managers, at a meeting held on the 29th of January, resolved to extend the time for the reception of applications to the 5th day of February inst.

Under these circumstances the Board of Managers ask the Institute that they may be discharged from all further consideration of this subject after the 13th inst., and that the whole subject matter relating to the premiums be referred to the new Board of Managers.

Respectfully submitted.

JAMES C. BALDWIN,	WM. S. CARPENTER,
WM. H. BUTLER,	GEORGE PEYTON,
WM. EBBITT,	JAMES KNIGHT,
THOMAS F. DE VOE,	CYRUS MASON,
JOHN V. BROWER,	WM. COTHEAL,
GEORGE TIMPSON,	HENRY STEELE,
JOHN JOHNSON,	GEORGE M. WOODWARD,
THOS. WILLIAMS, Jr.,	GEO. R. JACKSON,
ANDREW BRIDGEMAN,	JOHN D. JERSEY,
JOHN B. PECK,	CHAS. PERLEY,
ISAAC M. PHYFE,	CLARKSON CROLIUS,
T. F. ENGELBRECHT,	CHAS. A. WHITNEY,

THOMAS McELRATH,

Managers.

NEW YORK, *February* 5, 1862.

REPORT

OF THE BOARD OF MANAGERS OF THE THIRTY-FOURTH ANNUAL FAIR OF THE AMERICAN INSTITUTE.

The Board of Managers of the Thirty-fourth Annual Fair of the American Institute respectfully report:

That on the sixth day of February, 1862, the Board of Managers of the Thirty-third Annual Fair made a report to the American Institute stating that they were unable to make a final report of their proceedings, and asked that permission be given to the new Board of Managers to act upon the reports and the premiums, and conclude the proceedings of the year.

The American Institute considered the recommendation and referred the whole subject to the new Board of Managers and they herewith submit the reports made and the premiums they have awarded consisting of 1 large gold medal; 5 gold medals; 1 large silver medal; 5 silver medals; 2 bronze medals; and 5 diplomas.

Respectfully submitted,

JAMES C. BALDWIN, *Chairman.*

JOHN W. CHAMBERS, *Secretary.*

April 26, 1862.

REPORTS

OF THE POLYTECHNIC ASSOCIATION AND FARMERS' CLUB.

POLYTECHNIC ASSOCIATION.

The Secretary of the Mechanical Section reports:

That several of the special committees appointed to examine improvements in mechanism and manufactures referred to them, have carefully inspected the articles presented, and offer the following opinion upon their respective merits.

REVOLVING POCKET PISTOL.

This pistol, invented by Dr. Elliot, is intended for the civilian rather than the soldier, is a simple yet ingenious arrangement consisting of but few parts. Its principal feature is the great proportionate length of the barrels as compared with that of the pistol. The inventor is entitled, in the opinion of the examiners, to a bronze medal.

HEATING HOUSES.

The hot air furnace of A. H. Bartlett, known as Bartlett & Lesley's new Gothic Furnace.

The examiners are aware that a gold medal is offered for the best mode of heating houses. The hot air furnace, together with two other apparatus hereinafter to be described, present three different modes of heating, each having peculiar advantages. Although there are several varieties of each, these three modes, have this in common, that each uses only one of the three. Thus, of each different mode no more than one form has been presented, so that there is in reality no fair competition as to the best hot air furnace; the best hot water air warmer; and the best steam heating apparatus. As each of these modes is old in all its essential features, your examiners believing that no one of the articles presented can be pronounced the best, under all circumstances and in all conditions, deem it proper that they should notice the more prominent improvements in each which will be deserving of an award.

The principal novelty in the hot air furnace of Bartlett is its form, and while it is open to the usual objections made against hot air furnaces in allowing the air intended for breathing as well as heating purposes to come in contact with the usually red hot fire box, it is to be commended for the simple manner in which the gases of combustion are prevented from finding a way into the hot air chamber. The examiners deem this a cheap and efficient method of heating in situations where a chilling temperature is rapidly produced by immense drafts or currents of cold air, yet they cannot endorse it as the best method of heating. They recommend that a silver medal be presented to the inventor.

Brown's Water Furnace.

The object of this invention is to furnish to a house or conservatory a large quantity of air at a moderate temperature, generally below but never exceeding the boiling point of water. The apparatus is necessarily very large, because the heating surface must vary inversely with the temperature, yet the boiler and nearly all the other parts being made of cast iron, it is comparatively cheap. It is well adapted for green houses, for public schools, and for large assembly rooms, where a frequent change of air is more important than high temperature.

Mr. Brown has an ingenious method of regulating the heat of the water so as not to allow it to reach a state of ebullition. The apparatus requires careful attention, and in the coldest weather the fire should be continuous in order to guard against the danger of freezing. The examiners recommend that a silver medal be presented to the inventor.

Baker & Smith's Improved Low Pressure Self-regulating Steam Warming Apparatus.

The inventors of this apparatus are to be specially commended for the care and caution they have shown in making every part of their arrangement secure against accidents. The boilers they put up are made by other parties, but are tested by the inventors, so as to insure the capability of sustaining about one hundred times the pressure to which they are usually subjected. The pipes which distribute the steam and radiate the heat are of the kind which has long been in common use for similar purposes. These pipes can either be stacked in the room where the heat is to be used, or in an air chamber from which the air is to be conducted to the upper rooms. The regulation of the heat by the pressure of steam is not new, but Messrs. Baker & Smith have a modification of the connections which seems to be efficient. The most valuable novelty in their apparatus is the regulation of the admission of cold air into the warm air chamber—this seems to be essential when there is danger from the formation of ice in the pipes. It has been the aim of Messrs. Baker & Smith to make a steam heating apparatus which can be comprehended and managed by an ordinary domestic without the aid of an engineer, and this is accomplished in part by making the machine regulate itself.

This apparatus, as an improvement on the steam-heaters, is entitled to a silver medal.

Mitchell's Type-setting and Distributing Machines.

Type-setting and distributing machines operating in the establishment of J. F. Trow, No. 50 Greene street, invented by Wm. Mitchell of Brooklyn.

These admirable machines deserve high commendation. The inventor has not attempted too much by endeavoring to make his type-setter select every character to be found in the printer's case, but he has succeeded in all he has attempted.

This machine, properly managed, will do about the work of two compositors. The main adjustment of the type conveyors, which will deliver the type in their proper turn and place, is an invention, the final completion of which must have cost the inventor a vast amount of time and thought. The distributor is equally ingenious, and in its selection of the various letters and placing them in their proper order, the machine seems to possess a human endowment. This selection is regulated by a nick upon the side of each type, which is the infallible guide to its proper depository. These machines can be moved and managed by a boy. Mr. Trow deserves great credit for introducing these useful innovations, which have been in successful operation for seven or eight years.

The examiners think Mr. Mitchell is entitled to a gold medal.

S. D. TILLMAN, *Secretary.*

New York, *February* 27, 1862.

The Chemical Section of the Polytechnic Association, to which was referred the articles exhibited in competition for premiums under provisions established by the Board of Managers of the Institute, respectfully report:

That they have examined in full section and through special committees, the various articles exhibited, and submit the following as the result of their labors:

Ormsbee's Camera Box.

This Camera Box is designed to facilitate the production of two or more photographic impressions on one plate, and as in most other boxes used for the same purpose, the various portions of the plate are brought successively into the field of the lens by the movements of the plate-holder. In this box the movements and adjustments are made by brass work, thus securing the nicest accuracy. The box is also suitable for all the ordinary photographic uses, and, in short, is a happy combination of all the most desirable qualities of a camera box for practical work. We recommend that the large silver medal be awarded to the inventor.

Burnett's Ventilator for Sick Rooms and Hospitals.

This device consists of a refrigerator containing ice, to the bottom of which is attached a light hose of varnished cloth. In operation, the ice-box is placed on a shelf at a suitable height above the bed, and the hose led to the locality to be cooled; a current of air is at once established from the refrigerator downward through the hose from which it issues, cooled, and, to a considerable extent, purified; if desired, it is of course practicable to have the ice-box so disposed, that the fresher air from outside the sick-room may be used. We recommend that a bronze medal be awarded to the inventor.

Selleck's Method of Coating and Cementing Iron with Franklinite.

The specimens exhibited by Mr. Selleck, of soldering and plating wrought and cast iron with the Franklinite metal, indicate to the section the probability of an entirely new branch of industry. Several members have witnessed with great interest the methods of working, and are of opinion that it is practicable to cover large surfaces of wrought iron with a film of Franklinite metal of any desired thickness, which coating will be extremely hard and little liable to rust, and that as a cement or solder for wrought or cast iron, this new material will prove to be of great utility. The committee recommend that a gold medal be awarded to Mr. Selleck.

Baudellot's Beer Cooler.

This beer cooler consists essentially of an upright frame or series of horizontal copper pipes, so joined at alternate ends as to form a continuous water channel. In operation a stream of cold water flows within the pipes from the bottom to the top, where it is discharged, while the hot wort is laid on the whole length of the upper pipe of the series, and flows down evenly over the outside of the remaining pipes to the bottom, whence it is led to the fermenting tuns. The rapidity of flow and temperature of the cold water is easily adjusted to the amount of work to be done; also it is to be observed, that while the wort is properly and uniformly cooled by reason of the large surface in contact with the air, it becomes thoroughly aërated.

A special committee (Messrs. Johnson, Dibben and Seely) witnessed the cooler in operation, with approbation, at some of the largest breweries in the city.

A large silver medal is recommended to be awarded to the proprietors.

The other articles exhibited to the Association, and examined by the section, are not found worthy of the distinction of premiums. Some of them, however, display commendable ingenuity, and a fair degree of novelty. The lack of advantage over inventions of similar design alone excludes them from more favorable notice.

The lamps designed to burn coal oil, without a chimney, were specially examined by Mr. Churchill, whose report is hereto annexed.

The polar refrigerator was dismissed from examination on the ground that it had been previously exhibited at a fair of the Institute.

Respectfully submitted.

CHAS. A. SEELY, *Sec'y.*

New York, *February 27th*, 1862.

Report on Lamps to burn Coal Oil without a Chimney.

The lamps referred to me for examination were received in the following order:

No. 1. Thomas's.
2. Kaestner's.
3. Isaacsen's.
4. Miller's.
5. Smith's.
6. Dietz & Co.

No standard requirement was fixed for the competition, and the lamps must alike seem only to have this much in common, namely, that they will all burn on the top of a pint cup. Comparative results must, therefore, be regarded as approximations.

The evil against which they have to provide is simply blacks that smell; almost any naked flame can be made to smoke; but Nos. 1, 2, 4 and 6 will do so when carried about with such a draft of air as may be made by persons quickly passing, or by quickly shutting even a distant door. No. 5 is in the same category when burning enough coal oil to give a useful amount of light. It has been objected by Mr. Smith that other lamps can be put out by suddenly lifting them up. This is seldom the case with less motion than equals running up stairs, unless they are previously pulled downwards. It is to be remarked that the blacks are not accompanied with injurious products of decomposition, as in the case of imperfectly burnt alcohol, or tallow. No headache results; nor is there any acid generated, as there is from foul gas. This does not apply to the vapors escaping unburnt after contact with heated metal as in lighting Nos. 1 and 2. Entire cleanliness is of the greatest importance in the use of these lamps. Every part of them should be accessible to remove fragments of matches, spilt oil, &c. A small piece of dirt adhering to the burner has been observed to cause smoking. Offensive smells cannot otherwise be prevented. In this respect Nos. 1 and 2 are more defective than others.

The important properties of coal and petroleum oil, for lamp purposes, consist in its capillarity and the non-adhesiveness of the solid matters deposited from it. The latter are easily detached from the wick where this is accessible, as in Nos. 3, 4, 5 and 6. Too much has been expected from the first of these. It will, no doubt, enable a supply to be drawn up three or four inches. In none of these lamps is it indifferent whether the level varies; yet there is nothing provided to meet this, except the surplus ingenuity of the inventor, who bids his customer pray for a whole lamp and use half a one. In No. 5, with two fluids, this evil is doubled. The flames are marked by absence of flickering, but are agitated by any vibration communicated to the lamp.

A very transparent oil was furnished for the single trial of No. 5. I have used oils bought at 18c., 16c., 15c. and 14c. per quart; the last three being probably such mixtures as are now almost alone retailed. They may be distinguished by a purplish eflorescence on the surface. Lamp No. 6 loses much of the power of regulation when volatile oils are used. Where deposits of carbon were formed, especially in No. 4, this was the more observable the cheaper the oil.

There is one point which may be aggravated by the use of the more volatile oils, viz: the explosiveness of the vapor mixed with air. In lamps, as No. 1, where heat is carried into the fluid, on the cooling of the lamp after extinguishing the light, air will enter to take the place of vapor and a more or less intimate mixture of air and vapor will exist inside. I have frequently witnessed the explosion of such a combination obtained with less heat than is transmitted downward by No. 1, and probably by No. 2, when fitted to a metal lamp. But the effect is not violent when there is a free vent. The inventor of No. 5, has informed me that later trials made by him have resulted in greater success with "heavy coal oils," but I have been afforded no opportunity to verify this.

The combustion of coal oils involves less destruction of the wick than that of common oils, but the greater capillarity of the former produces so much swelling that a wick which does not fit loosely in its tube, when dry, is sometimes moved with difficulty. A case of unusual charring in lamp No. 4 was obviated by substituting a thinner wick. A few days disuse, even when entirely exposed to the air, does not prevent a wick being used without trimming after a few minutes immersion: but the amount of cleaning which occurs in practice so much diminishes the capillary power of the wick, that an experiment with a new wick affords no criterion of the value of a lamp. The volatilization of the oils used is irregular, affecting both the form of the flame and the inclination to smoke. The latter has been observed to increase with the increase of lateral surface exposed. The mode of limiting this in No. 6, by increasing the upper surface, is noteworthy. The difficulty in lighting is a serious drawback to No. 1, involving much care and time; indeed so long a time that it might be a serious difficulty to have no other lamp in case of fire. No. 2 is only slightly more effective. Nos. 4 and 6 may be relighted instantly night after night. It is to be observed also that while these may be blown out with comparatively little smell, Nos. 1 and 2 require to be turned down to be extinguished. They therefore require readjustment for lighting. The quantity of heat withdrawn from the flame proportionably retards lighting. It seems to have been assumed by those inventors who use pinions for setting the wick, that they would also serve for altering the quantity of light at will; but it is not so, the extent of exposed surface is then changed with the effect before noted, and direct experiment shewed that great variation in the character of a flame is produced by small changes in the height at which air is deflected upon it. In the field which seems open to these lamps—the desk and the secluded work table—it is of great advantge that a lamp should be self-supplying—the weary eye says that the light is burning, but affords no standard for adjustment, and turns dissatisfied from even destructive glare.

The pinions without racks afford an uncertain guide where a small want of parallelism may disarrange the whole effect.

The principle applied in Nos. 1, 2, 4 and 6, viz: drawing up a heated column of air below the flame, seemed to deserve examination. Perfect combustion being due to a proper admixture of the combustible and air, at a sufficient temperature, it is apparent how much velocity of issue, and extended conductors of heat in contact with the vapor, may impede this.

The characteristic of a lamp with a chimney is the concentration of flame and heat, where the air is made to impinge. Contrast with this the dispersion of the flame upwards and heat downwards. In proportion as this principle is developed, (in the reverse order of the numbers,) there results a larger flame from the same sized wick, at a cost of radiated heat and of oil; the light not varying equally with the size of the flame, and complete combustion being obtained by withdrawing heat from a much smaller portion of the flame than in No. 1. Another feature of lamps with chimneys, as commonly made, is excess of air beyond what is necessary for perfect combustion. This is always ready for an irregular supply of vapor, and with this form of lamp it is frequently of advantage to supply heated air, thus increasing the volume and diminishing pro rata the injurious excess; but without a chimney, heated air rising around is less adapted for concentrated combustion.

But there is also waste combustion above the burner and heat-abstracting apparatus, when the combustible vapor is driven upwards with a force which prevents its immediately mixing with air; it is then burnt on the outside in so thin a film as to be non-luminous. This was tested in the course of this examination in this way—a peculiarly steady flame was taken—a wire placed in non-luminous flame (alcohol or a Bunsen's burner,) is ignited and renders it luminous; in the centre of the dark part of the kerosene flame it remained dark, indeed actual cooling was observed, when a wire, previously ignited, was introduced into it; lamp black volatilized in the centre also, did not become ignited, while if it was retained in the burning film on the outside it grew hot, and when withdrawn into the air it kindled. These films, dark when looked at directly, were luminous when seen obliquely. I submit that this shows total absence of combustion in the centre, and absence of free oxygen in the burning film on the outside; also that a flame requires a certain thickness to appear luminous. This combustion without light measures the waste of combustible with increase of blue flame, or with equal areas it is inversely as the thickness at that part.

Mr. Smith has offered no results in opposition to the received opinion that a flame owes its luminousness to incandescent carbon. Such experiments are necessary to establish the economy of attempting to obtain light from burning alcohol as in No. 5.

Comparisons of the relative cost of different sized flames yielding variable quantities of light for uncertain periods, have given no exact results. The lamps Nos. 1, 2, 4 and 6, were taken into use as soon as received, and were repeatedly tested in various ways. I am familiar with a burner similar to No. 3. It requires a special lamp and wick—neither were furnished, and it has not been specially tried. It is intended for less general use than the former ones—it is partly based on the same principles, and the class of burner is inferior to them in nearly all but cheapness. No. 5 has been tried as far as suited the inventor. I have been assisted by other members of the section, and the conclusions obtained are confirmed by those who have used the lamps.

The principle of mixing the vapor of coal oil (schist oil) with air in a chamber heated by its own combination, was introduced by M. M. Busson, at Rouen, twenty years ago, in France; and that of correcting one flame by another, by Prof. Hare, between 1819 and 1824, on inventing burning fluid. The vertical currents used in No. 1 are found in No. 6 of earlier date, and the admission of air on a level with the top of the wick, is found in lamps of Nibbs & Birmingham, lampmakers, patented in 1858.

If originality in invention must be successfully developed to deserve a gold medal of the Institute, the lamps do not come up to this standard; they may be distinguished thus:

No. 1 gives the largest flame;

No. 2, a flame as white, of better form, but smaller;

No. 3 is the cheapest;

No. 4 gives, when well trimmed, a very grateful reading light;

No. 5, a very small light without smoke;

No. 6, a light similar to No. 4, but smaller.

The propriety of the reference to this section will be apparent. With chemists, the phenomena of flame are a frequent study, and the manipulation of lamps is part of their daily practice, but the mechanical section may well be asked, whether stamping and spinning should not be expected to furnish more exact and durable work than appears in Nos. 1, 4 and 6.

JOHN HARTLEY CHURCHILL,
Sub-committee.

FARMERS' CLUB.

Report on Cahoon's Patent Broadcast Seed-sower.

The special committee, to whom was referred the examination of Cahoon's Patent Broadcast Seed-sower, respectfully report:

That they have examined the two kinds of this machine; the first, or hand-sower, is composed of a breast-plate suspended from the neck, armed with a hopper and surmounted by a seed bag. In front of this hopper is a register plate which may be set to regulate the delivery, varying from one peck to ten bushels per acre. On the side of the hopper is a set of gearing with a crank-handle, which may be worked by the sewer while walking across the field. By this handle, a trumpet-shaped disc which receives the seed from the hopper is caused to revolve, to throw it by centrifugal force so as to cover a space many feet wide. In this manner from four to eight acres may be sown per hour by a single sower, and the seed is distributed with positive evenness. It may also be used for distributing guano, plaster, lime, etc. The best wheat crop raised in the State of Illinois in 1859, and which took the first premium at that fair, was sown with this machine. It is claimed that it saves four-fifths of the labor and time; that it enables any one, however inexperienced, to sow with regularity, and that, in consequence of the evenness with which it distributes the seed, it causes a saving of from one-quarter to one-third of the grain ordinarily required.

A larger kind of this machine is also exhibited to your committee, which is placed upon a wagon with a band or chain passing over a collar surrounding the hub of the wheel. This machine is moved by the progression of the wagon, and is capable of sowing ten to fifteen acres per hour. It is equally applicable to the sowing of wheat, rye, barley, oats, turnips, grasses, and all other seeds requiring to be sown broadcast. It has taken the premium at many of the State fairs, and is highly recommended by numbers of farmers who have used it. Your committee send herewith a list of the testimonials furnished by the inventor. Your committee would recommend that the gold medal be awarded to this machine.

Signed, SOLON ROBINSON,
N. H. GALE,
Committee.

Report on Halsted's Hand-garden Cultivator.

The committee, to whom was referred A. M. Halsted's Hand-garden Cultivator, respectfully report:

This cultivator is intended to be worked by hand. It is very simple in form, and, being made of iron and steel, is not liable to get out of order. It has six cutters arranged on a movable frame. These can be readily adjusted.

This implement is well adapted to all articles cultivated in rows or drills, and can be regulated to any desired width, from eight to twenty-four inches, and to depths of one-quarter up to two inches. It can be made to cultivate within one inch of the row without disturbing the plants, or burying them, and leaves the weeds on the surface of the ground. From the examination made by your committee, they deem it a very useful instrument for garden culture, and recommend the silver medal to be awarded to the inventor.

Signed,

SOLON ROBINSON,
N. H. GALE,
Committee.

REPORT ON WHITTEMORE BROS'. CHAFF CUTTER.

The special committee, to whom was referred Whittemore Bros. Chaff Cutter, respectfully report:

That they have examined this machine and find it novel in its construction, and perfectly well suited to the purpose for which it is intended. It has been long known in England, that twenty-five pounds of hay in the natural state, nineteen pounds cut one inch long, and thirteen and one half pounds finely chaffed, are equal in value as food for horses, cattle, etc.; but the cost of the English chaffing machine has been entirely too great to engage the attention of American farmers. The chaff cutter, however, is of but small cost, and embraces all the advantages called for. It is composed of two rollers, the one armed with shear steel edges, and the other with corresponding knives, sustained in their relation to each other by the casting of the ends, which insures very equable relative positions in the rollers, so that they shall be always in the proper position for cutting. This casting is arranged, however, so that its upper end sustaining the shear cylinder is permanent. The lower end, or that sustaining the cutting knives, is attached to two sectors that are held to the two sides of the machine by thumb-screws.

These sectors are movable, so that the perfect cylinders may keep in position in relation to the shorn cylinder between the vertical and the horizontal, and that each change of their relative position the length of the cut is altered, so that the machine is capable of cutting straw of all lengths, from mere chaff to an inch and a half long, thus enabling the farmer to select such length as he may prefer. It is also equally applicable to the cutting of cornstalks.

Your committee would recommend that a diploma be awarded for this machine.

Signed,

SOLON ROBINSON,
N. H. GALE,
Committee.

Report on Beardsley's Hay Elevator and Horse Power Fork.

The special committee, to whom was referred Beardsley's Hay Elevator and Horse Power Fork, respectfully report:

That they have examined this invention, and find it every way worthy of the notice of the Institute. The fork is so constructed that it may be pressed into the load of hay, and elevated by means of a pulley fastened to the string piece of the barn. To the other end of the rope the team is attached, after being disengaged from the wagon. As they move outward, this forkful of hay being equal to one-sixth of a ton, may be raised to any required position in the barn. On the pulling of a cord the fork drops, emptying itself, and may be immediately again lowered so as to take up a new quantity. In this way, in six forkfuls, which may be raised in six consecutive minutes, a ton of hay may be unloaded and stowed away in its place.

This is a labor-saving machine well worthy the attention of farmers. We would recommend that a diploma be awarded for this machine.

Signed,
SOLON ROBINSON,
N. H. GALE,
Committee.

Report on Whittemore, Belcher & Co.'s new Hay and Cornstalk Cutter.

The special committee, to whom was referred the examination of Messrs. Whittemore, Belcher & Co.'s new Hay and Cornstalk Cutter, respectfully report:

That they have examined this machine. The state of the art, as found by Mr. Whittemore, of making hide roller machines, was such that when they were applied to the cutting of cornstalks, the knife cylinder from the V form of the places between the knives would become stuffed with the pieces of cornstalk, and would be rendered thus inefficient. This machine, however, remedies this evil perfectly.

The hide roller forms the upper cylinder, as is usual in such machines, but the knife cylinder below it is so arranged that the knives are made to approach the hide roller in such direction as to leave no space between them to be stuffed by the cut stalk. They, therefore, are not subject to derangement, and constitute a substantial improvement on those before in use.

Your committee would recommend that a diploma be awarded for this machine.

Signed, SOLON ROBINSON,
N. H. GALE,
Committee.

Report on Improvements in Horse Shoeing.

The special committee to whom was referred the subject of examining the patent process for improvements in horse shoeing, invented by Thaddeus Selleck, respectfully report:

That they have examined the testimony of the usefulness of this improvement and believe it to be of great importance and value to the agricultural interests.

Mr. Selleck's improvements consist in the use of Franklinite metal instead of steel for the facing of the calks and toe pieces of horse shoes. This metal fuses at so low a temperature that, with the assistance of borax, it readily melts and combines with the shoe. When so attached it is much harder and more durable than steel itself, while the cost of application is much less, requiring only the ordinary skill of the blacksmith for its use.

From the copies of testimonials attached it will be seen that in practice shoes prepared as above with the "Franklinite," wore much longer than others, and as the surroundings, iron, wears, the hard Franklinite protrudes, and from its peculiar hardness prevents slipping on ice, stones, etc. This invention renders the changing of shoes less frequent, and therefore the hoof is not required to be pared or cut unnecessarily often. It is not in the province of this committee to treat of the great advantages to arise from other uses of this metal in the arts as this branch of the subject has been assigned to the Polytechnic Club of the Institute, but it may be proper for them to suggest that Mr. Selleck's invention will prove highly valuable for pointing and facing plows and agricultural implements generally, for the points of contact in the links of chains and other surfaces subject in use to friction, &c.

Your committee would recommend that the medal offered in the recently published programme of the Institute, be awarded to Mr. Selleck.

Signed, ISAAC P. TRIMBLE,
P. T. QUINN,
Committee.

REPORT ON THE BEST IMPROVEMENTS IN HEATING CONSERVATORIES.

The special committee to whom was referred the subject of examining the best improvements in heating conservatories respectfully report:

That they have examined the different methods offered for competition, and have considered the subject under the following heads:

1st. The greatest amount of heat in proportion to cost.

2d. The quality of heat thus generated.

3d. The least complicated system, which then and therefore demands less skill to keep it in working order and repair.

4th. Economy in space occupied by the heating apparatus.

5th. Durability of material used.

In addition to our own investigations we have availed ourselves of all the information possible from persons using the different modes of heating.

Having considered the subject as fully as the limited time allowed us would permit, we are unanimously of the opinion that the combination cone and flue boiler patented by A. E. Hitchings in 1860, is the best apparatus for the purpose of heating conservatories.

Respectfully submitted,

Signed, A. S. FULLER,
NEW YORK, *Feb.* 10, 1862. ISAAC BUCHANAN,
Committee.

REPORT ON THE SANFORD FLAX DRESSING MACHINE.

The special committee to whom was referred the Sanford Flax Dressing machine respectfully report:

That your committee visited the premises of Messrs. Sanford and Mallory, and saw the machine in operation; they have also examined the testimony of several manufacturers as expressed in their certificates as to the superiority of this machine, and which fairly corroborates the statements of the owners of the patent.

The machine itself may be thus described: Its cost is $130; power required to move it at 125 revolutions per minute, one horse; the amount of straw it will clean per day, 500 lbs., yielding 20 per cent. or 100 lbs. of flax, which is worth from one to three cents per lb. more than flax as ordinarily prepared; the tow resulting is as 32 to 56 in favor of this machine, and in quality it is worth from one to two cents per lb. more than ordinary tow—that is, flax from this machine parts with, as tow, but 32 lbs., while the same quantity of flax prepared in the old way would part with 56 lbs. of tow of inferior quality. The increase in perfecting flax is therefore great.

The machine is simple and not liable to derangement, and free from the usual chances of accident to the operatives, requiring only one boy or girl to operate the machine, and one to prepare the straw. The whole machine is inclosed within a case and may be thus described:

Two feed rollers, the one of India rubber or other flexible material, the other of metal, corrugated, and so geared as to run either way, thus providing for the ingress and egress of the straw which is held in clamps so that it may be pressed into and pulled from between these feed rollers as required. The straw on passing through these rollers is impinged upon their rear by a cylinder armed with lugs, each alternate lug being slightly toothed, while immediately under the feed rollers is a small spider drum over which passes an endless belt, armed with lugs similar in form and use to those before described, so that both sides of the straw are acted upon alike, removing all the non-fibrous organic matter, and leaving the flax of the full length of the straw.

Your committee would recommend that the premium offered in the programme be awarded to this machine.

Signed, J. A. NASH,
JAMES J. MAPES,
Committee.

NEW YORK, *March* 24, 1862.

ESSAY

ON THE CULTURE AND PROPAGATION OF THE APPLE.

BY L. A. ROBERTS, BROOKLYN, L. I.,

For which the Gold Medal of the American Institute was awarded.

Although apple trees are sometimes successfully propagated by layers and cuttings, undoubtedly the best method is from the seed, and the best manner of obtaining seed is as follows:

Take the cores from nice, fair apples, grown on thrifty trees, always preferring seedlings; wash them entirely free from the flesh of the fruit and dry them slowly, carefully, and thoroughly. The cleaning is conveniently done by first rubbing the core or pommace through a coarse sieve, and afterward macerating or stirring it in a vessel of water, when the pommace will float and can be skimmed off, while the good seeds sink. It is common to take ordinary pommace from a cider mill, but in so doing you are more likely to get seeds from poor fruit grown on unhealthy trees than from such as you would desire.

Some persons plant the seed in the pommace without cleaning it; in such cases the seed is often destroyed by the malic acid of the fruit.

It has been held that stocks raised from the seeds of crab-apples were more hardy than from those of cultivated fruit. While this is doubtful, it is certain that stocks from such seeds are almost certain to be of slow growth, and to make but small trees. We cannot, therefore, recommend their use.

SEED BEDS.

Prepare seed beds by trenching or plowing a soil of sandy loam, at least eighteen inches deep; make it rich with well-rotted manure, and under no circumstances use raw or unfermented animal manure, for it will certainly breed insects, as well as destroy the young roots. Sow the seed, in the autumn, in drills from twelve to eighteen inches apart. Cover not more than one inch deep with finely pulverized soil, and spread a thin mulch of some light substance to keep the ground moist and prevent the weeds from growing. The seeds will commence coming up early in the spring, and continue to do so for several weeks. Seeds may be planted in the spring, in which case they must have been carefully kept through the winter in a slightly moist condition. This can be done by keeping them in a cool place in boxes of sand just wet enough to keep the seeds from drying.

The plants should not be allowed to stand closer in the rows than one in about two and one-half inches. Careful attention to them when quite young will save much future labor and insure a better growth. Weeds should not be allowed to show themselves, and the ground should be kept mellow by frequent stirring, and moist by gentle watering, if necessary.

When the young trees, generally designated as stocks, have attained a diameter at the ground of about three-eighths of an inch—which they should do in one year from planting—they should be transplanted to the nursery. The transplanting may be done in the autumn or in the spring. It is sometimes well and necessary to let stocks remain eighteen months in the seed-bed to attain proper size for planting. Those that do not attain that size in two years, may as well be rejected as worthless.

THE NURSERY.

Select for a nursery, ground that has not been previously used for that purpose; a sandy loam, easily worked, is best. It should be level, or if inclined the inclination should be slight, regular, and southerly. Thorough drainage is indispensable. It should be sheltered from the bleak north and westerly winds of our northern winters by some natural barrier—a hill or a belt of trees. We shall not recommend that the soil be *very* highly manured, or at least made much richer than the orchards into which the trees are to be finally set, as if it is, the trees, when planted out, are usually checked in their growth and make comparatively but little progress for two or three years. If you are not prepared to make your orchard rich, do not over-manure your nursery, and what you do put on should be thoroughly mixed with the soil by trenching or plowing at least ten inches deep—fifteen would be still better, and the whole sub-soiled fi f teen inches more. Avoid the use of animal manure, so far as possible, using ashes, muck, well-decomposed leaf-mold, bone dust, and things of like nature instead.

TRANSPLANTING.

Transplant from seed-bed to nursery in the fall. Raise the plants from the seed-bed carefully with a spade placed at such a distance and inserted so deep as to do as little injury to the roots as possible. Prune off all small fibres; they will never work again, but decay and transmit disease to the tree. Cut the tap-root and all others that show an exclusively downward tendency, and prune off all broken or bruised roots with a smooth cut. Open trenches, running north and south, and sufficiently far apart to admit of easy culture with a cultivator or horse-hoe, without injuring the trees, say from three and a half to four feet. Set the trees eighteen inches apart in the trenches; put the earth slowly and carefully about them that it may come in contact with all the roots; press it gently with the foot, using care not to displace the tree so as to make the row crooked. Set a trifle—say an inch lower in the ground than they stood before, for the soil will settle about them. Cut back to a vigorous bud one foot above the ground.

If the stocks have made a good growth, they will be ready for budding in one year from transplanting.

It is perhaps unnecessary to note that whenever care in culture has produced improvement in fruit, seedlings from such fruit sometimes improve on their parentage and furnish us with something still better. But there is a strong tendency for them to return to their wild or native character.

The chances for getting good fruit from seedlings are so few that from the earliest time of which we have horticultural knowledge, artificial methods for preserving and propagating varieties have been employed, among the principal of which are budding and grafting. We prefer the former for several reasons, among which are:

1st. It can be done when we have more leisure than in spring, the time when most kinds of grafting must be attended to. Root grafting is an exception, and has its advantages.

2d. In grafting, we are obliged to use two or more buds on one stock; in budding, only one. This, when propagating rare varieties, is sometimes important.

3d. If the first operation does not *take* or grow, we can re-bud. Grafting, illy performed, spoils the stock.

4th. Budding can be done more expeditiously than grafting.

5th. Root grafting can be done in winter, and consequently is not subject to the first objection; but when scions of strong and rapidly growing varieties are grafted on seedling stocks, they are very liable to burst the bark near the point of junction.

BUDDING.

The most successful mode of budding with which we are acquainted may be summed up as follows:

Select a branch, the terminal bud of which is plump and full. Usually, at least two buds from each end thereof are imperfectly developed, and should be rejected. Cut off the leaves, leaving about half of the foot stalk attached to the branches (fig. 1). Holding the small end toward you, with a sharp, thin bladed knife, cut out the buds, leaving about half an inch of bark above and below the *eye*, as the bud proper is technically called, cutting just deep enough to secure a little wood under the eye. It is not necessary to remove the wood from the bud in working the apple, although with some kinds of fruit trees it is important to do so.

FIG. 1.

The best budding-knife is a small one, with a thin blade, round at the end, around half of which the edge extends the remainder of the end, and an inch therefrom on the back, being quite thin. The lower one-third part of the blade is left dull, that the fore-finger may clasp it. An old-fashioned Barlow knife, with the end properly ground into shape, makes a good budding-knife. A knife of this pattern was first exhibited at the Farmers' Club of the American Institute, in 1859, by A. S. Fuller, of Brooklyn. It has been very properly designated "Fuller's Budding Knife."

On the north side of the stock, four inches above the ground, make a horizontal incision through the bark, being careful not to cut into the wood, of from a quarter to a half inch in length; from the middle of this incision make an incision of an inch downward, so that both incisions, taken together, shall resemble the letter T (fig. 2). Without removing the knife, insert the back of the blade under the bark, and loosen it to the horizontal incision by an upward movement. Lift the bark on the other side in the same way, using care not to injure the alburnum or substance between the inner bark and the wood. Take hold of the

FIG. 2.

foot stalk of the leaf and insert the lower end of the bud you have prepared as above, under the bark at the opening formed by the junction of the incisions, and gently push it down to near the bottom. The bark above the bud should now be cut so as to make an exact joint with the upper part of the horizontal incision, and the whole bound with threads of bass bark, woolen yarn, or some other soft material, so that every part of the bud shall be covered except the eye (figs. 3, 4, 5, 6). The bud should be inserted on the *north* side of the stock to prevent it and the young shoot from the direct rays of the mid-day sun.

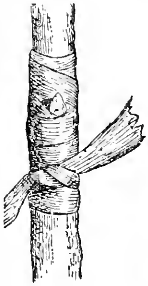


FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

Budding is usually most successful when done in August or September. *Just* the proper time is when the terminal bud of the stock is about half formed.

So soon as a union has been formed between stock and bud, which will be in about two weeks, the strings should be loosened, and when the union is complete, usually in from three to four weeks, they should be removed altogether. In the ensuing spring the stock should be cut down to within six inches of the bud. To this remaining part the shoot from the bud may be tied as it grows, until it has become sufficiently wooded to sustain itself, when the stock should be cut smooth diagonally downward from the place where the bud was inserted (fig. 7).

FIG. 7.

ROOT GRAFTING.

Should it be desired to pursue this plan for propagation, it should be done before planting in the nursery, the trees should be taken up in the autumn, the tap-roots cut off six inches below the top, and the bottom part thrown away. Grafts on the lower part will grow, but they will not make first rate trees.

Pack the stocks away, with the roots in sand, to keep them moist until such time as it is convenient to graft them.

Procure scions of ripe wood, firm and fully matured, from thrifty, productive trees in the fall, before very cold weather, and keep them in sand or moss moist, but not wet, in a place too cool for the buds to swell, but do not allow them to freeze.

When ready to use them, cut the scions in pieces of two or three buds each. With one upward stroke of a sharp knife, cut the stock from the crown or point where the root and top join at such an inclination that the length of the cut will be about four times the diameter of the stock. Select a scion as near the size of the stock as possible, and cut it at the same inclination with a downward stroke (fig. 8.) Place the two inclined surfaces together in such a way that the outer edge of the wood of each piece will come in contact with that of the other in as many points as possible without regard to the external portions of the bark. Bind the parts firmly in this position with strips of paper on which grafting wax has been spread.

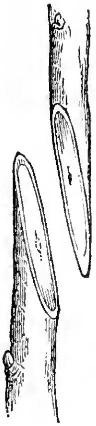


Fig. 8.

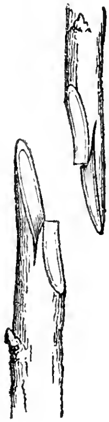


Fig. 9.

A more perfect contact of the parts can be obtained, and the chances of displacement lessened, by inserting the knife across the cut of both stock and scion and splitting them through the centre, (fig. 9.) so far that their parts can be sprung, and admit the shorter end of each into the split thus made in the other (fig. 10.) The edges of the wood should be adjusted, and the waxed paper applied as before (fig. 11.)

Fig. 10.

Fig. 11.

The best grafting wax is made by melting together four pounds of resin, two pounds of beeswax, and one and a half pounds of tallow. When thoroughly melted, pour it into water, and when cool enough to handle, work it thoroughly in the hands, remembering always that too much working won't injure it. The consistency of the wax is changed by the quantity of tallow used. It is applied to paper or cloth with a brush, after having thoroughly worked as above described, and then re-melted.

Every person should make his own wax, as, when improperly made, it does great injury to the trees.

After having grafted as described, the stocks should be replaced in sand. When the season is sufficiently advanced, they should be transplanted to the nursery in the same way as if directly from the seed-bed.

When trees in the nursery seem of feeble growth, or grow too luxuriantly from over-manuring, they will be improved by being cut back one third of their growth, and it is sometimes advantageous to repeat this operation twice, and even three times. The first cut should be downward from a strong, healthy bud; the second time it should be from a bud on the side of the tree opposite the one cut from before, in order to preserve a direct, upright growth.

When the tree has attained the height at which you desire the main branches to start—say from four to six feet, it should be stopped by pruning the ends, that from three to six lateral shoots may be developed.

Too much care cannot be had in the keeping and culture of a nursery. Weeds *must* be kept down and the ground kept mellow.

As an example of the way a nursery should be kept, it gives us pleasure to refer to that of Mr. William Reid, at Elizabeth, N. J., whose rule is to "take time by the forelock." He keeps all weeds, not down, but *away*, by keeping the ground stirred so often they do not have a chance to get up.

Annual top dressings of ashes, shell lime, muck, road scrapings, leaf mold, are any of them serviceable, and still better would be a compost of the whole.

THE ORCHARD.

In locating an orchard, the first thing to which attention should be directed is the selection of a proper soil; for although some varieties of apple trees thrive well on all the different soils, from a stiff, clayey loam to a coarse gravel, that which seems best adapted to the family at large is a rich, warm loam, with just enough sand to make it easily worked on a gravelly sub-soil. A true loam is for the most part readily soluble in water, and probably derives its name from its smoothness and softness. In this and more northern localities, a southeastern exposure, with a gentle slope, is best; next a southwestern; then south; while further south, a more northerly aspect is favorable. There are but few locations, if indeed there be any, that would not be improved by thorough underdraining.

An analysis of the apple-fruit and wood shows that it contains a large proportion of potash, soda, lime, and phosphoric acid. It is well if a soil can be found containing these substances in a proper condition to be taken up by the roots; if not, they must be supplied by the application of such manures as contain them.

Too much care cannot be taken to bring the ground in proper condition before transplanting the trees from the nursery, and every dollar spent in thoroughly pulverizing and mixing the soil will be paid back ten-fold. It is impossible to go too deep, for try your best, and roots will penetrate beyond.

The distance apart at which apple trees should be planted, depends very much upon the variety, some being naturally of an upright growth, others more branching. It being desirable to keep all varieties so pruned as to grow so near the ground as possible, we should never advise planting less than twenty-five feet apart, and think thirty preferable. If, however, you are determined to have fruit and other crops in the same field, the distance should be greater. We cannot, however, recommend this plan.

For setting in the orchard, select trees four or five years from the bud, straight and thrifty, with low branches—say from four to five feet above the ground. At this age they should be from one and a half to two inches in diameter, and from six to eight feet high. Those trees that require seven or eight years to attain this size, show, either from disease or neglect, too slow a growth, and are worse than worthless.

Transplanting on proper soil is best done early in the fall, as the roots will get in place and commence growing in the winter, ready to give the tops a good supply of food in the spring. On wet, heavy soils, however, spring planting is preferable.

Take the trees up carefully, in order to cut and bruise the roots as little as possible. Shelter them from wind and sun. Examine carefully every portion of the roots, remove all parts that are in any degree mutilated, and cut in others, always remembering to cut upward in such a manner that the incision will be on the lower side of the root, where it will be more likely to come in direct contact with the soil. If cut downward, the rootlets will not start so readily, and the ends will be very likely to decay in consequence of the water that rests on them as it settles.

It is impossible to give definite directions as to shortening in the top. That it should be done to some extent seems evident, when we remember that the tree has been deprived of a portion of its roots, through which the top received its sustenance. Generally, then, first prune to bring the tree into proper shape; next, shorten the limbs to balance as near as may be the amount of root that has been removed, cutting most those shoots that have a decided upward tendency, for the larger the space of ground you can make the branches of an apple tree cover, other things being equal, the larger will be your crop of fruit.

The ground having been previously prepared, holes for the reception of the roots should be made, and let them be so large that there will be no cramping or crossing thereof that did not exist in the nursery, and the deepest at the outside; first, to invite the roots from the surface; second, that the earth may not sink away, take the center of the tree down till it shall be lower than some parts of the root adjacent. Put in the earth slowly and carefully, being sure that it touches every portion of all the roots, pressing down that which is on top firmly with the foot to fix it in its place. The tree should be planted at the same depth it stood in the nursery.

Three stakes, to keep the tree in its place, should be planted at a distance of at least one foot from the tree, and equidistant from each other. The fastening should be of a material that will not chafe the bark, and be so loose as to allow a vibration of two inches in every direction.

We desire to impress the idea that no matter how perfect may be the tree, or how well adapted and prepared the soil, carelessness in planting will more than balance these advantages, and the orchard will prove a failure.

Better pay a competent, careful man ten dollars an hour for doing the work properly than to have it done as it most usually is, for nothing.

We have before noted our objection to cultivating other crops in orchards, and we do not believe the highest success can be attained when this is done. We would have the whole field kept mellow by frequent plowing and horse-hoeing, going deeper as you leave the trees. If any crops are cultivated, preference should be given to roots and hoed crops. Wheat is injurious, and rye should never, under any circumstances, be allowed; and never suffer a plow to come nearer than ten feet to the tree, under any consideration. Keep all weeds down for this distance by stirring the soil often with the fork and spade.

The practice of mulching trees, except perhaps for the first year or two after planting, we look upon as a choice of evils made by those who are unwilling to cultivate properly. Mulching will inevitably engender insects that will injure the tree, and with proper culture, is not at all necessary. It is a saving of labor at the expense of the tree.

From the first planting, the orchard requires the watchful eye of the cultivator, that it may be kept properly pruned. When is the best time to prune? has been well answered—whenever you see it necessary. In the spring, before the leaves start, there is more leisure, the bare branches better show their deformities, and encroaching limbs are more readily discovered. But whenever pruning is necessary, then prune, keeping in mind that the great object is to keep the limbs from coming in contact with each other, to prevent too thick growth, to preserve a good shape to the tree, and to encourage a good spread thereof.

All pruning should be done with a sharp knife, and the wound left as smooth as possible. With proper attention, it will never be necessary to remove a limb with a greater diameter than one inch. As the properties of the soil are constantly being used, they must be as constantly returned by proper manuring.

GRAFTING.

When trees bear their first fruits, we are often disappointed therein, as it frequently happens that whereas we had expected the best varieties, we only find those that are entirely worthless. Carelessness in selecting the scion from which the buds are taken is the chief cause of this trouble. When this occurs, we have, to make the tree of any use, to resort to grafting.

The physiological rules which govern propagating by grafting are the same as in budding, namely, inserting on one tree or stock a portion of the wood, with a bud attached, of the variety desired, in such a manner that a perfect union will be formed between them.

The manner in which grafting is usually performed on trees of any considerable size is known as cleft grafting. Cut the branches square across with a fine saw, and smooth them off with a sharp knife. They are then split down about two inches with a sharp

Fig. 12.

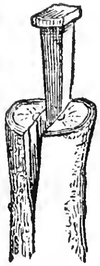


Fig. 13.

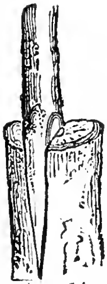


Fig. 14.

knife driven with a hammer or mallet, and a wedge inserted to keep the cleft open (fig. 13). Take a scion with two or three buds, and cut the lower end in the form of a wedge, being careful to leave the edges smooth (fig. 12). Adjust the scion on the outer side of the stock, so that the inner bark and stock of the scion shall come in direct contact, and withdraw the wedge (fig. 14.) Cover the end of the stock with grafting wax, allowing it to lap over the end about an inch. Rub it down smoothly, so as to make the joint between the scion and stock air and water tight, and entirely cover the cleft in the stock. When the stock is of sufficient size, say two inches, or more, in diameter, a scion may be inserted on both sides (fig. 15.) The weaker one may be taken off after the first year. The highest branches should be grafted first, and not more than one third, or, at most, one half, of the tree should be grafted at one time, as some leaves are necessary to assimilate sap for the sustenance of the tree.

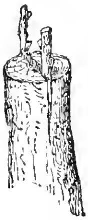


Fig. 15.

PREMIUMS

AWARDED BY THE AMERICAN INSTITUTE, 1862.

Agricultural.

D. H. Furbish, Portland, Maine, for the best machine for sowing cereals broadcast, (Cahoon's Broadcast Seed Sower.) Exhibited by Mapes & Lockwood, No. 23 Cortland street, New York. Gold medal.

A. M. Halsted, Rye, N. Y., for the best hand cultivator. Silver medal.

Whittemore Brothers, Chicopee Falls, Mass., for a chaff cutter. Exhibited by Mapes & Lockwood, No. 23 Cortland street, New York. Diploma.

Levi A. Beardslee, South Edmeston, N. Y., for a hay elevator and horse-power fork. Exhibited by Mapes & Lockwood, No. 23 Cortland street, New York. Diploma.

Whittemore, Belcher & Co., Chicopee Falls, Mass., for a hay and cornstalk cutter. Exhibited by Mapes & Lockwood, No. 23 Cortland street. Diploma.

Thaddeus Selleck, Greenwich, Conn., for an improvement in horse shoes, being the application of Franklinite. Diploma.

Hitchings & Co., No. 248 Canal street, New York, for improvements in heating conservatories. Gold medal.

Sanford & Mallory, No. 5 White street, New York, for Sanford's flax dressing machine. Large gold medal.

L. A. Roberts, Brooklyn, N. Y., for an essay on the cultivation of the apple. Gold medal.

Geo. H. Hite, Morrisania, N. Y., for a paper on pruning the pear. Diploma.

Mechanical.

Wm. H. Elliot, Plattsburgh, N. Y., for a revolving pocket pistol. J. W. Moore, agent, No. 426 Broadway, New York. Bronze medal.

Wm. Mitchell, Brooklyn, N. Y., for type-setting and distributing machines. Exhibited by John F. Trow, No. 50 Greene street, New York. Gold medal.

M. Ormsbee, Boston, Mass., for a photographic camera box. Large silver medal.

B. J. Burnett, Novelty Works, New York, for a ventilator for sick rooms and hospitals. Bronze medal.

Thaddeus Selleck, Greenwich, Conn., for coating and cementing iron with Franklinite. Gold medal.

A. H. Bartlett, No. 426 Broadway, New York, for the Gothic hot-air furnace. Exhibited by Bartlett & Lesley, No. 426 Broadway, New York. Silver medal.

Brown's Water Furnace Co., No. 274 Canal street, New York, for a water furnace. Silver medal.

Baker & Smith, 180 and 182 Centre street, New York, for improvements in steam heaters. Silver medal.

Geo. B. Turrell & Co., 626 Washington street, New York, for Baudellot's beer cooler. Silver medal.

ANNUAL REPORT

OF THE LIBRARY COMMITTEE OF THE AMERICAN INSTITUTE—1862.

The library committee of the American Institute, in conformity to section 47 of the by-laws, respectfully report:

The American Institute was incorporated to promote domestic industry in this State and the United States in agriculture, commerce, manufactures and the arts.

It was deemed by the founders of the Institute that a library was essential to the advancement of these objects. Statistics, especially such as related to the productive industry of the country, were necessary to aid the committees and members in making out reports on subjects that were constantly coming before the Institute. A library was accordingly projected and was styled "The Statistical Library of the American Institute." Members contributing $25 in money or books became stockholders and were entitled to take books out of the library, while members who had not taken a share were only allowed the use of the books in the rooms.

The contributions to the library were not very rapid, and as the members of the Institute were composed of gentlemen in nearly every department of life, the volumes contributed were necessarily of a miscellaneous character.

Had the books been purchased under the supervision of a library committee, it is not likely that any considerable number of works other than scientific would ever have appeared on the shelves of the library.

In 1850 the library committee having in view the reorganization of the library, submitted the following plan for the action of the Institute: "That in consideration of the surrender by the stockholders of their interest in the library as such, a resolution will be introduced at the next regular meeting of the Institute to make them life members, whereby they will not only retain all the privileges they now enjoy, but also be admitted to the fairs and lectures of the Institute free of charge."

A majority of the library shareholders agreed to surrender to the Institute their shares in consideration of being made life members. This proposition being accepted, the library thus became the sole property of the Institute.

For some years past the library committee have confined their purchases to works treating on agriculture, manufactures and the arts, with the exception of works on other subjects to complete sets already in the library.

It is thus gradually acquiring a solid and substantial character as a scientific library, and for the number of volumes which it contains is perhaps the most valuable, and purely scientific of any library in the country. It is the constant resort of members, inventors and others, for reference, as many of its practical works are not to be found in other libraries in the city,

While the library committee have cared for the preservation of the volumes already in the library, and to the completion of sets of works of importance, they have not overlooked the suggestions of members in the purchase of new books, as will appear by reference to the list of purchases herewith annexed.

The donations and exchanges during the year have been larger than for a number of years past, and your committee take this opportunity of acknowledging the valuable contributions from the Imperial Agricultural Society of France; Imperial and Central Society of Horticulture, France; Imperial Society of Acclimation, France; Mons. A. Vattemare, France; Imperial Academy of Sciences, St. Petersburgh; Trades Society of Lower Austria; Royal Agricultural Society of England; Society of Arts, London; Smithsonian Institute, Washington; Commissioner of Patents, Washington; Commissioner of Indian Affairs, Washington; Lieut. Gillies National Observatory, Washington; Maryland Institute, Baltimore; Massachusetts Board of Agriculture; Maine Board of Agriculture; New Hampshire Agricultural Society; Hon. Preston King, U. S. Senate; Hon. F. A. Conkling, House of Representatives; Board of Supervisors, New York; Commissioners of Emigration, New York; Astor Library; Governor E. D. Morgan, Albany; Regents of the University, Albany; L. S. Doty, Albany; C. Van Benthuysen, Albany; Edward Walker, Thomas McElrath, Prof. James J. Mapes, John M. Ferrier, Chas. A. Seely, J. M. Sanderson, D. T. Valentine, Jireh Bull, George Peyton, S. W. Francis, Thomas F. De Voe, New York.

The following communication was received from M. Alexander Vattemare, the founder of the system of International Exchanges. The works he refers to, embracing one hundred and sixteen volumes and reports on the subjects of agriculture, manufactures, and the arts, have been received. They form a valuable addition to our library:

To the Corresponding Sec'y of the American Institute:

"A long and most painful disease, which kept me nearly two years from my office, the overwhelming business accumulating during this long absence, as well as the desire of forming a collection of publications of interest to the Institute, and procuring the numbers and volumes wanted to complete your series of French publications, are my apologies for having been so long acknowledging your kind letter, as well as the case containing the nineteen copies of the Transactions of the Institute for the years 1854, '55, '56 and '57, which case reached my office on the 23d of March, 1861.

"These Transactions were presented in the name of the Institute, to their proper destinations, and received by the Imperial Academy of Sciences and the other scientific societies, public establishments, and private individuals with the greatest gratification, and all of them requested of me to address to the Institute their grateful acknowledgments for the same.

"You will find in the enclosed list the best evidence of the ever increasing popularity of the system of International Exchanges, an intellectual and peaceful link of nations, which ought never to be interrupted, for scientific intercourse in pursuance of its philanthropic aim overleaps the barriers often raised by prejudices or misunderstanding.

"Knowing, as they do, my devotion to the welfare of the American people, I trust that the Institute will appreciate my ardent desire, to see the interchanges between our two countries, carried on just now as actively as ever, showing thus to those unacquainted with the inexhaustible resources of your blessed country, that there is no alteration in the progress of America's glorious destinies.

"The members of the Institute may, perhaps, take the initiative in this patriotic act, by inviting their fellow-citizens to add to the Transactions of the Institute, what they can spare, such as books, pamphlets, maps, charts, &c., enabling me thus to do here what I did in 1848, '49, in the United States, by receiving and distributing in the name of France the most beautiful specimens of her genius, and without interruption, not even during the terrible days of revolutionary struggles, which overthrew a throne, and deluged Paris in blood, communicating among your people our faith in the speedy restoration of prosperity and confidence in the public credit of our country.

"The case containing the works inscribed in the enclosed list is not shut up yet, because I am waiting for the volumes to complete your series of the "*Societé Imperiale et Centrale d' Agriculture*," as well as the "*Bulletin de la Société d'encouragement pour l' Industrie Nationale*," wanted to complete your series of French publications; both societies have ordered them to be delivered to me, but the difficulty of completing those series is the cause of this long delay in transmitting them. Yet, you are sure to receive them, only I would not inscribe them in the list before being in possession of them.

"Hoping that this letter will find you in good health, and begging of you to be kind enough to present my affectionate respect and devotion to the members of the Institute, with the assurance that as long as it will please the Lord to keep me on this side of the grave, the Institute will always find me ready and most happy to attend to their wants within the limits of my humble power in anything connected with the specialty of labors of the Institute.

"Very respectfully, yours,

"ALEXANDER VATTEMARE."

The number of volumes in the library at the date of the last report was				8,012
Volumes found in the library not numbered				87
				8,099
Added during the year by	purchase	54		
	subscription	25		
	premium books	5		
			84	
	exchanges	73		
	donations	66		
			139	
				223
Total volumes in the library				8,322

In consequence of the depressed state of the times the library committee deemed it inexpedient to offer the duplicate volumes for sale; and only a very few have been disposed of.

Of the appropriation made in 1851 there still remains a balance of $154.62 unexpended and at the disposal of the library committee.

The catalogue containing 212 pages was printed in 1852; a supplement of 132 pages was added in 1857. It is very desirable that another supplement be printed containing the additions made to the library up to the present time, and we hope that permission will be given to our successors to have the work put in hand at as early a day as practicable.

The year through which we have passed has been the most remarkable in the annals of our country's history. The public mind has been almost exclusively occupied with the existing rebellion, yet while the peaceful pursuits of our countrymen have been so generally exchanged for the camp and the battle-field, your committee are not without substantial evidence that the particular interest entrusted to their care by the Institute during the past year, has at no period during its existence been in more prosperous circumstances, nor its usefulness more highly appreciated.

All of which is respectfully submitted.

WILLIAM HIBBARD,
EDWARD WALKER,
JIREH BULL,
JAMES K. CAMPBELL,
Library Committee.

NEW YORK, *January* 31, 1862.

BOOKS PURCHASED DURING THE YEAR ENDING JANUARY 31, 1862.

SCIENTIFIC.

Encyclopædia Britannica. Vol. 21, and Index.
New American Cyclopædia. Vols. 11, 12 and 13.
Nichol's Cyclopædia of Physical Sciences.
Leibeg & Kopp's Progress of Chemistry. Vol. 4.
Morfit's Applied Chemistry to the Manufacture of Soap and Candles.

Morfit's Chemical and Pharmaceutic Manipulations.

Abel & Bloxam's Hand Book of Chemistry.

Gregory's Inorganic Chemistry.

Anderson's Agricultural Chemistry.

Wise's History and Practice of Aeronautics.

Isherwood's Engineering Precedents. 2 vols.

Williams on Heat, and its relations to Steam.

Descriptions des Machines et Procédés Spécifiés dans les Brevets d'Invention. By M. Christian. Vols. 5 and 6.

History of Railroads and Canals. Vol. 1.

American and European Railroad Practice in the economical generation of Steam.

The Permanent Way, and Coal Burning Locomotive Boilers of European Railways.

The Economy of Steam Power on Common Roads.

Rankine's Manual of the Steam Engine and other prime movers.

Darwin on the origin of Species.

Year Books of Fact, in Science and Art. 3 vols.

Manual of Scientific Discovery. 1861.

Loudon's Arboretum et Fruiticetum Britannicum. 8 vols. 2,500 engravings.

Hooker's Icones Plantarum or Figures with brief descriptive characters and remarks of new and rare plants. 4 vols.

London Farmers' Magazine. 1861. 2 vols.

London Mechanics' Magazine. 1861. 2 vols.

Artizan. 1861.

Newton's London Journal. 1861. 2 vols.

Practical Mechanics' Journal. 1860–61.

Repertory of Patent Inventions. 1861. 2 vols.

Quarterly Journal of Agriculture and Transactions of the Highland Agricultural Society.

Silliman's American Journal of Science and Art. 1861. 2 vols.

Scientific American. 1861. 2 vols.

Journal of the Franklin Institute. 1861. 2 vols.

HISTORY AND TRAVELS.

Benton's Debates. Vols. 15 and 16.

Irving's Life of Washington. 3 vols.

Barth's Travels and Discoveries in North and Central Africa. Vol. 3.

Humboldt's Cosmos. 3 vols.
Holton's New Grenada—Twenty months in the Andes.
Macaulay's History of England. Vol. 5.
British Almanac.
American Almanac.

MAGAZINES AND REVIEWS.

Blackwood's Magazine.
Edinburgh Review.
North British Review.
Westminster Review.
London Quarterly Review.
Merchants' Magazine.
De Bow's Review.

PROCEEDINGS OF THE FARMERS' CLUB.

Rules and Regulations of the Farmers' Club, 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, &c., shall, as formerly, be under the control of the Recording Secretary.
4. The Club shall be called together from 12 M. to 2 P. M.
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 Recording 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 1 o'clock (but may be introduced earlier by vote of the meeting), and continue until 2 o'clock unless a vote 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 6, 1861.

Mr. John G. Bergen in the chair.

EFFCTS OF FROST.

Several members having spoken of the effects of the late frost in destroying fruit buds,

Mr. Fuller stated that he had noticed that varieties with pubescent leaves were uninjured, while others with smooth leaves and supposed to be equally hardy, had been destroyed. For instance, among grapes, with shoots of the same length, about 1½ inches, the Delaware was uninjured and the Taylor killed. Of hardy native fox-grapes, Blood's Black was uninjured and Blood's White was killed. The Diana, Concord, and Hartford Prolific were all uninjured. He would not lay this down as a rule for want of more extended experience, but made the remark as a suggestion to future observers. Some varieties of trees escaped by coming out late, as Rawle's Genet and the Northern Spy.

Mr. Carpenter said that Wilson's strawberry, and the Jenny Lind, and Scott's seedling, the latter being sweet strawberries, had escaped the frost. Downer's Prolific seemed also to be perfectly hardy. The Hooker had been frozen out.

Prof. Mapes remarked that in using a cold frame it is not at all necessary to guard against freezing, but to take care and not let it thaw. The cold may be the original cause of the harm, but the sudden increase of heat is the danger to be guarded against.

MARKET GARDENING.

Mr. Trimble suggested for discussion "The Agricultural Topography of Eastern Virginia with reference to Supplying the New York Market." He considered it important, especially at this time, that this subject should be taken up and considered by the club. These gardeners contributes to the comfort and pleasure of life by prolonging the season for vegetables, and ought to be protected.

Next subject for discussion: The subject of Indian corn and potatoes was continued.

Adjourned.

May 13, 1861.

Mr. Edward Doughty, of Newark, N. J., in the chair.

A NEW MANURE.

Dr. J. A. Thompson described the composition and mode of manufacture of a new disinfectant and manure, the basis of which is the Cayuga plaster. This plaster has been extensively used in Western New York as a top dressing with good effect. The new manure contains six parts out of twelve of this Cayuga plaster. When thoroughly dry, two parts, by measure, of lime of the best quality, are added, while hot, and ground with the plaster. Any superfluous moisture will thus be taken up by the lime. From wood of a porous structure a charcoal is then prepared, such as is best suited for disinfecting purposes. The wood is converted into charcoal in an iron cylinder. The charcoal thus produced is ground in an ordinary cob mill. Certain kinds of wood, containing upon analysis large quantities of the earthy phosphates, are burned in such manner that their ashes can be taken up clean and pure. Two parts of the charcoal, one part of these ashes, and one part of common salt are added to complete the compound, the ashes and the salt being mingled with the charcoal at the time of grinding. Then the composition is packed in air-tight packages, or sacks made air-tight, and is ready for use.

As an ordinary top-dressing, from one two hundred pounds per acre would be required, and the cost would be less than $20 per ton. This compound is submitted as containing all the most valuable inorganic elements required by the growing plant. If the club would appoint a committee to experiment with and report upon this manure, he would furnish them such quantities as they might require for that purpose.

A committee was appointed consisting of Messrs. Carpenter, Pardee, Gale, Robinson, Hite, Trimble and Bergen.

Dr. Trimble said that he had experimented with plaster and found the results sometimes very great and sometimes imperceptible. Upon rows of corn, it would make them green, but produced no better corn. Probably the committee would come to very different results with this manure from differences of soil and other conditions.

Mr. Robinson stated that his experience had been that plaster does not increase the grain but the blade, and is valuable in raising fodder.

Dr. Thompson.—It takes 400 parts of water to dissolve one part of plaster. If there comes a heavy rain before it is gradually dissolved and taken up by the plants, it may be washed away.

Mr. Capenter.—In a dry season plaster has no effect, while in a wet season the effect is very great. When used too frequently it may lose its effect.

Prof. Nash believed that on sweet land, moderately manured, plaster always pays. He had found that the best farmers recommended its use. If it is a dry season when it is applied, it will not show the effect until the following year. The farmer is certain to get its value sooner or later. As it dissolves so slowly the farmer may put it on either 100 lbs. a year or 400 lbs. once in four years, as is most convenient. Its use is not merely to furnish sulphuric acid and lime to the plants, but to give retentiveness to the soil, to take up gaseous substances from manures, decayed grasses, or from the atmosphere, such as are required by vegetation.

Dr. Thompson remarked that he found it best not to grind the plaster to an impalpable powder, but to leave it sufficiently coarse to require time for its complete solution.

Mr. Bergen presumed that the farmer for one-half the cost could sow his plaster, lime, sulphur, charcoal, ashes and salt, in such proportions as his land might require them. However valuable the manure might be, it seemed necessarily an expensive way to obtain it.

Mr. Pardee said that much of the value of the manure depended upon its containing the right ingredients mixed together in the right proportions and under the right conditions. Sowing the different ingredients separately would not have the same effect. The manufacture requires an apparatus and a degree of skill and chemical knowledge which renders it impracticable for the farmer to undertake it.

SPRING PLANTING.

This subject was postponed until the next meeting, and made the subject for discussion at that time.

Adjourned.

May 20, 1861.

Mr. W. S. Carpenter in the chair.

DECEASE OF JUDGE MEIGS.

Mr. Robinson.—I rise, not to move business, but out of respect to the memory of Judge Meigs, who departed this life at half past ten o'clock this morning, to move an adjournment of the Farmers' Club. Long years we have had him with us, one of the leading spirits of this Club, and I think it is due to his memory that the Club should adjourn in consequence of his death.

Mr. Pardee.—I cordially second that motion. The memory of Judge Meigs is very pleasant to us all—very courteous, very gentlemanly, very intelligent upon a great many subjects. We shall never forget the pleasant hours we have spent here with him.

The Chairman.—I can add my testimony to the worth of this departed friend. I have received great satisfaction and information from my intercourse with him. He has been an advocate of agriculture and horticulture to as great an extent, perhaps, as any member of this Club. It is with deep regret that I have heard the announcement of his death. We shall certainly mis him here, as a friend and as a co-worker with us in the objects of this Club.

Prof. Nash.—I most heartily concur in all that has been said. I hear of the death of that good man, so devoted to agriculture, with uncommon grief, though he had lived to a good age, and has been long useful. I hope that the motion will prevail.

The motion was agreed to, and the Club accordingly adjourned.

May 27, 1861.

Prof. J. A. Nash in the chair.

DECEASE OF JUDGE MEIGS.

Dr. Waterbury.—We have met with a very severe loss in the death of the secretary of the American Institute and of the Farmers' Club, Judge Meigs. Other gentlemen here may have had a longer acquaintance with him than I, but few have been more intimate with him. He was a man of more than ordinary capacity; his great age gave him experience, while the powers of his mind were undimmed. Slower, he might have been, in his later years, in coming to his conclusions, but never, when reached, were his conclusions more sound. His experience followed the whole existence of our republic. Judge Meigs was educated very thoroughly, in the old-fashioned time, and there are few in this country whose learning extended over so wide a field. With classical matters he was perfectly familiar. When you carried him back into the Hebrew or the Sanscrit he was not lost; yet he brought his powers to bear upon the most common affairs of life; nothing relating to industry or economy was beneath his notice. I feel that every member of this Club will respond to the following resolution:

Resolved, by the Farmers' Club of the American Institute, That the loss of its secretary, Hon. Henry Meigs, is one that cannot be repaired. As a body we can only join with the family and friends of the departed, in mourning the loss of a man whose whole energy of life has been for years devoted to the best interests of agriculture, and whose extensive learning enabled him to do much for the cause to which this Club has long been devoted—improvement and extended information in agriculture. As friends of that cause we sincerely mourn the loss of our friend—the friend of humanity.

The resolution was unanimously adopted.

PATRIOTISM OF THE FARMERS.

The Chairman remarked upon the noble part taken by the farmers in the present crisis. A supply of provisions is the first necessity in war as in peace. He believed that the men who cultivate the soil in the southern states would be the first to return to their allegiance.

Dr. Waterbury.—The north cannot only carry on the war, but take care of its agricultural interests besides. The soldier must be well fed in order that he may fight well; and that party which could best feed its soldiers would inevitably win the day.

The Chairman read an article from a newspaper, with regard to the "flax-cotton." He expressed the opinion that flax might yet be used as a substitute for cotton. It might not be so durable, but would be cheaper. Chemistry has done a hundred things kindred to that. When we can accomplish this, cotton will no longer be king. Illinois alone can produce 200,000 bags of flax yearly.

Dr. Waterbury explained the peculiarity of the fibres of flax, cotton and wool, saying that the microscope shows why cotton is king; that it is in consequence of the peculiar shape of its fibre.

WHAT CAN YET BE PLANTED.

Mr. Robinson read an article upon this subject, together with a letter from a woman, urging the planting of corn and root crops to meet the wants of the coming year. Indian corn, especially the improved King Philip, can be planted up to the 10th of June. Corn of almost any kind will produce a valuable fodder crop up to the first week in July. Buckwheat, field beans and pumpkins may be sown until June 10th. Still later, a most important crop, the root crop, can be put in.

Dr. Trimble said that in the latitude of 42°, upon the North river, he had found the first of June to be the best time to plant corn. He left the ground, a sod, unplowed until that time, then plowed it, harrowed it thoroughly, and planted his corn. The consequence was that it would germinate quickly, get the start of the weeds, and require very little cultivation through the season, compared with that planted earlier. And although the corn would appear to be late, he had always found that the two weeks of hot weather in September would ripen it effectually. He had known a farmer in Pennsylvania to obtain a good crop from corn planted on the 17th of June. For many years he had sown buckwheat from the 4th to the 19th of July; and the best crop he ever had, was sown upon the 11th of July. It is a little hazardous, but as you get clear of the frost, in sowing at that time, the crop is the best. The hot weather seems to blight the earlier blossoms. Shoots are sent out in succession for a number of days. Turnips he would sow the first of August. Sweet corn, for boiling, may be planted at any time up to July 10th. He had matured the seed of sweet corn planted on July 1st.

Dr. Waterbury said that the produce of corn would depend upon the aggregate amount of sunshine that fell upon it during its growth. He preferred using varieties requiring a long season, when he could. If the spring was backward he would go north for another variety. His neighbors never could do so well, in a good season, with the eight-rowed Canada, as he could with the sixteen-rowed North river corn. The only difficulty was that he had to be exceedingly careful in curing the stalks. He concurred with Dr. Trimble's suggestions as to the cultivation of corn. It ought to be planted upon sod-land, and the ground should not be touched until just before planting. The growth upon that sod, previous to planting, will be wholly assimilated by the corn crop before fall. As to buckwheat, he had sowed it about the 4th of July. It is an object to have it filled in cool weather.

Mr. Gale said that whether corn is planted earlier or later, the ground must be brought to a certain temperature, probably about 56° Fahrenheit, before the corn will germinate at all. If put in before that it might as well be in the corn-crib as in the ground. He mentioned having raised an excellent crop of corn, which was planted while his neighbors were hoeing their corn, upon a field which he had intended to mow. He would not put corn into the ground until he was satisfied that it would germinate in six or seven days. In 1857, while his neighbors planted corn, some of them three times, he had no trouble. He planted later, and covered it not exceeding half an inch. He had the best corn raised that season within five miles of it, and attributed it to these facts. As to buckwheat, the 4th of July was early enough. It is a very peculiar cereal, and if it does not happen to have the right weather at the right time it is sure to blast.

Mr. Robinson would not follow the almanac in corn planting. The old Indian rule was a much better guide, to plant corn whenever the leaves of the oak tree in that neighborhood are of the size of a squirrel's ear. When the oak leaves have made a fair start it indicates that the condition of the earth and atmosphere are sufficiently advanced for the planting of corn. Sometimes that will be the 15th of May; sometimes not until the 10th of June. He had heard Judge Meigs frequently remark that the oak tree was more infallible than the almanac maker.

Dr. Trimble stated, another good rule to be, to plant when the blossoms of the dogwood are fully expanded, perfectly white, and beginning to drop off. The depth to plant depends upon the season. Early in the season, or in moist weather, we may cover lightly; later, especially if it is dry, we must cover deeper, in order that the corn may be surrounded with the moisture necessary for its germination.

Mr. Robinson.—The proper time to cultivate corn is before it is planted, by preparing the ground thoroughly. The suggestion of Dr. Trimble he approved. He would spread the manure intended for the corn upon the grass, and let it lie until planting time, and then turn the sod over from five to eight inches, running the subsoil plow as deeply as possible in the bottom of each furrow, and then harrow the ground thoroughly. If the ground has been previously subsoiled, and will bear to be turned up with the Michigan plow, there will be no occasion for harrowing. Then the after cultivation will be to go over the ground with the horse-hoe to keep the surface mellow, and the crop is certain.

Prof. Nash stated the results of experiments in plowing manures under, showing that upon sandy soil, where the manure was plowed in four inches deep, the product was greatest. Upon a retentive soil the depth should be less; a single inch may be sufficient. If the manure is sufficiently near the surface to receive the proper warmth and moisture, it is readily decomposed. If plowed under to the depth of eight inches it will be decomposed very slightly, and then not into the compounds valuable to the plant, but into those which are absolutely hurtful. A farmer who plowed a large quantity of manure sixteen inches below the surface, never could perceive that any benefit resulted from it, either to that or to future crops. Probably the manure was all converted finally into compounds, many of which were poisonous, so that it did more harm than good. If corn is hoed after harvesting, the roots are so torn as to injure the crop.

Mr. Gale related his experience in corn culture. He plants his corn at the distance of three and a half to four, by five feet. He expressed the opinion that every time the ground is moved in the cornfield the crop will feel the advantage of it. If the man who plowed his manure so deep, had had his land so thoroughly disintegrated that the roots of the plant could reach it, he would probably have been benefited; but his own rule would be never to put manure into the ground at all; it needs air as well as water to act upon it, in order that it may be decomposed, and take the condition in which the plant can appropriate it.

Mr. Lodge stated that corn should never be worked after the braces begin to be thrown out from the bottom of the stalk. If earth is put upon them then they become soft, and are unfit to support the corn. The corn should be planted in warm, well pulverized ground; the surface should be kept clean and open until the braces appear, and then it should be left undisturbed.

Mr. Robinson said that the subsoil plow is the best implement for working the rows for corn, and for working the corn when it is young.

The subject selected for the next meeting was, "What may yet be Planted." Adjourned.

June 3, 1861.

Mr. Edward Doughty, of New Jersey, in the chair.

ROSE SLUGS.

Dr. Trimble inquired whether cutting down a few bushes containing slugs, the others being free from them, and burning them, would not be the best remedy; whether the bushes would not shoot up again and make good bushes hereafter; or whether it would be necessary to kill the slugs individually.

Mr. Robinson said that he had found the aphis worse than slugs, and proposed that the subject should be considered at the next meeting.

TURNIPS.

Dr. Waterbury said that there would soon be a call for cavalry for our army, which would create a demand for forage for the horses. To supply this, horned cattle and sheep should be taken from the hay-mow, and provision made for feeding them on turnips. It is not too late in the season for sowing that crop.

Dr. Trimble suggested that the blockade of the Southern ports had cut off that market for our hay crop, and hence that which was formerly sent thither will be on hand for the army horses. Many articles of consumption are now unusually low, because there is no market for them in the South. Even eggs were sent from New York to Galveston, last year.

Mr. Carpenter considered the turnip crop important for the health of cattle. They will thrive better with an occasional mess of turnips, and if necessary can be fed with them altogether. In England the turnip crop is considered one of the most valuable crops grown. Cattle are fatted on turnips principally. Turnips can be raised very cheaply; they cost but 7 cts. per bushel, and sometimes even less, but little more than the cost of storing. Nor is it too late to sow buckwheat, or even corn. The finest crop of corn he had ever raised was planted after the 5th of June; although that is too late for corn as a general rule.

Dr. Waterbury said that history showed the effect of war to be to raise the price of agricultural produce. If prices are now lower, it is merely the temporary result of shutting up the outlets. The kind of turnip he preferred, was the ruta baga, being richer and containing more substance than the white turnip. The white turnip contains so much water that cattle are sometimes said to do better, on feeding them with turnips, if denied all other water than that contained in their food. The ruta baga turnip can be planted in drills, either with a small sowing-machine, or by attaching a tin cup with a small hole in the bottom, to a stick, for a handle, so that the seeds may rattle through the hole. Turnips require the best of land. The rows ought to be from twenty inches to two feet apart. If the land will yield 100 bushels of corn to the acre, he would recommend the distance of two feet. It is well to mark the rows by placing a long board four inches wide by the side of the row in planting, and walking across it. This makes a mark which can be readily seen for a month. One half the trouble of taking care of the crop will be saved by keeping ahead of the weeds. As soon as there are any signs of vegetation of any kind, the hand hoe should be passed between the rows. It may be necessary to do this a second time; but it will be very little trouble compared with weeding. As soon as the rows are visible, the cultivation may be done by horses; for the horse will keep between the rows if he can see them. What sort of an implement shall the horses use? The common plow throws the earth over upon the rows. The cultivator moves with too much irregularity. Construct a skeleton plow of wood, after the pattern of the common plow, taking the beam, one handle, and the land-side, and to that land-side bolt a common cast iron plow point, so as to stand at the same pitch with the common plow; and it is just what is required. It will raise a furrow which will fall in again behind the point and break in pieces; it will destroy the weeds; and yet it will not cover the rows. In thinning out the crop, if for the market, they should be left about a foot apart; but in raising for stock they may be left nearer. It is unnecessary to pull out every plant singly; but they may be thinned with the hoe; and two or three left together will grow nearly as large as one in the same place. The best way to prevent injury from the bugs is to provide for them, to sow the roots thickly enough to feed the bugs and yet leave all that are required. The harvesting of turnips is an easy matter. They will keep best if buried in the field; but for feeding to stock in the winter it will be necessary to put them into the cellar. The amount of stock a farmer keeps is the key to his prosperity; and that will be governed much by the amount of turnips he raises.

Prof. Nash regarded the turnip crop as of great importance in the present crisis, although not so important permanently. Every country must have its fallow crops. The old principle of fallowing has become obsolete. Instead of the naked fallow, intelligent farmers have fallow crops, which, while they may be in themselves profitable, have the effect of preparing the ground for other crops and clearing it of foul weeds. The great fallow crop in England is the turnip, from a climatic necessity. Indian corn is our fallow crop from climatic experience. The turnip never can take that place in this country, any more than Indian corn can take it in England. Corn is a tropical plant, requiring a hot sun, and will not flourish in the continual fogs of England; but in that moist climate the turnip will do better than here. It has been the salvation of England. Her advancement this day rests upon the turnip, and nobody can over-estimate its importance to that country. But in this country it is otherwise. Corn is our great crop. We are destined never to raise less than $500,000,000 worth of corn excepting in very bad years. Even in New England we have three months of tropical weather; and what is more, we have sixteen hours of sun then in the day, whereas they have but twelve hours under the equator. Many farmers may laugh at the idea that corn is a fallow crop; but we accomplish precisely the same results with our corn that the Englishman does with his turnips. We break up the land, manure it heavily, and raise a tremendous crop of corn, and the land is then ready for wheat.

But this year we want every farmer to put in a crop of turnips. The English thin their turnips with a machine which has revolving knives so placed as to cut away about nine inches in every foot of the rows. But it will often happen that the cutter will destroy all the turnips in one place, leaving the row untouched where there are no plants. For this reason, he would not recommend that machine. A greater weight of turnips can be raised by placing the rows at least twenty inches apart, and thinning the turnips to a distance of twelve inches than by having them closer together.

Dr. Waterbury said that while corn was the true fallow crop of this country, yet the turnip crop was the most profitable, if the land is in a proper condition, and the same amount of money is put upon it. An acre of land, for instance, will raise 1,000 bushels of turnips at 20 cents, or one hundred bushels of corn at fifty cents.

Mr. Adrian Bergen said that in consequence of the too early planting of corn this year, it had become necessary to go over the ground and take the hard crust off the top of the hill in order that the corn might be able to come through. It would be better to plant it the first week in June than the first week in May. One difficulty in comparing the profits from corn and turnips arises from the fact that another crop can be taken from the same ground with turnips, but not with corn. Early potatoes may be dug in July, and a crop of turnips raised from the same land; even ruta bagas can follow potatoes in this way.

Dr. Trimble.—In England the turnip crop can stand out all winter, and the stock can be fed in the field. Besides, it requires more labor than corn, and labor is cheaper there. In consequence of their climate, it is there a certain crop; while here it cannot be relied upon. About once in ten years we get a good crop. It is not yet too late to plant corn for next winter, because it is a backward season.

Mr. Carpenter never failed in growing ruta bagas, planting them from the 20th of May to the 5th of June. If put in later he had not found the crop so satisfactory. He paid no regard to the quality of the soil, unless sandy or weedy, but took pains to have it in good tilth. About 200 lbs. of Peruvian guano, with an equal quantity of plaster, should be scattered along the top of the ground to mark the rows and keep the insects away. At the second hoeing he would thin them out to ten or twelve inches. Barn-yard manure is not so good for them, as it is filled with the seeds cf weeds. White turnips he had raised, without any expense, among his corn, sowing it at the last hoeing. When the corn is cut they are still small; but they then receive plenty of light and grow rapidly. He was satisfied that the strap-leaf turnip was worth more than 7 cents per bushel for feeding to cattle, while their cost did not exceed 3 cents per bushel.

The crop of carrots is very valuable, and is unfailing. They may be planted until the 10th of June. They are more trouble to cultivate, but are considered worth nearly as much as oats.

Prof. Nash.—There is nothing more unsettled than the question how much turnips are worth. Many men of sound judgment will say they are not worth a fig; that they find that their cattle eat as much if not more hay, when fed with turnips, and come out no better in the spring. Others place an extravagant estimate upon it. The corn crop is almost sure. Even in 1816, the poorest year for corn for many years, there was a two-thirds crop. The turnip crop must in this country inevitably be uncertain.

DRIED CURRANTS—KIRKLAND APPLE.

Mr. Robinson exhibited specimens of currants, dried in the sun, by Mrs. Hite, some of which had been kept three years. There is no necessity for importing so much dried fruit, when every family can so easily prepare so excellent an article.

Mr. Pardee said that it was much better than the imported fruit, and suggested that it could be mixed with dried apples for pies, &c.

Mr. Pardee exhibited a specimen of the Kirkland seedling apple, perfectly sound, although it had remained all winter in a warm room. The flavor remained uninjured.

Mr. Hite stated that the cherry currant has too large seeds for drying; that the small red Dutch currants are the best.

Mr. Pardee suggested the Versailles currant, as having small seed, and being well flavored, while as large as the cherry currant. It is a new French variety.

GAPES IN CHICKENS.

Mr. Carpenter inquired the cause of gapes in chickens.

Dr. Trimble stated it to be a worm in the throat of the chicken. If chickens are not hatched until July, they are not so liable to the disease.

Mr. Bergen had never lost a chicken from the gapes. He could only attribute his exemption to the fact that he always kept grain within reach of the chickens. Whether that was the cause or not he could not determine.

Mr. Doughty had observed that when feeding chickens on Indian meal, they had been troubled by the gapes; and upon being fed upon dry cracked corn, they ceased to be so troubled.

Mr. Carpenter.—I am in the habit of keeping grain constantly by my fowls, and I also have fed them on cracked corn. Yet they have the gapes. As soon as they are large enough to eat corn they are safe.

Mr. Gore, finding his chickens troubled with the gapes removed them from the house to a place where they could get fresh water, and they were no longer troubled with them.

Dr. Trimble was of opinion that the cause was the deposit of an egg in the mouth of the chicken by a fly. This is hatched and becomes a larva, like the bot fly in horses, and the insect in the heads of sheep.

Dr. Waterbury suggested the importance of a large supply of fresh air to all fowls.

The subject selected for the next meeting was "Flowers, Indian corn for Soiling, and Strawberries."

Adjourned.

June 10, 1861.

Mr. Hawxhurst in the chair.

RHUBARB.

Mr. Carpenter exhibited a stalk and leaf of Cahoon's Mammoth Rhubarb, grown from a single eye set out last spring. For culinary purposes it is not equal to Myatt's Linnaeus, although as good as the Victoria or Prince Albert. But for wine purposes it is preferable to any other. Leaves have been grown to weigh nine pounds.

Mr. Pardee said that the rhubarb had been raised very much in value by the system of selecting the best seed from the best plants, and giving the plants thus produced the highest possible cultivation. By the continous repetition of this process, we not only obtain varieties very much improved, but they are more likely to produce their kind from seed than those which are not so thoroughbred.

Mr. Robinson stated that the original Cahoon's Mammoth Rhubarb was produced at Kenosha, Wis., on Lake Michigan, on land richer than any garden could be made in this vicinity, being a muck of the richest kind, and 20 feet deep. It is remarkably true to its kind in raising from seed.

Mr. Carpenter—Rhubarb inclines to a moist and deep soil. Covering it in the winter does not materially hasten it in the spring. It is a gross feeder and will exhaust the richest soil; but if the soil is renewed, it will bear for a great number of years. The rhubarb is a desirable plant, being a healthy and inexpensive food, and making its appearance in the spring long before currants.

Mr. Robinson—There is not a family in the city, that has room to place a barrel in the back yard, but may raise more pie plant than they can consume.

SUGAR *vs.* MEAT. DIETETICS.

Rev. Mr. Weaver said that rhubarb was not inexpensive, because it cost so much for sugar to render it palatable.

Mr. Robinson.—A pound of sugar costs less than a pound of meat, and will go farther as food in the family. It may as well be eaten with rhubarb as with anything else.

The Chairman.—One small Victoria supplies me abundantly, and most of my neighbors. Sugar is considered by a very economical friend of mine, as the cheapest diet that he can bring into his family.

Rev. Mr. Weaver.—Do people eat any the less meat when they have sugar?

Prof. Nash.—When used to a reasonable extent, sugar goes farther than meat, per pound.

Mr. Pardee said that probably most people who ate sugar, ate nearly as much meat as they would without the sugar, but it only proves their bad habits of eating. A great many people, after eating a sufficient dinner, will finish off with a sweet and luxurious dessert, and then suffer for twenty-four hours, perhaps, from the effects of it. There is more nutriment in sugar than in meat, and it would be well if we ate less meat and more sugar. He narrated his experience in substituting a dinner of a cup of black tea, with plenty of sugar and milk, for a hearty meal of beef steak, the effect having been that he had not only felt better, and been in perfect health, but had gained in weight. He had found himself equally able to endure fatigue.

Rev. Mr. Weaver said that it was true that most of us eat more than is necessary, and that most people who die have their diseases brought on by eating too much. We do not know what the true diet is, and have little disposition to learn. The more dainties are placed before a man, the more he will be likely to eat. We should not place so many luxuries before men to tempt their appetites.

Dr. Waterbury said that the animal that could digest the greatest quantity of food, could do the most work. Col. Pratt made it a rule never to buy a team of horses that could not eat a bushel of oats per day; half a bushel apiece. Otherwise he did not consider them profitable for his business. The generally received theory, that of Liebeg, is, that sugar is used in supporting respiration, while meat assists muscular exertion. Consequently the man who is called upon to undergo severe muscular exertion, should eat a greater proportion of the flesh of animals; while, on the other hand, the food of literary men should contain less animal flesh, since the brain receives little or no support from animal food. The brain contains no nitrogen, whereas beefsteak is highly nitrogenized. But soldiers and laborers should be fed with meat. Stages are never run upon hay, but upon grain, upon oats, which are highly nitrogenized, and which take the place of meat in supporting muscle.

Prof. Nash.—It is true that the man who can digest the most can do the most work; but there is a point with every individual beyond which eating diminishes his ability. Is not overeating the cause of more leanness than undereating?

Dr. Waterbury.—I believe it is in the city. If a horse fed upon half a bushel of oats per day, lies idle in the stable, he is ruined. His food must be diminished, and when he is again to be put upon hard work his food and exercise must be gradually raised. So with man. If he indulges in heavy diet without corresponding exercise, the result will be a dyspeptic condition of the system.

Mr. Pardee was no believer in late dinners. He had seen too many friends carried down to the grave by it. A light tea, at six o'clock, or soon after that, should be the last food taken in the day.

Prof. Nash said that it was a mistaken notion that time is saved by eating quickly. On the contrary, our powers of action are so much diminished that we lose time by it. A man who takes half an hour for his meal, will not eat as much as the man who takes only eight or ten minutes. This may seem paradoxical, but the reason is obvious. Hunger is caused by the gastric juice preying upon the stomach, for the want of food to act upon. If we eat rapidly we pass the point of repletion before the gastric juice has time to act upon the food and to cease to act upon the stomach. We continue therefore, to be hungry, and keep on eating, although we have taken enough. The man who eats rapidly should not wait until he ceases to be hungry before stopping his meal.

INDIAN CORN FOR SOILING.

Mr. Carpenter.—Corn may be planted up to the 1st of July for soiling purposes. Corn may be sowed upon a piece of sward, if not too weedy; but drilling is the better plan. Many farmers defer cutting too long. It may be commenced when the corn is a foot high. It will then make a good second growth. It seems to answer a better purpose, and to be more palatable when cut early. When topped out it becomes hard, and the cattle do not like it as well. It may be drilled twenty inches or two feet apart, so as to leave room to pass a plow through.

Mr. Robinson.—Or drill it four feet apart and sow turnips.

Mr. Carpenter.—I have wintered horses upon the stalks; once in particular, as an experiment, I wintered two horses upon corn stalks alone, and with a gratifying result. They were in as good a condition as others wintered on dry hay. These were the stalks from the field crop of corn, after husking the ears. There is more nutriment in the stalk if it is cut before producing the ear, and cattle eat it better.

Dr. Waterbury.—Maize is a grass. Other grasses we cut when in blow. Does the analogy hold with maize?

Prof. Nash was inclined to the opinion that it does; and that corn should be cut for soiling when the tassels are beginning to come out.

Mr. Gale was in favor of cutting after the ear is set, but before the grain is filled. Then the cob and all would be eaten. Before that the corn is not sufficiently mature. He had raised an excellent crop of chicken-corn, sowed broadcast in May, and cut at that point, and the animals ate it eagerly. He inquired whether millet would not be better than corn, to be cut before the grain has ripened.

Mr. Robinson.—Two crops can be grown in the same season for soiling. The most profitable way is to sow clover, manure it thoroughly, so as to produce a heavy crop of clover, and as soon as that is mown, which may be at this time, to turn the soil over and put in the corn. Dressing the ground with ten bushels of lime will help the growth of the corn very materially.

Mr. Gale.—Then sow clover seed with the corn, if you please, so as to have it ready to fertilize another crop another year. I would plant for soiling the corn that produces the most sugar, perhaps Stowell's evergreen. The best of mowing ground should be broken up every three or four years, to convert the sod into manure.

Mr. Carpenter suggested that the Chinese sugar cane would be an excellent article for soiling.

Mr. Freeman, (from southern Illinois,) stated that he had raised the sorghum, 12 feet high, the seed of which had ripened, and the cattle would eat the entire stalk, while of corn they would not. It was cut when the seed was ripe and put up in bundles. There was no other curing. He had been so well pleased with the result of this experiment that he proposed this year to substitute the sorghum for corn, for a soiling crop. It can be fed to horses, mules and cattle. It is planted at the same time with corn. It stools out, four to six from each seed; and there is about three times as much weight of fodder to the acre as can be raised of corn. It is planted in hills, because it stools more than if planted in drills. It is planted at a distance of four to four and a half feet each way.

Mr. Gale considered it worth three times as much as corn for soiling, but was fearful that in this latitude, if planted late, so as not to mature, it would be difficult to cure it.

NEW SUBJECT.

The question selected for the next week, was "Flowers and strawberries." Adjourned.

June 17, 1861.

Dr. Trimble, of New Jersey, in the chair.

GAPES IN CHICKENS.

Mr. Robinson read an inquiry from Mr. Horace C. Wheeler, of North Stonington, Conn., for a cure for the gapes in chickens. He had taken great pains with their food and shelter, feeding them upon coarse meal. He had tried the proposed remedy of mixing pepper with their food, but without success.

Mr. Doughty suggested that feeding with cracked corn seemed to be a preventive; perhaps by scouring the worms from their throats.

Mr. Carpenter said that the old method of feeding chickens with moistened Indian meal was the worst that could be adopted. But even feeding with dry cracked corn was not a sure preventive.

Mr. Doughty.—I give them the cracked corn as soon as they are hatched, as coarse as they can eat it.

Rev. Mr. Weaver explained the process by which chickens troubled with the gapes can be cured; by doubling a horsehair, running it down their windpipes, and twisting it around until the worms get entangled in it, when they can be pulled out, sometimes to the number of a dozen.

The Chairman had seen the same operation. Some women become very expert in ridding chickens of these worms. As the worm is in the windpipe, and not in the tube to the stomach, it is not easy to see that the feeding can much affect it.

Mr. Carpenter suggested that the change of the male birds every year would tend to give the chickens stronger constitutions, and thus cause them to be less affected by the gapes.

THE PRINCESS PEA.

Mr. Carpenter exhibited specimens of the Princess Pea, planted April 16th, and fit for the table on June 13th, in fifty-eight days. It grows from two and a half to three feet high, and is very prolific, the pods containing from five to eight peas. The quality is very good, better than that of most early peas. It is a new variety, introduced last year.

ROXBURY RUSSETS.

Mr. Carpenter exhibited specimens of the Roxbury Russet apple. He considered them a good apple for Massachusetts, where they originated, but they had been overrated for the middle states, where they do not flourish so well.

PHELPS' OHIO COMBINATION HIVE.

Mr. Phelps exhibited specimens of honey formed in this hive, the comb being so formed that at any time a sufficient quantity of honey for a single meal may be taken from the hive without cutting.

Mr. Robinson explained the hive. It resembles the Langstroth hive. There are frames, or sashes, a few inches square, set in a box, and separated by partitions formed of slats an inch wide and with quarter inch space between them. There is also a space of quarter inch between these partitions and the sashes. The bees can readily pass through these narrow openings, but will not build out their comb into them, unless the openings are wider. The bees fill up these sashes separately, and any one, after it is filled, can be removed with the contained honey, without disturbing the others; and an empty sash can be returned in its place. Mr. R. proceeded to narrate some incidents with reference to the swarming of bees, to show that if there are two small swarms at about the same time, they should be put together. If there are two queens, they will dispose of one, and in all probability unite as one colony. The more bees are handled the more gentle they become, and the more unlikely to sting when it is necessary to handle them.

Dr. Peck explained his method of building straw hives so as to admit of the modern system of removable sashes or boxes. Making a square frame of the desired dimensions, a rope of straw is to be wound around it, so as to cover the sides. This gives the coolness, airiness, lightness, and comfort of the straw hive, in a convenient shape. This hive can be very readily fumigated, if moths should get into it.

Mr. Robinson.—They have already been made and patented just in the form you describe. I dare say you have told somebody, and he has patented it as an original invention of his own.

STRAWBERRIES.

The Chairman exhibited specimens of Wilson strawberry plants, nearly equal in foliage and in fruit. The first had been planted out in September last; the second in June of last year; and the third in April of this year. They were planted with a ball of dirt. He exhibited them to show that the strawberry can be planted out at any season, and if managed properly will yield fruit. It is the least trouble to plant them out in the spring.

Mr. Fuller exhibited a large variety of specimens of fruit from his seedling strawberries, most of which were the second year from the seed. The cultivation in stools is the best; but as strawberries are wanted for field culture, it is necessary to test seedlings by giving them the same culture, as they are expected to receive. He had this year, therefore, given these seedlings field culture. The Downer strawberry had been heralded forth as a most wonderful berry. It was certainly a remarkably prolific berry, more productive than Wilson's, but it was small, with a poor flavor, and in fact good for nothing. Wilson's he considered as still the best strawberry we have; most productive, rather acid, but of good flavor. If he could raise a seedling as good as the Wilson, the Triomphe de Gand, or the Hooker, he should be satisfied. Scott's seedling is a very mild, pleasant berry, but a shy bearer. The Reine Hortense is a good berry, one of the best. The Bartlett is a remarkable variety in another respect. The bed may be allowed to run together for four years, and is still loaded with berries, although overrun with grass. The Triomphe de Gand may be eaten before it is ripe. The Vicomtesse has a very good flavor. Some of the largest and most handsome berries were the seedlings from the Wilson, one year from the seed.

Mr. Pardee.—In company with a number of gentlemen I visited Mr. Fuller's grounds last year. We selected and marked some 50 or 60 of his seedlings as superior. Some very large and fine berries were thrown overboard because inferior in flavor. Some of the berries we marked, we considered of the very highest flavor, and the best berries in the market. It was universally conceded that it was the best lot of seedlings we had ever seen, the best in flavor as well as in productiveness.

Mr. Carpenter.—I visited Mr. Fuller's place last week and was surprised and delighted to see the efforts he has made to produce the berries we now have here on exhibition. I found an extensive plot devoted to the cultivation of seedling strawberries, and containing many thousand seedlings. We discovered there a great improvement over anything we had ever seen before. Several of his seedlings appear to me to surpass the Wilson, which I consider one of the best berries we have, for general cultivation. Nos. 53, 20, 42, 46, and 7, I selected as being equal in every respect to the Wilson; and I would prefer them to plant, to the Wilson; especially No. 46 and No. 20. I think this Society should take some action upon the subject; and I move that a committee be appointed to visit Mr. Fuller's grounds, and to examine his strawberries, and to name such as may in their opinion be worthy of dissemination.

The Chairman expressed his gratification at the results attained by Mr. Fuller.

Mr. Fuller.—I shall certainly object to any puffing of my strawberries, although I shall be happy to meet the committee and afford them every facility. I am working upon a platform; and when I can produce a strawberry to answer the requisites I have prescribed, I shall be willing to have it sent forth; but I must be satisfied myself before I shall propagate or send out any new variety. First, I want a berry that is productive, that will bear in beds, or in common soils, and not merely in stools or in rich soils. I do not want a berry that will run all to foliage like the Peabody, or all to fruit like the Wilson, on any soil; but one that will accommodate itself to the soil. I want a fruit that will elevate itself above the earth, by a good stout fruit stalk, capable at least of lifting the berry out of the earth and laying it upon the straw. I want a large berry; not very large and hollow or with a tasteless white pith, but of a good size, solid, and uniform. I want a good bright color. No. 34 is of excellent quality and productive; but by the time you have carried it five miles it will look as if it had been picked for three days; and that is sufficient to condemn it. Then I want a good quality. The Wilson has not sugar enough in it. If we can get the quality of the Triomphe de Gand or the Hooker, and the size and productiveness of the Wilson, we shall accomplish something. Again, we want the calyx to part readily from the fruit. We want all these things combined. Out of 1,000 varieties of last year, I preserved 70; and of these 70 I shall only preserve four for another year. I have this year, seedlings, that have borne fruit for the first time, that promise still better than anything I had last year; but I must test them thoroughly before I can endorse them.

The Chairman appointed Messrs. Mead, Pardee, Carpenter, and Roberts, as the committee to examine and report upon Mr. Fuller's seedling strawberries.

Mr. Hite exhibited a new seedling from the Wilson; and remarked that he had two strawberry plants with the flavor of the peach.

Mr. Doughty had tasted of these strawberries, and could corroborate the statement as to their flavor.

Mr. Gale appealed to Mr. Fuller not to destroy the seedlings which he had rejected, but to allow others to try them on other soils. And he trusted he would not wait until he had obtained every conceivable improvement before disseminating his plants, but would take advantage of any real improvement however small.

The Chairman remarked that inventors would sometimes aim at something beyond their reach and failing to attain that would leave what they did attain, which was really valuable to the tender mercies of the world. He should expect the committee to take care of these strawberries.

Rev. Mr. Weaver read the following recipe for making strawberry syrup: Put 12 lbs. of strawberries into a pan, and pour over them two quarts of water previously acidulated with 5 ounces of tartaric acid. Let them remain 24 hours. Then strain, taking care not to bruise the fruit. To each pint of clear juice add 1½ lbs. of lump sugar, finely powdered. Stir it frequently, and when quite dissolved, bottle the syrup. The whole process must be cold.

FLOWERS.

Mr. Fuller and Mr. Cavanach exhibited and distributed a large number of specimens of beautiful and fragrant flowers.

The subject of "Fruits and Flowers" was continued for discussion at the next meeting. Adjourned.

June 24, 1861.

Mr. Adrian Bergen, of Long Island, in the chair.

TREATMENT OF LAWNS.

Mr. Gale read a communication in which he took exception to the method of frequently and closely cutting the grass of the lawns of the Central Park in this city, and carrying off the grass.

Mr. Carpenter.—In this country we are rather in our infancy in the management of lawns and parks; but it is a settled principle in England that the oftener a lawn is shaved the more beautiful it becomes. The lawn of Mr. Reed, in Elizabeth, N. J., which is cut once in six days throughout the season, is a most beautiful object. I have been much pleased with the general management of the lawn in the Central Park. I think that the system of close shaving, which is repeated as often as once a week, will improve and beautify the lawns much more than the old system of mowing.

Mr. Robinson.—As to carting away the grass, that is a mere matter of dollars and cents, whether the grass is worth more for mulching than for feed; because the mulching can be obtained from coarser materials, such as salt hay. It would be well if we could devise some means to produce a lawn in the City Hall Park, where great efforts have been made thus far without success. I think the fault has been in the manuring. It has been manured with the richest kind of nitrogenized manure, so as to cover the ground two or three inches thick with street manure. But the attempt to make the grass grow is a wretched failure.

Mr. Carpenter considered the effect upon grass of close cutting to be the same as that upon shrubbery, to cause it to send out an excess of vegetation, branching until the ground becomes completely covered. When the lawn is taken care of in this way no spot of ground is visible.

Dr. Trimble said that it would not do in this country to imitate England in the management of lawns. It will do in the spring and early summer to shave the grass closely, but when the heat and drought of July and August come, if the grass is cut, the roots will be killed for the want of protection. In England, there is a kind of moss growing between the roots of the grass, keeping the ground green and velvetty, like a carpet, and that moss is destroyed by the drought of August in this country. To make a lawn beautiful it must be cut constantly, but the land must be deeply trenched and underdrained so that it will bear to be cut in hot weather. Grass will grow under locust trees even better than in the sunshine.

Mr. Pardee cited the lawn of Mr. John C. Green, on the northern border of Staten Island, as one constantly beautiful, a velvetty green, and made so by being shaved every week. By proper preparation he believed that a lawn might be made as perfect in this country as in England. If we have not sufficient moisture, the defect can be supplied by an occasional watering, and if with manured water so much the better. The new English lawn grass, the *Spergula prolifica*, which grows but two inches high, and needs no cutting, does not succeed here.

Mr. Fuller inquired what was the proper way to make a lawn.

Mr. Carpenter.—I would sow white clover principally, with a little mixture of timothy. It may be better to seed it down with some cereal, oats, wheat or rye, for they seem to protect the young plant; but the ground should be thoroughly trenched, and well underdrained, if necessary.

Dr. Trimble.—The first thing that is wanted for a good lawn is a great deal of money.

Mr. Gale objected to the plan pursued in the Central Park, because it would be impossible to obtain any depth of sod, commencing in that way. To make a lawn, it should first be underdrained, and made very rich. We should then sow four or five kinds of grass seed—red clover, white clover, red top, and several others. Let that grow the first year and rot on the ground. The roots would then have an opportunity to penetrate and permeate the ground, and the next season there would be twice as much foliage, as if the grass were cut every week the first year. Even the Canada thistle cannot live two years if cut three times a year. Even allowing cattle to pasture upon mowing land in the fall injures the sod.

Mr. Carpenter said that meadows would frequently have but little grass after a few years, while pasture lands never became void of a sod. Yet pasture land is nipped oftener than once in five days. Meadow lands not pastured eventually run to weeds. When the grass is cut, the weeds and coarse grass are the first to start. If cattle are turned in, they are nipped off first.

Dr. Trimble said that sheep or deer were much better upon lawns than cattle. In the lawn near Windsor Castle, sheep are kept surrounded by moveable wire fences, which are moved daily. Guinea pigs will answer the same purpose, on a small scale.

NEW STRAWBERRIES.

Mr. Carpenter, from the committee appointed to examine and report upon Mr. Fuller's seedling strawberries, stated that the committee had made a careful and thorough examination, and submitted the following report:

"We have been much assisted in forming a correct and reliable opinion, as Mr. Fuller has growing, beside his seedlings, and receiving the same care and cultivation, the following popular varieties: Wilson, Hooker, Boston Pine, Jenny Lind, Triomphe de Gand, Oscar, La Constante, Wonderful, Wizzard of the North, and many others, enabling the committee to compare his seedlings with these. From the great number of seedlings, comprising many thousand plants, one hundred kinds might be selected, none of which would be inferior to some of the varieties now propagated for this market; yet the committee believe that the number now in cultivation should be reduced. A selection of six varieties would be a sufficient number to furnish a succession of fruit. This select list of varieties should be adapted to general cultivation. With all the boasted success with new and improved seedlings, there seems to have been little progress made toward completing such a list. The committee can name but two varieties, the Wilson and Triomphe de Gand, that they could recommend for general cultivation, and the first of these is considered by some far from being perfect. The great effort now being made to ameliorate the condition of this fruit must result in the production of greatly improved varieties, and the committee hope Mr. Fuller will feel encouraged from his past success to persevere until he has accomplished his desire, viz: the production of a perfect strawberry. The committee feel the responsibility of recommending new varieties that have been tried but one or two years. Many of the new seedlings that have lately been introduced have been overrated, and they would caution the public against purchasing any new variety without its first having been tested by responsible parties for at least three years, for the true character of a strawberry cannot be established in less time than this. They trust Mr. Fuller will not allow his seedlings to be disseminated this year, but let their merits be established by another year's trial; let this club appoint another committee who will test their value and report after another year's fruiting. We shall then have something reliable, and public confidence will be established. In testing Mr. Fuller's seedlings, the committee adopted the following requisites to entitle a variety to consideration: large size, good flavor, high color, firm and solid, great productiveness, foot stalks well up, and good foliage. The committee believe that the following six varieties possess, the foregoing properties, in a greater degree, than any other kinds that they are acquainted with. They name the following seedlings in their order of excellence, using the numbers heretofore affixed:

"No. 5, named by the committee, 'Farmers' Club,' is of the largest size, flavor very good, color a beautiful glossy crimson, flesh dark pink, solid, firm, foliage good, footstalks well up, very productive, staminate or perfect flower, seedling of the Wilson, first year's fruiting, very promising of being well worthy of cultivation.

"No. 53, named 'Brooklyn Scarlet,' size large, flavor best, color brilliant scarlet, shape long, pointed cone, solid, firm, very productive, foliage good, footstalks well up, perfect flower, fruited two years, and shows no deterioration.

"No. 20, named at the suggestion of Solon Robinson, was 'Col. Ellsworth,' size very large, oblong, irregular cone, with neck, color dark crimson, flavor good, solid, flesh dark pink, ripens early, foliage good, footstalks well up, as productive as the Wilson, perfect flower, fruited two years, very promising, seedling of Peabody's seedling and a remarkable fine berry.

"No. 42, named 'Great Eastern,' extra large, brilliant scarlet flower, good, solid, tolerably firm, very productive, foliage good, footstalks well up, perfect flower, fruited two years. The committee believe this to be one of the largest berries in cultivation.

"No. 7, named 'Ridgewood,' size large, flavor best, color dark crimson, solid, tolerably firm, very productive, foliage good, footstalks well up, perfect flower, fruited two years, promises well.

"No. 34, named 'Nero,' very large, color dark glossy maroon, seeds yellow and very prominent, solid, very firm, and dark throughout, very prolific, flavor very good, foliage good, footstalks medium, pistillate, fruited two years, promises well.

"The following varieties, seedlings of 1860, Nos. 1, 12, 22, 46, 43, and 56, the committee consider very promising and recommend another year's trial. No. 14, though this year not of the largest size, maintains its productive character, and for flavor is not equalled by any berry in Mr. Fuller's collection. The variety reported last year as the 'Unifolia,' has this year, in a great measure, lost its specific character, and it may be considered more curious than useful."

Mr. Fuller exhibited specimens of the seedlings recommended by the committee, and also of some of the best varieties already brought into general notice. He believed that twice as many strawberries could be raised upon an acre as potatoes. He was satisfied that he could raise 600 bushels to the acre; by actual measurement he had raised at that rate. The Triomphe de Gand will yield 400 bushels to the acre. The expense would not exceed $100 an acre. He had probably not spent over $25 an acre, but $100 an acre would pay better than $25. The question now is whether we shall have berries of good quality, abundant and cheap, or raise tart berries not worth picking.

Mr. Robinson had set out 100 plants of the Wilson and 100 plants of the Hooker, and without having given a dollar's worth of care to the beds, he now had more berries than his family could use or give away. On a single day, they had picked two bushels of berries.

Mr. John G. Bergen suggested that it would be necessary to renew strawberry beds, and to take care of them, in order to continue to obtain good results.

On motion of Mr. Pardee,

The report of the committee was adopted; and they were requested to make further examinations and report next year.

Dr. Trimble stated that his strawberries had been winter killed, and that he should have had no strawberry beds this spring, if he had not transplanted plants and formed new beds, as explained last week.

Mr. John G. Bergen had found no advantage with regard to winter killing from mulching. The Peabody seedlings were nearly all killed.

Mr. Pardee said that it was always best to give a slight covering to strawberries and raspberries; for although it may not always be necessary as a protection against winter killing, it is an advantage to the fruit. A larger quantity of fruit can be raised by keeping the plants a foot apart than by allowing them to grow nearer to each other.

Mr. Robinson said that he could warrant three new seedlings to be proof against winter killing; Prince's Eclipse, Prince's Scarlet Magnate, and Prince's Climax. These berries would bear a bigger crop of vines than any other kind, and less fruit. Yet there is a great abundance of the fruit, for it is utterly worthless.

Mr. Fuller.—Gentlemen will see now how I happen to be so bashful about my seedlings. Mr. Prince has puffed his berries, and you see the result. I have been so much afraid of just such a blast myself that I have resolved to disseminate nothing until it has proved itself to be good.

Mr. Gale.—I am glad to see that we are progressing; that we are finding out that mulching is good. Some kinds of strawberries were killed by the warm weather we had in the first of March, and the cold that followed, although they were mulched, because they felt the force of that hot weather just in proportion to the protection they had during the winter, and felt the subseqnent cold for the same reason; so that this fact does not militate against the principle of mulching.

Subject for next meeting.—The subject selected for the next meeting, was "Corn, Fruits, and Flowers."

Adjourned.

July 1, 1861.

Mr. George H. Hite, of Morrisania, in the chair.

Mr. Robinson read an invitation from the Brooklyn Horticultural Society, to attend an exhibition of fruits and flowers at their rooms on the evening of Tuesday, July 2d.

MILDEW OF GOOSEBERRIES.

Dr. Trimble exhibited a specimen of gooseberry that had never mildewed in his garden. It is under a tree, always in the shade. The branches lie upon the ground, and yield a profusion of fruit. No care whatever is taken of it. Some years ago he had had a bush upon which the fruit never mildewed; but upon dividing it, and cultivating it, the mildew attacked it.

Mr. Carpenter said that farmers in the vicinity of New York would do well to pay more attention to raising small fruits, instead of following the old routine of corn and potatoes. The Houghton gooseberry, yielding at the rate of two hundred bushels to the acre, which will bring $1.50 per bushel, is a profitable crop. Larger gooseberries will bring from $2 to $4 per bushel.

Dr. Trimble said that the gooseberry would not be a reliable crop until it could be ascertained what the mildew is, and how to remedy it. He had tried all proposed remedies, without effect.

Mr. Carpenter considered the cause of the mildew to be in atmospheric influences, and the remedy to be close and proper pruning. The branches should be thinned out so as to permit a free circulation of air, and so as to admit the light. The branches should be at least three to six inches apart.

The Chairman, saying that that coincided with his experience, added that he had his ground forked up late in the fall, and left very rough, covering it with long manure, which remains until the spring.

Dr. Trimble.—When I followed that plan I could get no fruit.

The Chairman.—With the English varieties, the more care you take in pruning, the better will be the result.

CARE OF SHRUBBERY.

Mr. Carpenter expressed the opinion that thousands of trees have been lost this season in the Central Park from an excess of water. A large hollow is made around the tree, and a barrel of water is poured in every day. It would be much better to dig around them often, keeping the ground mellow.

Mr. Gale said that they should take the grass which they shave from the lawns so closely, and scatter it half an inch thick around the trees. They would need no water, if thus mulched, unless there should be no rain for six weeks. It would be better to cart on a load of stones than to leave the earth entirely bare. Whether the watering could do any damage he could not say. He had applied two or three gallons per day regularly to a small pear tree, with excellent results.

Mr. Carpenter.—I had reference particularly to trees newly planted out.

Mr. Gale said that might make a difference, although the general impression is that a tree newly set out needs quite as much water as an old tree. At any rate the trees should be mulched. It nourishes the tree and protects it from the sun. He was in favor of fall plowing, fall digging and mulching. If land is mulched with coarse manure in the fall it is leached just where it is wanted.

The Chairman recommended mulching, and in watering to put two or three pounds of Peruvian guano with a barrel of water, and to use the solution, especially for small fruit. Digging to keep the ground mellow is very important in the summer.

Mr. Carpenter.—What I objected to was watering upon the bare ground, which becomes as hard as a brickbat. The tree, if newly planted out, must die under such treatment. Digging around the tree carries moisture to the roots, and assists the tree in making new roots.

THE AUSTIN STRAWBERRY.

Mr. Carpenter exhibited a dish of Austin strawberries, grown eight miles from Albany, the largest of which weighed an ounce, and measured $5\frac{7}{8}$ inches in circumference. This strawberry flourishes best in a sandy soil, and appears to be a good market berry. It is very productive, and by some is preferred to all other varieties; but it is yet a new berry, and some which have been longer known could be recommended with more confidence.

THE RASPBERRY—PRUNING.

Mr. Carpenter said that raspberries had been much neglected, and probably in part from the trouble of covering them in the fall. There are some new varieties, as the Belle de Fontenay and Doolittle's Black Cap, which promise to be perfectly hardy. They will give abundance of fruit, with as little care as currants. Brinkle's Orange he regarded as the best raspberry, but it requires covering.

Mr. Doughty had found the Belle de Fontenay a perfectly hardy and prolific berry, as well as one of the best fruits. Doolittle's Black Cap he feared would prove too small.

The Chairman stated that proper pruning would almost supersede covering. About the time of the summer solstice, if the shoot is six feet high, cut it down to four feet, and it will send out strong lateral branches. If they are very vigorous shorten them. The plant will then ripen and harden its wood, so that it will stand the winter. So with the blackberry. In this way he had obtained fruit from the very top of Brinkle's Orange.

Mr. Carpenter had tried this method to some extent upon shrubbery. He had found the grapevine better prepared for the winter by being nipped in. He had seen the benefit of it upon the pear. There are some varieties, the Madeline, for instance, which grow rapidly in the latter part of the season, and the frost comes while the wood is soft. Shorten it in and it will ripen the wood.

The Chairman remarked that if the laterals are cut the top must be left. It will not do to cut both at the same time.

Mr. Peter G. Bergen had tried this method upon peach trees, but the effect had been to cause the tree to send out a large number of laterals, making it a bush that he could not see through.

INSECTS.

Mr. Bergen proceeded to say that he had had trouble in raising currants, from a worm which would bore the branch; and this year the worms have attacked the fruit itself. They were extending their ravages to the gooseberries, blackberries and pear trees. He had been very much troubled with slugs. The trouble seemed to be rapidly increasing. Peaches drop off as if stung by some insect.

The Chairman explained briefly how to prune to avoid the too close branching of the tree, which tends to harbor insects.

Mr. Carpenter said that the more evergreens are planted about a dwelling the more birds and the more fruit there will be. If birds are encouraged they will rout the insects.

Dr. Trimble exhibited specimens of the pupas of the measure worm, which he had obtained from the city parks. He had found many of them empty, having a hole upon one side. An ichneumon fly had attacked the measure worm in this city. It deposits its eggs in the body of the worm, and after it has spun the cocoon they hatch, and destroy it. Probably by another year the measure worm will have been destroyed by this fly. There are many varieties of the span worm—a measure worm. In New Haven the elms were saved by encircling the trees with something which would prevent the female, which was without wings, from crawling up. But there are varieties, of which both male and female have wings. The only remedies are to destroy the eggs in the winter or spring, as they are found, in clusters upon the tree, and the ichneumon fly. There are few or no birds in the city, and therefore our parks are perfect cabinets for the entomologist. The ichneumon fly seems to be the provision of nature to prevent the too great increase of this class of insects. The Hessian fly a few years ago threatened to destroy our entire wheat crop, but it was itself destroyed by the ichneumon fly. The curculio is a beetle, and beyond the range of the ichneumon flies, for they attack only the insects that are at one period of their lives caterpillars; they cannot control the coleopteras. There is an immense class of these flies, from three inches long, down to little specks that are hardly visible. Birds are useful in destroying insects, but birds should be selected with long beaks, such as the wren, the thrush, the oriole, and the catbird. Birds with short beaks are seed eating. Let the spiders alone in the stable, and they will protect the horses from the flies.

Mr. Robinson.—The most troublesome insect on my place is the rose bug. They have taken possession of the apple trees. It is no uncommon thing to see half a dozen of them upon a single apple.

The Chairman suggested throwing plaster of Paris upon them, killing them when they come down.

Mr. Robinson said that would not do for such large numbers.

The Chairman proposed raising smaller trees, pruned upon the spindle system, which would yield better fruit, and as much as large trees.

Dr. Trimble stated that thousands of these span worms, half grown, are lying dead upon the ground, probably destroyed by the ichneumon fly. The lady bug is a great destroyer of the aphides, but not numerous enough to control them.

Subject for discussion.—The subjects of "Corn, Fruit and Flowers" were continued.

Mr. Hite proposed at the next meeting to explain his methods of pruning. Adjourned.

July 8, 1861.

Dr. James P. Knight in the chair.

LANDS ON LONG ISLAND.

Mr. A. McCotter sent to the Club a specimen of rye grown on Long Island, on land which had never been in cultivation, upon the application of 150 lbs. of guano to the acre.

Dr. Peck stated that this rye was remarkable merely from the fact that it was grown on the barrens of Long Island, on land where it is supposed that nothing will grow. It shows that the waste land there may be cleared, and produce a fine crop of rye by the application of 150 lbs. of guano to the acre. It may be seeded down to clover, and it will produce two tons to the acre, or a good crop of timothy; and it will continue in heart with the same culture that is applied to other lands in the State of New York. With ordinary culture it will produce wheat as well as any other lands in the State. The premium crop of wheat, a few years ago, was raised at Brookhaven, upon Long Island, on land geologically identical with this. There is no difficulty in raising any kind of crops there, in great abundance. It is a great natural garden. There are tens of thousands of acres of land there suitable for any kind of crop, and with sufficient tenacity to sustain anything.

Mr. Robinson argued that wherever wheat can be grown, even on Coney Island, it may just as well be grown as upon the richest prairie land of Illinois, so far as the expense of keeping it in heart by manure is concerned. He preferred manures which would yield the largest return the first year. Whatever is unused the first year might as well not have been applied until the second, and the interest on its cost would have been saved. Other things being equal therefore, the manure is most profitable which yields the quickest return. Money spent for manure brings a larger profit than railroad, bank, or insurance stock.

Mr. Carpenter objected that while that might save interest, it would cost labor. He preferred in seeding down a plot of grass for five years, to put on manure enough to last the five years. Fields he had laid down ten years ago with 20 bushels of medium bones to the acre, were now showing astonishing results.

Mr. Robinson.—How much did you spend?

Mr. Carpenter.—Ten dollars per acre.

Mr. Robinson.—How much did you get back the first year?

Mr. Carpenter.—Fifteen or twenty dollars.

Mr. Robinson said that as the manure had lasted ten years he might assume that only three dollars worth of it was consumed the first year. If instead of applying bones, Mr. Carpenter had applied some manure costing three dollars which would be all used up the first year, he would have had the same result the first year. He would then have left seven dollars to be expended in manure yielding an immediate profitable return instead of lying idle.

Mr. Carpenter.—For immediate returns I know nothing to equal guano; but generally stimulating manures which give their results the first season, leave the soil in a worse condition than it was in before.

Dr. Peck alluded to the indefinite way farmers have of speaking of putting on so many "loads of manure" to the acre, without specifying how large a load, or what kind of manure.

STRAWBERRIES.

Mr. Carpenter exhibited a specimen of the Austin strawberries, which he considered remarkable for its lateness. They were sent here from Watervliet, near Albany. The Wilson, growing by their side, had ceased fruiting before these were ripe for the market. These are the only good strawberries now coming into New York. They are not so sour as the Wilson.

Mr. Pardee said there seemed to be a general dissatisfaction with Downer's seedling and the Austin strawberry. Downer's seedling is prolific but the berries are small and the flavor is very indifferent. The Austin is hollow, rather mealy, lacks the requisite of a good flavor, very soon becomes insipid, and is not prolific under ordinary culture. His own observation had been that this strawberry was no better than others. If it could be established as a fact that it is later, it will be valuable, and bring a large price after other strawberries are gone. Strawberries that will bear three days earlier will bring a dollar instead of eighteen cents per quart.

Mr. Robinson said that in his garden the Wilson held out ten days longer than the Austin. It might possibly be because the Wilson plants were a year older. He did not consider it firm enough for a market strawberry. They will sell, however, if late enough to be offered after the better strawberries are gone.

Dr. Trimble thought that those who raised these strawberries ought to be encouraged, for they were certainly in a good condition, of fair size, and with a strawberry flavor, coming at a time when we have no other strawberries.

Mr. Carpenter reminded the Club that he had exhibited the Austin strawberry last year as late as July 22d. The Hooker strawberry is much better flavored; but it is not hardy, and does not bear satisfactorily.

Mr. Hite.—Plant the Hooker strawberries six inches apart and you will have as much fruit as from the Wilson planted at 12 to 18 inches.

PRUNING CURRANTS AND GOOSEBERRIES.

Mr. Hite exhibited specimens of currant bushes trained upon the Spur system. The cherry-currant bushes were about seven years old, the roots being eight or nine years old. There were also specimens of the Red and White Dutch currant. The bushes were all heavily loaded with fruit from the bottom to the top. He explained the system thus: The first year allow one cane only to come up from the cutting. The next year cut that half way down, and it will start and grow very vigorously, and send out a great many little side shoots, which must be pinched in about the middle of June. Other shoots may come out, but by the middle of August they must be pinched off. In the spring of the next year, it must again be cut off, leaving it half or three-quarters of an inch from the stem. Side shoots must not be allowed to grow, unless they come up from the ground. There may be six or eight canes allowed to grow, so that the main stem can be replaced at any time. A stake may be put up and all fastened to that. A stake will be necessary in order to support the fruit, and the canes may be all tied together to that like an umbrella. The same system, with some slight modifications is applicable to the gooseberry. In this case instead of a single stem, a tree is formed. By this process fruit is generally obtained the second year, and will bear every year in profusion. The cherry currant has some peculiarities. At this season of the year the upper shoot will sometimes stop growing, while the others continue to grow. If an inch or two of the shoot is cut off it will again begin to grow. The summer is the best season for pruning the cherry currant. By this system, there is but one stem, and the fruit is much easier to pick. Currants pruned in this way can be planted two feet apart.

Mr. H. proceeded to exhibit specimens of gooseberries, and remarked that since adopting this plan of pruning he had not been troubled by the mildew.

The Chairman remarked that the Crown Bob could be grown well in the close yards of the city.

Mr. Hite.—If a gooseberry bush is attacked with the mildew, it will be paralysed down to about three inches from the ground, where there will be a bud started. Cut it down to that, and burn the top. It will soon send up a vigorous shoot, which will grow six or eight inches before fall.

The Chairman said that a vigorous plant was less liable to be attacked with the mildew, which is a fungous growth.

Mr. Pardee had never seen mildew upon a plant, unless that plant was neglected. He believed that there was no necessity for mildew upon the best English gooseberries.

Dr. Trimble produced a specimen of his gooseberry, mentioned last week, and asked why that did not mildew?

Mr. Pardee replied that it was an American gooseberry, the mate to Houghton's seedling, which is not liable to mildew under fair cultivation, a valuable variety for common cultivation, for cooking, preserving, or for wine. The English gooseberries are preferred because they are more showy and highly flavored.

Mr. Carpenter said that the system of pruning illustrated by Mr. Hite had been brought to great perfection in England by Mr. Rivers. It is now applied successfully to the pear, which may be planted at distances not greater than two feet.

The Chairman suggested that this method of pruning allowed the wood to mature more thoroughly.

Mr. Hite was trying the experiment of the spindle system with the pear; and also a system of connecting a row of trees by inarching and pruning them upon the espalier plan.

Subject for discussion.—On motion of Dr. Trimble, the subject of "The Fruits of the Season" was selected for the next meeting.

Adjourned.

July 15, 1861.

Mr. A. S. Fuller, of Brooklyn. L. I., in the chair.

PEDAL ENGINE.

Mr. Hotz exhibited his Pedal engine. It resembles the Hydropult, but is constructed to be worked with the feet, thus enabling the operator to exert a greater force with less labor.

Mr. Carpenter remarked that it was a more powerful machine than the hydropult, but not so convenient to carry.

Dr. Trimble said that especially in drawing water from a deep well to water a garden, which requires more force than can well be applied by the hand, this implement might be very useful.

Mr. Gale, Dr. Trimble and Mr. Doughty were appointed a committee to examine and report upon this invention.

LATE STRAWBERRIES.

Mr. Carpenter exhibited a specimen of the Austin strawberry, from Watervliet, in excellent condition. It is now retailing at 25 cents per half-pint basket.

Mr. Pardee said that a strawberry which would bear under ordinary exposure until July 15th, was a valuable acquisition; but that this might be accomplished in several ways without its being a test of the berry. The strawberry may be made to produce a late crop by giving it a stern northern exposure, by cultivating it in the shade of trees, or in masses, or by cutting off the early flowers, and in other ways. To prove the lateness of the Austin strawberry, it is desirable that some other cultivators should test it.

The Chairman—I think that it is a late berry.

Mr. Carpenter said that these strawberries were cultivated upon an open level piece of ground, with no shade whatever, and no care taken to prolong the season. He had found many of the plants a few days ago, in his own garden, just blossoming a second time.

Mr. Robinson stated that it was easy to prolong the bearing of any strawberry. When they are in full blossom, go over the bed and give it a dressing of fine salt. It will kill every blossom. They will then re-blossom and bear two weeks later than they would otherwise have done. Mr. Peabody has carried strawberries to the market in Columbus, Ga., regularly for more than six months in the year, from the same bed.

Mr. Pardee.—Mr. Lawrence, of New Orleans, has carried them to the Picayune office every month for ten months in succession.

Mr. Robinson.—Mr. Peabody attributed the continuous bearing to artificial watering. He watered them thoroughly every day.

Mr. Pardee.—Mr. Peabody told me that we might have strawberries six months in the year, as well as not. He trains his plants so as to reduce their luxuriant habits. He took new pine barrens, and put just enough soil with it to give it a little life, and the consequence is that the leaves are no larger than a quarter of a dollar, while there are berries more than three inches in circumference. The same result may be produced from a soil composed of three parts of pure river sand and one part of good, fair, loamy, garden soil. My plants, potted in that way were in bearing for at least three months during the summer with no symptoms of throwing out a runner. Mr. Peter B. Meade had also obtained the same results; but one morning he was surprised to find one of his plants throwing out a runner. Upon examination he found that a small bit of manure had given that plant power enough to send out runners. As soon as the runners start, the production stops. The Crescent seedling was supposed to have the power of continuous bearing; but as soon as it received ordinary cultivation it lost that property. I have no doubt that in this way any one willing to take the pains can have late strawberries. Of course they must be attended to and well watered, as carefully perhaps as greenhouse plants.

Dr. Trimble remarked that sometimes strawberries are found in blossom out of season, the same as apple trees, pear trees, &c., but it never amounts to anything. That is different from a regular lateness of a variety.

Mr. Carpenter.—By special watering, strawberries can be made to produce a second crop in October, the Bartlett particularly.

The Chairman.—Every fall a large proportion of the old plants come into bloom and fruit. Generally when the snow flies I can go out and pick a dish of strawberries. But I do not consider a fall bearing strawberry of any value. Put the Bartlett in the green-house and it will bear fruit continuously for eight months.

Mr. Carpenter.—We have perpetual raspberries, and I have no doubt we may have perpetual strawberries. But every fruit has its season, and when we have had an abundance of it, we want something else. It is a novelty to have raspberries in October; but we cannot prize them then so much, having other good fruit, such for instance as the pear and the apple of the improved varieties.

Mr. Pardee said that although for ourselves we might not prize these fruits out of their season; yet, when out of season, they will bring from two to three dollars a quart from rich people, who want them for their parties, because they are out of season; and hence it may deserve attention as a matter of profit.

Mr. Doughty.—The Catawissa raspberry with me is perpetual. I can go into my garden at any time and get a supply; and they are sweet enough to eat without sugar. It is perfectly hardy.

The Chairman, Mr. Pardee, and Mr. Carpenter corroborated these statements, and spoke favorably of this raspberry.

Mr. Gale referred to the immense amount of money expended annually in preserving strawberries, as an evidence that they are desired out of their season, and that it is most desirable that late strawberries should be grown, if possible. All sorts of fruit should be in the market as long as possible, for it will conduce not only to comfort but to health. While he could obtain the fruit, it was his custom to make it one-third to one-half of his diet, and he never enjoyed more energy or vigor of body or mind than during that season.

Mr. Robinson suggested that the Farmers' Club memorialize the Legislature to forbid the selling of berries excepting in measured baskets. The true way is to sell them by the pound; but any kind of measure is better than the present way of selling fruit and vegetables in this market.

CURRANTS.

The Chairman exhibited varieties of currants.

Mr. Pardee referred to the fact that professedly new varieties are frequently got up to sell, receiving new names, although identical with the old varieties. He preferred the Versailles to any other for a red currant.

Mr. Hite, while recommending the Versailles currant, also recommended the red Dutch.

The Chairman said that he had five varieties of the currant, all of which he believed to be identical with the cherry currant. He had received the last year three new strawberries, all of which proved to be the Wilson; and another new strawberry will appear next year, which will also be the Wilson. The red Imperial he presumed was identical with the Cherry currant. The white Holland is the white Grape. The Gloire de Sablons has been highly recommended at Washington; but it is a little diminutive currant, with a stripe in it, and this paper contains the whole crop from five bushes. Here is the Imperial Jaune, which is certainly a fine currant; but I really think it is the White Grape.

Mr. Hite considered the flavor different.

The Chairman.—Here is the Imperial red. I think this will turn out to be another old one. I have come to the conclusion that there are but two or three currants worth cultivating. The

White Grape, the Cherry and the Versailles are certainly improvements upon the older currants. The Victoria has a very long bunch, and is prolific; but the lower end seems never to get ripe.

Mr. Carpenter.—The White Grape is double the size of the White Dutch, with the same cultivation, and will bear more fruit. I consider it one of the most prolific currants in cultivation.

CARNATIONS.

The Chairman exhibited specimens of seedling carnations, some of which were of colors never before attained.

GRAPES—THE ROSE BUG.

Dr. Underhill stated that he had observed this year that the grapes grew farther apart on the stem than usual, making the cluster more open, and by admitting the light and air, making the grape more highly flavored. The greatest nuisance among the insects was the rose bug. It was considered a part of the spring's business to remove them, as much as to remove the weeds. By plowing in the fall, turning up the larvæ to the frost, they had been much reduced; but the vineyard would still be visited by rose bugs from the woods and from lands not so treated. The ordinary remedies, syringing, smoking, etc., he had found useless in the vineyard. The insects soon return and are as troublesome as ever. Every morning and evening, men go through the vines with a cup with a little water in it in the left hand, and holding it under a leaf or a cluster, the moment the plant is touched they will drop into the water. The same method will answer for rose bushes by taking a large tin pān to catch the insects in.

Mr. Pardee remarked that if this method would answer for the rose slug, it would be an easy method of getting rid of them.

Mr. Gore said that they would not fall from the leaf so easily; so that it would not answer the purpose.

THE SPAN WORMS.

Dr. Trimble stated that the victory of the ichneumon flies appeared to be complete. There were many varieties of these flies that had simultaneously attacked the spanworm.

Subject for discussion.—The subject selected was "Fruits of the season and Potatoes." Adjourned.

July 22, 1861.

Dr. Trimble, of Newark, New Jersey, in the chair.

OATS—BONE MANURE.

Mr. Carpenter exhibited specimens of Poland oats and black oats, five feet and six inches in length, selected from patches in the field. Last year a crop of corn, estimated at 60 bushels to the acre, was taken from the field, 15 bushels of bones to the acre having been applied. This year the same quantity of bones was put on, with no other manure. He used the sawings and the fine bone. He considered bone to be the best manure he could use for the cereals. It has this advantage over guano, that if a large quantity is applied, sufficient strength is imparted to the stalk to hold it up; whereas, upon applying 500 lbs. of guano to the acre to wheat, the result was a great growth, but long before the seeds formed, it fell and was a total loss. This field was seeded down to grass, and the next year the effect of the guano was imperceptible. The second year the grass nearly failed in that part of the field where this large amount of guano had been applied, showing that it had stimulated the soil to such an extent that it had exhausted it, and it became the poorest part of the lot.

HOTZ'S PEDAL ENGINE.

The committee appointed to examine Hotz's Pedal Engine beg leave to report, that they deem it a valuable acquisition to the many and improved implements of security and usefulness, to the domestic household. The vacuum being as perfect as in other implements for like purposes, it will take water from a well or reservoir 30 feet below the surface, and by the action of a person weighing 150 lbs., without any advantage of mechanical force, throw it to an equal height, or 50 feet in a horizontal line; and of course proportionally higher and further with greater weight and facilities of mechanical force. The improved nozzle, or pipe for sprinkling or showering, is the most perfect your committee have examined. It is susceptible of producing a mist, and then by a simple turn of the wrist throw a solid stream $\frac{3}{16}$ths of an inch in diameter. For watering gardens, putting out fire and washing windows, your committee esteem it a cheap and valuable invention.

(Signed) N. H. GALE,
I. P. TRIMBLE,
EDW. DOUGHTY.

New York City, *July* 22, 1861.

The report was adopted.

FRUITS AND POTATOES.

Mr. Carpenter exhibited Austin strawberries, sent by J. C. Thompson, Tompkinsville, Staten Island, and also from Watervliet. The former were in bunches, many of which were green and small, showing that they were not yet exhausted. Also, specimens of Johnson's seedling gooseberries, of which fifty-three weigh a pound, and worth over four dollars per bushel, sent by Mr. Thompson. Also, specimens of the Downing seedling gooseberry, which he did not consider an improvement. Also, a choice seedling gooseberry, of excellent flavor. Also, the Prince Albert currant, of good flavor and very late. Also, the Brinkle's Orange and Belle de Fontenay raspberries, the former especially adapted to family use, both for quality and productiveness. Also, a raspberry sent by Mr. F. A. Henry, from Western Pennsylvania, represented by Mr. Henry as being a superior berry, but which he suspected had been overrated.

The Chairman.—Nearly all these fruits degenerate when you undertake to transfer them from the mountains to lower levels.

Mr. Carpenter also exhibited varieties of potatoes. The Early Algiers, supposed to be a choice seedling, he regarded as an improvement in early potatoes. It cooks as dry and mealy as potatoes in September. Pell's seedling gave a successful result, being taken from the ground in 70 days, although then not fully grown. The Dykeman potato, now generally planted in this vicinity, is not equal to the Early Algiers in quality, and will not produce within one-third as much to the acre.

Mr. Gale exhibited cherry currants raised by Mr. Hite, some of which measured more than one inch in circumference. They are cultivated upon a horizontal trellis, the upright shoots being cut down to within half an inch of the branch. The grape he cultivates in the same way. A pear tree pruned upon the same general system has upon it a pear growing out of the body of the tree within twelve inches from the ground. The peach tree he has commenced to treat upon the same system. The gooseberry also he prunes upon the same system, and has no mildew.

Mr. Pardee.—He is only following the instructions of the books.

Mr. Fuller explained his method of training grape vines, substantially the same as Mr. Hite's. He would have the trellis 18 inches from the ground, in order to prevent the bunches from being spattered with dirt. He preferred allowing one vine to occupy the lower bar of the trellis, and the next vine the upper bar, rather than to fasten the two to the same bar. When the shoots reach to the top of the trellis it is usual to pinch off the ends; but he preferred to let the two end shoots run wild. If the top is checked too much it checks the roots, and some strong-growing varieties will do to grow wild. The next year these ends are cut off down to the trellis.

Mr. Gale said that Mr. Hite proposed to connect those two ends by inarching.

Mr. Fuller.—I see no advantage in that.

The Chairman suggested the appointment by the Farmers' Club of a permanent committee whose duty it shall be annually to revise the list of fruits recommended to be cultivated.

Mr. P. G. Bergen stated that he had visited the "barrens" of Long Island and had found strawberries and blackberries doing well. The cranberries transferred to the uplands were doing extremely well. He considered those lands capable of high cultivation with moderate fertilization. He had seen cucumbers and melons of remarkable growth. Dwarf pear trees did not seem to do well, perhaps from the difference of the soil from that of New Jersey whence the trees were obtained. The cranberries are cultivated by some between the pear trees. Their cultivation on the uplands is still a matter of experiment, but has been tried since 1856.

ENTOMOLOGY.

Mr. Fuller exhibited specimens of rose bugs and beetles.

The Chairman.—Here are a few specimens of the immense class of coleoptera. Some of them live three or four years under the ground in the form of a larva; and this is the period of their destructiveness. The greater part of these beetles are amongst the scavengers of the world. Very few of them in this, the last stage of their life, eat much of anything.

Mr. Fuller said that the word "rose-bug" included a large variety of insects, every locality giving the name to a special variety. These are some of the last to appear. By keeping a diary, he had found that the same varieties always appeared within a few days of a regular time; so that he knew when to expect them. By killing them as fast as they appear, the garden or vineyard can be preserved from destruction; for with that course they do not increase in numbers. If let alone, they would soon destroy everything.

The Chairman said that the proper way to get rid of the apple-moth, is to pick the fruit as it falls and feed it to the hogs; but as it is a winged insect, it cannot be exterminated in any locality without combined action by the farmers of the neighborhood.

Mr. Carpenter described an insect which has attacked the melon crop within a short time, and which also attacks squashes, pumpkins and everything of that nature. It bores the stalk near the root, destroying the life of the plant, and is a white grub, half to three-fourths of an inch in length.

The Chairman stated that it had been computed that the undisturbed progeny of a single herring would in twenty years monopolize the whole earth. Yet we are in no danger of being swallowed up by the herrings. The fact is that there is no fish, beast, or insect, that would not multiply to swallow up everything, if there were nothing to regulate their increase. The destruction of the-span worms of this city by the ichneumon flies, is an illustration of one mode of regulating this enormous increase.—We need not get nervous about the insects; it is not intended that they shall destroy everything. They are just as much a portion of creation to make the world suitable for us, a superior order of beings, as any other of the branches of created beings.

Prof. Nash suggested that perhaps, as we succeed so poorly in our attempts at regulation, they might be as well regulated without our help as with. We used to kill birds, for instance; but found out at last that they were beneficial to the farmer.

The Chairman said that if we could find a remedy for the curculio, which is safe against the ichneumon fly, it would be a blessing. He considered it necessary to bestow a great deal of attention upon its destruction. His remarks were intended especially to apply to the caterpillars, and butterflies.

New subject.—The subject selected for the next meeting, was, "The Flowers and Fruits of the Season," to be illustrated by an exhibition.

Adjourned.

July 29, 1861.

Mr. Henry Steele, of Jersey city, in the chair.

APPLES.

Mr. Carpenter exhibited specimens of apples—the Red Astrachan, which is one of the earliest apples, and fine for cooking, but rather acid for the table. They will ripen gradually for a month or six weeks. a few at a time. Also, the Early Joe, one of the earliest and finest apples. The Gifford is a few days later. The early Strawberry apple is another desirable apple for every farmer.

Mr. Pardee.—The Summer Rose is one of the best early apples.

Mr. Carpenter.—The Jersey Sweeting is a little later than these; but I know of none so desirable. Its quality is almost equal to some of our best pears. It is a great bearer, and bears every year. I obtain good fruit in two or three years, by grafting on the top of an old tree. The trees may be grafted from the middle of April until they are in full bloom. I think it is not very safe to graft after the blossom has fallen; but I have been as successful when the trees are in full blossom as at any other time.

WHEAT—CORN.

Mr. C. also exhibited a new variety of spring wheat, of very promising yield, some of the heads being six inches long. It was sown about the first of May. Also, a specimen of early Narraganset sweet corn, a week earlier than other varieties of sweet corn.

Mr. Robinson exhibited a specimen of Mediterranean wheat, and remarked that boiled wheat is an excellent dish for the table. It is to be gathered as soon as it is ripe enough to shell, or may be used after it is ripened, and is cooked like rice; to be eaten either as a vegetable with meat, or with syrup or sugar. It is far superior to rice; more nutritious, and costing less.

DROUGHT—WATERING—CULTIVATION.

Mr. Carpenter, after referring to the drought now pervading some sections in this neighborhood, said that he was convinced that upon ground which has been trenched, digging often to mellow the ground is more serviceable than watering. The atmosphere penetrates the soil and its moisture is condensed about the roots.

Dr. Trimble suggested that early in the season, before the plants are large enough to permit digging, the surface may be kept mellow with a rake oonstructed for the purpose. The ground should be raked over after every rain, before the surface has had time to become hardened in drying.

Mr. Gore said that in 1848, in a drought in Maryland, he had cultivated his corn constantly, and was considered a crazy man in consequence; but he had corn, while his neighbors had none.

The Chairman, in visiting a garden a few days ago, had observed that the cucumbers alone seemed to be suffering from the drought; their vines so covering the ground that it could not be stirred beneath them.

Mr. Pardee said that irregular and partial watering is worse than none. A garden should be watered as regularly as a horse, or not at all. It is a trade to learn how to water, as much as anything else, with regard to horticulture. In city gardens, an excellent implement for keeping the ground mellow, where the plants are too near together to use an ordinary hoe, is the bayonet hoe.

Mr. Carpenter had found the bayonet hoe very useful in the cultivation of beets, carrots and parsnips. In watering, he would first dig the ground deeply, and would afterwards cover the ground upon which the water is poured with fresh earth. In the Central Park, the trees are dying, because the water is poured upon the surface, and a basin is formed around each tree, forming a perfect hard-pan.

Mr. Robinson.—The proper plan is to water the top of the tree or plant. Washing the dust from the leaves will do more good than wetting the roots.

Mr. Pardee stated that Col. Stoddard, who was very successful in raising strawberries, put on a pailful to every four or five hills. The leaves of a plant need to be clean, in order to have good respiration.

Dr. Trimble considered the irrigating process the best. If we are to water at all we should water effectually.

Mr. Robinson.—Do we sufficiently consider the proper time to stir the earth? On some days the moisture will be immediately dried out of the earth, and on others the earth will condense the moisture. Ought we not to measure the hygrometric condition of the atmosphere, and know whether stirring the earth will add to its moisture or evaporate its moisture?

Dr. Underhill.—I never thought I received much advantage from moving the soil, during a drought, in the early part of a hot day. The cool soil turned up will become heated, and a considerable part of the moisture which would have remained in the soil will be dried up. But, I do think an advantage is gained by turning up the cool soil to the influence of the atmosphere just at night, working, if it is moonlight, very late. The plowing should be commenced very late in the afternoon and continued as long as you can see. The dew is thus very much increased. I have noticed this for many years.

Mr. Gore.—It has been my practice to cultivate in the afternoon.

Mr. Carpenter.—I plant out everything after the heat of the day is over, particularly at this season. In setting out cabbage plants, take a good sized crowbar and shove it two feet into the earth, filling the hole with water and then with earth, and one out of five hundred will not die. But it should be done just at night. The plant will be almost established by morning.

Mr. Underhill.—Watering should be done just at night. It will then sink into the ground far deeper, and the same quantity of water will do three times as much good.

ASPARAGUS.

Mr. Carpenter.—Is it necessary to allow asparagus seed to mature, in order to have a good growth another year; or may the tops be cut off?

Mr. Underhill.—My own experience is, that the plant will be soon destroyed if it is not allowed to go to seed. The young plants, when not wanted for renewals, may be hoed up in the spring.

Mr. Gore.—Asparagus should never be cut later than the middle of June.

Mr. Robinson.—We should stop cutting when the cutting is still good, and let it perfect the seed thoroughly.

Mr. Pardee.—The ripening of the seed is the most exhausting operation there is. The only way to raise hybrid roses is to cut off the bulbs where the roses have blossomed, and prune them down a little. Instead of allowing the asparagus to harden the seed, I should suppose that cutting it off would save the strength which is necessary for that process. That is the law for all flowers. Whenever we want flowers to continue, we must take them off as soon as they have fairly blossomed.

Dr. Trimble.—The Canada thistle can be killed by that process, and a very large number of the perennial plants would be killed by it; cutting off the top several times during the season, and again in blossom.

Rev. Mr. Weaver.—In this case there is nothing to throw the strength into, for you cut off the whole top.

Mr. Pardee.—To make a vine strong, it should be pruned in November, and should not be left until spring. That throws the strength back into the buds that are left.

Mr. Carpenter.—There can be no doubt that wood grows in the winter. Fruit trees will grow half as much in the winter as in the summer; therefore, pruning gives the best results when done in the fall.

Rev. Mr. Weaver.—That throws the strength into the buds that are left. The case of asparagus is different, nothing being left.

JOHNNY-CAKE.

Mr. Robinson read a recipe, by a lady, for making Johnny-cake: "Take some good corn meal; run it through a coarse sieve; pour boiling water, just enough to mix it; have the griddle hot; put on a little butter to prevent sticking, unless you have a soap-stone griddle; spread the dough in cakes about seven-eighths of an inch thick; let it bake sufficiently on one side before turning. A cake may be prepared from rye, oat, or wheat meal, in the same manner, that will also be delicious." Mr. R. remarked that lard or pork-rind were either of them better than butter for greasing the griddle; cooked butter being never good, any more than cooked honey. But beeswax is better than either. Wax a rag with beeswax, in the fall, and add a lump as large as a pea at each time of cooking, and it will prevent the cakes from sticking as well as lard. The griddle should be rubbed over with the waxed rag, in the morning, before commencing to bake, and then the same rag should be used to brush off the crumbs. It is better in every respect. He had used it for years.

Subject for discussion.—The subject of "The Flowers and Fruits of the Season," was continued.

Adjourned.

August 5, 1861.

Mr. Pardee in the chair.

HONEY AND BEES.

Mr. Steele exhibited a specimen of honey made in small sashes without any intervening partitions. A little guide-comb is rubbed upon the inside of the top of each sash, when the bees will proceed to fill the sash with honey, which can be removed without cutting. He, also, exhibited his bee-moth protector, which is constructed with a row of circular apertures, fitted with trap-doors, alternately opening inward and outward. The bees will pass through readily, while the bee-moth will be effectually excluded.

Dr. Trimble regarded this a most ingenious contrivance, and had been pleased to see the bees going in and out. It had been said by naturalists that it is impossible to educate any insect, because their lives are not long enough. This apparatus seemed to overturn that theory.

Mr. Steele—It is not the result of instruction, for I have had the bees pass through within three minutes from the time it was put on, without instruction. Bees coming out and opening the door, will open it to go in again. Bees not in at the time, and coming back from the fields, seeing it for the first time, would wait, and seeing others go in would enter in the same way.

Dr. Trimble—There is the instruction.

Mr. Steele—It is a perfectly effectual protection when it is properly put on. I have never known it to fail, excepting from not putting it on properly, or from not putting it on early enough.

Dr. Trimble—Must the hive be made perfectly tight? Will the young insect creep through into the hive?

Mr. Steele—Undoubtedly I make my hives perfectly tight.

Mr. Carpenter said that there was another annoyance; mice would destroy both bees and honey, and this would be no protection against mice.

Mr. Steele—You can protect the bees from mice in various other ways. The bees can be put upon a stand so suspended that mice cannot approach them.

Dr. Trimble stated that but one kind of mouse would attack bees. The ordinary mouse and the meadow mouse will not touch them. It is rather a small mouse; the tail is very long. Its fore-legs are short. It is somewhat of a kangaroo shape.

Mr. Fuller—You are describing the prairie mouse. I did not know that that was found in this vicinity.

Mr. Carpenter—I have noticed that the shape was peculiar. It appears to be a distinct variety.

The Chairman suggested that a wire placed across the trap-doors, so as to allow them to open only far enough to admit the bees, would cause this protector to keep the mice out.

Mr. Carpenter inquired whether the Italian bee could, as represented, extract the honey from the red clover. The common humble bee is the only one that we now have that can feed upon it.

Mr. Steele had some bees purporting to be Italian bees, but they were no larger than the common bee.

Mr. Carpenter said there were two kinds of bees called Italian bees, only one of which is genuine.

Dr. Trimble—Our ordinary honey bee cannot reach the honey in the red clover, Its tongue is not long enough. If the Italian bee can extract the honey from the red clover, it would enable us to have many times as much honey as we now have. Besides, it would enable us to have clover seed from the first crop of clover, which we now seldom have. The humble bee is almost the only insect that we have which can penetrate the red clover; and the humble bee does not live through the winter in numbers. The new colony of bees is not raised so early in the season as the red clover blossoms. There are, therefore, not bees enough to fertilize the blossoms.

Mr. Fuller did not consider bees necessary to fertilize clover. They may assist in fertilizing clover, and insects may assist in fertilizing strawberries; but nature has provided for their fertilization without such aid. The native Indians of the Southern Ocean discovered that if diœcious trees are planted within ten miles of each other the one would fertilize the other.

Mr. Burgess suggested that the bees do not visit the wheat fields, and inquired how they were impregnated.

The Chairman—Nature is not dependant upon the bees.

Mr. Carpenter—No doubt the bees will carry the pollen; but whether it is necessary, I doubt. We are indebted to the bee for many hybrids that have proved valuable.

Mr. Burgess—And for many that are not. When I wish to save seed, I should be glad to have the bees kept out of my garden.

Dr. Trimble referred to elementary works on botany to prove his statement.

The Chairman—Close observers are continually exploding the theories of botanists.

Mr. Fuller--We have had the theory advanced here that every branch of a tree is connected with a corresponding root, so that neither can live without the other. But the facts explode that theory; for, if we take a limb of a tree and cut away the bark so as to prevent the continuous passage of the sap, by tenoning out pieces in two rings, the upper openings being opposite the uncut portions of the lower ring, the sap will pass sideways and the limb will continue to grow. The reason why plants sometimes fail to be fertilized in the greenhouse, is the absence of the wind.

FLOWERS.

Mr. Fuller exhibited specimens of the gladiolus, remarking that they are so easily grown, and so easily kept through the winter, that they will probably to a great extent take the place of the dahlia.

COMMUNICATION FROM CALIFORNIA.

The Chairman read a communication which had been sent to the Farmers' Club from Mr. Bruce, dated at Mariposa, in California, June 24, 1861; as follows:

To the Secretary of the Farmers' Club:

Dear Sir: I promised to write to you from hence, and to communicate such information from time to time as I considered either new or useful for the benefit of the members of the American Institute, of which, though absent, I still consider myself a member. This promise I now proceed to fulfil.

To give any detailed account of my voyage would be interesting to but few; I will, therefore, say nothing on that subject, further than to state that the passage to Aspinwall, on the Atlantic, was all that any one familiar with sea life could desire; and our trip by railroad, over the Isthmus, exceeded in comfort that of any railroad I ever rode on. It was through a country of tropical luxuriance, excelling all I had previously beheld. The inhabitants along the road, as we passed, crowded out to take a look at us. They were composed of every hue and color humanity has yet assumed—the majority of them dressed, as I should suppose, were earth's earliest inhabitants, while the children were destitute of all covering whatever.

I have said that our passage on the Atlantic was all any one familiar with sea life could desire; but our trip on the Pacific excelled it in tranquility by all odds. There was, for most of the distance up from Panama, scarce a ripple on this placid ocean to disturb the digestive organs of the most delicate female. This sudden change for the better brought to light many ladies who had not before been seen at table, and thereby filled up spaces long vacant, calling out from among them many who were votaries of both Apollo and Terpsichore, thereby enlivening our evenings for the balance of our trip with singing and dancing to a late hour. We stopped at Acapulco to coal on our way up, where many of the passengers went on shore and indulged in fruit eating, some contracting sickness therefrom, while those remaining on board were amused by the natives, who surrounded the ship in boats, selling fruit, shells, coral, squirrels, monkeys and parrots, a portion of each being purchased by the passengers; while others were amused by throwing overboard pieces of money to divers, who displayed great agility in that art, by catching each piece before it reached half way to the bottom, although sharks were visible all around the ship. On leaving Acapulco we met in the night a ship, that our captain mistook for one of Jeff Davis's cruisers, and instantly ordered all our lights extinguished. He at last came to the conclusion it was the downward steamer of our line. This sudden freak created no slight sensation among the female passengers. We at last reached San Francisco, this wonder of the world, which, like ancient Rome, stands on seven hills, and not low hills either, covered with houses to their summits. No other nation in the world could believe it possible to construct a city of such magnitude, and, I may with propriety add, magnificence, in the short period of a dozen years. What would this State have been if given over to slavery, as at first attempted? Little better than a wilderness! I remained three days in San Francisco, and took a good look around; then took steamboat for Stockton at 4. P. M., and arrived there at 2 A. M.; staid on board till daylight, when I went to a hotel with my daughter, intending to take a view of the place. We walked around, and were particularly struck by the beauty of the place and its surroundings. The outskirts are altogether composed of handsome white cottages, each having a fine garden, and attached to each house a small windmill, employed in pumping up water into a reservoir. This water, by the aid of hose, is used to irrigate their gardens, which otherwise, for eight months of the year, there being no rain, would remain a perfect barren; but by this mode of irrigation the ground produces all manner of fruits, flowers and vegetables in the greatest abundance. We visited the State Lunatic Asylum at this place—a fine building of brick, with elegant surroundings. Here we were shown through the female department by the lady matron, Mrs. Farnum, in whom I found an old friend, who politely entertained us for two hours. The next morning at 6 A. M. we took stage for Mariposa. On being seated in the stage, and ready to start, a gentleman stepped up and inquired for me by name, stating he had received a telegraphic dispatch from my grandson from San Francisco, who had gone down to meet us, but passed us on the way, and requesting us to remain till he came up, which we did. Next morning we started, making stages of twelve miles, with a fine coach carrying nine inside, and some outside, drawn by five excellent horses on a smooth, level road, over a plain of vast extent, relieved occasionally by round-topped hills, on which were grazing large herds of cattle and horses, in fine condition. Although the herbage on which they fed was, to all appearance, burnt up by the sun, yet upon inquiry I learned that in that state the cattle would thrive better and become fatter on it than when in the green state. We soon reached the mountains, in the valleys between which we passed many fine farms; and, although only in the month of May, I was surprised to find it the harvest time in this region. On several farms the mowing machine was at work cutting down wheat and barley, which, to all appearance, were an abundant crop. Of Indian corn I saw but little; oats and barley, as also wheat, upon occasion, are mowed in the green state for hay, and the horses appear to thrive on it, they being all in fine condition. We put up for the night at the mining town of Hornitas, where we went to bed at the hotel the stage stopped at, but not to sleep, although much in need of it. This town, as are most mining towns, is infested by a set of men who, after the well-disposed are abed, make night hideous with their howling in their drunken orgies. They thus deprived us of all sleep, which had to be paid for, the same as if we had been blessed with a taste of kind Nature's sweet restorer.

At 5 A. M. the stage for Mariposa called for us, in which we travelled breakfastless a distance of seven miles, to Bear Valley. Here the chief quartz mills of Fremont are located in a little village, finely situated between his gold-bearing mountains. Again started and passed as before many pleasant farms, or ranches, as they call them here, some deeply and successfully engaged in the culture of fruit of all kinds--grapes, peaches and apricots, in particular; the same means of irrigation having to be pursued as I have mentioned was done at Stockton by windmills and pumps, unless, as is frequently the case, a mountain spring is in their vicinity, when the most ingenious methods are resorted to to get and give by its distribution equal benefits to all the plants, under which treatment everything flourishes in the utmost luxuriance till late in the fall. We reached the town of Mariposa at 12 M., and were warmly received by my sons, who had been long expecting us. Mariposa is situated, like most of the towns in the mining districts, in a valley between high mountains of gold-bearing quartz. The valleys appear to have been chiefly formed by landslides at various periods, forming eminences or risings above each other, many of which form good farming land, but all containing more or less gold in particles or large lumps. I am the more convinced in this theory, from a conversation held with our next neighbor, an old, trusty employee of Mr. Fremont's, who informed me that in front of the place where we now are, that was bought from him, and which fronts on the creek or brook, he had in one day taken out $2,300, and the next day $1,700, and added a million of dollars had been obtained within the space of a few hundred feet. Wealth thus easily obtained is as easily got rid of; hence the inhabitants, with but slight exceptions, are woefully deficient in domestic economy. All that is bought, with the exception of beef, is at four times its cost in New York. There being no coin less than a dime in circulation, we pay a dime for a pint of milk. I had an invitation for myself and family to spend a day at the ranch of a Mr. John Neal, formerly a jeweller of New York city, but who got burnt out in the great fire which nearly destroyed this place three years ago, but managed from the wreck of his fortune to buy his present farm, situated about three miles from here. I accepted the invitation, Mr. Neal sending for our accommodation horses saddled for the journey. We found his place off from the Fremont grant, situated in a valley of some eighty acres, almost environed by high granite mountains, from the debris of which his land is formed, and consequently must, if the theory of Prof. Mapes be correct, contain the sixty-four primaries, and from its apparent fertility must contain them in suitable proportions to afford to plants their most nutritious pabulum. I am the more convinced of the truth of this, when taken by Mr. Neal through his ground, which is admirably laid out for the cultivation of fruits of all kinds, for which purpose it is mainly designed; and although little more than two years since he entered on it a wilderness, it will take the palm as an orchard and garden from anything I ever beheld at the north, in the immense profusion with which the trees are loaded with fruit, with this peculiarity that the apples, peaches and many other fruits grow in clusters of from five to eight. The color of the soil of this lovely spot was jet black, and the secret of its great fertility was discoverable in a large spring situated on the side of a mountain near by, the water from which is led in little ditches of an inch or so in depth in every direction through his garden and orchard where required, thus obviating the necessity of the windmill and pump, before alluded to, for this purpose. These little streams, meandering through his grounds, carried little bright shining particles of mica, which, to the uninitiated, bore all the appearance of gold. Besides the immense crop of fruits and vegetables Mr. Neal has already raised this year on his farm of eighty-four acres eighty tons of hay, made from huge crops of barley, wheat and oats, which is cut while the grain is yet in the milk, the hay being in value here from twenty-five to sixty dollars a ton. All the help Mr. Neal employs to perform the labor of his farm is an old Indian chief, of great celebrity as a warrior, and his two sons, boys of about sixteen and seventeen. All of them excel as marksmen, and by their dexterity as such keep his table continually and abundantly supplied with all manner of game native to this region of country. The Indians are in abundance, located a short distance from this town, some of whom are daily visitors; but few of them seem disposed to adopt habits of civilized life.

The Chinese are to be found in large numbers in and around the neighborhood. They are chiefly engaged in mining, and that in places deserted by the whites as not sufficiently productive. There are two classes of these—Tartars and Chinamen—who bear a deadly enmity to each other. When the opportunity presents of either side being brought within the meshes of the law, the other side will expend large sums in the feeing of lawyers, and do their utmost to have their opponents hanged. A peculiar arrangement exists with regard to the people. If any of the males die here they are buried for a time, then disinterred and placed in a leaden coffin, soldered up tight, and that placed in a wooden box, which is sent to San Francisco. There it is encased in a still stronger box, in which it is shipped to China; but the females, for some reason, are not included in this arrangement.

I am making every effort to make such collections of seeds of flowers, fruits, vegetables and trees as I thought might prove of interest, besides various curiosities. I have obtained some already that are deemed valuable, but the sending of them by express—the only safe mode from here—will be attended with some expense, that, to an individual, might soon prove too burthensome, I would respectfully ask if the Institute could devise any mode whereby I could be relieved of expense in their transmission.

With best respects to my old colleagues of both Clubs,

I remain yours, truly,

JOHN BRUCE.

Mr. Carpenter remarked, with reference to the statement in this communication that cattle do well upon dry grass, that he had adopted the practice of preserving a piece of grass into which the cattle could be turned in case of drought, and he had found that the cattle did well upon this dry grass. Another method is to plant corn for soiling. Sweet corn may be cut up and fed to hogs, who will eat the entire stalk and thrive upon it.

Mr. Adrian Bergen had tried the plan of feeding cattle upon dry grass, and they kept in good heart. They might fail in their milk with this feed. Any kind of corn may be cut from the ground and fed to hogs, who will eat it up clean, and do well. He remarked that he had lately been down upon the "barrens" of Long Island, and was confident from his own observation that they could be cultivated to advantage. They were growing as good crops down there as anybody need to grow.

On motion of Mr. Gore, Mr. Carpenter was requested to reply to Mr. Bruce's letter.

Mr. Fuller remarked that the Sequoia Gigantea stood the cold of last winter, and might be called perfectly hardy. He considered it worth four times as much as the Cedar of Lebanon.

Mr. Carpenter did not consider it perfectly hardy. Mr. Reed, of New Jersey, lost his best specimen last winter, a tree about eight feet high, one of the largest in this neighborhood. He had learned that Mr. Gore was about to leave soon for Honduras, and would suggest that he should write to the club.

Mr. Gore promised to do so. He had never found such conflicting accounts about any other place, and hoped to be able to furnish some reliable information respecting it.

DROUGHT.

Mr. Carpenter had observed marked effects from the sprinkling of plaster in drought, from its attracting the moisture from the atmosphere.

Mr. Gore had noticed the same result.

Mr. Doughty had lately sprinkled plaster upon oats which were all burning up from the drought, and the good effect was easily seen.

The subject of "Protection from Drought," was selected for discussion at the next meeting. Adjourned.

August 12, 1861.

Mr. Amos Gore in the chair.

APPLES AND PEARS.

Mr. Carpenter exhibited ten varieties of early apples, the Bovine de Mai, the Drap d' Or, the Early Strawberry, the Summer Queen, the Summer Rose, the Red Astrachan, the Sweet Bough, the Early Joe, the Indian Queen, and a chance seedling as yet unnamed. The latter he described as tart, very tender, and very juicy. It remains a long time upon the tree, is productive, and an excellent variety. The quality of apples does not seem to be affected by the drought this year, although they are prematurely ripening, and the crop, especially of winter fruit, is falling from the trees. Of pears he exhibited four varieties, the Beurré Giffard, Osband's Summer, the Ott, and the Jargonelle. The Ott is a seedling from the Seckel, and quite as good. He took occasion to commend the accuracy of Mr. William Reed, of Elizabeth, N. J., in labeling his trees, remarking that it is discouraging to an amateur, after waiting several years for a choice variety, to find that the result is some other miserable and useless kind.

Mr. John G. Bergen said that the seedling was a first rate apple. The pear exhibited as a Jargonelle is called by Downing the Windsor Bell, and has been condemned by the American Pomological Convention. He considered it a great wrong to throw it out, for it is one of the most profitable pears that grows upon Long Island. It is one of the best bearers, and the strongest growers. In planting a pear orchard he would plant more of them than of any other kind, excepting perhaps the Bartlett. This is not the usual Jargonelle pear.

Mr. Carpenter.—This is known as the Jargonelle by all the nurserymen in the United States and in England, and is so called by all the books, without an exception.

Mr. Bergen.—We had the matter up in the Convention, in Philadelphia, last fall, and this was admitted by Mr. Wilder and others to be the Windsor Bell.

Dr. Trimble considered the Jargonelle, as he had seen and cultivated it, worthless. It may appear fair and fine upon the tree; but knock it down from the tree, and it is not a pear but a squash.

Mr. Bergen said that that might be true, if the pear is allowed to ripen on the tree; but if the Windsor Bell is picked green and put into the cellar, and allowed to soften there, it will ripen without becoming rotten at the core. If they are destroyed by being left too long upon the tree, it is not the fault of the pear.

Mr. Burgess.—This is not the English Jargonelle at all. It is nothing like it. It is a great fault of the Jargonelle that it will not bear gathering. It should be eaten from the tree, one day before it gets ripe. It is a fine pear, if you can find it just right.

Mr. Bergen read Downing's description of the Windsor Bell, in which the tree is mentioned as of straggling growth.

Mr. Carpenter.—This is not straggling. It is upright.

Mr. Bergen.—Then I may be mistaken in the identity of this pear.

THE GLADIOLUS.

Mr. Andrew Bridgeman exhibited some beautiful specimens of the Gladiolus, in spikes, mostly however secondary flowers, the season for them being nearly over. From the bulb planted in the spring there will shoot up four or five stalks, according to its strength. Each stalk produces three spikes of flowers, a principal spike growing from 18 to 20 inches long, and flowering gradually up to the top, and a secondary spike on each side of it which are much shorter. The bulb that is planted dies, and each of the stalks thrown up expands at the base and forms a new bulb to be planted the following season. These bulbs renew themselves indefinitely, and there is no occasion to renew from seed. The proper time for planting is April or May. They may be planted as late as June, if the bulbs are kept dry and are not started. They will stand the winter; but it is not desirable to leave them out, for two reasons. The bulb being formed each year above the old one, it is necessary to plant them deeper. Besides, the multiplication of the bulbs makes it desirable that they should be taken up and separated. They should be taken up just before or just after a frost, and after being gradually dried should be kept in a dry place, the tops having been cut off and the roots cleaned. These specimens were of the French hybrid Gladiolus, derived from the Emperor's gardens. The soil best adapted to them is a good loamy soil. They require considerable moisture, and do not bear, particularly in the dry season, too much exposure to the sun and heat. It should not be fertilized too strongly with manures.

Mr. Carpenter remarked that experience seemed to show that there is a certain point that we cannot go beyond in the improvement of fruits and flowers, and that if we attempt to pass that limit, the fruit or the flower falls back to its original condition.

PROTECTION FROM DROUGHT.

Mr. Carpenter stated, that, in a portion of Westchester county, there has been no rain of any consequence since the 4th or 5th of June. Yet, the portion of his garden which had been trenched, 30 inches deep, and manured throughout at the same time, there was no injury from the drought. Melons planted there, and receiving no artificial watering, were doing as well as he could desire. In other parts of his garden the ground is baked hard, and the melon vines are nearly dead, there being no fruit upon them of any value. Much can be done upon the farm by subsoil plowing, 20 inches deep. A piece of ground thus prepared and sown with carrots, was doing well. The stirring of the surface, in a dry time, is very important. An application of a very small quantity of gypsum will produce a striking effect, from its attracting the moisture of the atmosphere. He had applied it with marked effect upon potatoes and corn. It is a good plan to give the corn a slight dusting three or four times, with gypsum, in the course of the season.

Mr. Bergen said that clearing the ground of weeds is not all that is necessary. At no time does the ground so much need frequent stirring as in the time of extreme drought. He had lately visited what were known as the Barrens of Long Island, and had found the crops, notwithstanding the drought, in a green and flourishing state. He coincided with the view taken by Dr. Peck, that before many years shall have elapsed, these lands will be cleared off and cultivated. Within the last fifteen years, hundreds of acres have been cleared off, and wherever they are properly cultivated the crops look well.

Dr. Peck.—Probably the only remedy we have, without resorting to irrigation, is through deep tillage. The soils in this region, south of the Highlands, and within fifteen or twenty miles of the sea shore, never need to suffer, with proper tillage, if thoroughly plowed and subsoiled or trenched to the depth of not less than 18 or 20 inches. Keep the surface of the earth stirred, so that the atmosphere may thoroughly permeate it, and the drought will have little effect. As to the Long Island soils, it had been twenty years since he had brought up the subject before the Farmer's Club as a matter of public interest; saying, then, that he could see no reason why they should not be cultivated. The event has proved not only that they are well worthy of cultivation, but that they will stand a drought as well as any other region in the State. For twenty years successively, he had visited Hempstead Plain, with a view to observe the effects of drought upon that soil. When in other places the corn leaves were rolling up from the drought, going by railroad to Hempstead Plain, he would invariably find the corn green and luxuriant. There is not now a single sign of drought in that whole region, while there has been no more rain there than here. And there has not been a drought there within the memory of man.

The Chairman stated his experience in Maryland, in 1841, when he had raised the only crop of corn in the neighborhood, in consequence of deep plowing and constant cultivation. His neighbors only plowed, as is customary there, about 3 or 3½ inches deep.

Mr. Robinson suggested that, that was probably twice as deep as they really plowed. In measuring the depth of plowing, if we measure from the top to the bottom of the furrow, as turned up, we shall make it nearly twice as deep as it really is.

Dr. Peck recommended the old method of plastering corn, throwing in a teaspoonful to the hill, two or three times in the season. The sea air does not, as is sometimes supposed, destroy the effect of plaster.

Mr. Bridgeman had observed that the plains of Long Island stand a drought better than inland soil. He had also observed the same thing of the eastern shore of New Jersey. He ascribed this result to the influence of the salt in the atmosphere, which has a tendency to attract and retain moisture. He had found that a small quantity of salt sprinkled upon dry lands, would often enable them to stand a drought.

Mr. Robinson cited his own garden as an exception to Dr. Peck's theory, that land deeply plowed and constantly stirred, is safe against drought. His land had been trenched 30 inches deep, thoroughly manured, plowed and subsoil plowed repeatedly and as deeply as possible, and had been stirred as frequently this manner as it is ever desirable to stir land even in drought. In addition to that, plaster and salt and ashes have all been used. Yet, with all this, the drought is so severe that the crops fail. There has been no rain there since the potatoes were planted, sufficient to wet them in the hill. In planting the potatoes, he had marked the rows with a subsoil plow, going as deeply as possible, and scattered salt with the potatoes in the rows. By his method of cultivation, he had been able to obtain a few small potatoes, while his neighbors, who merely scratched the ground Maryland fashion, got none. All the remedies for drought have failed, excepting irrigation; and to that we must come at last. The best outlay that can be made upon a farm is to prepare by wind-power or water-power for irrigating the land, and placing it beyond all fear of drought. If the lands are properly under-drained there will be no danger of giving them too much water.

Dr. Trimble said that in New Jersey, where they have marl, there is no necessity for irrigation. They have no drought.

Mr. Carpenter said that drought was particularly injurious to shrubbery and trees newly set out, unless they have been properly watered when set out. And by a proper watering they can be protected from the effects of drought. Spading around each tree to a depth of fifteen inches, then applying not less than six pailfuls of water to a tree ten feet in height, and mulching the ground as far as the roots extend, there is no necessity for repeating the operation, if there should be no rain for a month. Unless thoroughly wet more injury may be done than good.

Subjects for discussion.—The subjects of "Protection from Drought," and "Fruits," were selected for consideration at the next meeting. Adjourned.

August 19, 1861.

Mr. Austin Church in the chair.

APPLES AND PEARS.

Mr. Carpenter exhibited specimens of apples and pears, a little later than those exhibited by him last week. Persons wishing to set out fruit trees would be enabled to test the fruit in advance, and would be enabled to detect any errors committed by nurserymen in labelling their trees. The Alexander apple, which usually ripens in September, has been forwarded by the drought. He had found it a free bearer, bearing every year. It is a fine cooking apple, and large and showy for the market. The Gravenstein is one of the best apples for the dessert or for cooking. One of them will perfume a room. The Bay apple, Jenny's seedling, small and finely flavored, and the Horse apple, for cooking, were among those exhibited. Of pears, the Tyson, Bloodgood, and Dearborn's seedling were mentioned.

Mr. Robinson exhibited specimens of Erhard's early pear, which he highly recommended, and of the early strawberry apple, beautiful to the eye, and spicy to the taste, and as fragrant as the Gravenstein, which every farmer should possess.

Mr. John C. Bergen endorsed the recommendation of the apple, but stated that it did not now succeed in Kings county. They had done well twenty or twenty-five years ago; but he should now be compelled to remove the trees. He presented specimens of the Summer Bell or Windsor pear, of which he had spoken last week. The Pomological conventions may reject it, but the public consider it a good pear.

Mr. Carpenter said that, in quality, this pear is but second rate, but that for market purposes it might be serviceable.

Mr. Bergen said that this pear is astringent, and that many persons prefer the Bell pear to the Bartlett, because it is astringent. This pear ought not to be set aside as unworthy of cultivation.

THE HESSIAN FLY VS. THE APHIS.

Mr. Robinson read a letter from a gentleman in Montrose, Pa., enclosing wheat-heads infested with insects this season for the first time, and inquiring whether it was the Hessian fly.

Dr. Trimble, after citing "Kirby and Spence" to prove his former assertion that certain plants could not mature seed without the instrumentality of certain insects in their fertilization, stated that he had examined these insects a month ago and found them to be the aphis, or plant-louse. He had found upon investigation that it has been attacked by a parasite insect which would keep it in check. The aphis is remarkable in its rate of increase. It commences early in the spring, and there are eight successive generations during the summer. Then comes a generation of winged insects, which lay eggs to produce the young for the next summer. It has attacked vegetation generally this summer. The wheat-fields and oat-fields are black with them. Yet he should not apprehend any material injury to the grain.

Mr. Carpenter did not consider the appearance of this insect an occasion for alarm. Grain does not appear to be injured in the least by them. They might injure tender shrubs.

Mr. Bergen had had his cucumbers so much injured by them that he would obtain but $50 from a plot which usually yielded $250. He should be compelled to abandon the raising of cucumbers on this account. They have injured squash plants, but not to such an extent. Watermelons are much injured by them.

Mr. Fuller regarded the aphis as an insect doing great injury. If he did not destroy them upon the grape vines early in the season, they would injure them so much as to stop their growth. He had lately found that his strawberry plants had been attacked by a sort of subterranean aphis. He was obliged to take up the plants and clean them from the roots, and transplant to prevent them from destroying his vines. Yet, there were none upon the top of the plant. As to the fertilization of plants, although there are works which throw out the hint that insects are indispensable, he was not convinced of it.

BUTTER-MAKING.

Mr. Robinson read a letter from Clinton county inquiring why the writer sometimes failed to obtain butter in churning, and giving in detail the facts respecting his cows, dairy, churn, &c. He remarked that he had had the same experience this season, the butter sometimes coming promptly, and at other times not for hours.

Mr. Carpenter recommended the use of the thermometer churn.

Mr. Robinson stated that the writer used the thermometer in churning, and the cream was brought to the temperature of 62 deg., which was the proper temperature. He had himself commenced churning with the cream at 62 deg., and kept it at 62 deg., and yet after four hours of churning the butter had to be strained out from the buttermilk.

Mr. Gale said that just as good butter could be made in August as in October, and can be made as well in the western part of New York as anywhere else. The only difficulty is in knowing how to do it. The true mode is, the moment the milk is strained, to put it in a cool place properly ventilated, and to keep it cool until it is to be churned, when it must be churned at the proper temperature.

Mr. Robinson said that the thermometer in the churn would not suffice; there must be a thermometer in the dairy, and the temperature there must be properly regulated. Then, provided always that the electrical condition of the atmosphere is right, we may always make butter. But we all know that milk is affected by a violent thunder storm, and we cannot be sure of making butter unless we know that the electrical condition of the atmosphere is right.

Prof. Mapes suggested that it was not the electricity but the difference of barometrical pressure consequent upon a thunder shower which affected the milk by precipitating particles held in mechanical suspension. Probably a milk room in the neighborhood of Bull's Run on the day of the battle would have been affected in the same way. We are apt to attribute effects to a fact associated in some way with the cause. For instance, Mr. James G. King raised very large crops by the aid of galvanism, placing wires at some depth below the surface of the soil and connecting them with a battery. But he found that with the same disintegration of the soil which was required to bury his wires, he could raise the same crops without the battery.

Dr. Trimble said that the error probably was, as suggested, in not keeping the milk at a proper temperature before churning. In the best dairies of Pennsylvania, which he had visited, the dairy is built over a spring of water at a temperature never varying in summer, and not far from 55 deg., and the pans are set in this water. There is no difficulty there in churning, and they consider this spring-house essential in making good butter.

Mr. Carpenter said that dairymen from whom he received large quantities of butter informed him that they never had a failure. The milk is always the same, it is churned by the thermometer, and the result is always the same.

ELDERBERRY WINE.

Mr. Robinson read a letter inquiring how to make wine from the elderberry without putting spirits in it.

Prof. Mapes said that the proper way would be to change the nature of the sugar at the outset. If we melt the sugar and add a very small quantity of sulphuric acid, half a gill to 100 lbs of sugar, and boil it four or five hours, we may then add common chalk which will take up the sulphuric acid and go to the bottom in the form of gypsum. The supernatant fluid, poured off, would not afterward give an article resembling rum, but would give an article resembling brandy. If the sugar be so treated we may make the best of elderberry wine with it.

Mr. Carpenter read a receipt from a lady—"One quart elderberry juice, to three quarts water, and three pounds sugar. Let it ferment and then cork up."

Mr. Robinson said that the juice of apples would make better wine than anything else excepting grapes. Next comes the juice of peaches and pears. They are all far superior to berries. Elderberry wine he did not consider worth making.

Mr. Fuller said that apple juice was decidedly better than anything excepting grape juice for wine.

DROUGHT.

Mr. Robinson read an extract from the "Boston Cultivator," stating that Mr. E. L. Metcalf, of Franklin, Mass., is preparing to irrigate forty acres of his land.

Prof. Mapes explained the importance of underdraining land to prevent drought. The primary function of the drains is the aeration of the soil, and both ends should be left open. The current of air en ering charged with moisture is cooled sufficiently to deposit a portion of that moisture in the soil with which it comes in contact, and this moisture is taken up by capillary attraction within reach of the roots of the plants. The air escaping from the outlet of the drain will be several degrees colder than when it entered, and this heat, as well as a portion of its moisture has been taken up by the soil. . Hence, underdrained lands, properly subsoiled and surface plowed, will be two weeks earlier in the spring and two weeks later in the fall than other lands. He desired that the subject be continued for another week.

Subject, "Drought and Flowers."

Adjourned.

August 26, 1861.

Mr. Doughty in the chair.

TRANSPLANTING CORN—TOPPING—SUCKERS.

Mr. Burgess exhibited a specimen of corn which had been transplanted when about a foot high. It was topped as soon as the grains were impregnated. There were several suckers, and the yield was seven ears, several of which were of good size. It had not suffered from the drought. His object was to show that corn could be readily transplanted.

Mr. Carpenter would object to topping corn, when the greatest yield of grain was desired. There will be more corn, and it will be heavier, if the tops are allowed to remain until the grain is perfected. But in many cases the value of the tops for fodder may more than compensate the loss on the grain.

Mr. Robinson.—I think this experiment touches a new point, in topping corn. In all the experiments that have been made, the results have apparently been in favor of not topping the corn, the increased value of the corn when not topped being more than the value of the stalks. But Mr. Burgess tops his corn several weeks earlier than corn is ordinarily topped. In the experiments hitherto the corn has been topped after the ears have been so far ripened that the grain would grow; for when in a good state for eating, particularly the sweet corn, if the ears are plucked from the stalk and hung up and dried until they shrivel up, they will vegetate. But it is a new idea, worthy of being tried, to top corn so much earlier.

Mr. Gale mentioned an incident which had occurred to himself. His neighbors' cows had broken into his corn-field, and remained there several days before they were discovered, topping the corn most effectually; but in the fall, where the cows had been there was the heaviest yield of corn. In his experiment in Maryland, before mentioned, he did not top his corn, as his neighbors usually did.

Dr. Trimble said that corn ought to be planted at such a distance as not to throw out suckers. They are a nuisance in a corn-field excepting in hills where but one or two kernels of corn have vegetated. There suckers may be allowed to grow.

Mr. Bergen explained that he had not brought this corn to illustrate the advantage of topping corn, or of suckers, but merely to show that even in such a drought as that of the present year corn may be transplanted so as to fill up vacant hills. It may be done so rapidly that 500 could be transplanted in an hour.

Mr. Carpenter.—I do not think farmers can transplant their corn to much advantage. The best way is to sow it on an inverted sod, preparatory to transplanting; but I believe it to be the most difficult of vegetables to transplant. I have attempted it, but I could never make it amount to much. It is better to put in plenty of seed, and then if there are too many to take out the surplus. But as a general thing, I think farmers plant their corn too far apart. If planted in hills three feet apart each way, four grains to the hill, or in drills three feet apart, and the grains nine or ten inches apart in the drill, it will produce more to the acre than if planted farther apart. A neighbor of mine, who last year planted a large field, partly in hills and partly in drills, found that the drills yielded about five bushels per acre the most, and this year has planted a large piece in drills, which now has a very promising crop.

Mr. Robinson had never been able to satisfy himself that suckers upon corn detract from the yield. The results appeared the best where the suckers had been permitted to grow. Whether corn will sucker or not depends, not upon the distance at which it is planted, but upon the variety, and upon the season.

Mr. Carpenter.—It has been proved, I think, beyond dispute, that it is detrimental to a crop of corn to take off the suckers. I am always pleased when I see an indication of suckering; for it shows great strength to bring out the crop.

Mr. Steele stated that he had observed that corn never puts out braces unless there are to be two or three ears to the stalk. Sometimes a second and even a third tier of braces will start out. Their office is to support the stalk. So the suckers come up from a strong stalk, and their office is to supply pollen for the late ears and for the tops of the ears. Corn that is topped does not fill out so well to the ends of the ears.

Mr. Burgess.—The suckers have their own roots, and support themselves. They do not rob the parent, but rather add to its strength, being attached to it, and the sap going into it.

DROUGHT.

Mr. Burgess exhibited specimens of late beans and tomatoes which had not suffered from the drought, and attributed it to his method of manipulating the soil. Before every rain he passes between the rows with a fork loosening the earth so that the water shall at once sink beneath the surface; and after the rain he loosens the surface with the rake. He recommends in planting potatoes, &c., upon hill-sides to make the rows as nearly level as practicable, so that the water may sink into the earth instead of being conducted down the hill.

Mr. Fuller remarked that an occasional drought is necessary, and he believed the drought of this summer had been of great benefit to the country in destroying the different varieties of fungus. All the cryptogamous plants seem to have been destroyed this year. There is no mildew upon the grape vines or in the ground. An immense amount of seeds of such plants must have been destroyed this year.

Dr. Trimble said that the same remark would apply to the larvæ of insects. By experiment he had ascertained that the larvæ of the curculio would not be perfected in the absence of moisture.

UNRIPE SEEDS.

Mr. Burgess also exhibited young tomato plants, produced, as he supposed from the seed of tomatoes pickled green and remaining in the brine all winter. They came up thickly wherever the brine was put, while in the rest of his garden there were only a few in a place, in scattered patches.

Mr. Carpenter said that he presumed some of the tomatoes must have matured their seed before being put in the pickle.

Mr. Burgess maintained that wheat cut when the milk can be pressed out from it will make the strongest stalk.

Mr. Carpenter.—There is vitality enough in the stalk to mature the grain.

Mr. Robinson suggested that in this case the seed were not separated from the tomato, and might be ripened in the same way.

Mr. Burgess had planted the seed from a green cucumber, and obtained a premium for the cucumbers produced.

MISCELLANEOUS.

Mr. Burgess exhibited a sweet scented verbena, and a petunia with a green-edged corolla.

Mr. Fuller, in answer to an inquiry, stated that seeds and plants to be sent to South America must be put up dry. There will be moisture enough in hot latitudes condensing upon them, however tightly they may be packed.

APPLES AND PEARS.

Mr. Carpenter exhibited the Summer Pippin apple, and the Ott, Brandywine, Tyson and Russet pears. The Madeline is one of the earliest pears, but is astringent.

MANURES.

Mr. Robinson exhibited a specimen of a manurial substance produced from butcher's offal, and which it is proposed to sell for $8 per ton.

Mr. Carpenter referred to tafeu, fish guano, and other similar manures, as being of very doubtful utility. The only manures of the kind he had found always reliable were Peruvian guano and bone dust.

Mr. Fuller said it was unsafe for the Farmers' Club to recommend any special manure, no matter how valuable it might seem, for a few tons would be made according to the sample, and the rest would be worthless. Bone dust and Peruvian guano are the only ones worth hauling, and we may even be swindled in bone dust, for an agricultural firm in this city has been selling for bone dust a mixture three quarters of which is vegetable ivory, and the other fourth perhaps bone and perhaps something else. He had tried a ton of the phosphates this year, with no results. These manures might be valuable if there were honest men engaged in their manufacture. Poudrette, for instance, properly made would be valuable, but as now made, using lime to expel the ammonia, it is of no value.

THE APHIS.

Mr. Morris, of New Jersey, stated that the oats were destroyed by the insects in his neighborhood. Upon examination he had found that although the principal part of these insects were the aphis, yet there was another insect with them, which he exhibited.

STRAWBERRIES.

Mr. Robinson read an inquiry as to the proper method of raising strawberries for the market.

Dr. Trimble obtained a full crop the first year by setting out the plants a foot apart.

Mr. Gore.—I have had excellent results setting them twenty inches apart.

Mr. Carpenter.—The method depends upon the variety and the soil. I think most of our native seedlings will bear in masses. The Bartlett, I think, will bear closer growing than any other. I have seen them as close as they could stand, and bear a fine crop. So with the Austin. On the contrary, the foreign varieties produce better in hills. The Triomphe de Gand will not bear neglect; but should be grown in hills. It is one of the finest flavored berries in cultivation.

Mr. Robinson read another inquiry, as to the best means of carrying strawberries to market. The best baskets, he said, are Cook's baskets, made in New Haven. He should prefer a box made by cutting two shavings from a block of wood just long and wide enough, and bending them into the proper shape and tying them. Such a box would be so cheap that it need not be returned to be used a second time. They should be sent to market in a spring crate.

Mr. Carpenter said that in setting out strawberry plants they should be mulched an inch thick with green grass. This will wither and dry up by the time the plants are well rooted.

Mr. Fuller recommended to set out strawberries from this time until the 10th of September, twelve inches by eighteen apart. If but one crop is desired the ground may be made rich. No runner should be allowed to grow the first season. If too much manure is put on, the plants will be of no value after the first season; and in the neighborhood of Boston it is the practice to raise but one crop from the plants. By transplanting, or dibbling out runners as soon as they begin to form a root, cutting off the runner on the side next to the main plant, close to the little plant, a new set of roots will be thrown out on that side, and then the plants may be transferred to the main bed.—Although this process makes the main bed fifteen days later, yet the plants are larger, and it seems to pay for the trouble to dibble them out and let them stand ten days. Old plants may be transplanted, of scarce varieties, but the new plants are better. Cook's basket costs but three cents to the quart, and the berries will sell for enough more to pay for that. But it should be honest measure. It will not do for him to yield to the demand of dishonest dealers for scant measure.

Mr. Robinson.—If he does we must expose him.

Mr. Carpenter mentioned that the same crown never bears fruit a second season. It sends up new crowns around the first, and they produce the fruit.

Mr. Fuller said that that was the way with the lily and other perennials of that class.

Subject—"Fruits of the season." Adjourned.

September 2, 1861.

Mr. N. H. Gale in the chair.

UNRIPE FRUIT AND VEGETABLES.

Mr. Steele exhibited specimens of grapes and tomatoes such as are sold in the New York markets, saying that he thought the time had arrived when the Farmers' Club should do something to put a stop to the desecration and sacrilege of bringing vegetables and fruits into the market in an improper state, forcing the residents to eat what they do eat before it is ripe.

The Chairman.—This is a very important subject. If the club could have such an influence, it would be a saving to the farmer and a saving to the purchaser. For instance, as our farmers are in the habit of taking their potatoes to market, every barrel contains from one to two pecks not fit for family use, and which are only thrown away. But if they would keep these out they would not loose more than one barrel in twenty, for they do little more than fill up the interstices between the larger potatoes, and the potatoes would bring from a quarter to half a dollar more per barrel. So the farmer, in keeping out the small potatoes, would receive as much as in putting them in, and would have the small potatoes besides.

Mr. Adrian Bergen had been astonished that the people of New York would use such fruit and vegetables as are brought to market; but they would buy them, and how could we prevent it?

Mr. Robinson said that the small potatoes could be sold separately, for half price, to bakers for yeast and for bread. As to unripe fruit, not only are fruit and vegetables brought here in an unfit state for human beings to use, but after they are brought they are injured by the manner in which they are kept. Potatoes, especially, are much injured by exposure to light and air, undergoing that slow but certain process of turning green and becoming unwholesome food. Peaches are brought into the market not merely unripe, but sometimes only half grown; and two-thirds of the grapes sold here are only fit for hogs to eat. But if the people know no better than to buy them, how can we blame the producer for bringing them?

Mr. Pardee said that it was a wonder that New York did not suffer even more than it does from the use of unripe fruit. Children will even take the wilted cucumbers that the grocers throw into the street and eat them. Grapes are brought into the market as soon as they are colored, which is some time before they get their flavor, and we seldom see a peach that has the peach flavor. The Isabella grape, the Lawton blackberry and the Wilson strawberry are all green for a considerable time after they are colored, and until they are thoroughly ripe they are not only wanting in flavor but are unwholesome. There are some varieties of the pear that can be ripened in the house; but it is necessary to study the peculiarities of each variety. He had brought a specimen of the Isabella grape, colored, and inquired whether any other person, excepting Mr. Steele, had grapes as far advanced.

Mr. Doughty.—I have the Hartford Prolific very nearly ripe.

Prof. Mapes said there was a period of summer rest in the growth of grapes which can be obviated by a stimulating manure. Stick a pin at the end of any lateral, and it will be found that the growth of all the laterals has for a time entirely ceased. The nitrogenized superphosphate of lime, or potash in solution, two pounds to one hundred gallons of water, applied either before the first of July to prevent it, or after that time to arrest it, will cause the grape to keep up its growth. He had Delaware grapes riper than the Isabella; also Norton's seedling and Bland's Virginia. The Hartford Prolific he did not find earlier than the Isabella.

Mr. Doughty.—My Hartford Prolifics are a good deal earlier.

Prof. Mapes exhibited two specimens of beet plants grown by Prof. Mason. The seed was sown on the 20th of July, in the early part of the drought, in a rich bed treated in alternate rows with Mapes' nitrogenized superphosphate of lime. Those treated with the phosphate were twenty-six inches long, producing a good crop, while those in the alternate rows not so treated were four inches long and worthless.

The Chairman.—My family do not eat one-fourth of the fruit and vegetables that we would eat if we could get them in a proper condition. If we could only persuade the gardeners around the city of New York that they can make more money by keeping their fruit and vegetables back until they are ripe, we could accomplish something. I have not bought five pounds of grapes here for twenty years, because I cannot find them here fit to eat. And I have not eaten an apple this season, excepting one that Mr. Carpenter brought here. It is a subject well worthy of the pulpit, to put a stop to bringing this unwholesome food into the city.

Mr. Steele mentioned having brought in a basket of good ripe tomatoes to a market woman, a little later than the usual season of them, and she was so much pleased with them that she offered to fill his basket in return with Vergalieu pears. So it is sometimes, at least, profitable to have your fruit ripe.

Mr. Robinson mentioned another instance in which a market gardener cleared $1,000 by sending his tomatoes to market a week earlier, although they were green. The proper remedy is to begin at this end,—to stop the buying and eating.

Prof. Mapes said that tomatoes could be raised ten days earlier by topping the vines. Ninety per cent of the fruit is within eighteen inches of the ground, and ninety per cent. of the vine is beyond that distance. The vine does not bleed, so that it may be cut fearlessly, and the removed branches should be dug beneath the surface. The proper time is when the first fruit is of the size of an egg. The same principle applies to lima beans. If allowed to grow at will, they will measure forty feet; but the first beans are formed on the lower part of the vine, and many of those on the upper part of the vine never ripen. The terminal bud should be pinched off at five and a half feet high, and they will then throw out laterals and yield largely. They will yield at least fifty per cent. more when so treated. There is another matter which farmers should take into consideration. The flavoring matter of every fruit is a proximate principle known as fusel oil combined with one of the acids. Fusel oil is one of the products in the distillation of grain. He had instituted a series of experiments to determine how to produce these flavors. Taking one hundred watch glasses and placing a drop of fusil oil in each, he then added to one a drop of nitric acid, producing a pine apple flavor; to another a drop of hydrochloric acid, producing the flavor of the cherry; to another a drop of tannic acid, producing the strawberry flavor, etc. The flavor of strawberries may be increased by watering them with a dilute solution of tannic acid. But the mere fact that a certain flavor is produced in a watch-glass does not prove that the same flavor will be produced in the soil, for we do not know what chemical changes will there take place. But chemistry having informed us how the flavors are produced, we may then by experiment ascertain how to obtain in the plant an increased flavor.

Mr. Gale corroborated the statement of the good effects resulting from pinching the tops of tomatoes and lima beans.

Mr. Steele.—The same principle applies to all kinds of vines.

GRAPES AND DWARF PEARS.

Dr. Houghton, of Philadelphia, stated that in that neighborhood they had not arrived at any satisfactory results in the cultivation of native grapes. They had suffered severely from mildew, vine-bleeding, late frosts in the spring, and early frosts in the fall. Most of the good native grapes in the Philadelphia market come from Cincinnati. He considered them the least profitable, least certain, and least useful of the fruits. The culture under glass he considered more reliable, and consequently more economical. As to dwarf pears, upon the quince stock, with proper treatment they do well. His own orchard, containing 3,000 trees in a good condition, upon the quince stock, was planted for marketing purposes, and he had great confidence in it. There is not a borer in the whole orchard. The method of keeping them out is this. He plants the quince root about two inches below the surface of the soil. To protect the tree, the beetle must be prevented from going down to the quince root. The motion of the tree by the wind would soon, in ordinary soil, leave a space around the trunk sufficient to enable them to go down; but if the tree is surrounded with pulverized charcoal, that will sift down and keep this aperture filled up. But from the middle of June to the middle of July, when the beetle deposits its egg, he applies a further preventive. By means of a bellows, constructed for the purpose, he throws a powder consisting of Scotch snuff, Cayenne pepper, and pulverized white hellebore, around the trunk of the tree, first mixing it with a little plaster or airslacked lime, under the belief that any insect coming there and finding such substances in his way would consider it a notice to leave. The charcoal tends also to keep up the moisture in the quince root at the junction with the pear, so that the sap shall flow freely up into the tree. The apple requires further protection, since they will enter the tree anywhere, if prevented from entering at or below the surface of the ground. His method was to protect the tree a few inches above the ground with charcoal dust held in place by a wrapping of tarred felt or of pasteboard. At the close of the season this being taken off, the borer will be found to have penetrated not more than one-sixteenth of an inch, at the surface of the charcoal, and can be readily removed.

Mr. Pardee mentioned the success of Mr. Miller, at Seneca Falls, in raising native grapes of at least twenty varieties. So at Utica, fine native grapes are grown.

Mr. Fuller.—I went over to Southern Illinois, expecting to find it a good place for grapes; but I found the same trouble they find in Philadelphia. It was neither north nor south. One year it would be a southern climate, and the next year a northern climate. Every year or two the warm April days would start the vines, and the frosts of May would kill the shoots. Plants are sometimes killed at Philadelphia, or in Georgia even, that will stand the New York climate.

Mr. Robinson mentioned that he had known the oak tree to be killed in Georgia by frosts in April.

Mr. Steele.—I noticed in Richmond, two years ago, that their best grapes were brought from Cincinnati.

The Chairman.—It depends more upon the altitude than anything else. In the warmer climates, go upon the hills and these difficulties will all be avoided. In Northern Tennesee, upon hills 2,000 feet above the level of the ocean. they sometimes have not a particle of frost, while the corn is killed to the ground in the valleys, 1,500 feet below them.

Subject for discussion.—The subject of "The fruits of the season," was selected for discussion at the next meeting.

Adjourned.

September 9, 1862.

Prof. Cyrus Mason in the chair.

The Chairman stated that he had just completed revising the yearly volume of the Transactions of the American Institute, and had found that their contribution to the public enlightenment consisted primarily in the Proceedings of the Farmers' Club, and secondarily in the Proceedings of the Polytechnic Association. In the progress of the age, the newspaper has come nearly to supercede all other modes of diffusing intelligence among mankind. While in former years the annual exhibitions of the American Institute have presented hundreds of novelties to public notice, the newspaper is now anticipating them through the weekly reports of these two Clubs. Within a week from this time more persons will have read the proceedings of this Club, to-day, than of any other association upon this continent, within as short a time. The local newspapers will have copied them all over the country, because these inquiries directly concern the mass of the people. It was thought to be a great advance to publish these reports at Albany; but now that the newspapers are circulating them, they are a hundred fold more read than they were thirty years ago. If a novelty appears here it will be much more thoroughly investigated than it could be by a committee at an annual fair. It would seem, therefore, desirable that the Farmers' Club, and the Polytechnic Association, should have the power of conferring premiums, thus making these two associations a perpetual fair.

APPLES AND PEARS.

Mr. Carpenter exhibited a large assortment of apples and pears, embracing forty varieties of apples and twenty varieties of pears, being, with a few exceptions varieties which have ripened since his last exhibition. A few of these varieties have been hastened in reaching maturity by the drought. Of apples, the Gravenstein he placed at the head of the list, the finest apple, and with the highest perfume, of large size, and good appearance. Next comes the Hawley, of monstrous size, and of the best quality. Next comes the Porter apple, an excellent market apple, bearing profusely, and having a delightful perfume. The Dutch Mignon is a monstrous apple, weighing a pound; and the Rhode Island Greening is also a large apple. The Pound Sweeting is a fine looking apple. The Landron is a new, large apple, of excellent quality. The St. Lawrence is a beautiful apple, of good quality. The Alexander is a beautiful apple, but is not valuable for the market. The Cloth of Gold is a fine orchard apple. The Fall Pippin, and other varieties, were exhibited without comment. Of pears, the Beurre Clairgeau is of great beauty, but not yet in season. The Flemish Beauty is very large. The Bonne de Zees is a French pear, a fine bearer, of large size and delightful flavor, averaging larger than the Bartlett. The Beurré Kirtland is a seedling from Pennsylvania, a good table pear, but not of first quality. The Belle et Bonne is second rate for the table, and a good cooking pear. The Beurré d'Amadis is a second rate pear, and a great bearer. Stephens' Genesee is an excellent variety, thrown out at one time by the Pomological Convention, but afterwards restored to the list. The Bartlett, Ott, Seckel, Doyenne Boussack, Tyson, Louise Bonne de Jersey, La Cass, Captal, Eyewood, Fondante de Automne, Fondante de Malines, Colmar d'Aremburg, and Hull, were exhibited without special comment. He considered the culture of pears as more profitable than the culture of apples, for they will bear every year, and are less liable to be attacked by insects. Bartlett pears had been worth $15 per barrel this season.

Dr. Underhill complimented the specimens of fruit exhibited to-day as an honor to Westchester county. It was gratifying to see so fine a collection so early in the season.

The Chairman remarked that the production of good fruit tends greatly to the civilization and refinement of society. Out of all the fruits exhibited by Mr. Carpenter, there was but one which had been known in his father's family when he was a boy. Most of them were improvements upon the apples of the last generation. The consumption of fruit should be encouraged in the country, where it is too much neglected, as well as in the city.

NATIVE GRAPES.

Mr. Carpenter alluded to the remarks of Dr. Houghton, of Philadelphia, with regard to the cultivation of the grape in that region, speaking of it as unprofitable and uninteresting, and of the grapes as unhealthy. It was evident that Dr. Houghton's taste led him to the cultivation of the vine under glass; but Dr. Houghton cannot raise grapes for less than forty cents per pound under glass, while Dr. Underhill can raise them in the open air for twelve cents per pound. He had been advised by Dr. Underhill twelve years ago to enter into the cultivation of a vineyard, for nothing would pay better, or be more healthy, or more interesting; but his tastes had led him to prefer the cultivation of the orchard.

Dr. Underhill did not regret that Mr. Carpenter had not followed his advice, for his success in his own chosen pursuit has vindicated his choice. Yet he had nothing to take back from the opinions he had expressed twelve years ago. The experience for many generations of the thirty millions of France has proved the healthfulness of the grape. The feeble resort to the vineyards of France to strengthen their constitutions; and the liver complaint is there unknown. But if the grape is not ripened it is, of course, unhealthy; and it is very difficult to induce men in this country to prune it so that it may be able to ripen the crop. The vine always produces five times as many buds, unless they are destroyed by the winter, or in some other way, as can be properly ripened. Unless four-fifths of the fruit is taken off early in the season, the grapes may make vinegar, but cannot make wine. The pruning should be commenced before they blossom, and continued until the vines have all been pruned. Grapes ripen best high up, where they can have plenty of sun, and at the same time plenty of foliage. If we take off the foliage to let in the sunlight the vines cannot breathe, and the fruit will be sour, for the sugar will not be perfected. The proper way to eat grapes is to swallow the pulp without breaking it, rejecting the skin unless it is desired fcr its astringent qualities.

Mr. Carpenter.—A medical man at Brooklyn said that the seeds were very unhealthy, and should never be eaten. I am very glad to hear this statement to the contrary, for it appears to me, then, to be incorrect.

The Chairman corroborated the statement that it is necessary to take off a large proportion of the fruit in order that the remainder may be properly ripened.

SAMBUCUS WINE.

Mr. Robinson read a statement with regard to the Sambucus or elderberry wine, recently advertised in this city, as being the product of a new species of the elder brought from Portugal.

Mr. Fuller.—It is all a humbug. I will state that in advance. Mr. Spear has gathered up all the elderberries in that neighborhood.

Mr. Robinson.—That is just why I introduced it here. That whole region has been scoured to gather elderberries to make this Sambucus wine.

NITROGENIZED SUPERPHOSPHATE OF LIME.

The Chairman corroborated the statement of Prof. Mapes at the last meeting, respecting beets raised by him. Celery and mushmelons, also, that he had manured with the nitrogenized superphosphate of lime, furnished him by Prof. Mapes, had done well, while others had completely failed. Upon examining the ground in the morning he had observed moisture where this manure was applied, and entire dryness where it was not. It had been applied freely, but not at such a rate as to make it unsuitable as an economical manure.

Mr. Carpenter.—I have tried the superphosphate, and also wood ashes and plaster, and I can see no advantage in the superphosphate over the wood ashes and plaster. On my land, which is a little light, plaster and wood ashes have an excellent effect.

The Chairman.—I should have mentioned that I applied plaster with the superphosphate, mixing the two together.

Subject for discussion.—The subject of "Fruits and Flowers" was selected for discussion at the next meeting.

September 16, 1861.

Dr. Hawkes in the chair.

GRAPES.

Mr. Steele exhibited some Isabella grapes with the flavor of the grape, in contrast with others colored, but unripe, such as are sold in the New York market.

Dr. Trimble would discourage the use of the Isabella grapes at this season of the year. Usually it is not fully ripe until there has been cold weather; and at this season there is a large variety of ripe fruits.

Prof. Mapes remarked that he had not seen a sweet grape brought to market by Dr. Underhill. His grapes are large and fine looking, but not so sweet as many other Isabella grapes. He had found a marked difference between different vines, all supposed to bear the Isabella grape. He exhibited a piece of grapevine bearing grapes, and as the producer supposed, also peaches. Upon cutting one of the supposed peaches open, in the presence of the club, he found therein the appearance of a seed; but it was pronounced by Dr. Trimble to be a larva, such as is often found in such excrescences from the bark of trees.

Mr. Perry, of the firm of William Perry & Son, of Bridgeport, Conn., exhibited a specimen of the Delaware grape, grown in Pennsylvania.

Mr. Pardee.—This is the best of the native grapes. Its flavor is far above the Catawba or the Diana. This is a young vine; it was a layer last spring. I have seen large vines bearing in the same way bunches that would weigh nearly a pound.

Mr. Fuller.—This is a fine specimen, and I believe the first exhibited here, of a vine grown upon Bright's system. It is a question whether that is a good system. The plan is to grow vines two feet apart, trained upright. Each alternate vine is trained up to throw out laterals to bear fruit, while the others are kept from producing laterals or fruit. The next year these vines are allowed to bear, and the others pruned in a single stem. This system is two hundred years old; but is now introduced again as Bright's system. As soon as the root becomes old, it will fail to produce a good healthy cane. The sap always runs up to the upper part of the vine. Here you see the best colored and the ripest bunch of all at the very top, and here are the poorest bunches at the bottom. That is the trouble with the upright system, that it bears the best bunches at the top. Upon throwing it down upon a horizontal trellis we have bunches nearly equal for the whole length.

Mr. Perry.—The chickens destroyed some of the finest lower bunches of this specimen. You will observe, too, that on that upper lateral there are but two bunches; while upon this lower one there are four, so that they will naturally have less nourishment. The stake may be leaned over in the spring, checking the flow of the sap and equalizing the bunches.

Mr. Fuller.—That is not Bright's system, but the old greenhouse mode. Bright's system is upright, and intended for the vineyard, where they cannot introduce this tipping operation. Trained upright, a vine will bear the best fruit at the top; and if allowed to extend itself upward the best fruit will still be at the top, and there will be a space at the bottom where there will be none.

Mr. Perry considered the horizontal system more complicated and difficult; especially in covering the ground evenly with vines.

Mr. Pardee said that the club were greatly indebted to Mr. Perry, for this fine specimen of the Delaware grape, and to Rev. Mr. Weaver, for specimens of the Hartford Prolific laid upon the table to-day by him. He had never found Dr. Underhill's grapes well flavored, although so fine looking.

Mr. Bergen attributed the difference between Isabella grapes to the difference in the locations in which they grew. He had grown superior Isabellas and inferior ones from cuttings from the same vine. In one case an Isabella grape vine, which had produced superior fruit, failed upon a time to produce better fruit than the other vines.

Prof. Mapes.—My Isabella grapes are grown upon an arbor, and they differ as widely, grown a few feet apart, as it is possible for them to differ, and they have maintained that difference for fourteen years. The fertilization and manipulation of the soil, for the whole length of the arbor, has been alike, during the entire fourteen years.

TREE COTTON.

Mr. Kendall exhibited a specimen of tree cotton grown by him in Maryland, and a portion of the tree. It has been popularly believed that the cotton plant cannot be grown north of the parallel of 37° in our country. But as long ago as 1833 cotton has been perfected in Canada. The plants have also perfected their fibres in Massachusetts. Early in 1854, he had had his attention particularly drawn to the perennial cotton tree, being then in Chili. For a whole year he studied the growth and the product of that tree. The climate of Southern Chili is as rigorous as that of New York State. Yet there are cotton trees there one hundred years old, annually supplying the natives with materials for textile fabrics. By diligent investigation and inquiry, he had learned that it produced with great certainty, and that the crop was never a failure. In those regions the tree commences bearing the third year, and continues in bearing 35 or 40 years. In warmer latitudes, it dwindles to a shrub, bearing 10 or 12 years. He had observed that in many instances tropical plants have been improved by their removal to the temperate zone. Thus with the cotton tree. It is improved by the cold, producing a finer fibre and a longer staple. This specimen was grown about fifteen miles north of Baltimore. The annual production would probably be about twelve pounds to each tree. It will probably perfect the fibre of the cotton wherever Indian corn will grow. He would estimate the yield per acre at 1,500 pounds; whereas the yield from the cotton plant is 500 pounds.

Mr. Pardee remarked that the specimen produced was above the average of good cotton, and nearly approached the Sea Island cotton.

Prof. Mapes corroborated this opinion, and moved that Mr. Kendall be requested by the club to deliver a public lecture upon this subject.

The motion was agreed to.

FRUITS, POTATOES AND GRAIN.

Mr. Carpenter this week exhibited improved varieties of potatoes and of grain. Hallet's Pedigree wheat has produced a head seven inches in length, and the yield has been 108 bushels to the acre. The Poland wheat, with a kernel of remarkable size, the Noe wheat, of excellent quality, the Red wheat from Italy and from Turkey, both superior to the common varieties, and the Rivet wheat, and another variety of bald wheat from France, were also exhibited. Mr. C. also exhibited an improved variety of winter barley, remarkably prolific, and another sample of barley from France. Spelts, grown in Germany, appear to form a variety of wheat of inferior quality. It is used in Germany for diet. He stated that he was preparing ground to test all these varieties. Of potatoes, he exhibited many beautiful specimens. The Peach-blow, one of the best; the Eusko White; the Coppermine Prolific; the Pinkeye Rustycoat; the Rough and Ready; the Early Algiers, one of the best early potatoes; Pell's seedling,—the Early Algiers will yield about double the quantity with the same cultivation, and of equal quality; Bulkley's seedling, and the Garnet Chili,—the same potato, but an acquisition; the Meller seedling, identical with the Peach-blow; the Prince Albert, very large and improving in quality, and the Buck-eye potato, which has been very much improved since its introduction, and is superior to the Garnet Chili. Of apples, he exhibited the Gloria Mundi; and of pears some delicious specimens of the Doyenne Bossock, Bartlett, and Bon de Zee, which were distributed among the audience. Mr. C. also exhibited, sent him by Mr. Isaac Briggs, of Macedon, Western New York, a new grain resembling rye, and yielding about forty bushels to the acre; and a new variety of onions, forming about four hundred bulbs on the top, instead of black seeds. These being planted will produce good sized onions.

Mr. Carpenter.—I generally advise to plant the Bartlett pear; yet I scarcely eat the Bartlett, because I have so many better pears ripening at the same time. I recommend that as one that gives universal satisfaction. With regard to potatoes, if we can have but one, I would advise the Buckeye. It is nearly as early as the Early Algiers, and is a good potatoe late. The Princess Pea I find a few days earlier than the Dan O'Rourke. My taste leads me to prefer a variety; besides, the difference of locality will frequently change the character of a fruit or vegetable.

Prof. Mapes exhibited an insect which had attacked his Seckel pears—pronounced by Dr. Trimble to be one of the class of scavenger beetles, attracted probably by the perfume of the pear.

WORMS IN POTATOES.

Mr. John G. Bergen inquired how he should destroy the worms which trouble potatoes. He stated that he had abandoned the growth of the Peachblow potato, finding it to require more manure, to deteriorate in flavor when large, and not to be invulnerable to the potato rot.

Mr. Pardee recommended using the salt and lime mixture, and frequently stirring the soil. This would be so offensive to the worms that they would leave.

Mr. Bergen stated that he had a piece of ground which had become so wormy as to be worthless for potatoes. It had been frequently stirred, had been limed, and seaweed, containing salt, had been applied to it.

Prof. Mapes.—That would not be a hundredth part enough salt. I have tried it for fourteen years and know that it will keep the worms away.

Mr. Bergen.—That is not sufficient; I have other ground where the worms keep away without it.

Rev. Mr. Weaver suggested that Mr. Bergen should try that mixture on this piece of ground.

Dr. Trimble.—I would not recommend him to take that trouble. I do not believe in these mixtures at all. These insects are wonderfully erratic. One year they come upon us like the aphis of this year, and the next are gone. Any chemical ingredient which will destroy the larvæ of these insects will destroy the seeds of vegetables and vegetables themselves.

Prof. Mapes said the lime and salt mixture had been known and valued from the time of George III. Applying lime or salt separately, or at different times, will not produce the same effect. The mixture must be formed so as to make a chemical combination, producing chloride of lime and carbonate of soda; and this chemical union will not be found in the soil.

Subject for discussion.—The subject of "Flowers, Fruits and Vegetables of the Season" was selected for discussion at the next meeting.

September 23, 1861.

Mr. John G. Bergen in the chair.

EGYPTIAN CORN.

A specimen of grain sent for identification was stated by Prof. Mapes to be a variety of millet known as Egyptian corn, the seed of which was said to have been taken from a mummy. It will produce sixty bushels to the acre.

APPLES AND PEARS.

Mr. Carpenter distributed fine specimens of the Porter and Hawley apples. They are particularly deserving of attention from the length of time they remain perfect in the market. The Porter has been considered as a first rate apple; but the Hawley is superior to it. It would be well if nurserymen would pay more attention to the kind of soil adapted to each variety of apple. He had been compelled to abandon the cultivation of some varieties of apple, as the Spitzenberg, while others, as the Porter, would grow on his grounds to great perfection.

Dr. Trimble exhibited some pears from Newark, N. J. Pears are better ripened in the house, but should never be taken from the tree until by bending the stem a little it breaks off at the shoulder. If taken off too early the stem itself will break. Dr. T. exhibited Seckel pears of a beautiful color.

Mr. Robinson stated that the Seckel pears had been raised of double the usual size, the grafts having been taken from an ordinary tree.

Mr. Carpenter said that the Seckel pear tree, as well as dwarf trees, should be manured frequently and thoroughly. Where they produce as freely as the Seckel, the soil is soon exhausted; and if the tree is neglected it will soon cease to bear and die.

Prof. Mapes stated that Seckel pears could be raised of double the usual size by the use of potash, in the form of unleached wood ashes, and phosphates rendered soluble. This would not cost more than two cents per tree. The color of pears depends very much upon the iron in the soil. The color is very high, particularly upon the Louise Bon de Jersey, in the belt of soils in New Jersey, between New York and New Brunswick. Prof. M. proceeded to narrate the arguments with regard to grafting the pear upon the quince stock.

Mr. Doughty related an instance of pear trees upon the quince stock, which had grown so little that orders were given to throw them away; but their removal having been neglected, they began the next year to grow rapidly and produced excellent pears. It was presumed that they had thrown out pear roots.

Prof. Mapes said that he had had occasion to move many pear trees, and he knew it was not true that when the pear root is thrown out the quince root dies. In every instance he had found both roots perfectly healthy and growing.

The Chairman stated that his own experience corroborated these statements. He had found that the Bartlett would sometimes do well on a quince stock, and would sometimes fail.

Prof. Mapes stated that the Bartlett will produce upon the same area of ground, a much larger quantity and better quality of fruit, upon the pear stock than upon the quince.

Mr. Carpenter was opposed to the theory of having the same tree both a dwarf and a standard. He would plant the quince stock an inch below the surface, to protect it from borers merely. By putting it deeper the roots are brought too far beneath the surface, and will not feel the changes of the weather readily. The tree keeps growing until it is injured by a frost.

Prof. Mapes would only plant three or four inches deeper, which will enable the pear roots to be formed. Whether the tree shall remain a dwarf or become a standard depends upon the pruning. As soon as the pear roots are thrown out, new vigor is infused into the tree.

TREE COTTON.

Mr. Kendall was invited to repeat his statements with regard to the *Gossypium Arboretum*, or cotton tree of Chili, and made some statements additional to those in last week's report.

The tree grows to the size of the peach tree. Under the tropics there is no regularity in the crop; but in the colder latitudes the crop is as regular as that of the grains of the north. It takes root kindly from cuttings, and may he produced from the seed. It is of rapid growth, is a prolific bearer, makes an efficient hedge, and is a highly ornamental tree. The blossoms are variegated and odorous. The predominant color is a bright glossy yellow. It is the same species with the cotton tree of Africa, but the quality differs with the locality. The African tree produces a short, irregular staple, while this produces a long and uniform staple. The lint is much more easily prepared for the market than that of the herbaceous cotton. The seed is not distributed throughout the lint, as in the herbaceous plant, but is confined to a central stem, so that the lint may be drawn away, leaving the seeds in a cluster. Clothes made of this cotton are water-proof. The cotton will require ginning, but the gin may be simplified, and the fibre will not be materially deranged.

Rev. Mr. Weaver desired that some steps might be taken to introduce the seed and try the experiment further.

Dr. Trimble.—If it will grow in Baltimore county, as stated, it may be grown anywhere as a profitable crop.

Mr. Carpenter stated that Mr. Kendall was about to deliver a public lecture, in accordance with the request of the Club last week. He hoped that the Club would give more attention to this subject, and take some further action.

The hour for adjournment having arrived, the subject of "Fruits, flowers, and vegetables of the season," was continued, and the Club adjourned.

September 30, 1861.

Mr. Amos Gore in the chair.

DAHLIAS.

Mr. Bergen exhibited specimens of the following dahlias: Lady Popham, Lilac Queen, Triomph de Rubex, Triomph de Truna, Ruby Queen and Lord Palmerston. He stated that from the six petals of the natural flower, cultivation had produced a flower with 370. The nearer the centre we take the seed, the more certain the seedling is to be double.

SATINWOOD.

Mr. Brown exhibited branches resembling the locust or mimosa, which he stated to be from a satinwood tree, brought into this country from the East Indies several years since, and now some 50 feet high. The wood is valuable for cabinet work, and it may be well to know that it will grow in this climate.

APPLES, PEARS AND GRAPES.

Mr. Carpenter stated that probably 300,000 bushels of apples would come to this market from Westchester county this year, the fruit being unusually fine; while in other parts of the State apples are not plentiful this year. The color of fruit, he considered as depending more upon atmospheric conditions than upon the presence of iron in the soil. Easterly and southerly winds, near the seacoast, bringing the spray from the sea, tend to discolor fruits; and when they do not prevail to a considerable extent, our fruit is as highly colored as the western fruit. Mr. C. exhibited specimens of Concord grapes, which he considered superior to the Isabella.

Mr. Fuller suggested that persons exhibiting fruits or flowers, and especially if for identification, should bring a piece of the stem and a leaf. For instance, the leaf of the Concord grape is so distinct from that of the Hartford Prolific that it may be distinguished in the dark, while the fruit is not always so distinct.

Mr. Carpenter proceeded to exhibit his closing specimens of apples and pears, including the late fall and the winter varieties. Among the pears were the Vicar of Wakefield, very large and nearly equal to the Bartlett when properly ripened, but unreliable, and therefore not adapted to general culture; Langley's Beurré a better winter pear, Paradise of the Autumn; the Sheldon, a fine native pear; the Fulton, which is in November what the Seckel is in September; the Beurré d'Anjou, a first rate fruit; the Henkel; the White Doyenne, Vergalieu, Louise Bonne de Jersey; and the Van Mons Leon le Clerc, which he would caution every one against buying; for although a more delicious pear does not grow, and it is large and showy, the tree is imperfect, and a fair specimen cannot be obtained one year in ten. From the appearance and flavor of the fruit, any one would be tempted to try it. He would rather encourage the culture of standard trees. Although perfect pears may be sooner grown upon the quince stock, yet they may be grown to equal perfection upon the pear stock when it has reached a proper degree of maturity. Of apples he exhibited, among other varieties, the Dutch Mignon; the Harrison Sweet; the Manomet.

Mr. Carpenter proceeded to exhibit the Schwarr, a choice apple for winter; the Baldwin; the Dominie, a good apple for the market; the Roxbury Russet; the Northern Spy, long coming into bearing, this being the first specimen upon trees grafted seven years ago and large enough to bear two or three bushels a piece; the Golding, an excellent apple for table or cooking; the York Baldwin, more valuable than the Boston Baldwin; the Wine apple; the Holland Pippin, unworthy of cultivation.

Prof. Mapes considered the Holland Pippin a fine apple.

Mr. Robinson.—Will you name ten varieties which you would recommend to be grown in Westchester county for the market?

Mr. Carpenter.—The Rhode Island Greening; the Gravenstein; the Hubbardston Nonsuch; the Porter; the Fall Pippin; the Drap d'Or; the Sweet Bough; the Baldwin; the Dominie; and the English Russet. I have omitted the Hawley; that must be put in somewhere.

Dr. Trimble exhibited specimens of the Gansell, Bergamot, and Seckel pears from New Jersey.

Mr. Fuller said that he considered the Northern part of New Jersey, and northward even up to Albany, a safer place for a vineyard than localities further south. The shoots do not start so early in the spring, and are more likely to escape the spring frosts.

Prof. Mapes stated that the strip of land between Newark and New Brunswick produces sweeter grapes than are grown elsewhere; but so long as the people of New York city will eat sour grapes they can be better grown further north.

Mr. John G. Bergen had observed that the sweetest and best grapes are those which have the most sunshine.

Mr. Fuller.—The grape vine is more affected by soil than any other plant. Vines may be destroyed in three years, for quality, by the mismanagement of the nurseryman. Make short cuttings from the base of healthy shoots upon a healthy vine. Pinch in every lateral so that the cuttings shall ripen every particle of their wood to the top, and proceed properly, step by step, with the vines thus produced, and the grapes will be as good or better than those of the parent vine. Instead of Isabella, which ripen late and which the season is hardly long enough to ripen at all, so far north, he would plant the Delaware which ripens its shoots to the very top, and whose leaves remain healthy until the grapes are gone; the Concord, which, although not equal to the Delaware sells better than the Isabella; the Hartford Prolific, which rattles too easily from the bunch unless thoroughly ripe, but which is a week or ten days earlier than the Concord. The Diana will be a favorite with some people because of its musky flavor. It is a little later than the Concord. The Rebecca sometimes grows well in the city yards, but in the fields is good for nothing. The Delaware grape may be readily propagated from layers, but from cuttings it is difficult to produce it. All hardy cuttings should be set out in the fall. If cuttings of the currant are set out now, they will be rooted within ten days, although they will have no tops; and next year they will grow two or three times as much as if cut in the spring.

Mr. Carpenter stated that he had been deterred from attempting to strike Delaware cuttings from the representation of its difficulty, but upon trying it, he had been as successful as with other varieties of the grape. He considered the Clinton a valuable grape, after ripened by the frost.

Mr. Fuller said that the Cuyahoga grape was a new variety which promised well. The Ontario grape is the same with the Union Village, and no better than the Isabella. It makes no difference what a grape is if it will not grow well. People seeing the Rebecca grape set out hundreds of vines before they find out its true character.

Mr. John G. Bergen said that the Rebecca grape would grow finely in the yard, but he who should adopt it for vineyard culture would make a fatal mistake.

Mr. Pardee.—Perhaps a new grape was never introduced with more care and authority than the Rebecca. It had been exposed to the open air and they knew all about it. Just so long as people would buy it at three to five dollars a vine it was an excellent grape; but when the price falls the nurserymen are discouraged, and some new variety, like the Cuyahoga, is trotted out. The whole truth has not been told until very recently about the Rebecca, and I hope we shall take breath before we recommend any new grape which may be brought forward.

Mr. Fuller.—We were told that the Rebecca vine stood there all winter, but I have been told since that it was laid down every winter. But suppose that it did stand there. We have a Black Hamburgh in New York which has for years stood out of doors without protection. Shall we recommend the Black Hamburgh for out-door culture? The nurserymen suffer more than other people after all, paying five dollars a dozen for a new variety of strawberry, for example, that is good for nothing. Every year they pay a good deal for new things which fail, while they sometimes find one that will sell. He would not condemn the Rebecca because it is now grown finely by some persons, but for general cultivation it is not to be recommended.

Mr. Carpenter remarked that the Bartlett pear can be prolonged by keeping it in a refrigerator. They can be kept until December in this way.

NEW SUBJECTS.

The subjects of "Corn Fodder" and "Mushrooms" were selected for discussion at the next meeting.

Adjourned.

October 7, 1861.

Mr. Geo. Andrews, of New York, in the chair.

GRAPES.

Dr. Crowell desired information with regard to the new grapes, the Rebecca, Anna, Diana, &c.

Mr. Pardee.--The Delaware sustains itself this season, standing at the head of the native grapes. Next to that comes the Diana. Although it has been killed in some places this last winter, yet upon inquiry I do not attribute any importance to these cases. There has been a disposition to cry down the Rebecca, but I have never eaten them so fine as this season. I have no doubt that it is a little tender, but with a little care the Rebecca will give satisfaction for garden culture. The Anna is pronounced a little better than the Rebecca. The Concord is improved this year. It is superier to the Isabella, and I think will prove a finer grape than most people have anticipated. The Hartford Prolific is also improved this year. I am disposed to give more credit to the Isabella than most people do, when it is well ripened. But I have very little opinion of most of the grapes--the Isabella, Concord, and Hartford Prolific--grown in vineyard culture. The Delaware and the Diana are as hardy and as early as the Isabella, and although I consider the Isabella a valuable vine, where already established in city yards or in protected situations, I do not know that it has any advantage. Certainly where the Delaware and Diana are well established, no one will wish to eat Isabellas or Catawbas. Some of the best of our native grapes sell as high as foreign grapes. As the vines grow older, we find that the bunches of some of the new varieties grow larger and finer. This is easily explained. While the price of vines is from three to five dollars, the vines will be forced beyond their strength to produce new vines. The vines thus produced will slowly recover their strength; but I do not think that a vine which has once been overtasked can ever completely recover.

Dr. Trimble.—I think the Isabella grape has been much disparaged and unjustly. I never thin them out, and my vines will bear a profuse crop for twenty years in succession. This year, owing to the weather, the fruit is sweeter than usual.

Dr. Crowell.—I rely upon four varieties, the Concord, Hartford Prolific, Isabella and Catawba. The grape which takes the pre-eminence, when well ripened, is the Catawba. I find that it pays to erect rough board fences to protect my grapes.

Mr. Carpenter.—The Isabella and Catawba cannot be grown generally with success north of New York. The great bulk of the grapes for this market will be grown north of New York, and the Concord and Hartford Prolific have given general satisfaction there. I have Isabella and Catawba vines twenty-seven miles north of New York, and I can only ripen them once in seven years. My Hartford Prolific and Concord were ripe several weeks ago.

Mr. Robinson stated that the finest show of Isabella grapes in the State was to be seen in Yates county, upon the top of a high hill, and grown upon a stiff clay loam; the biggest berries, the biggest bunches in the State.

Mr. Pardee.—I have lived fifty miles north of Yates county, and every year I had ripe Isabellas grown without ringing and without protection, excepting that they had a southern exposure, being upon the south side of a building. For twenty-five years I never knew one instance when my Isabella vine and my Catawba vine, trained above my wood-house, did not ripen grapes enough for my family.

Mr. Carpenter.—These grapes come in the same category with the Newtown Pippin; they are local.

Mr. Fuller.—I do not believe in the doctrine of location, for apples or any fruit. If the Newtown Pippin will grow in one location, I believe it will grow anywhere else, within the range of temperature, with the right soil and culture. There are more failures south of New York than north of it, in growing the Isabella grape. Not one vine in twenty ripens its fruit well. But it is not the lateness of the fruit which is the cause of the failure. It is the peculiarity of the leaf, which is thin, and easily destroyed by the wind. If the leaves of a vine are destroyed before the fruit is ripened, it never can ripen. That is the trouble with the Isabella vine; and I do not think the Rebecca is any better. But I have never seen the leaves of the Concord whipped to pieces by the wind. The Concord is a model grape, so far as the leaf is concerned.

Mr. Carpenter.—The Pomological conventions have determined that certain fruits are adapted to certain localities. The Newtown Pippin, the Rhode Island Greening, and the white Doyenne pear, are examples. The latter will grow at great perfection at the west, but cannot be raised upon the seaboard.

Mr. Pardee.—The Vergalieu pear was rejected for western New York, a few years ago, now it ripens well there. The changes of the seasons overturn all our distinctions of locality.

Dr. Underhill exhibited samples of Isabella, Catawba, Ohio, and Norton's seedling grapes. He asserted that the Ohio grape was not the same with Norton's seedling.

Mr. Fuller.—Cannot native grapes be profitably grown at five cents per pound.

Dr. Underhill.—If we allow them to grow with five times as many upon the vine as they should bear, and neglect them, they may be; but if we properly prune them, and bestow the labor upon them which they ought to receive to enable them to perfect their fruit, they cannot. Every imperfect or unripe berry is carefully trimmed out before our grapes are sent to the market, so that every berry that we send may be eaten in the dark.

Mr. Carpenter.—Fruit properly grown is cheaper at double the price. Apples are sometimes gathered by being shaken from the tree, bruising them and causing early decay. They may be sold for less per barrel, but are not the cheapest apples.

Mr. Fuller.—In order to obtain cheap grapes, I should give them the highest culture. I think I can grow grapes at five cents per pound which will yield $1,000 per acre, and grow them well. I have no thinning out of my grapes. I disbud the branches as I lay them down.

Dr. Underhill.—If you cut out the buds, of course you do not have to cut out the fruit.

MISCELLANEOUS.

Mr. Steele exhibited Vergalieu pears grown this year from the same tree which last year produced them with a black knot. This year but two were so affected. He exhibited also a pear which he asserted to be the Beurré Diel, ahead of its time.

He was interrupted by Mr. Pardee and others, who said that he was mistaken in the name. Mr. Carpenter, after tasting the pear, pronounced it the Onondaga.

Mr. Steele insisted that he was right, and promised next week to prove it by bringing other specimens from the same tree.

Dr. Trimble again brought forward specimens of the Gansell Bergamot pear.

Mr. Carpenter exhibited two pears, the Lawrence, and the Beurré Clargeau, both excellent pears. Good judges consider the latter nearly equal to the Seckel.

TREE COTTON.

Mr. Robinson read a letter in which a sea captain, whose name was not given, confirms the statements of Mr. Kendall with regard to the cotton tree. He describes the cotton as of very fine texture, equal to our Sea Island cotton, but not of so long a fibre. He had once brought 150 bales of it to this city, prior to 1853; but on account of the tariff, and as it was imperfectly ginned, he reshipped it to Liverpool, for which he received such good returns that the merchant resolved to ship his cotton direct to England.

FUMIGATION OF BORERS.

Mr. Bergen exhibited a specimen of poplar perforated by large borers, to show that they so stop up the hole behind them that they cannot be reached by fumigation.

"Corn fodder" and "Mushrooms" continued. Adjourned.

October 14, 1861.

Prof. Nash in the chair.

PRESERVATION OF GRAPES.

Mr. Robinson read a letter inquiring what is the best method for keeping grapes.

Mr. Pardee.—I obtained a premium five or six years in succession for Catawba grapes brought to the annual meeting of the State Agricultural Society in February. My process was this: Selecting a very pleasant, dry, sunny day, when the grapes were just ripe, I commenced at half past three o'clock in the afternoon to take the grapes from the vines, as carefully as my fingers could take them off, and picked out with the scissors all the green, wilted, or imperfect berries. I next carried them into the house and laid them very gently upon a table. I then dipped the ends of the stems into a little melted wax or sealing wax. Perhaps that was not essential, but, at any rate, it did no harm. I left them upon a table, in a cool and rather dark room, for a week or two, until fully dried and sweated. I then took a candle box and spread upon the bottom of it a little layer of cotton; upon that a layer of dry old newspaper; upon that bunches of grapes so laid as not to touch each other; upon them another layer of cotton and of newspaper; then another layer of grapes; and so on alternately until the box was filled. I then put the box in the coolest place in the garret, and let it remain until the frost was so severe that it was dangerous to leave them there any longer, when I put it into the coolest chamber I had where there was no danger from the frost. There they would remain with very little loss of flavor, even to March or April. I have prepared them in granulated cork, in vats, in bran, &c., but the plan I have given was the most successful.

Mr. Carpenter.—Without claiming to answer the question from my own experience, I may say that I have learned from my friends two different ways, both claimed to be effectual. In each case all the care recommended by Mr. Pardee must be exercised in selecting and preparing the grapes for being packed. One method is then to pack them in wheat bran, holding them in the box with the stem downward so that the berries shall fall apart as much as possible, and then pouring the bran between the berries. The other method is to lay the bunches in an earthen jar, glazed upon the inside, without anything between them, and covering over the jar to bury it in a dry sandy soil beyond the reach of frost. The gentleman who described this method, and who was the only person from whom I have heard it, stated that after the ground had thawed in the spring he had found the grapes in great perfection.

The Chairman.—The inversion of the bunch to divide the berries seems to me an ingenious and useful device; for if it is desirable that the berries of different bunches should not touch each other, it is desirable that the berries of the same bunch should be separated, so far as it is possible to do so.

Mr. Carpenter.—The grapes received from Europe seldom come in perfect order, unless the passage is short. They now use the granulated cork, which is better than the sawdust, which was formerly used.

Mr. Burgess.—Whenever bran, sawdust or cork is to be used, it should be well dried in an oven, making it as hot as it can be held in the hand, cooling it before using it.

Mr. Pardee.—In some locations moisture will accumulate, if these substances are used, dry them as you will.

The Chairman.—For keeping potatoes the rule is to keep them cool and moist. Fruits should be kept cool and dry. To secure these conditions the amateur gardener has an ice-house or refrigerator building. Every man must inquire how, in his own locality, he can best secure the conditions of keeping his fruit as near the freezing point as he can without reaching it, and as dry as may be.

APPLES AND PEARS.

Mr. Steele exhibited a pear indented by another in growing. Pears that are apt to cluster should be thinned out to prevent this defect.

Mr. Carpenter exhibited about forty varieties of apples from the western part of Connecticut, mostly local varieties, having only local names. Some of these he considered worthy of introduction, and had made arrangements for that purpose. The favorite apples for orchard culture he found to be the Rhode Island Greening, the Stackyard, the Black apple, the Baldwin, the Roxbury Russett, and the Meadow Sweet. Mr. C. exhibited specimens of the Beurré Clargeau.

GIRDLING GRAPES—SWEET CORN.

Mr. Hite exhibited a specimen of grapes from a girdled vine.

Mr. Fuller.—It makes them dropsical. They have more water and less sugar. It hastens their maturity, but certainly does not improve their quality.

Dr. Trimble.—When the bark grows together again, as it sometimes will, the quality is inferior.

Dr. T. exhibited some flowers, and some sweet corn, ready for the table, planted upon the 8th of July.

Messrs. Pardee and Carpenter eulogized Stowell's Evergreen sweet corn.

Prof. Mapes stated that Stowell's Evergreen corn, grown in 1855, and that grown in 1856, had been placed together upon the table at the American Institute fair in 1856, and no man could tell the difference.

MUSHROOMS.

Prof. Mapes stated that the amount of French mushrooms imported into this market had reached a $1,000,000. They are grown in cellars or vaults, with a uniform temperature of 55° during the entire year. Horse manure, from which the long straw has been removed, is placed in heaps and allowed to heat to 115°, when the process is arrested and the heap remodeled. At its second heating it is stopped at 105°. The process is repeated until it will not heat above 90°. It is then ready for the cellar, where it will heat up to 90° and cool gradually to 60°. It is finally covered with very fine earth and the spawn is sown. In about four weeks a white fog-like wet will appear, and in two weeks more little buttons, about the size of peas, which must be removed from the cellar. Then the mushrooms will begin to grow, and ten quarts may be gathered every other day from every twelve feet in length of the beds. The beds will continue to bear for about eight months. He had built two caves five hundred feet long, each, and wide enough for two beds, but the arches being of wood, instead of brick, were destroyed the first season. Yet the crops of that season re-paid the entire cost. Some kinds of mushrooms are poisonous in one district and edible in another. If chocolate colored they are edible, and if pink are poisonous.

TRANSPLANTING TREES.

Mr. Carpenter.—I have this season transplanted evergreen trees every month since April, and with uniform success, both with earth attached and without it. I think the best time to transplant evergreen trees is after they have made about an inch growth. They then seem to receive no check in their growth. Transplanting later seems to prevent their growing, but, nevertheless, they live and do well. I have also found that we may transplant deciduous trees at any time when the soil is open, by taking all the leaves off. I do not approve of watering the tree much after it has been transplanted. Put the ground in good condition, and mulch it, and it is sufficient, unless it is found that a little water is necessary to cause the earth to settle among the roots.

Prof. Mapes.—Mr. Whitlock, who has transplanted thousands of evergreens every week in the year, never waters.

Mr. Fuller.—A nurseryman never waters a tree when he transplants it.

THE LIST OF FRUITS.

Dr. Trimble read the list of fruits recommended by the Farmers' Club last year.

The Isabella grape, White grape currant, and Catawissa and Fastolfe raspberries were added to the list, and as amended the list was unanimously adopted for this year. It is as follows:

Summer apples.—Early Bough, Early Harvest, American Summer Pearmain, Summer Rose.

Autumn.—Autumn Bough, Gravenstein, Hawley, Fall Pippin, Porter, Jersey Sweeting.

Winter.—Baldwin, Rhode Island Greening, Jonathan, Monmouth Pippin, Spitzenberg (Esopus,) Tallman's Sweeting, King of Tompkins County, Boston Russet.

Summer pears.—Doyenne d'Eté, Dearborn's Seedling, Beurré Giffard, Rostiezer, Tyson.

Autumn.—Bartlett, Seckel, Beurré d'Anjou, Beurré Superfin, Doyenne Boussack, Duchesse d'Augoulême (on Quince,) Flemish Beauty, Fondante d'Automne, Sheldon, Urbaniste.

Winter.—Beurré Gris d'Hiver Nouveau, Beurré Diel, Lawrence, Vicar of Wkinfield.

Cherries.—Belle de Choisy, Bigarreau, or Yellow Spanish, Black Eagle, Downer's Late Red, Early Purple Guigne, Elton, Black Tartarian, Governor Wood.

Plums.—Green Gage, Coe's Golden Drop, Imperial Gage, Washington or Bolmar, Smith's Orleans, Jefferson.

Peaches—Crawford's Early, Crawford's Late, Early York (large), Bergen's Yellow, George IV., Oldmixon Free, Morris White.

Clings.—Heath, Large White, Oldmixon.

Nectarines.—Downton, Stanwick, Early Newington.

Apricots.—Dubois' Golden, (American variety,) Peach or Moorpark.

Grapes.—Delaware, Diana, Concord, Union Village, Hartford Prolific, Isabella.

Quinces.—Orange, Rae's Seedling, Portugal.

Currants.—Large Red Dutch, Versailles, Victoria, Large White Provence, White Dutch, White Grape, Black Naples.

Gooseberries.—Downing's Seedling, Houghton's Seedling, (hardy American varieties and free from mildew.)

Raspberries.—Hornet, Franconia, Orange, Belle de Fontenay, Catawissa, Fastollf.

Strawberries.—Triomphe de Gand, Bartlett, Wilson's Seedling (acid,) Hooker's Seedling (sweet,) Jenny Lind.

Blackberries.—New Rochelle (or Lawton,) Dorchester, Newman's Thornless.

Subjects for discussion.—The subjects of "Corn Fodder" and "Preservation of the Potato" were selected for the next meeting.

Adjourned.

October 21, 1862.

Mr. Adrian Bergen, of Long Island, in the chair.

FRUIT AFFECTED BY THE STOCK.

Mr. Carpenter.—It has been asserted by men of science that the stock has no effect upon the fruit. Let the stock be of the apple kind, and let apples be grafted upon it, and I believe that it is pretty well settled that the stock will not materially affect the result. Yet here are two specimens taken from two trees in a farm in Connecticut, both grafted some fifteen years ago at the same time with scions taken from the same tree. One was grafted upon a Fall Pippin and the other upon a very inferior apple, not a crab apple but a remarkably small apple. The former is twice the diameter of the other, and appears like a better apple. They are fair specimens of the trees from which they were taken. But although the evidence seems to be very strong, I doubt the whole thing yet. I have grafted the Maiden's Blush upon the Siberian Crab, and I never saw finer specimens than that bore.

[The apples having been cut and tasted were pronounced to be so decidedly different in quality as to be convincing evidence of a mistake in grafting.]

Prof. Nash.—Anybody would argue, *a priori*, that the stock would affect the fruit, in size or quality, or both. I have always been exceedingly inclined to believe that such is the fact. It would seem impossible that a graft put upon a tree of defective organization should mature a perfect fruit; and I believe if a series of experiments were to be made, this would be found to be the fact. And this is perfectly consistent with Mr. Carpenter's experiment with the crab apple, because the elaboration of the sap takes place not in the stock but in the graft, and the sap of the crab apple tree may be sufficient to develope all the perfection of the Maiden's Blush.

Mr. Carpenter.—As a further illustration of the theory that the stock does not materially affect the fruit, I will mention that the pear is grafted upon the quince, the thorn, and the mountain ash, these stocks being used to dwarf the pear, but the character of the fruit is not materially altered. The only effect is that the dwarfed trees attain their full growth much earlier than the standard trees, and are therefore sooner prepared to develope all the qualities of the fruit. We obtain in from three to five years such fruit as the pear stock will require ten or fifteen years to produce. The pear on the pear stock will generally bear speci-men's in a few years, but while it is perfecting the tree, and rapidly growing, the fruit will not be as fine as after it has reached its full size. I have used the Paradise and Doucin stock to dwarf the apple, but I never could see any difference in the flavor of the apples produced.

Dr. Trimble.—I have grafted plums upon the common hedge plum and the only bad effect was that the stock was short-lived and the graft outgrew it. I could see no difference in the plums. Again, as an experiment, I inoculated a number of peach trees upon these natural red hedge plum stocks. Some of these trees lived long enough to bear peaches; and although nothing can be more unlike than the hedge plum and the peach, I could see no difference in the peaches. I grafted 120 or more varieties of plums upon the hedge plum, but by the time they were ready to bear I found that I could raise apricots as readily as plums, and I turned every one of these plum trees into an apricot tree, inoculating them with the peach apricot from Italy. I gathered several crops of apricots from them and I saw no difference in the fruit.

Mr. Burgess.—Nobody in England would use the peach as a stock for the peach or apricot. Nothing will give the apricot or peach so fine a quality as to bud it upon the muscle plum. I think that the great reason why peaches fail in this country is because they are upon their own roots. I think if they were grafted upon the muscle plum it would be a great acquisition.

Mr. Pardee.—That is becoming common in Western New York. I have grafted the pear upon the apple. The grafts would grow tolerably well but would never produce much fruit. With the quince it assimilates very nearly. The whole virtue of the graft-ing process lies in the terminal bud which will push out as far as you choose to let it go. In pinching trees the object is to throw the sap back and form laterals. So with vines, such as melons and squashes, pinch the terminal bud and laterals will be formed, and upon these laterals fruit will be grown. So a grape vine will run all over the side of a house and produce little or no fruit if it is not pruned. If we put a bud into a tree and it grows vigorously, it cannot but produce the same kind of fruit, because the fruit lies in that bud and the sap only helps to elaborate it. If we get a stock that is too thrifty it will develope apples very large, very watery, and very apt to be deficient in flavor. It is very rarely that we get a large and fine Spitzenbergen apple. It is not the fault of the graft but it is from the influence of the soil. It is very difficult to ascertain how far the stock affects the fruit, because we have not yet learned how far the effect is due to the soil.

POTATOES.

Prof. Nash.—Nature teaches us how to preserve potatoes. When you leave a potato in the ground below the reach of frost it is better in the spring than any that you can preserve. From October, when they are ripe, until May, they are in a cold and moist condition. Remove the potato without any delay to a moist place, regulating the temperature so that it shall be cold continually and yet not freeze, and the potato will be as good in May as in October.

Mr. Carpenter.—My experience has been that different potatoes require different treatment. There are some varieties whose best season is early and they will be poor in the spring, whereas other varieties will be better in the spring than in October. The Prince Albert, for instance, is better in the spring. The Western Red is a miserable watery potato in the fall, but quite late in the spring is a good eatable potato. The Jenny Lind is a very poor potato in October, but by being kept in the cellar until May or June becomes almost equal to the Peach Blow. I am satisfied that in raising potatoes a change of seed is requisite for the best results. I procure it from the West if I can, every year, and I think I have seen the benefit of it. Indeed this will apply to almost every thing we plant. Changing the seed will be a material benefit. I think that if I had been obliged to pay $10 per bushel for my seed potatoes it would still have paid me.

Dr. Trimble remonstrated against the doctrine of changing the seed.

Mr. Andrews stated that the President of the Agricultural

Society of Monmouth county, N. J., who raises excellent potatoes, and has no rot among them, considers it important to change his seed every year.

Prof. Nash.—I admit that some potatoes deteriorate less than others, but that any have become better by keeping I cannot admit. I object entirely to the practice of farmers, of spreading their potatoes on the ground to dry in the sun. Let a potato be kept in a moist place, at a temperature just about 32 deg., and it would keep unchanged for thousands of years, but the moment it is exposed to a higher temperature the process of converting starch into sugar commences and the potato deteriorates.

Prof. Mapes.—A few years ago, Mr. Roberts presented here potatoes from Michigan, weighing eight pounds more per bushel than any potatoes we had ever seen. He left in the ground all winter the portion he intended for seed, taking them up in the spring and replanting them. The potatoes grew heavier and better in quality every year. Bermuda farmers say that they never replant their own potatoes, but always buy their seed in New York. They generally buy the Western Reds.

Dr. Trimble.—I have cultivated the Bermuda potato here, and it retains its distinct individuality from year to year.

Prof. Mapes.—Many have tried it and it has changed. Some years ago Mr. Pell stated that he had raised a larger crop of potatoes by gouging out the eyes than he could raise from the whole potatoes. His results, however, were different from those of others. Another suggestion has been to turn the stalks outward when twelve inches long and cover them; then to turn them inward when they have grown twelve inches more, and cover them again, repeating the process until the potato blossomed. The number of potatoes produced was very large. But in this case as well as in that of planting the eyes only, the potatoes averaged small. I have found also that cut potatoes yield less than whole potatoes, and small potatoes less than large potatoes. Mr. John Bucklin of the Phalanx farm, has repeated these experiments with the same results. It has also been determined by experiment that the potato yields the most when planted at the depth of six inches; that it yields the greatest weight in pounds and the greatest quantity in bushels by flat instead of hill culture. I have no doubt of the advantage of changing the seed.

Mr. Burgess was in favor of changing the seed of potatoes.

PRIZES OFFERED.

Mr. Carpenter read a communication from the Board of Managers of the American Institute, announcing that they had determined to refer the award of medals at the next exhibition to the Polytechnic Association and Farmers' Club, and communicating a list of the subjects to be assigned to the Farmers' Club for consideration.

Adjourned.

October 28, 1861.

Prof. Cyrus Mason in the chair.

PLOWS AND PLOWING.

Prof. Nash.—This subject is old and trite, but not unimportant. Great improvements have been made in the art of preparing the soil for the crops; but have we yet attained the best possible practice? I think not. Fifty years ago it might have been said with truth, that man's power over the soil had been doubled since Virgil, two thousand years before, wrote his description of the best plow of his time. Within the last fifty years, man's power over the soil has been doubled again. It has been more than doubled by improved implements, if we are to judge solely by his present ability to effect a complete overturning of the soil; for we can go over more than two acres to our fathers' one. But if we look also at the influence of their plowing and of ours upon the fertility of the soil, the comparison will stand differently, and we shall find that we have not gained as much as we had supposed. While we can stir more than twice as much soil in a day, we can not show practical paying results in a like proportion. I am not a believer in the correctness of the universal practice of turning the furrow slice upside down to any depth we choose to plow, on all lands and for all crops. In the time of Abraham, the plow was probably a little more than a section of a small tree with one limb projecting forward at an angle of 45 deg., cut perhaps to the length of one foot, to enter the ground, armed at the end with a sort of iron thimble terminating in a point, and another limb on the opposite side to be bent backwards and to serve for a handle. The effect of such a plow would be not to invert the soil, but by long continued patient labor, to loosen and mix it. Precisely such would be the effect of the plow described by Virgil, who lived midway between Abraham and our time. The

Spaniard among the Cantabrian mountains, at this day, uses for a plow, a huge rake, having four iron teeth about two feet long. The rake's tail he ties to the yoke with leather thongs. The yoke is but a straight stick fastened by other thongs to the horns of a pair of cows or oxen, or a cow and an ox, as often happens. Thus harnessed, he drives them over the field, more in some places and less in others, till the whole is mellowed as far as the teeth can reach, a depth of two feet slant measure, and at least one foot perpendicular. The operation must be enormously laborious, but the results are somewhat proportioned. Fifty bushels of wheat to the acre is but the average crop in that part of Spain. The people there will tell you that this rake-fashioned plow is 3,000 years old. Its effect on the soil, like that of Abraham and of Virgil, must be to pick it to pieces and to mix it. Similar to this has been the effect of nearly all plows used previously to the present century. The process with all was tediously laborious ; but it pulverised and mixed the soil thoroughly if persevered in sufficiently long. Within the present century the efforts at improvement in the plow seem to have aimed at saving of labor more than at a thorough pulverization and intermixture of the surface and subsoils. If a complete inversion of the soil is to be aimed at and is to be the only end gained by plowing, then our best modern plows are about perfect. In lightness of draft, in ease of holding, and in the beauty of the work they are capable of doing, there is little room left for improvement. But do they effect that on the soil which secures the greatest crops? I think not. The Spaniard of the Cantabrian hills, does a much better thing for his crop in six days, with his cows or mixed team, and himself or his wife to drive, than we with our fine teams and A No. 1 plows can do in six hours. In speed, we beat him all hollow; in the crop, he beats us as much. What is now wanted is to combine our speed with his thoroughness. On another occasion I propose to continue this subject, and to exhibit the model of an implement for this purpose.

Prof. Mapes.—The ordinary plows introduce a wedge into the earth which tends to compress the soil on the land side and also below it. There is a digging machine, the cost of which is a great objection to it, but which will do the work more thoroughly.

Mr. Fuller.—The garden fork is the best digging machine I know of, although I think I could improve upon that.

Prof. Mapes.—Even in digging with the fork the whole leverage of the handle is brought to bear upon and compress the earth behind the upper portion of the tines. The failure of the steam plow is in its applying too much power in a particular place and thus compressing the soil. The power must be applied gradually and must be diffused as much as possible to avoid compacting and hardening portions of the soil. There are machines which will plow in one tenth the time of the ordinary plow, but they would destroy any farm they might be used upon.

POTATOES.

Dr. Crowell exhibited specimens of Bermuda and of peach blow potatoes, all raised in New Jersey, appearing to be the same potato.

Mr. Carpenter.—This Bermuda was evidently a peach blow originally. The Bermuda planters generally plant the Western Reds, the character of which is so changed from the soil and the climate that we consider their potatoes equal to anything we have at any time in the year. I have never seen any indications of disease in the Bermuda potatoes.

Dr. Crowell.—The potatoes twice planted in New Jersey show some indication of a dry rot; but very little of it.

Dr. Trimble.—I have planted the Bermuda potato and never knew them to rot; the potatoes were very good, but they degenerated.

Dr. Crowell.—The first year I got no double potatoes. The second year they began to come double.

Mr. Carpenter.—I should not advise any one to plant the Bermuda potatoes in this country because we have early potatoes that show better results. The Bermuda potatoes soon come back to the character of the Western Reds and are very unsatisfactory.

Mr. Pardee.—The Bermuda planters buy the potatoes which they can buy the cheapest. Generally they buy the Western Reds, but if they can get the peach blows cheaper at the time when they wish to buy them, they will take them. These potatoes are evidently the peach blows, and if so, they cannot have come from the Western Reds, for I do not believe the Bermuda climate will turn a Western Red into a peach blow.

Mr. Robinson.—The harvesting season here is the planting season in Bermuda; the potatoes, therefore, are taken from the ground, packed into barrels, kept in the dark without the opportunity to change, transferred to Bermuda, and immediately put into the ground again.

The Chairman inquired in what climate potatoes arrive at the greatest perfection? It is stated that they originated in a far Southern latitude; but at present our best potatoes seem to come from the North.

Mr. Robinson doubted the imputed Southern origin of the potato, for they flourish as far North as anything, if cultivated, better than in the South. He had seen potatoes growing in Canada, blossoming with the profusion of a field of buckwheat, while in the Southern States they have few blossoms and are nearly worthless for food.

Mr. Fuller suggested that they might have originated in a Southern latitude, but so far up on the mountains as to be really not a tropical plant. In its natural state, the potato seeks to reproduce itself from seed, but by our cultivation we have so far changed that that most of the force of the plant goes to form tubers.

Prof. Mapes repeated his statements made last week upon the proper mode of cultivating the potato, and proceeded to make further suggestions upon the same subject. When a potato is placed in the ground with a freshly cut surface, there is a tendency in the starch to be transformed into acetous acid. To prevent this the farmer dips it in plaster to form an artificial skin; but if a thickness of an inch of plaster will not hold water, it is evident that this thin covering of plaster cannot take the place of a skin to prevent this transformation of the starch.

Mr. Carpenter.—I agree with Prof. Mapes upon most of his statements, but I am fully convinced that cutting the seed to two eyes, gives me the best results. If the whole potato is planted, but few of the eyes will sprout; whereas, if they are cut down to two eyes, they will all germinate. I would cut a potato of good size into six parts of two eyes each, and place the pieces 12 inches apart in the drill, the rows being 20 to 24 inches apart in order to produce the best results. With regard to the depth of planting, I would recommend six inches for ordinary soils, but for a heavy soil I think there would be a loss of ten days in planting so deep, and I would recommend to plant but three inches deep in clay soils. As to the time of cutting the potatoes I have tried different times with no apparent difference in the result. I found that when I cut them immediately before planting there was a new skin formed, and I could see no advantage from cutting them either the day before or the week before planting.

Prof. Nash.—I agree with Prof. Mapes upon every point excepting the depth of planting in heavy soils, and that I suppose is really no exception, for with such tillage as he would recommend they would cease to be heavy soils.

Prof. Mapes.—I would not vary the depth of planting in heavy soils, but I would manipulate differently, for I would cover the potatoes first at the depth of three inches, and when they had grown through that, add the other three inches of covering. The new potatoes are formed further beneath the surface than if merely covered three inches, and are less liable to be exposed to the deleterious action of the light and atmosphere. As to the cutting of potatoes, if a sufficient amount of pabulum is furnished all the eyes will germinate, thus answering the objection to planting them whole.

The subject of the proper method of cultivating potatoes, was referred to a committee consisting of Messrs. Mapes, Carpenter, and Fuller.

PREMIUMS OFFERED.

The Chairman read a communication from the Board of Managers of the American Institute, with regard to the exhibition to take place in February next, and referring to the Polytechnic Association and Farmers' Club, the subject of the award of premiums, to be reported upon prior to the 15th day of January next.

To the Farmers' Club of the Institute, the Managers have assigned the following subjects:

1. Flax. For the best mode of preparing the fibre—long or short staple. Large gold medal.

2. For the best seed machine for sowing cereals, drilled or broadcast. Gold medal.

3. For the best vegetable seed sower. Silver medal.

4. For the best mode of packing and preserving apples and pears. Gold medal.

5. For the best portable mill for grinding corn, by hand power, for farm use. Gold medal.

6. For the best corn shelling machine that will not break the grain. Large silver medal.

7. For the best implement for cultivating the garden by hand power. Silver medal.

8. For the best novelty and improvement in horse shoeing. Silver medal.

9. For the best improvement in heating conservatories. Gold medal.

10. For the best essay on the culture of the peach. Gold medal.

11. For the best essay on the culture of the apple. Gold medal.

12. For the best essay on the culture of the pear. Gold medal.

13. For any improvement or new implement adapted to the farm, not enumerated, and superior to any now in use. Gold medal.

14. For the best implement for field culture. Large gold medal.

15. For the best power for farm use. Silver medal.

[The communication will be found in the report of the Polytechnic association for October 31.]

Adjourned.

November 4, 1861.

Dr. Crowell, of New Jersey, in the chair.

SELECTION OF SEED.

Mr. Adrian Bergen exhibited a specimen of corn which he considered the most profitable corn to plant on Long Island. It will yield sixty bushels per acre on common land.

Mr. Carpenter.—I think this is what is called the T corn. It is productive, but a little late. I do not consider it as well worthy of attention as some other varieties. It is not so heavy as flint corn. I have tried the Wyandot corn, and if I were in a latitude where I could ripen it, I should have continued to cultivate it. I planted two grains of it, from one of which I gathered seventeen ears, that made half a bushel of corn in the ear. The ears were some of them twelve or thirteen inches long. One grain in the hill, at four feet apart, I estimated would produce 150 to 200 bushels per acre. Although the stalks of the southern corn are larger, I think the eight-rowed flint corn, planted three feet apart, four kernels in the hill, yields more to the acre. It is better still to plant in drills, three feet apart, and dropping the kernels eight inches apart in the row.

Mr. Steele.—A gentleman of my acquaintance, in planting corn, always rejects the extremities of the ears, and never will plant an imperfect grain. The result is that his corn is continually improving.

Mr. Carpenter.—I have full faith in selecting the best seeds for everything. I would select my seed corn in the field, and from no stalk except those having two or three ears. From those stalks I would select the ears that ripen first, and that are the largest and best developed, filled out to the very end. By pursuing that course, year after year, we may improve the varieties of corn, and the same principles will apply to all the cereals and vegetables. A friend of mine takes his seed corn from the ends of the ear and rejects the middle. He argues that from the small end he obtains earlier corn, and that the ears are developed out to the very end. I do not know but he is right.

Mr. John G. Bergen.—These small kernels fill out later than the others, and may grow more rapidly. I should not reject any but the imperfect kernels. The principle of selecting seed corn from stalks producing two ears, may be carried too far. I know a man who has experimented twelve years or more, and he carried it so far as to produce eight ears to the stalk; but he came to the conclusion that he lost in the size of the ears as much as he gained in their number. I doubt whether corn can be produced profitably with more than two or three ears to the stalk.

Mr. Fuller.—That is the principle upon which we take seed from the middle of the ear. We follow the same principle upon which this man produced eight ears instead of one; that the result will depend somewhat upon the character of the seed planted. But it was said here last week that we should always select the largest potatoes for seed. I say that is wrong. If we wished to improve the potato in size, that would be right; but what we want is to improve their quality.

Mr. Robinson.—Mr. Bergen has told us the reason why the kernels from the end of the ear produce earlier corn, because they come to maturity in a shorter time. Nature indicates that if we plant kernels which took only 70 days instead of 90 to perfect, we shall obtain an earlier crop.

Mr. Adrian Bergen.—One season I broke the ears in two, and planted the butt ends only, but I found no difference in the crop. I usually select the best ears for seed, and I do not find as good ears where there are two or more ears upon the same stalk. I should prefer one large ear upon the stalk to two or three small ones, and I select my seed accordingly.

Mr. E. Henry.—Mr. Carpenter's rule for planting corn should be modified according to the quality of the land. If it is very rich we may plant four grains to the hill, but if it is poor we should plant only one.

Mr. Carpenter.—I would rather reverse that and plant the one grain in the rich land, for it will tiller enough to produce several stalks.

Mr. Adrian Bergen.—You would better plant none at all on poor ground, for on poor ground you cannot raise corn.

The Chairman.—I have found this season that it would pay to raise the plants of Wyandot corn in beds, and set them out afterwards.

Mr. Carpenter.—The Wyandot corn is remarkable for tillering; it seems to tiller from the root instead of throwing up suckers. As to the potato, the largest buds will be found in the largest potatoes, and they will throw up larger and stronger stalks than smaller potatoes.

Mr. Fuller.—Is the large potato, of any given variety, of a better quality than the smaller ones?

Mr. Carpenter.—That is not a question for us to settle. We grow for the market and want a potato that will sell. I think the Red-blow and Buck-eye may be grown too large, so as to be injured by their size. But the Mercer I have never seen too large.

Mr. John G. Bergen.—I prefer to plant large potatoes for another reason. I have observed that the crop is earlier. They come up earlier and keep ahead the whole season. I have found the seed end of potatoes to be earlier, but not to produce so well. I have experimented also in the depth for planting potatoes. I planted at all depths, from two inches to twelve under the soil. My results were not quite consistent, but I came to the conclusion that three or four inches under the soil was the best depth. My intention was to give them a flat culture, but it was not absolutely flat, because that would be too much expense.

Mr. Robinson.—I have learned from Mr. Bergen not only that the large potatoes are the earliest, but the reason. They mature the quickest. As to large or small potatoes for seed, there is not an iota of difference, provided the small potato is as ripe as the large one. The small potatoes are generally immature, and that is the reason why they do not so soon send out shoots, or so well support them as the large potatoes.

Mr. Carpenter.—Where the majority of the potatoes of a crop are large, would you plant the small ones?

Mr. Robinson.—No; but there are cases where the farmer knows that the small potatoes are ripe, and just as perfect as the large potatoes, if not more so. Then why not plant them? Why will they not produce just as good a crop as large potatoes?

Mr. E. Henry.—This year peach blows planted by the side of Mercers, stood the drought much better.

Mr. John E. Bergen.—I do not think it is always so; but the peach blow being longer lived may have out-lived the drought.

CHRYSANTHEMUMS.

Rev. Mr. Weaver exhibited a large bouquet of Chrysanthemums, grown by Mr. Richardson, of Fordham. They had been subjected to several severe frosts, but had not suffered from them.

Mr. Fuller.—There is no trouble about keeping them all winter in dry ground without covering, although it is better to throw enough litter over them to shade them, and prevent the ground from freezing and thawing. Frost does not seem to trouble them. Chrysanthemums are apt to run back to single flowers if not kept under high cultivation. The best way to guard against that is to grow them from cuttings every year. The cuttings strike easily, and this will keep the flowers in perfection.

Mr. Carpenter.—I have no trouble about keeping the Chrysanthemum through the winter. If it is allowed to grow at random it becomes a straggling bush. I find it well to nip it several times to thause it to grow out laterals.

Mr. Fuller.—The pinching can be continued until August.

MISCELLANEOUS.

Mr. John G. Bergen read a paper in reply to the circular of the New York State Committee of the American Pomological Society, in regard to fruit culture in Brooklyn and vicinity.

Mr. Robinson exhibited Bunker Hill apples, sent from Waterville, New York. It was generally pronounced a second rate apple, being inferior to the Pearmain, which it resembles.

Mr. John G. Bergen exhibited a Vicar of Winkfield pear, of a high color, which he attributed to its growing in sandy soil.

Mr. Robinson read a statement that cider apples were now bought by calico dyers of Manchester, Eng., the juice being used to make fast colors, and the price had risen in consequence of this new use.

The subjects of "the feeding of cattle" and of "fall flowers" were selected for discussion at the next meeting.

Adjourned.

November 11, 1861.

Dr. Trimble, of Newark, N. J., in the chair.

Mr. Pardee mentioned the fact that geraniums and salvias have been preserved through the winter by hanging them up in a cellar.

Mr. Carpenter had tried this plan without success, and considered it ordinarily a useless method.

HONOLULU NECTARINE SQUASH.

Mr. Carpenter exhibited a specimen of the Honolulu Nectarine Squash, which he considered superior to the Boston, the Hubbard, and all other varieties, especially for pies. They make as good a pie without eggs as other varieties with them. They are also valuable for cattle, nearly equal to corn for fattening cattle and hogs. They weigh from twenty to forty pounds; they require rather more care than the ordinary corn pumpkin, but will pay as a separate crop; there is danger of their crossing. Ordinarily melons and squashes will not mix at a greater distance than ten rods; but with the aid of bees they will mix at a distance even of forty rods.

APPLES—FLOWERS.

Mr. Carpenter exhibited specimens of the Meadow Sweet and Autumn Strawberry apples.

Rev. Mr. Weaver exhibited a beautiful bouquet of Chrysanthemums, and other late flowers, from his garden.

Mr. Robinson exhibited a nosegay of flowers from the roadside, hastily gathered this morning on the way from his dwelling.

PLOWS AND PLOWING.

Prof. Nash.—A fortnight ago I stated that I believed that the soil should not be inverted in plowing, and stated some historical facts to show that none of the plows used from the dawn of humanity down nearly to the present time, have had that effect.

The plows used by the Jews, Greeks, Romans, and modern French and Spaniards, until the late improvements, and even at present in large parts of Europe, stir the soil without inverting it. In our late improvements we have aimed at two results and accomplished both; first, to construct a plow that will go alone, and the plows of Ruggles, Nourse, Mason and Coles need but little attention; second, to construct a plow that will turn the soil over handsomely, and we have attained that. The husbanding of power is a point to which sufficient attention has not been given until within the last five or six years. I raise the question whether, by turning over the soil handsomely, we gain anything? It is pleasing to the eye, but does the field produce well? I believe it to be bad economy. The surface soil, to the depth of eight inches, weighs 1,600 tons. By our inverting plows every particle of that must be raised, and pushed sideways on an average one foot. This requires a great expenditure of power. If the process is repeated, as it usually is, throwing the earth outward every time, there is soon a depth of two feet of soil piled up along the fences, and the fields become mis-shapen. The great end of plowing is to pulverize the soil. There are certain chemical changes which take place when the soil is brought up to the surface; but when you bury that soil it changes back again to what it was before. Another object in inverting the soil is to bury the seeds of weeds. If we bury them they will either germinate and appear above the soil about the end of July, at the very time when you wish to stop working in the field, instead of appearing immediately in the spring to be destroyed in the early cultivation, or they will remain dormant until another year, when by another inversion of the soil they are brought near the surface, and are just as troublesome as they would have been if left in their original position.

Here is a model (exhibiting it) of what I propose. There is a horizontal cutter below, which will cut the soil to a width of about seventeen inches, and lift it one inch, which Mr. Mapes says will separate it into as many parts as if it were raised a foot, and will produce the same effect as if the soil were cut across every quarter of an inch. I propose to have four or more vertical cutters besides the central connection with the beam of the plow. I think that this will make a furrow twice as wide with the same power.

Mr. Carpenter.—Can it be used on sward ground?

Prof. Nash.—I think not; but I am not positive about that. I had in view simply stubble ground, and ground devoted to hoed crops the year before. In cutting a piece of wood with a chisel across the grain, it will take four times as much power to take off a shaving two-fiftieths of an inch thick as to take off a shaving one-fiftieth of an inch thick. The power required increases not directly with the thickness, but as the square of the thickness. If I were to undertake to cut off an inch at a time I could not do it. So you will see carpenters taking off many shavings, because they can cut many small ones more easily than one large one. So it is in the soil. These vertical cutters are so arranged that the first cuts its shaving, and is followed by the second, so far behind as not to allow the earth to become wedged between them. Placing four more vertical cutters (making nine in all, counting the standard) a little behind the others, we have a perfect potato digger.

Mr. Carpenter.—This may answer the purpose in part; but, as a whole, it seems to press down the earth below, while lightening it above. The mole, on the contrary, mellows the ground both above and below. There should be something here to manipulate the soil below the horizontal cutter.

Prof. Nash.—That can be done with a sub-soil plow.

Mr. Carpenter.—That is a double operation; besides, there is the same difficulty at the bottom of that. The spading fork is nearest to perfection of anything we have now.

Mr. Robinson.—I think if I were to undertake inventing, I should take a hint from the buzz-saw, and invent something to saw up the earth and convert it into sawdust.

ISABELLA GRAPES.

A gentleman exhibited Isabella grapes from Washington, in Dutchess county, N. Y. The ground is upon a limestone base, which does not hold the water freely. The vines are always buried in winter.

Mr. Carpenter.—I will repeat that I do not believe the Isabella grape can be grown successfully in ordinary culture north of this latitude. By burying the vines they are advanced and ripen with greater certainty. I refer to open culture. We have the Concord, which is sure without special care in burying the vines, and it is conceded to be about equal to the Isabella. Why, then, should we encourage the culture of a grape, which is so uncertain as the Isabella, north of this latitude?

Mr. Pardee.—In Newburgh, Catskill and Peekskill, there are whole vineyards of Isabella grapes, and nobody thinks of burying the vines; and I never saw finer Isabellas than I have eaten around Poughkeepsie and Newburgh. We might as well talk against the Spitzenbergen apple as the Isabella grape; and we can encourage the Concord without depreciating the Isabella.

Rev. Mr. Weaver.—I lived for some years north of Albany, and we had excellent Isabella grapes, although we never pretended to bury the vines.

The Isabella is not a grape that will ripen under all circumstances; but four years out of five they will do well. With care and cultivation they will do well two hundred miles north of New York.

DOUBLE FLOWERS.

Mr. Carpenter stated that of a dozen Zinnias raised from the seed, but one had proved to be double. The flower is very pretty, and lasts very long—sometimes over a month without fading.

Mr. Pardee.—The Zinnia has been a long time a single plant, and it is difficult to break up its habit. Unless the central petals are pulled out it is almost impossible to obtain seed from the double flowers. The seeds are scarce and costly, and the seeds of the single Zinnia exactly resemble them in appearance. It is not to be wondered at, therefore, that after the seeds have passed through several hands, but one out of a dozen is pure. If there is but one plant, and if that is double, the seeds will be perfect. But if there are any single plants in the garden almost all the seeds will produce single flowers. So with balsams. One single balsam will hybridize all the rest, if permitted to go to seed, and the seed will be utterly worthless; whereas, if that one is destroyed, the balsam seeds will almost all be double. It is a valuable rule with regard to all kinds of flower seeds, to protect the double plants from the single plants, because it is the nature of the single plants to produce seed in abundance.

The great difficulty with regard to flowers is that the soil is not half prepared. The proper implement is the spading fork. The ground ought to be turned over almost every day for a week or more before planting the seeds. The bayonet hoe is an excellent implement for distributing the soil without disturbing the plants. If the soil is disturbed just before a rain, it will become very light and porous. Flowers want plenty of room, plenty of air, plenty of stimulus. Perhaps nothing is better for them than soap-suds every Monday from the wash.

Mr. Steele.—I use a common sieve for fine flower seeds in planting. I sift the earth, then strew the seeds, and sift fine soil over them.

TRENCHING.

Mr. Carpenter.—I have never seen greater benefit from trenching than during the drouth of this past season.

Prof. Nash.—I do not think the benefit of trenching can easily be over-stated. In Belgium the soil is sandy upon the surface and clay below, and trenching and mixing it makes it very fertile. The government exempts from taxation the man who trenches his soil for twenty-five years.

Mr. Carpenter.—I suppose an acre can be trenched two and a half feet deep for $50.

Prof. Nash.—It will cost $500 if the man who does the work is to be paid for it.

Mr. Pardee.—You can do it for less than $500 in the way I have done it. I never carry the soil from one part of the garden to another. I first throw up the earth twelve or fourteen inches deep with a spading fork, and then fork up the earth as much deeper to lighten it. Then I throw the earth from the next row upon this, and fork up the earth below that, and so on. This lightens the soil two feet deep. I have my garden trenched in this way every spring. Doing it with the spade is a slow and difficult work; but the ground can be trenched very rapidly with a long spading fork. And there is a vast difference between going three feet deep and two feet wide in the expense.

Prof. Nash stated that the question had arisen upon the farm connected with the State Reform School in Massachusetts, whether it would pay to trench land with the labor of the boys at two cents per day. They came to the conclusion that the cost of trenching three feet deep was $500 an acre, and that it was a good operation at that.

Mr. Carpenter.—Mr. Pardee's method is very good as far as it goes, but it is very different from changing and manuring the soil two feet deep, making it all loam for that depth, forking up another foot. I can run a cane to the bottom of the trench of land trenched eight or nine years ago.

The further consideration of the subject of "Trenching" was postponed until the next meeting. Adjourned.

November 18, 1861.

Rev. Mr. Weaver, of Fordham, in the chair.

GRAPES.

Mr. Carpenter exhibited a cutting 25 feet long, from a Diana grape vine. The entire growth this year was 30 feet 8 inches; and if it had been summer pruned as it should have been, it would probably have grown eight or ten feet longer. He had also planted a hundred cuttings this year taken from the same vine. It was a two year old vine planted two years ago. He considered the Diana one of the strongest growers; the Hartford Prolific and the Concord, not extending quite so far. The Delaware had made a very satisfactory growth this season, a little over twenty feet. A vine may be too rampant in its growth, for if it grows very freely it requires a great deal of attention. The Rebecca is rather delicate, growing this year only about eight feet; still he did not think the Rebecca should be set down as unworthy of cultivation. In point of productiveness, he considered the Concord superior to the Delaware, the bunches being much larger. As a market grape, he should consider it equal or superior to the Delaware; but in quality, although it has much improved this year and is likely to become a favorite grape, it falls short of the Delaware. The Concord ripens as far North as it is desirable to cultivate the grape. The Diana is rather late, ripening but a few days earlier than the Isabella.

Mr. Pardee. I should quite disagree with the estimate Mr. Carpenter places upon the Concord grape. It is a large, loose jointed, foxey grape. No Concord grape has yet been produced without the foxey flavor. It is a very watery grape, and although the bunches look large, I have never yet seen a bunch weighing over fourteen ounces. Bunches of the Delaware have repeatedly been produced weighing as much. I suppose the Diana comes next to the Delaware in point of flavor. I do not myself dislike the musky flavor of the Concord grape, and I think it is desirable to cultivate. There is an objection to it for a market grape that the berries rattle off the bunches. I undertook to bring some from Poughkeepsie to this city, and although great care was taken, the jar of the railroad cars shook off every grape. It will not hang upon the bunches like the Isabella and Catawba.

Mr. Carpenter.—I feel bound to defend the Concord grape against the charge of dropping off. I have kept bunches which were fully ripe and sweet when they were picked, for ten days in the house, and then shaking the bunches failed to shake off a a single grape. The Concord upon my vines this year is finer than I have ever seen the Isabella.

Mr. Pardee.—I have had an extended opportunity of knowing the fact. There were at least 150 gentlemen at the Poughkeepsie Horticultural Society all raising it, and without exception, they made that objection to it. Ten days is not long enough for a market grape to remain on the stem.

The Chairman read an article from a Montreal newspaper and also extracts from correspondence, respecting the Adirondack grape, discovered by Mr. Bailey at the foot of the Adirondack mountains, which is stated to be superior to all others for cultivation north of Albany. It is ten or fifteen days earlier than any first quality grape and promises to be as good in quality as the Diana or the Delaware. It has not yet been extensively introduced.

EXCELSIOR MOWER.

Prof. Mapes exhibited, on behalf of the agent, the model of an improved mowing machine. The bar is capable of lifting itself upon coming in contact with a stone. The driver with his foot, may raise it a certain distance, and in addition to that the bar will lift itself a certain distance so that by the two motions combined it may pass over an obstacle a foot high. The cutter bar continues its motion in all its positions. In moving upon a side hill without tipping the machine at all, the machine will mow as well as upon level ground. The wheels may be readily unshipped so that when the bar is raised the mower may be moved like an ordinary carriage.

Mr. J. B. Clute stated that he had taken the agency of this mower. The name of the inventor is Robert Bryson, of Schenectady. This mower performs all the functions of the Buckeye mowing machine, which is said to be the most perfect machine hitherto constructed, and has also the advantages which have been stated.

TRENCHING.

Prof. Mapes said that trenching properly means the reversing of the soil, and not merely its lateral movement. If we filter through a barrel of soil containing one percent. of carbon and one percent. of alumina, the brown liquor from the barn-yard, more than 90 percent. of its organic matter is taken up within its first twelve inches, and at a depth of 34 inches the organic matter will have been taken up so completely that there will be no chemical trace of it in the pure and inodorous water which will run out. If land is reversed to a depth of two feet, the top soil, which has absorbed all the organic matter, is brought below, so that the roots penetrating into it can still find pabulum there. In some places a disturbance of the subsoil will destroy the crop for the next year. If the subsoil contains sulphuret of iron, the atmospheric action will change it into sulphate of iron which is fatal to vegetation. But if we add lime, it will combine with the sulphuric acid and form plaster, leaving the iron in the form of a protoxide which is not injurious. The soil will then become productive again, and more than ever before in consequence of the trenching. The red shale hard pan of New Jersey, when exposed to the atmosphere, soon crepitates into an excellent soil well supplied with potash. An acre of ground cannot be trenched three feet deep, thoroughly, for less than $500, unless it is done with the trenching plow, and then it will cost about $70. The advantages of trenching can, to a very considerable extent, be obtained from underdraining and subsoil plowing. If the drains are properly made and open at both ends, there is a circulation of air equal to that from trenching. I plow from 12 to 15 inches deep, and run a 19 inch subsoil plow below that; and if I can get down 32 inches with them both, I am satisfied. I have got it as deep as that for many acres, and have found it to pay. The security against drought alone is a great advantage, because we lose one-tenth of our produce in this country from drought. Land will pay better with each successive plowing it receives at $3 per day, with medium paying crops, until it has received seven plowings. I think that perfect trenching is neutralized by its cost. Neither trenching nor subsoiling will avail upon a naturally wet soil not underdrained.

Mr. Carpenter said that trenching had the advantage of bringing to the surface a new soil upon which manure could be applied with a larger percentage of profit. Upon land he had subsoiled ten years ago, he could perceive no difference after the fourth year; but ground trenched ten years ago remains unchanged; it is as light now as when it was first done. When land is worth $500 an acre, the soil must be deep in order that it may be useful for agricultural purposes. Upon such land trenching may be useful, even if it costs $500 or $1,000 an acre.

Prof. Mapes.—In England they trench but little deeper than they plow; only about fourteen inches deep.

Mr. Pardee thought that spending $500 an acre upon trenching was a mere matter of theory never reduced to practice. The best method in practice was turning over the soil and subsoil, as he had explained last week, which costs less than $50 per acre.

Mr. Robinson.—I can get a ditch dug three feet wide, three feet deep, and one rod long, for 25 cents. That is fifty superficial feet, which is just half a cent per superficial foot. That will be about $218 per acre.

Prof. Nash.—That would give the man who did it 1 1-8 cents per ton for lifting the earth, and no more. I still think that land cannot be trenched three feet deep for less than $500 per acre; and as I said last week, that there is no advantage in reversing the soil.

NEW SUBJECTS.

The subjects of "fall plowing," "winter feeding," and "trenching," were suggested for consideration at the next meeting.

Adjourned.

November 25, 1861.

Dr. Hawkes in the chair.

SQUASHES AND PUMPKINS.

Dr. Trimble called attention to a mammoth pumpkin, the seeds of which were selling for a dollar per dozen.

Mr. Carpenter said that the mammoth pumpkins were generally deficient in quality. The white mammoth Leghorn is a valuable squash, but not as valuable as the Honolulu, the largest specimens of which weigh from 35 to 60 pounds.

Mr. Robinson.—What advantage is it to grow big pumpkins weighing 200 pounds? Is it any more profitable than growing 200 pounds of pumpkins weighing 10 pounds each? These big pumpkins are almost worthless in their quality.

Mr. Carpenter.—The field pumpkin is considered a paying crop when planted among corn, as the Connecticut farmers are in the practice of doing. I consider it a profitable crop when planted by itself, for home consumption. The pumpkin is valuable for feeding to cattle, to hogs and to poultry. It is very fattening, particularly the Honolulu squash, and may be fed for a long time. Any atmosphere that will keep sweet potatoes will keep pumpkins. I paid $5 per pound for the seeds of the Honolulu squash last year, and I believe they are worth it if they cannot be procured for less. It will probably produce more pounds from the same seed than the mammoth varieties.

Prof. Nash.—It will cost twice as much per pound to raise one squash weighing 100 pounds as to raise 10 squashes weighing the same in the aggregate. With regard to raising pumpkins among corn, I believe in the principle of one crop only in one year upon the same soil. The better way is to plant the pumpkins by themselves, and to prune them so as to produce pumpkins instead of pumpkin vines. I speak now of farming and not of gardening.

Mr. Carpenter.—In planting pumpkins among corn, I never could perceive any difference in the corn in the hills where the pumpkins grew, so that I conclude it is not detrimental to the crop of corn. I have seen three heavy crops, corn, turnips and pumpkins on the same ground, each of which was sufficiently large to satisfy any farmer for a single crop. What the effect upon the soil is I cannot state, but I have never seen any detrimental results from growing the three crops together. It is supposed that turnips are not very exhausting, drawing most of their nutriment from the atmosphere.

Mr. John G. Bergen.—Culture of that kind is very common among market gardeners; but the more crops you take off the ground the more manure you must put on to keep the ground up. The most profitable pumpkin that I have seen grown is the West India or cheese pumpkin. It is not uncommon to sell $100 worth per acre, besides feeding the small ones. The most profitable squash I have found to be the early white scollop squash, not so much for its quality as for its being so early. I have received $400 per acre for this squash.

TOUGH TURKIES.

Mr. Pardee stated that tough turkies could be made tender by steaming them an hour before baking.

GAS STOVE.

Mr. Pardee stated that the gas stove sold by Mr. Pierce, 806 Broadway, would heat a room at a cost of $1\frac{1}{2}$ cents per hour, without any unpleasant smell. It seemed to be a great improvement upon the common gas stoves.

Prof. Mapes.—Will it give more heat than a similar consumption of gas in the open air?

Mr. Pardee.—Yes; twenty times.

Prof. Mapes proceeded to state facts tending to show that when gas burns with a blue flame it gives out very much more heat than when it burns with an ordinary bright yellow flame.

SUBJECT FOR NEXT WEEK.

On motion of Mr. Pardee, Mr. Fuller was invited to address the club next Monday, at one o'clock, upon the subject of "Cuttings."

ACCLIMATION.

Prof. Mapes.—For the purpose of bringing up the question, I will take the ground that there is no truth in the doctrine of acclimation. That is, I shall maintain that plants being carried from a certain country to different places, and acquiring various peculiarities in those places, will, when carried back, all produce alike. The same vine will produce Madeira wine in the island of Madeira, and Hock wine in the Hock district, as often as it is carried back and forth. The Gossypium Arboreum, at 40 deg. 10 min. south, in Chili, is a long, fine staple. At 15 miles en this side of Baltimore it produces a cotton like that of Chili. The same tree grows in Peru, Honduras, Borneo and in other places. As you approach the Equator it becomes a short staple; and as you recede from the Equator it becomes a long and fine staple, finer even than that of Edisto island. Now I contend that if you take the seeds from any one of the localities and carry them to any other, they will produce the quality of cotton now produced there. In other words, the plant maintains its integrity, and when carried back to its original locality it will produce as it did before. We are all familiar with the facts about the Bermuda potatoes. Western reds, peach blows and Carters all go to Bermuda and come back Bermuda potatoes, which we know to be such from their appearance. Plant those potatoes here, and back they go to western reds, peach blows, &c., as they were before. The Havana orange carried to Florida becomes a Florida orange. There are grapes which gentlemen have taken much pains to acclimate, and which after some time they have placed in the open air; but unfortunately they did not try the experiment of placing them in the open air in the first place. I have no evidence that any plant has changed its integrity from removal to a different climate, or has become better capable of standing the severity of a climate from exposure to it.

Mr. Carpenter.—I think we should make a distinction between plants propagated by cuttings or eyes and those propagated from seed. I have no doubt that we can alter the character of vegetables produced from seed, and that they can be acclimated; but I think those produced from cuttings or tubers cannot. Bring a muskmelon from Persia, and by planting the seed each year of the first melon that ripens, we may get it to ripen some weeks earlier, and by following it up we may obtain a permanent advance.

Prof. Mapes.—That does not meet the point, because the same thing might be done in Persia. It is the particular selection of seed that makes the difference, and not the change of climate.

Rev. Mr. Weaver.—As I understand acclimation, the statements of Prof. Mapes prove it. I do not understand it to mean such a change that the plant will not return to its former character, but such an adaptation to the climate that the plant becomes able to live there, as a person going to Africa, and having the fever several times, becomes acclimated and is able to live there.

Prof. Mapes.—I admit it as to the fever, but not as to plants. I hold that if we should raise seed from the Gossypium Arborium here, and procure seed fresh from Chili, and plant them together, the result would be the same. It is sometimes the case that a larger or older plant will bear more cold than a smaller one, and a young plant brought from a warmer climate may be unable to bear the cold, and yet the same plant when a few years older may seem to have become acclimated.

Dr. Holton said that it was his opinion that the external force of the climate might so prevail over the internal force of the plant as to develope a new interior power. If Cretins, from the goitrous district of Switzerland, are carried to other countries, the children will retain a goitrous tendency, although that disease is produced by the climate. After some generations that tendency may be overcome. So plants, after some generations, will probably return to their original character, but not immediately.

Prof. Mapes.—That is the true issue, for I claim that they will return the first year. But the illustration is not quite fair, for diseases may become hereditary, and it must be shown that the changes in plants are from disease to establish any analogy.

Mr. Pardee.—Mr. Peabody supposed that by his mode of treating Hovey's seedling and the large early scarlet strawberries, he had so changed their character that they would not run; but upon giving them the ordinary treatment, the very first year they returned to their former habits, running as rapidly and forming as large a leaf as other plants not so treated.

TRENCHING.

Prof. Nash said that where labor is cheap and bread is dear, as in England and on the continent of Europe, it may be good policy to trench, and yet it may not be good policy in this country. So long as we keep so many horses, so long as labor is higher than six cents per day, and so long as there is no lack of bread, the stirring of the soil by human muscles is out of the question, excepting in the smallest enclosures. One foot in depth of soil weighs 2,000 tons to the acre, and more if it is in a moist condition. In trenching three feet deep, at $500 per acre, this would be 8⅓ cents per ton for lifting the earth. The subsoil plow produces as good an effect upon the soil above it as the spade, and the action of the air and rain admitted upon the soil below it will keep it from becoming too compact.

Mr. Carpenter.—In England the trench plow has nearly superseded the subsoil plow. When land is subsoiled it soon settles back into its former condition, but when it is trenched either by the spade or the trench plow, the change in the position of the subsoil, allowing the atmosphere to operate upon it chemically, is productive of the best results. In trenching, the earth has not all to be lifted; the top spit is merely rolled over into the furrow; the second is more laterally, and the third is the only one that is lifted.

Prof. Nash.—The inertia of every ounce of the soil must be overcome. It must all be lifted a little, and a portion of it three feet. As to the pressure downward of the subsoil plow, I admit, action and reaction being equal, that there is just as great a pressure downward as the lifting force, but at the depth at which the subsoil plow runs, who cares for that? But it will not remain condensed by this pressure, for, as I have stated, the action of the air and of the rain will soon cause it to crumble.

Mr. Adrian Bergen.—I do not see that it makes any difference whether you plow or spade, provided you go into the ground deeply. In my garden I sometimes plow a part and spade a part, and I can see no difference in the results from the part plowed and from the part spaded.

Mr. Robinson read extracts from Stephens' "Book of the Farm," relative to the English mode of trenching fourteen inches deep.

Prof. Mapes stated that that was written before the invention of the Michigan plow, which would do the same work, turning a six inch furrow into a fourteen inch hole, and then lifting the next eight inches and plowing it in a reversed position upon the top, at an expense of three cents per running rod.

Adjourned.

December 2, 1861.

Mr. Henry Steele, of New Jersey, in the chair.

NEW GRAPE.

Mr. Haight, from Dutchess county, exhibited a specimen of a supposed new grape, produced from a vine eight or ten years old, upon the grounds of a neighbor of his. It ripens some ten days earlier than the Isabella, with the same protection, and is a very good grape.

Mr. Fuller.—It is a very good grape; with the Catawba flavor, but without the muskiness of the Catawba. It may be a seedling from the Catawba.

Mr. Pardee.—I think it is the Diana. The flavor has been changed from being kept in the house for some time. If it were not for its early ripening I should think it was a Catawba; but there might be reasons for its ripening earlier, being on the south side of a house, for instance.

Mr. Haight.—That is the case. It is on the south side of the house, within ten feet of it. The house is a white building.

Mr. Fuller.—If Mr. Haight will bring a branch of that vine a foot long I will tell him whether it is a Catawba or Diana. It is very easily settled by the wood. If it is a Diana it will have frem the base of the bud little dark streaks running down the dark upon the new wood.

Mr. Haight.—Would you recommend propagating this grape?

Mr. Fuller—I would recommend planting it in other localities, away from the house, to see whether it keeps its earliness.

Mr. Pardee.—It is certainly worthy of further experiment.

DEATH OF M. ISIDORE GEOFFROY ST. HILAIRE.

Dr. D. P. Holton.—It may be appropriate to allude to the death of Prof. Isidore Geoffroy St. Hilaire, upon the 11th of October.

He was professor of the Garden of Plants of Paris, and President of the Society of Acclimation. His father, Etienne Geoffroy St. Hilaire, was cotemporary with Cuvier, and held that where Cuvier ended, with the examination of facts, was the proper place to commence a philosophical investigation of natural history. His labors were chiefly in discovering the law of harmony between the different orders of animals, and at the same time the law of compensation, that a deficiency of one organ is counterbalanced by a corresponding development of opposite organs. The son, whose death has recently taken place, continued these researches, and his labors have been very efficient and very acceptable to lovers of natural history.

ACCLIMATION.

On motion of Mr. Robinson, the subject of "Acclimation" was selected for the next meeting.

On motion of Dr. Hawkes, Dr. Holton was requested to translate from the French, the views of Prof. St. Hilaire upon this subject, to be read at the next meeting.

APPLES AND PEARS.

Mr. Carpenter exhibited specimens of the Schwaar apple, one of the oldest and best apples in the country. Also, of the Glout Morceau pear, which is a longer keeper than the Lawrence, and will command a higher price in the market. It is a great bearer after the trees have acquired sufficient age. The Vicar of Winkfield is a great bearer, but I have never seen it a good table fruit. It lacks flavor. For late winter pears we have none completely satisfactory. The Madame Eliza, the Marshal Dillon, and the Beurré Clairgaut are good late pears.

CUTTINGS AND LAYERS.

Mr. Fuller.—Before I commence I wish to say that I have no sympathy with the spirit of gardeners who are unwilling to make known their methods of propagating plants. I have never had a secret in gardening, and I never will have. I cannot promise to tell you anybody's secrets—I do not know that there are any worth telling—but only what I have learned from the reading of many authors, and from practice; for some of you may not have had time to spend ten years in this study and practice.

In the propagation of hardy plants there are certain principles which govern us. The roots of a plant always come out of the alburnum or inner bark of the plant. Perhaps there is a greater variety of plants that will root from green wood than in any other way. But the cutting must be placed under glass where the evaporation of the leaves can be stopped until the leaves are formed. As a general thing the easiest way is to grow plants from cuttings of the hard, dry wood. We know that the circulation of the sap, in deciduous plants, does not cease when the leaves drop off. The proper time to make these cuttings is, as soon as the leaves drop off in the fall, or as soon as they can be pulled off without injury to the adjacent buds. We make the cutting near the bud, in order that the descending sap, passing down the plant to form the last layer of wood for the season, may exude from the wound we have made and throw out roots. The first plant which is ready, is generally the currant. We cut them in lengths of six or eight inches, and plant them in ground prepared for them, by being dug deep and made moderately rich. The ground should be sandy, or porous in its nature. We set out the cuttings about two inches apart and pack the soil about the base of the plant very firmly. The cuttings may be made in September; and as roots will grow after the weather is too cold for foliage, roots will be formed upon these cuttings ready to feed the plant when the circulation begins in the spring. If the cuttings are not made until spring, the alburnum becomes hardened during the winter, and the cutting must be placed where that can be softened again before roots can be formed. Almost all domestic shrubbery may be grown in the same way. But there is a difference in the mode of throwing out roots; for while one plant will throw out roots all along the stem, others will only throw them out from the freshly cut surface. The latter requires special care in packing the earth closely against the end of the stem. Quince cuttings may be taken from the one, two or three years old wood. The two years old wood will generally grow the best. If not to be set out in the fall, when cut, they may be placed in the cellar, or heeled in, in rows, so that the earth shall come in contact with every part of the bark. The rose is grown in the same way; but as it only forms roots at the base, it is necessary that the cutting should be taken off at a bud, cut smooth and square, and that that end should be protected by being placed in contact with the earth. It is not necessary that the stem should be buried in this case. It is generally necessary to wait until quite late before the frost will enable you to strip off the leaves from the rose in order to make your cuttings. It is generally the practice to make cuttings from the grape two or three feet long; but I prefer to make them of only two or three eyes, the cuttings being from four to six inches long. Another method of making cuttings is to cut away a portion of the old wood, making a hip or mallet shoot; and many cuttings so made will grow, which would not grow if cut in the other way. There are some varieties of evergreens, as the arbor vitæ, the box, and the yew, which we can grow in the open air from cuttings, planting them in a half-shady situation and a sandy soil. But the better way is to plant such cuttings under glass, in a cold frame, in a soil nearly all sand. The leaves of the evergreen are covered with a fine hard coat, or epidermis, which imbibes very little moisture and perspires very little. They will, therefore, remain green for months where deciduous plants would perish. The surest way to propagate them is to make small cuttings from the green wood in the summer, when the tree is growing most rapidly, and plant them in a hot-bed; but this method requires more care and skill. I prefer to make all my cuttings so short that they can be planted perpendicular. If the cutting is delayed until so late in the winter that the sap begins to rise, they may be placed in the ground in a reversed position, so that the butt end of the cutting shall be near the surface; and then the rising of the sap will make the callous excrescence from which the roots are to spring. The cuttings may afterwards be taken up and placed in their proper position.

A layer is a cutting, only it is propagated in another form. The branch is cut partly off, forming a tongue upon which there should always be a bud. The object is to check the flow of the sap, and to produce roots there, so that the branch may be separated from its parent plant and become self-supporting. The fall is generally the best time for layering deciduous trees; but there is no general rule. Some varieties, such as the soft-wooded plants, do better in the spring. It is easier to make layers near the surface of the ground, but it is not necessary, for you may put a box of earth up into the tree, and keep it there until the roots have been formed in it. You can bend over your tree and layer from the whole top of it, if you desire many plants; but in that way you will destroy the parent tree. The best time to layer the grape is in the spring, after the buds have started. The roots that grow from a layer are not as sound, or as firm, or as active as those growing from a cutting; because the layer derives its nourishment from the parent plant during the summer, and the roots have had little to do. There is a great difference between roots that have had work to do, and those that grow merely because it is their nature to shoot out. Evergreens can only be layered successfully in midsummer, when the plant is making its most rapid growth. If you wait until the plant has stopped its growth, you will find that the resin exuding from the wound will so coat it over as to prevent the alburnum from producing roots. Carnations may be layered in the fall, after they are through flowering, about the first of September. Make a tongue by cutting right under a bud, so as to leave the bud on the tongue, making the tongue about three-quarters of an inch long. Ten days will suffice to root it well; and it may be planted out in the spring. The new plants will produce much better flowers than the old ones. Verbenas should be reproduced every year to keep them good.

Mr. F. illustrated his remarks by numerous practical examples upon specimens of a large variety of plants.

Mr. Carpenter and Mr. Pardee expressed their gratification from the remarks of Mr. Fuller, and condemned the course of certain gardeners who had objected to Mr. Fuller's betraying the secrets of the profession.

Mr. Fuller.—I learn that the greatest trouble was that I explained the mode of propagating the *Daphne*. Now Theophrastus, who wrote 300 years before Christ, described that very plant. This illustrates the secrets of the profession.

Subject—"Acclimation." Adjourned.

December 9, 1861.

Rev. Mr. Weaver, of Fordham, in the chair.

PEARS.

Mr. Carpenter recommended the following pears, after trial. Of American varieties, Osband's Summer ripens the last of July, and is handsome, of good size, and of fine flavor. The Beurré Kirtland ripens about the time of the Bartlett. Manning's Elizabeth ripens a little earlier, and is a delightful pear. The Kingsessing, Brandywine, Cabot, Sheldon, Fulton, Princess St. Germain and Stephens' Genesee have proved good. The Washington is one of the finest American pears. Of foreign varieties, the Beurré

Clairgaut, the Beurré Hardy, the Beurré de Montigeron, the Golden Beurré de Bilboa, the Henkel, the Paradise d'Automne, the St. Michael Archangel, the Duchesse d'Orleans and the Winter Nelis have proved good.

On motion of Mr. Pardee, a pear exhibited by Mr. Randall for a name, and which was pronounced a superior winter pear, was named the Randall pear.

DUANE'S SEED SOWER.

Mr. Carpenter stated that Mr. Duane desired to enter for a premium his Seed Sower and Broadcast Sowing Machine, and moved the appointment of a committee to examine it.

The motion was agreed to, and Prof. Mapes, R. L. Pell and John G. Bergen were appointed as said committee.

ISIDORE GEOFFROY ST. HILAIRE.

Dr. David P. Holton said: The announcement of the death of Isidore Geoffroy St. Hilaire, an honored correspondent of the American Institute, calls us to pause in our ordinary course, to pay a tribute of respect to his memory; to pass in review some of the labors of the distinguished naturalist, and to consider some of the valuable deductions and analogical inductions of his philosophic mind, especially those forming the basis of the organization and practical working of one of the most important societies of France—the Society of Acclimation—whose president he was from its foundation, 10th February, 1854, to his decease, Paris, October 11th, 1861.

The setting forth of these labors might have been entrusted to one of greater erudition and scientific appreciation; but a solemn duty rests upon your speaker—that which a pupil bears to a respected teacher.

As in the schools of Medicine (passing from modern times to remote antiquity,) we associate Bichat with Hippocrates; so in Natural History we associate Geoffroy St. Hilaire with Aristotle.

To give even a general view of the works of Isidore Geoffroy St. Hilaire it is peculiarly necessary to speak of his father, *Etienne*—a father whose developments in Natural History have placed him as a fixed star in the galaxy of brilliant lights of the first half of the nineteenth century; a father whose "PHILOSOPHIE ANATOMIQUE" was the polar star in the reasoning and observation of the son in his logical deductions and generalizations, giving in fact a new direction to the analytical and synthetical labors of those studying practical questions respecting plants and animals.

Those who have attended the lectures of the son at the Sorbonne, or Garden of Plants, well remember the enthusiastic elucidation and application of the principles of "Mon Père." At what round on the scale of progress commenced the father, Etienne?

This point cannot be seen without passing in enumeration, at least, some of his cotemporaries and predecessors.

Before the finishing strokes to Buffon's great work had been drawn, his co-laborer, Daubenton, called the young St. Hilaire to the Garden of Plants, where Lacèpède and Jussièu then labored.

St. Hilaire had not been long in his new position before he received some essays from young Cuvier, and discovering therein marks of genius called him from obscurity to Paris.

Cuvier, born in 1769, (the natal year of Wellington and Napoleon) was three years senior of St. Hilaire.

At the points where Buffon and Linnæus closed, the young co-laborers, Cuvier and St. Hilaire, commenced their work upon a zoological classification; and there were but three years between the completion of Buffon's Natural History and their first essays on Comparative Anatomy.

Before passing in review the three schools of natural science which occupied the attention of students in the first half of the present century—the schools of Cuvier, of Schelling, and of Geoffroy St. Hilaire—let us briefly enumerate some of the links in the chain of progress anterior.

Plato's most celebrated pupil was Aristotle, the prince of Natural Philosophers of Antiquity, who became the teacher of Alexander. The spirit of conquest did not eradicate from the conqueror his early implanted zeal for the advancement of Natural History. In all his military expeditions Alexander was accompanied by a body of scientific men, charged with the mission of studying, collecting and sending into Greece whatever was deemed of interest or practical utility. Thus, with the productions of Southern Europe, Aristotle was able first to compare those of Egypt, of Asia Minor, of Persia and of India—trophies which the young king of Macedonia, at each victory, was pleased to send home, as if he had charged himself with conquering the world *for science*, as much as *for himself*. It was worthy of Alexander thus to acquit himself towards his preceptor, Aristotle. Thus the rice plant and the bean from India were introduced into

Europe, according to Theophrastus, a pupil of Aristotle, justly styled the second naturalist of antiquity; whose studies, pursued in his botanical garden at Athens, have in reality founded the science of botany.

Pliny and his cotemporary, Dioscorides, labored some four hundred years later. Pliny, as is well known, was suffocated at the eruption of Vesuvius in A. D. 79.

From this time the chain of progress seems for ages obscured in dark waters. It re-appears in the times of Luther and Bacon, and henceforth science marches upon sure bases in place of assumptions and fancies.

Henceforth the portraitures of Deity are to be received by the human mind in freedom, that TRUTH may have its perfect work.

It has often been said that more has been done in the department of zoology, during the fifty years commencing with the French revolution, than all which had been previously done.

Among the chief means of progress we enumerate the re-organization of the Garden of Plants in June, 1793, and the creation of the Menagerie five months later. That this became *the* school of Comparative Anatomy, is due to the bold, initiative and persevering labors of Geoffroy St. Hilaire, and his co-laborers, Cuvier and Lamarck.

It was in 1800 that first were published the "Lessons on Comparative Anatomy" by Cuvier, while that of Blumenback appeared in Germany five years later.

It was when Cuvier published his Comparative Anatomy that Bichat gave to the world his "General Anatomy," reserving in part physiology, and through it medicine.

Now, in order to realize the true position of Geoffroy St. Hilaire, to comprehend what is his "method," his Philosophic Anatomy, to seize the characteristic of his noble work, it remains for us to pass in review the three cotemporaneous schools of Natural History: the school of Cuvier, that of Schelling, and that of Geoffroy St. Hilaire:

1. The school of Cuvier was one of *observation*, of the direct study of nature in all its phenomena, in all its manifestations accessible to our senses; whence comes our knowledge of *facts*. According to Cuvier the science was essentially the *history*, the descriptive and the methodical exposition of the *facts*.

2. The school of Schelling recognized the necessity of *observa-*

tion, and, moreover, after and through it, reasoning, whence comes our knowledge of *facts;* and by the aid of these facts comes our knowledge of the *laws* of Nature; a knowledge of the general relations of the facts and of their laws; a *reasoned* history of nature, which may become the positive philosophy of history.

3. The school of Geoffroy St. Hilaire employed reasoning on the one part and observation on the other, whence, at the same time, the knowledge of the *laws* of Nature were deduced independently of the facts from pre-established principles, and parallelly the knowledge of the facts.

The school of Geoffroy St. Hilaire, is at the same time a history and a philosophy of nature; two sciences, (as says Isidore) in one, the first only empirical and accessory—the second purely rational and fundamental; two sciences parallelly developed and reciprocally independent.

What Cuvier and his school have accomplished, is good, (says Geoffroy St. Hilaire,) but it is necessary to do more.

Observation and analysis are indispensable, but they are not sufficient. Reasoning and synthesis have their rights. Let us use our senses for observation, as most and best we can; but, also, after observation, those most noble faculties within us—our "judgment" and our "sagacity."

Let us establish positive facts, and afterwards seek to deduce their scientific consequences.

"Ne faut il pas q'après la taille des pierres, arrive leur mise en œuvre ?"

After cutting the stone should we not put them to use; otherwise what fruit do we derive from the materials?

But we cannot here fully elaborate the higher natural history sought by Etienne.

Happy in the conception and development of his "philosophic anatomy." Happy father, in having a son whose useful life carried the "method" to practical ends with greater certainty and rapidity than could at first have been looked for.

"Philosophic methods," in multiplied forms of utility, among which witness the triumphs of acclimation.

The teaching of Schelling at the universities of Jena, Wurtzburg and Munich, and his prolific pen, had created for his philosophy a widespread popularity, which he lived to see justly upon the wane, giving place to the rival school of the Geoffroys, not in France only, but throughout Europe; and in 1841, at the 66th year of his age, in the University of Berlin, his first lecture, if not apologetic, was at least pivotal, and he there commenced in silence to elaborate a new species of philosophy which was to bear the name of "positive" philosophy. This he never published.

The favorite expression of Schelling, best defining his philosophy, was:

"Ueber die Natur philosophiren heisst die Natur schaffen;" that is to say, "To philosophize upon nature is to create nature."

He lived long enough to realize that his creations were only transcendental chimeras. Long enough to witness the triumph and practical adoption of the "method" of his rivals, the Geoffroys.

The father, Etienne, having established analogies from points of views in the department of comparative anatomy, the son, Isidore, brought additional demonstrations of the same from tera-tology, still further strengthened by confirmations from embryology. Nor was he limited to the animal kingdom in co-ordinating analogical developments. Vegetable characteristics were found to have typical coincidences and analogies, in harmony with those of the animal kingdom.

Thus munificently commissioned by the positive charter from nature, countersigned by all the subordinates in the two kingdoms, the animal and the vegetable, Isidore Geoffroy St. Hilaire went forth to possess an inheritance which he has transmitted greatly augmented by newly discovered laws and harmonies.

What Alexander and Aristotle did for Greece as acclimators, Isidore Geoffroy St. Hilaire desired to do for all the world. This thought, in him ever active, sought a development, and found its best expression in the organization and labors of the society of acclimation. "Apres la taille des pierres, arrive leur mise en œuvre."

ACCLIMATION OF PLANTS.

Prof. Mapes said that the definition of Webster, the process of becoming habituated or inured to a foreign climate, being accepted as the meaning of the word "acclimation," there was no such thing as an acclimation of plants. There is no analogy in this respect between plants and animals. Lima beans grown here for a hundred years are no more hardy than those just imported. The Gossypeum Arboreum produces a very different fibre in different latitudes, but he believed that the seed from all of these latitudes brought here would produce the same result. He had been in the habit of attempting to acclimate plants by gradual exposure; but upon placing them out of doors at once the result was the same. Take a tender seed from the latitude of New Orleans, and plant it fifty miles to the north of New Orleans; take a seed from that and plant it fifty miles further north, and so on until you reach this latitude, and then it will be just as tender as when it started. There are no facts demonstrating the reverse yet made known.

Mr. Carpenter referred to the change in Mediterranean wheat, and in Poland oats, in being brought to this country. He believed it required a series of years to produce the change here, and inferred that if carried back an equal length of time would be required before they would return to their original character.

Prof. Mapes was of opinion that it would return the very first year; that plants never carried back, even temporarily, to their original location, the changes which had taken place in them abroad.

Mr. Fuller expressed the opinion that acclimation does not take place in plants, although they may be said to become naturalized when carried into a new locality where they flourish. One reason for the belief that plants become more hardy upon being carried northward, probably is that we are able to select the hardy plants at the North, and to cultivate from them. If we could make the same selection at the South, the same effect would be produced.

Mr. Carpenter.—The hand of nature has not distributed upon the earth its shrubs and trees, and given each its locality. They have been carried from one locality to another in various ways. Birds, for instance, sometimes carry seeds five hundred miles or more from their native place. The wild pigeon is annually carrying seeds from the South to the North, and from the North to the South.

Mr. Pardee.—There seems to be only one real point of difference of opinion here, whether a plant carried back to its original locality will return at once to its original characteristics, or only after a series of years. The great practical question seems to me to be, not what they will become when carried back, but what they will become when brought here.

On motion, the question of Acclimation was continued for another week.

Adjourned.

December 16, 1861.

Mr. R. L. Pell, of Ulster county, in the chair.

STRAWBERRIES.

Mr. Carpenter said that in consequence of the mildness of the weather, his strawberries were blossoming; and a practical gardener had stated that every plant thus blossoming would be destroyed. If so, the crop of strawberries next year would be small.

Mr. Robinson.—Mine have been blossoming all through October and November.

Dr. Crowell.—Mine always do that. I cannot say that it injures the crop. I noticed the same thing last fall, and I had a very heavy crop this season. My method of cultivation may be new to some. After the season is over I mow down the plants close to the ground so as to destroy all the runners, which do not form again during the fall to any considerable extent. I then run a cultivator both ways between the stools, and then the subsoil plow.

SEED CORN.

Mr. Robinson read a communication from the New England Farmer, of December 7, recommending persistent and extensive experiments to settle the disputed questions about seed corn, stating that if the result should be a gain of but three bushels per acre, it would add millions of bushels to the product of the country.

Dr. Trimble stated that a North Carolina farmer for many years had raised enormous crops of corn, which had commanded a high price in the market, both to be sent south for seed corn and to be sent north for hominy. His practice was to take off the irregular, the small and the defective grains from the ear, and to use them for planting, while the regular and perfect corn was shipped for the market.

Mr. Carpenter stated that a loaf of corn bread weighing five pounds can be made for $6\frac{1}{4}$ cents for the meal, while flour for a similar loaf would cost nine or ten cents; yet the corn contains one-fourth more nutriment. Most of the corn for hominy comes from Maryland, where they raise it to great perfection. It is important to get corn that will ripen early. The golden drop is 10 or 12 days earlier, from being selected for a series of years by taking the earliest ears, from corn producing two ears to the stalk, for seed. Now the stalks generally produce two or three ears.

BELLIGERENT BEES.

Dr. Trimble read from a newspaper an account of seventy swarms of bees engaging in a war which only ended from the approach of night, and remarked that he presumed the cause to be a scarcity of food in that neighborhood, and that they had undertaken to rob one another.

Mr. Robinson.—What becomes of the bees of a weak swarm when a strong one robs it? The bees and honey will all disappear in a few hours.

HOTZ PEDAL PUMP.

Mr. Hotz exhibited a modification of his pump, so that it may be worked by hand instead of by the feet. In other respects it is similar to his former plan, heretofore referred to a committee of the club and reported upon favorably.

THE YAK—ACCLIMATION.

Dr. Holton, as an instance of the recent acclimation of an animal, by the Society of Acclimation in France, read the following paper:

Marco Polo, the great voyager of the middle age, mentions the Yak of Thibet, an animal, which, to the inhabitants of the elevated table land between the Himalaya and the Kuen-lun mountains, is as useful as is the camel in Arabia or on the burning deserts of Africa. It serves for draft, for riding, or for a beast of burden; it furnishes milk, wool, and an excellent meat.

This useful animal was seen only upon its cold, native plateaux, averaging from 10,000 to 12,000 feet above the level of the sea. No specimens, even, had reached the museums of Europe, till upon the suggestion of Isidore Geoffroy St. Hilaire, a long time preoccupied with the grand thought of acquiring and acclimating this animal of ardent utility, the French Consul at Shanghai, M. de Montiguy, having obtained a herd of twelve sent them to the garden of plants at Paris, where I had the pleasure of witnessing their arrival in the month of April, 1854.

The principal races and varieties of the species were moreover represented in the choice of the individuals:

For there were three white ones, with horns	3
Five white, without horns	5
And four black, also without horns	4
There being six males and six females	12

6 } 6	12	a, b, c	Three yaks of the white horned race kept at the Garden of Plants.
		d, e	Two of bl'k race without horns, sent to Count de Morny, in Allier, the elevated central portion of France.
		f, g	Two of bl'k race without horns sent to the Ag. Com. of Barcelonnette, in the department of Basses Alpes.
		h, i, j	Three white without horns, sent into the department of Doubs, bordering on Switzerland.
			Two white without horns, sent to Mr. Jobes, a farmer on the Jura mountains.

Three years later (1857) the twelve were all living and in good condition.

The family of three, kept at the Garden of Plants, (where the mean annual temperature is much like that of the Central Park) had in less than three years increased to eight, and of the five young yaks one was of the second generation indigenous—certainly noble specimens of acclimation. On the 13th September, 1856, was born a young male from a female that had herself been born the 14th March, 1855, and consequently had not obtained her eighteenth month.

As I watched this movement at acclimation for more than three years, I could not but think the mountainous regions of the United States, or the high plateaux of the American continent would one day be enriched by the philosophical deductions of my venerated preceptor.

True we have the cow, the horse, the sheep, each more perfect in its own order than is the yak, which seems to be substituted for all three. But we should not neglect to consider that the cow, the horse and the sheep have been raised to their present perfection from inferior races, by reason of the care of man. So may it be in regard to the yak. One race may (under changed external circumstances) serve us with wool; one with milk, and another with beef, while yet another may continue much like the yak of Thibet, to furnish all at once.

ACCLIMATION.

Rev. Mr. Weaver considered the question of the return of plants to their former state foreign to the question of acclimation.

Prof. Mapes considered it an important practical question, and stated that it had come up as a collateral question; the opinion having been advanced that there had been permanent changes, which he could not admit.

Dr. Holton, agreeably to the request of the club, read the following translation of an extract from the opening address of Prof. St. Hilaire, President of the Society of Acclimation of France, on the occasion of its third anniversary.

"Each climate has its productions; each region its animal and vegetable species. But has nature there invincibly attached them? Has she placed laws forbidding their passing the bounds of their original country? Are they like the waves of the sea which are condemned to come to break eternally, at the foot of the same rocks, their lifeless force, their useless violence.

"Has God said to them 'Thus far and no farther.' Let us look around us and we shall see everywhere the same answer.

"Among the vegetables, the wheat, the vine, the potato and a multitude of others—are they the gifts of our soil? No; the wheat and the vine have come to us from the east, the potato from America—plants acclimated in Europe, the two first from time immemorial; the other in the 16th century. They are now more multiplied among us, because more useful than any others which nature placed here.

"Immense benefits, and so great that in the estimation of the ancients they could not have come except from divine hands. Ceres, Triptolemus and Bacchus have their places in Olympus. Gods of Peace aside the Gods of War, and the most beloved if not the most fearful.

"Pious enthusiasm, ardent gratitude of young humanity, with which contrast sadly the cold oblivious indifference of modern generations. If a conqueror may have added a province to his empire, twenty centuries ago, we all know his name. Know we as well that Hawkins and Drake made the pacific conquest of the plant which Parmentier afterwards cultivated and spread abroad?

"Surely if the conqueror is a hero, Hawkins, Drake, Parmentier are the benefactors of the human race.

"Our most useful animals are not natives of the soil of which they form to-day the principal riches any more than are our alimentary vegetables.

"The horse, the ass, the cow, the hen, the pheasant, the peacock, the Guinea fowl, and let us not forget the smallest, but not the least important of our domestic animals, the silk worm, are the gifts of Asia and Africa. Some, and the most precious, obtained in high antiquity; others acquired in the times of the Greek wars, and of the Roman domination.

"In modern times we owe to America the Cobaie, the Turkey and two water fowls; so that of the four quarters of the world, that which has enriched Europe least is Europe itself.

"Our domestic animals are ours, not by right of nativity, but right of conquest.

"Man has commanded and nature has obeyed.

"But has he not sufficiently commanded? Has not nature sufficiently obeyed? Some have seemed to think so, and I have been obliged to reply heretofore, and on many occasions, to those who say:

"Our domestic species, are they not sufficient for all our needs? The horse and the ox give us their force; the beef, the hog, the sheep and fowl their flesh; the cow and the goat their milk; the hen its eggs; the sheep its wool; the silk worm its silk. Wherefore then new conquests? We are rich enough. Shall we not repose upon our riches?

"I have made an inventory of these pretended riches, and behold what I have found: In nature there are at least one hundred and forty thousand (140,000) species, only forty-three (43) of which are subdued to man! And, moreover, of these forty-three ten are not found in France!

"It is sufficient to cite these figures; comment is unnecessary.

"We say then boldly, it is not for us simply to glean upon the steps of former generations. Rich harvests are still in advance."

Mr. Carpenter.—I take the ground that selecting the first seed that ripens is the only way in which the acclimation of plants can be effectually attained. For the shrub I think it is an impossibility. But it is pretty evident that animals may be acclimated. The cow and the horse were introduced into this country in the seventeenth century, and the horse has already become very different in Canada from what he is in Pennsylvania.

Mr. Robinson.—I happened to be acquainted with the man who grew the first bale of cotton shipped from the United States, and he stated to me that when the seed was first brought to South Carolina it was supposed to be so much a tropical plant that it would be difficult to grow it even on the low sea coast near Charleston to perfect itself so as to produce cotton. And after it had been grown there successfully the planters in the upper part of the State would not for a long time plant the seed, thinking it would not grow there. Yet cotton has been carried even into Indiana, north of the latitude of 40 deg., where it perfects itself every year. So with the sugar cane, upon its introduction into Louisiana; it was at first doubted whether it could be grown to produce sugar, and even after that was successfully done upon the coast the planters back from the river would not believe that they could grow it. Yet, I have seen it, far up on the hills, upon an old worn-out plantation, produce four hogsheads to the acre, which was as much as the best lands upon the river, with equal cultivation, could produce. Whether this was acclimation or habituation is of little consequence. It is our object, as it was the object of the Society of Acclimation, to inquire whether there are new plants or animals which can be usefully introduced. Shall we "rest upon our riches," or shall we stretch out our hands abroad and see whether we cannot grasp something else and bring it here and make it serviceable to us. Here is this tree cotton. Who knows but we may as well have our cotton trees on every farm as easily as our apple trees, or pear trees, or cherry trees?

Prof. Mapes.—I am as much in favor of introducing new plants or animals as any one. That is a different question. Mr. Robinson has stated the opinions of the planters upon the introduction of the cotton plant and the sugar cane; but it has been clearly proved by the government, in an experiment which cost $100,000, that the sugar cane has not been acclimated; for new plants have been introduced which have been grown by the side of the old ones and there was no difference.

Mr. Carpenter.—I was one of the first to plant the Persian melon. I found it very superior, and procured some fine specimens. I planted again and gained a little. Of course I planted the first that ripened, for all did not ripen. It has now advanced some thirty days, and it has all been brought about by the selection of the first seed that ripened.

Mr. John G. Bergen.—I am inclined to believe with Prof. Mapes that no permanent change is produced. In my experience in raising vegetables of all kinds, I have never seen any change produced after the first year, excepting from the selection of seed. In supplying the New York market, it is a matter of great importance to get early vegetables. Cucumbers can be grown out of doors so as to be ready for the market by the 4th of July, and we have not succeeded in advancing them beyond that. Something may be gained by a careful selection of seed; but that is independent of acclimation.

Mr. Carpenter.—I think our soil affects the results as well as our atmosphere assists in producing earlier seed. I think seed becomes acclimated through the influence of the soil as well as of the atmosphere.

ADIRONDACK GRAPE.

Mr. Bailey, the introducer of the Adirondack grape, stated that it had ripened this year more than three weeks earlier than the Delaware. It is of the color of the Isabella. The bunch is more compact, and is well shouldered. This grape bears as well as the Isabella, and is as hardy. It has been recommended in Montreal as the best grape for Canada.

WESTERN APPLES AND GRAPES.

Mr. Fuller exhibited specimens of twenty varieties of apples from Burlington, Iowa, which for size, color, and shape, would bear comparison with the apples of Westchester county or of New Jersey. A specimen of Catawba grapes, and of Catawba wine, from the same place, were also exhibited.

New subject.—The subject of "Flax" was selected for consideration at the next meeting.

Adjourned.

December 23, 1861.

Mr. N. H. Gale in the chair.

PEARS.

Mr. Hite exhibited well ripened specimens of the Easter Beurré, and explained his method of ripening them. They were allowed to hang upon the tree until there had been two or three white frosts. They were taken from the tree, while the white frost was upon them, into the house, wrapped in papers and set carefully in a painted box, which was then placed in a cold cellar—a wine cellar. In about a week the papers were wet from the exudation from the pears, and had a smell something like cider. The papers were taken off, the pears wiped dry with a napkin, and new papers put on. In about a fortnight the pears were again in the same condition, and the papers were again exchanged, and every fortnight the process was repeated. If the papers are not taken off there will be a mould, which will strike into the pear, and which cannot afterwards be got rid of. About a week ago the pears in the box were all alike, of a russetty green. These specimens were taken out and put in the dining room, in a comfortable atmosphere; and they have ripened and colored well, while those remaining in the box are still hard and green. He had had these trees in plentiful bearing for half a dozen years, but could never get the fruit to ripen. Some he had packed in sawdust, but in about two months they tasted like pine wood. Others he had packed in bran, but they shrivelled. The method adopted this year, and now explained, had proved successful.

Mr. Carpenter.—Will you describe the mode of cultivation?

Mr. Hite.—It is a system I conceived some three years ago of pruning and spurring the limbs of these trees. I spoiled a good many trees in learning how to do it. About the first of June I cut the limbs to within about three buds from where they start. By the first of August they will have grown from six to nine inches, and then they may be nipped to the next leaf, similar to a grapevine. A fruit bud will form there, and the buds will be enlivened all the way down. About two years ago there came out from a fissure in the bark, about a foot from the ground, on one of my trees, a fruit spur, and this year it produced a pear. That pear, growing directly from the trunk of the tree, was seen upon the tree by several gentlemen now present, and among them yourself (described in the report of July 22d,) has ripened, and here it is, a large, beautiful specimen of the Easter Beurré. Other buds have come out from the same point, which will next year bear fruit, and all the limbs of the tree are now perfectly clothed with fruit buds. I learn that the plan of Debreiul, recently introduced in France, is essentially the same with mine. My greatest trouble was to find the right time for the pruning. If the limbs are pinched more frequently there will be more buds, but they will not be fruit buds. Debreiul's plan is to plant out a tree that is a year old, and let it grow as it pleases that year. Next year cut it down to about six buds. These buds will then start out, and must be pruned so as to keep the fruit upon these limbs.

Dr. Underhill.—I tried this method upon some standard peach trees a number of years ago. I cut them down to ten to 16 inches, and allowed but three or four branches to grow, and they made most beautiful trees. They were many of them Malacatoons, and the third summer they were loaded with fruit, bending down like a weeping willow, in every direction from the centre. That was the last year they bore. If I had taken off two-thirds of the fruit I should have saved my trees.

Mr. Hite.—I find that the peach tree never bears twice upon the same wood.

Dr. Underhill.—The plan in New Jersey is to grow peach trees all sap and no ligneous fibre. The winter naturally freezes the water, and produces the yellows, and on the fourth year they die from that cause. Their life is reduced from twenty years to four years, by an artificial tremendous growth in the nursery.

Mr. Carpenter.—I am very glad to see these specimens to-day. I had determined last week to root out my Easter Beurrés, but I believe I will try them again. If I can produce such specimens as these I shall be well satisfied; but I do not think such specimens can be produced generally. I have never seen the Easter Beurré before, so finely grown, or so finely flavored. In Europe it is esteemed one of the finest winter pears; but in this country it has not given satisfaction, and there are few who are willing to grow it. I have had it for ten years, and have never succeeded in perfecting the fruit. The season does not seem to be long enough. But I am inclined to think that much depends upon the management, and that the system of summer pruning laid down by Mr. Hite has a tendency to develop the character of the pear. The single stem system, which I believe Mr. Hite has adopted, has many advantages, and I believe it has been proved that it produces as much fruit as any other system. Mr. Rivers, perhaps the most extensive pear grower in England, has adopted that system. But to produce good trees from the quince stock, and a good supply of fruit, they must be well manured every year, and the ground must be kept mellow, and cultivated.

Mr. Fuller.—I think once in ten years is often enough to feed a tree; but say "cultivate" and I will agree with you. I believe the whole secret of dwarf pear culture is stirring the soil.

Mr. Carpenter.—I am speaking of trees planted out in the natural soil. If they hang full of fruit, and are not well manured, they will be ruined.

Mr. Fuller.—In almost any orchard, while the hill of potatoes or of corn, not worth six cents, will be carefully hoed, you will see around every tree a bed of grass. Now if the tree were to be hoed as often as corn, or oftener, it would succeed. Grass keeps a tree as dry as a bone all summer, because the grass absorbs all the moisture in its own growth. I believe it is more the want of cultivation than the want of manure, which is the cause of the failure of dwarf pear tree culture throughout the country.

Mr. Cavanach.—So far as my experience with dwarf pears goes, I think they have been manured too highly. I find that in many city gardens the trees bear very little fruit, but make a great growth of wood.

LANDS IN NEW JERSEY.

Mr. Robinson read a letter calling attention to the cheapness of fertile land in southern New Jersey.

Prof. Mapes testified to the value of the lands referred to for agricultural purposes.

CHESS.

Mr. Carpenter read a letter inquiring whether oats turn to chess, and stating certain facts: In the spring of 1860 an acre of land was cleared, surrounded by timber lands, and three quarters of an acre was sown with oats, and the rest planted with corn. The seeds were fully ripe, and shelled somewhat in harvesting. In the spring of 1861 the whole acre was sowed with spring wheat. Where the oats grew the chess nearly destroyed the crop; but there was very little, if any, chess where the corn had grown. In the same way a piece of land sown with Poland oats, and the next year with wheat, had but little chess in it; but an adjoining piece of land, under the same treatment, but sown the first year with common oats, and the next year with wheat, produced nearly all chess.

Prof. Mapes.—The seed oats may have had chess in them.

Mr. Carpenter.—I do not believe that oats turn to chess. I have a neighbor whose wheat was frozen out, and chess took its place, and he is convinced that his wheat turned to chess. I think it is easy to understand. Chess is a hardy plant, which will stand any kind of weather or treatment. It tillers very much; and if the wheat or rye suffers from the weather, a few seeds of chess will show very great results.

Mr. Robinson.—I settled once on a western prairie; I sowed some clean, handsome looking wheat in November, and it came up quite green. The cattle got into it, but it grew the next spring, and made heads, but ninety-nine out of every hundred of them bore chess. I knew another instance. In a large tract of wheat was a water basin, where the water stood in the winter; and while the rest of the field produced a handsome crop of wheat, over the spot where the water stood there was not a stalk of wheat, but the stalks of chess were as thick as the wheat outside the line. Yet I do not believe that wheat turns to chess; I believe the seeds of the chess had lain there from time immemorial. I knew another instance where the marks of a threshing machine were plainly to be seen wherever it went, from the growth, not of wheat, but of chess.

Mr. Fuller.—Can it be proved that wheat was not originally chess?

Mr. Carpenter.—Were oats, wheat, barley and rye all chess originally? They are all said to turn to chess.

Mr. Fuller.—If it could be shown that these grains all had a common origin, in chess, it might clear up the mystery. But we do not now know what was the origin of any of them. Some ten years ago a friend of mine in Wisconsin sowed two and a half acres with oats, at the bottom of a hill, upon new land. He harvested his crop, and in the winter the heavy rains washed down earth enough to cover the oats that had been shelled out. They came up beautifully, but they produced all chess; yet I do not think the oats turned to chess.

Prof. Mapes stated that he had carried to the Smithsonian Institution two heads of wheat, each containing chess upon the same head with the wheat. They decided that it was there a parasite. Wheat or rye decaying in the soil may furnish the very pabulum needed by chess.

The Chairman.—If wheat develops chess from the want of proper cultivation, then by proper cultivation chess ought to produce wheat. Here is an opportunity for useful experiment. Let somebody take the best chess he can find and see if he can produce wheat from it.

CARROTS.

Prof. Mapes called attention to the method of raising carrots with oats, so that the oats should protect the young carrots from the sun and from the growth of weeds.

The Chairman.—I tried it in 1856 and did not succeed. It is a good deal of labor to take the oats off. I thought if I should ever try it again I should try buckwheat.

SODA ASH SWEEPINGS.

Mr. Carpenter inquired what soda-ash sweepings were worth for agricultural purposes.

Prof. Mapes.—Very little compared with potash sweepings. You can better get the soda from common salt, by the salt and lime mixture, when it also gives you chlorine to form chloride of lime. I think they have a value; but they are not worth more than one-fifth as much as potash sweepings.

Subject for discussion.—The subject of "Flax" was continued until the next meeting. Adjourned.

December 30, 1861.

Mr. Edward Doughty, of Newark, N. J., in the chair.

HYBRIDIZATION.

Mr. Robinson read a letter from a correspondent in Indiana, inquiring why his Rutabaga turnips did not do well this year. They grew up with long stalks like cabbage stalks, and made very small roots. Mr. R. attributed it to the mixture of the seed plants with cabbage.

Mr. Carpenter attributed it to their not having had time to bottom. If planted late, with stimulating manure, they will make large tops, but have not time to form roots. If there is time enough, it is desirable that they should form large tops.

Dr. Trimble.—If two such vegetables as the turnip and cabbage will intermix and form a *tertium quid*, we have almost unlimited power over vegetables.

Mr. Carpenter.—The Kohlrabi is supposed to be a cross between the turnip and the cabbage.

Rev. Mr. Weaver.—I think it is a distinct vegetable.

Prof. Nash.—Hybrids tend back to the original forms; and if the Kohlrabi were a cross, there will be a tendency to return either to the turnip or the cabbage.

Mr. Gale referred to the question suggested last week whether oats or wheat ever turn to chess, and suggested the appointment of a committee to experiment and determine whether chess will produce wheat, and whether the turnip and the cabbage will intermix.

Mr. Carpenter said that if we sowed pure grain we should reap pure grain, provided no chess had been grown there before. Chess is a very hardy plant, will stand any severity of the weather, and seems to do well just where wheat will not do well, in low wet places.

Mr. Robinson.—I had a water example last week, and now I will produce a dry land example. Upon the same prairie which had the wet place in the center, where chess took the place of wheat, upon the highest part of the prairie and upon as dry land as one would wish for a garden, one of my neighbors sowed in the spring a field of oats. After harvesting the oats, he plowed the ground and sowed timothy. The oats were clean and the timothy seed was clean, yet the result was neither timothy nor oats, but chess. I do not believe that the oats turned to chess, but I know that if chess had been in the ground it had lain there a good while, for I was the first occupant of the ground, and I know that no chance sowing, since America was discovered, had put chess seed there.

Dr. Holton undertook to explain the possibility upon physiological principles that wheat might turn to chess. The commencement of vegetable, as of animal growth, is a cell, composed of an envelope and its contents. The contents appear under the microscope to be a homogeneous uniform mass. Then there appears in the cell a darkened spot, a nucleus, or center of growth, and the cell divides and becomes two. Like produces like. A wheat cell will produce a wheat cell. But there are exceptions arising from external causes. The instances of such exceptions and of abnormal growth are abundant. The formation of a cancer in the human system is an illustration. So it may be consistent with nature that wheat cells, from some foreign impulse, may abnormally develope the cells of chess.

Dr. Trimble mentioned instances where an abundant crop of white clover and of red clover, had sprung up, where apparently there had been no seed planted.

Mr. Gale said that a place might be cleared in the centre of the woods, anywhere, and white clover would grow there; but he had never seen nor heard of chess growing where the cereals had not been sown.

Dr. Trimble.—There is almost invariably chess seed in wheat.

AMERICAN SILK.

On motion of Mr. E. Henry, the "Culture of Silk" was selected for discussion at the next meeting.

FLAX.

Mr. Carpenter.—The subject of to-day, the growing of flax, I consider more important than either silk or cotton. Although grown to a considerable extent in former years, this fibre has been very much neglected lately in this country, and especially since cotton has been so extensively introduced. Flax is very durable, comfortable to wear, easily cultivated, and by the aid of improved machinery it can be converted into a material equal in some respects to the best of silk. I am told that the new machinery produces a fibre equal to the best Sea Island cotton; and it is improved by being mixed with cotton, taking a silky appearance.

Prof. Nash described the method of cultivating flax. It requires a strong soil, and is an exhausting crop. Half a bushel of seed to the acre is sufficient in raising the seed, but up to a bushel and a half may be sown when the fibre is to be used. Being sown so thickly it grows more slender and the fibre is finer. The soil is plowed the first of May, or as soon as the weather becomes warm, and is harrowed nicely, and the seed being scattered evenly a bush is passed over it, so as barely to cover them. When the upper bolls are ripe, and the lower ones green, it is ready to be pulled.

Mr. Robinson stated that the steam gun, invented by Mr. Allen, of the Novelty Works, converts the stalks into a very fine fibre at a very moderate expense.

Dr. Trimble explained the old processes of hatcheling, etc., and expressed the opinion that if they could be superceded by the new machinery, it would tend to cause flax to become a substitute for cotton.

Dr. Jarvis considered linen superior to cotton or wool as an article of clothing. Cotton is continually giving off minute particles, filling the atmosphere, and inhaled by the lungs. He considered cotton as a curse, from its electrical action, while linen is beneficial, and there is far less dust from it. He doubted whether wool was fit for human beings to wear, and would be glad to see linen supply its place, as well as that of cotton.

Mr. E. Henry said that the exhaustion of the soil by the cultivation of flax arises from two things: the fact that everything is removed from the soil in the flax crop; and the fact that the land is left exposed to the sun at a season when that is an injury.

Prof. Nash said that flax ceased to be cultivated when cotton became abundant, because it would not pay, and it could not be again introduced without better processes than were formerly used. It is superior to cotton for wearing, excepting that in cold weather it will crack, and fail sooner than cotton.

Rev. Mr. Weaver considered wool a more important article of clothing than flax. He had been ordered by his physician to wear woolen under-clothing, and the effect had been a marked improvement in his health.

Mr. Lancaster described flax culture in New Hampshire, and the mode of using it, as it was before cotton took its place.

Dr. Jarvis suggested that when the system is in an abnormal condition, it may require woolen garments; and yet, normally, linen may be better, more invigorating, and more conducive to health. Adjourned.

January 6, 1862.

Mr. W. S. Carpenter in the chair.

THE AMERICAN ELK.

Mr. Lorenzo Stratton, of Little Valley, Cattaraugus county, N. Y., stated that he had succeeded in domesticating the American elk, and was requested to make a statement of his experience to the meeting.

About eight years ago, he said, I had an opportunity to purchase two horned elks. I did so, as a matter of curiosity, and because I wished to see a few specimens of this forester preserved, as my place is situated in the region where they used to roam in countless numbers. They did well, and bred. I fenced off a few acres for them, and found after a while that I could certainly raise venison cheaper than my neighbors could raise beef. I devoted a large plat of stony, bushy land, unfit for any other purpose, to them. Since then I have succeeded in breeding thirty-seven elk. I have had no accident of any kind amongst them, and they have fatted and bred regularly, and have become quite domesticated. The does have been gentle, and act like domestic cattle. The bucks have been also gentle, until they were about four years old, when they have been difficult to manage, in September and October, like a bull or stud-horse. In such cases I generally made venison of them. Excepting these instances, however, the animals are quite docile. The first fawn that I raised was very shy; he was in a lot of about fifteen acres, and when I went to him he would flee from me, so that I could hardly get a sight at him. The next fawns raised were not so frightened when they saw me; and now, when I go into the field, the young fawns are like so many calves. My lot is fenced with common rails, six or seven feet high, and there is no difficulty in keeping the animals within bounds. Frequently, when the fence may get down, they go out into a neighboring piece of woods; but, as soon as anything startles them, they run for their own field again, and only feel safe when they arrive there. They are not inclined to stray off. This lot in which they are confined they consider as their home, and chase off any dogs that may come upon it. In four generations, by kind treatment, I have, as I contend, not merely succeeded in taming them, but in domesticating them. They are as gentle as sheep that run wild. I have sheep in the same lot that are taken to the barn every winter and fed; and this fall, when I go into the lot, I cannot call them as I can my elks, which have been there summer and winter, and never left the ground. I have kept two elks until they were four years old, and they are dangerous to go near in the autumn. They attack a person both with their horns and their feet.

The elks find the greater part of their own living. They are on the same grounds now that their species used to occupy when the country was wild, and ought, perhaps, to take care of themselves now as well as they did then: they eat brush, moss and grass: they eat almost everything that comes in their way: they will grub on scrub-oak until they destroy it: they eat daisies greedily; not a daisy can grow where they run. There is nothing to hinder the raising of them on cultivated farms. Still, I suppose it would be cheaper to raise them on land which was useless for any other agricultural purpose. There are a hundred thousand acres of land in this State that can be used in this way, and that is good for nothing else. I have an idea that the waste lands of Long Island, of which I have read, might be turned to account in this way. My elks are on the same ground that they have occupied since I first commenced to raise them. I wintered twenty-two last winter; I have brought three into market here. Two of them are bucks, with antlers, weighing five hundred lbs. apiece, and one doe, weighing three hundred lbs. I have several hundred lbs. of hay near my field, with which I feed the animals a little. I think that, in ordinary circumstances, three elks will not eat more than one cow.

They reproduce when they are two years old. I think it used to be generally believed by the Indians that they commonly brought twins, but I have not known an instance where more than a single one has been produced at a birth. They might possibly be made to give milk, but never, I think, with profit. They can be driven, and make very fancy teams, but this is never likely to be done, as a matter of utility. I broke one pair, and sold them for $1,000, to take to Europe. I used a common horse harness, with the bit. The bucks are very beautiful trotters, and I think that a buck with antlers moves with more grace and majesty than any other animal. The objection to their use in this way is that in the summer their horns are very easily chafed and hurt. They shed their horns in March, and the new ones commence growing in two weeks, and in about ninety days from that time are complete. During this time they are not in good condition to drive; and, besides this, they cannot stand the hot weather. In the winter time they will travel an immense distance. They will probably outstrip a common horse, but will not equal a trotting horse: they do not tire as easily as a horse, and a buck of four years old will go a distance of fifty or a hundred miles quicker, and with less fatigue, than a horse could do. The great profit in raising them, however, is for their meat. They live and fatten on useless land. Where the feeding ground is brush they will destroy it; but the grass will come up more profusely on this account in the summer; and it has the result of giving them better feed in the summer, though not so good in the winter. I paid $400 for the first pair I bought: I have bought two does since, from which, with the first pair, I have raised my whole stock: I have been at various unnecessary expenses, from the fact that I did not know how to manage them: I can now raise elk cheaper than I can sheep: I have a three year old buck, weighing four hundred and eighty pounds, which has cost me less than any three year old sheep I have got: I have been anxious to introduce them as a common stock, and have sold them for $100 a pair. A great many are afraid to buy them, for fear they will get away and go wild again. They see me go into the field, and all the flock come about me, and each one try to get his nose into my pocket; but they say, "I don't believe I could do that;" they think there is some Rarey secret about it. Whenever I go into the lot I generally carry a little handful of salt, or grain, or something which they like, which makes them come about me.

I think there is no better meat than that of the elk: it is richer and more juicy than the meat of the deer. I killed a two year old doe this year which had had no fawn; she was very fat; I took twenty-nine pounds of tallow from her, and she weighed two hundred and eighty-two pounds dressed, the skin weighing twenty-eight pounds.

Dr. Trimble said that, several years ago, he was traveling in Illinois, over the prairies, and he recollected seeing at a house where he stopped a full grown elk perfectly domesticated. There were no fences about, and it never attempted to run away. He was struck with the similarity between this doe and the doe of the deer: he could hardly see any difference, except that the doe of the deer is not as stout or strongly built: he also spoke of the beauty of the deer in one of the Philadelphia parks, and said that they were perfectly tame, so that children played about among them.

Mr. Stratton said the difference between the deer and elk, as regarded their being kept as a common stock, was that the deer could be tamed, but not domesticated, like the elk. The offspring of a tamed deer is just as wild as it would be under any circumstances until tamed. The elk, on the contrary, seems to be more of a reasoning animal, and may be made as gentle a stock as any common kind of cattle.

On motion of Mr. Pardee, it was

Resolved, That the Club recommend to the commissioners of the Central Park to take into consideration the propriety of introducing the American elk into the park.

SILK CULTURE.

The regular subject of the day, "The Culture of Silk," was then taken up.

Mr. E. Henry.—Having no other interest than a desire to bring to the notice of my countrymen a source of agricultural and manufacturing wealth, at this time suffered to slumber in neglect, I would especially direct the attention of those who take an interest in the resources of our country, to the importance of providing proper employment for a class now almost entirely neglected, and by so doing adding millions to our national wealth. I refer to American silk culture, which has been so much neglected for the past twenty-five years, that a popular belief seems to prevail that the labor and the climate are unsuited to its production. Nothing can be further from the fact, as I shall be able to show.

From the early settlement of the colonies to the present time, the cultivation of silk has been more or less successful here; much more so than in France or Italy, when the first attempts were made to introduce it in those countries. As early as 1623 the cultivation commenced in the colony of Virginia. In 1759 the colony of Georgia exported 10,000 lbs. of raw silk, which sold for two to three shillings higher per lb. than that of any other country. In 1771 the cultivation began in Pennsylvania and in New Jersey, under the auspices of Dr. Franklin and other enterprising gentlemen. In Connecticut the cultivation commenced about the year 1790, and the value of the raw material and sewing silk made in three counties in that State in 1810 amounted to $28,503. In Texas and California much has been done within the past few years to establish its success in those States.

These facts are but a few of the many which go to show that in nearly every part of our country silk has been produced.

The subject received the most attention between the years 1828 and 1837. It was at this period our government became so much interested in it. The committee on agriculture in the House of Representatives took the matter under special notice. Commissioners were appointed, information collected, and a manual was ordered to be published, giving general information as to the mode of cultivating and manufacturing. Acts were passed giving all necessary protection, and under the auspices of the government, the press, and a general popular feeling on the subject, American silk culture was going on prosperously. At this period a raging speculation was going on in the country, affecting nearly every branch of business. The great number of persons embarking at once in the silk business, naturally made a great demand for mulberry trees, for on this tree the silkworm feeds. The demand for the trees, and the advancing price, soon attracted the speculator; and so wild did the people become on the subject, that a mania prevailed in the country, well-known as the "morus multicaulis speculation." Many of the silk growers lost sight of their legitimate business, and, like others, were involved in the ruin that soon followed. It is here proper to remark that this *tree* speculation had nothing whatever to do with the legitimate business of silk culture, but so connected have they become even in the minds of the intelligent, that the disasters of both are considered one and the same thing; but it is now quite time that an error so injurious in its consequences should be disposed of. A quarter of a century is quite long enough for a popular prejudice to have been dissipated, and a thinking, intelligent people should examine and learn the truth for themselves, and act in accordance. The silk business, when it most needed the fostering hand of government, received a finishing blow, by an act of Congress taking off all protection. This act is said to have been passed at the time to satisfy the nullifying Senator of South Carolina, John C. Calhoun, who had lately changed his tactics on the tariff question, making it a plea for South Carolina to destroy the Union. The evidence on record up to this date proves, beyond all doubt, that under a fair protective tariff, the silk culture in this country is both practical and profitable. I know of no branch of agricultural industry whereby so much was produced to profit with the same amount of labor and capital. I would at this time call the especial attention of my countrymen to the fact that some suitable branch of labor must be provided for the respectable class of females. The war that is now raging will naturally give a preponderating female population, and some suitable employment must be provided for it; and in no business can women be so profitably and respectably employed as in the production of silk. The draft upon our national resources for imported silk has been one of great magnitude; and now, while our country is bleeding at every pore, this silken artery should be closed. If patriotism, if love of independence are the offspring of America, let us unite our efforts, and by the aid of our legislators, our representatives, and an intelligent agricultural people, at once encourage, protect and foster the production of American silk.

Dr. Holton read extracts from several French authors, in relation to silkworms, imported from Japan and other countries, and the food most suited to their keeping.

Dr. Trimble said it is not necessary that we should import worms from Japan, or any other country, to make silk. We have several varieties, which are natives of this country. They may be found by any one at night, for they are moths, which fly at night—not butterflies, which fly in the daytime. There are four species noticed particularly: first is the *Cecropia*, which feeds upon the apple, cherry and plum trees of our country; second is the *Polypheme*, which feeds upon the oak and lime, or basswood trees; third is the *Juna*, which feeds upon the walnut or hickory tree, and the fourth the *Promethea*, which feeds exclusively upon the sassafras tree. These worms have the same enemies, however, as others—the ichneumon flies—to which we are so much indebted in large cities, where there are no birds, for the destruction of worms that would otherwise trouble us. The idea of the Emperor Napoleon, in importing worms from Japan, is to produce a silk cloth to clothe his soldiers with, so strong and cheap that one suit may last through several generations of soldiers. The Chinese used to hand down the clothing from one generation to another. This was made from one particular kind of worm, which is probably the kind of worm that Napoleon is trying to introduce. In the southern part of the East—for instance in Madras—the silkworm goes through its transformations in forty days. Most of the insects native to this country, which have been mentioned, come at precisely the time that the leaves come. The parent insect will deposit her eggs invariably upon the tree so that they will come out at the exact time that the leaves appear. At Madras the insect is six days an egg, twenty-two days a worm, eleven days a grub, and one day a moth, so that in its perfected existence it lives but a single day. There, of course, the management must be hurried. We have worms that do not feed on the mulberry tree. The speaker could not say whether they are as good, as few experiments have been made on the subject. The mulberry tree seemed to have been especially intended for this silkworm, as no other insects live upon it.

Dr. Holton read from a French periodical, on the subject of the silkworm, imported from Cayenne, and which feeds on the ailanthus tree. The tree upon which the worm originally fed was the *Cafe diable*, but after feeding for some time on the ailanthus, if it is then placed upon its native food it will leave it and die of hunger, rather than touch it, and will feed on nothing thereafter but the ailanthus. This is an encouraging fact, and proves that it is not essential that the worm should feed on one tree alone, but that it may feed on any that will suit its appetite. The capacity to deposit the silk does not depend on the food the worm eats, but is a quality inherent in the worm itself, and it makes no difference what the food may be, so long as the worm eats it, and is satisfied with it.

Mr. Gale read accounts of several experiments in the food of the common silkworm, which demonstrated that the worm would feed on lettuce or blackberry, currant and other leaves, but that the leaf of the mulberry was best suited to its wants.

The same subject was continued to the next meeting, and the Club adjourned.

January 13, 1862.

Prof. Nash in the chair.

ICE AND ICE-HOUSES.

Mr. Carpenter said as it was the season of the year when people were providing themselves with ice, he should like to inquire what thickness was best, and what was the best manner of packing. His plan had been to lay it flat, preferring it about eight inches thick and ten or twelve feet square. Some of his neighbors, however, packed the ice upright, and claimed that this plan had advantages over any other.

Mr. Bergen said that some persons adopted the plan of breaking the ice into small pieces, and say that it keeps better when thrown into the ice-house in this way. It is, of course, more difficult to get it out in the spring, and it cannot be taken out in any regular shape. The speaker had always packed his ice in cakes, horizontally. The only argument which he saw in favor of packing it uprightly was that, possibly, it might be handier to take out again. He had packed ice when it was not more than five inches thick, and it had kept very well. Undoubtedly the best time to fill your ice-house is in cold and freezing weather; firstly, because the ice is easier to handle then; and secondly, because it will keep better.

Dr. Trimble said it was not necessary to build great ice-houses, at much cost, to keep ice during the summer. Hundreds of tons will keep well, piled up in the open air, with no other protection than hemlock boughs placed over it. He remembered once in a town where he lived, that a number of neighbors met together and concluded to try the experiment of taking ice from a pond and making a mound of it, under the protection of a piece of woods, where the sun scarcely ever reached. They covered it over with straw, and they had ice in adundance all the next summer. The speaker remembered coming down the Hudson river once, and a number of sportsmen, who had been among the Catskill mountains for trout, were coming down also. They had found enough of ice among the mountains to pack all their fish in, and they said it remained there in abundance. There are many neighborhoods in the country where, with a single days combined effort, they can have any quantity of ice for the summer.

Mr. Carpenter objected to recommending any such course to farmers. He thought every farmer ought to be able to keep his own ice. It was true ice could be protected in this way in the open air, by shavings, sawdust, or evergreen boughs surrounding it. Referring to the mode of keeping ice in houses he said that, generally, if the soil was sandy the refuse water would settle into the ground; but it was necessary that the water should run off in some way. If a drain is built the air should not circulate through it. There should be a trap in it, where the water might stand, and keep out the air.

Rev. Mr. Weaver thought the cheapest method for a person living where ice-carts run was to buy it. This was the case if we count the extra labor and expense necessary for the storing of ice. To a farmer, who does the work himself, the case may be different.

Mr. Kavanagh spoke of a very simple mode of building an ice-house, which was to place hemlock boards in a sloping position, about ten feet high. The expense was not more than ten dollars, and it would last three or four years. If covered with shavings the boards keep quite dry and sound.

Mr. Carpenter said that one important use to which ice was put, among the dairies of Westchester county, was to place in cans of milk to be sent to New York. It was as good as a cow to the dairyman, for it saved him a large quantity of milk, and it was a benefit to the buyer, for it kept the milk sweet and healthy.

Mr. Henry, in speaking of the use of ice in preserving meat, said that meat laid upon ice is injured. It is well enough for the cold air to strike it, but it should not come directly in contact with the ice.

Mr. Kavanagh said that frost had a tendency to make meat tender.

Mr. Bergen could not say as to the effect of ice upon some kinds of meat; but he had always been accustomed to keep fish upon it, and it was kept in this way as fresh as when first taken from the water.

The Chairman said that in New Hampshire, the plan in cutting ice was to use the ice-plow, and to cut the ice to some depth both ways, so as to make the cakes about fifteen inches wide and twenty inches long. The ice was always got as thick as possible—generally about fifteen inches—so that the cake would have about the proportions of a well-formed brick. The pond being checked off by the ice-plow, the workmen then went along and struck carefully into these cracks all along, which would produce a crack the whole distance, perhaps, so that sometimes a piece ten rods long might be broken off perfectly straight; then it is separated the other way into squares. The thicker the ice is the better.

THE CRESSANE PEAR.

Mr. Bergen presented a specimen of the Cressane pear, which had kept until this time in good condition. He considered it a pear worth raising, although the Pomological convention had rejected it. It is a good and regular bearer, of good flavor, and keeps well.

THE CULTURE OF SILK.

Mr. Henry said he considered this time of war the most appropriate one that could be chosen for the agitation of the subject of silk culture. It was the duty of every lover of his country to bring into notice those products which bring it wealth and keep its means within itself. There is no article, for which so much money is sent out of the country, as for silk. It is the result of a war that there becomes a preponderance of the female population, and the culture of silk is the most profitable kind of labor that can be devised for this class. The mulberry tree grows in almost every part of our country naturally. The high duty placed by the government now on all imports is also favorable to silk culture.

Mr. Carpenter said this country was not poor enough yet to go into this subject practically. There are so many other more profitable means of employment that an attempt to introduce it would result in failure. Strawberries, blackberries, raspberries, currants—any kind of fruit and vegetable, almost, is more profitable.

Mr. N. H, Gale spoke at some length on the subject, as follows:

Mr. Chairman: The subject of silk culture has been one of more than common interest to me for many years—ever since I was made acquainted with the capacity of the soil and climate of our country for its culture, and the genius and talent of its citizens for its manufacture; but more especially since the fall of 1848, when in my meanderings in the south and southwest. While in Marion county, Tenn., on my way from the county seat, I was overtaken by a rustic citizen, and invited to accompany him to his humble dwelling, just under the mountain, known as Walden's Ridge; and so importunate were his solicitations, that I felt a sort of social necessity of complying with them, notwithstanding I had intended to pursue my journey a few miles further before putting up for the night. When we arrived at his dwelling, something near a mile from the main road by a common cow-path, from the south, I was heartily welcomed by his wife and little ones, as a man from the north, that he had picked up on the way, and through much persuasion had come to spend the night with them. I was immediately voted the freedom of the domain, and ushered into the parlor, as the observed of all observers—the elephant from the city of New York. Soon after our horses were provided for, his good wife had prepared an ample and substantial meal for the household, of such as the plantation afforded; and a better is not to be found in every household of civilization. After the cloth was removed, and all the family seated in the parlor, (do not ask me any questions respecting the parlor; a description of it might excite the nerves of refined civilization in this great metropolis) the first subject of conversation introduced by the wife was the culture of silk; and she took a small silk shawl from her shoulders, that I had before observed, which she had worn for five years, the material of which she had cultivated. She bred the worms, fed them, reeled, colored and spun the silk, and wove the fabric, and wore it for five years—then an every day appendage, and worth, for daily service, $2, if not more, in contrast with any other fabrics in use by females. She was exceedingly chagrined and mortified that her business and pleasure had been destroyed, and begged of me, when I returned to the north, to inquire if there was any sale for cocoons; and if so, she would engage to furnish a quantity at $3 per bushel. She informed me the amount she could make annually by silk culture, but I do not remember; yet, if I mistake not, she said by employing a girl for domestic labor for one month, they, with the little ones, in that time could make half as much as the farm produced, with ten times the outlay of labor and money. After my return to the north, in November, 1851, in a tour up the Naugatuck valley of Connecticut, at Humphriesville, I visited a silk manufactory, to fulfill my pledge to my hostess, and upon inquiry learned that they gave $3 per bushel for cocoons; but the hazard of transportation at that time, together with the expense, would not warrant me in recommending to her silk culture at so great a distance from market.

The gentleman in charge invited me to go through the factory and examine the machinery, and some of the processes of silk manufacture, and I was never more surprised and delighted in any institution of my country than in that. I there saw one of the most beautiful specimens of silk manufacture that I have ever met with, either domestic or foreign, and the weaving being performed by a female. It was a fancy piece—a table cover, if I mistake not, and I do not remember ever to have seen a more perfectly beautiful piece of fabric during my life, before or since. The colors were unexceptionable, and were so blended in the figures as to fill the eye to completeness; and I was led to exclaim, Great God! when will the time come when the industry and skill of the humble people of these United States will be delivered from the deadly influences of heartless, demagogical politicians, and the damning influence of slavery—that moral Upas, whose roots take hold on hell, and has paralyzed the industry of our country, and robbed it, directly and indirectly, of thousands of millions of dollars within the last half century. And as much, sir, as I love my country, and yearn for the full development of its entire natural resources, together with that of its mental and spiritual genius and industy, still I cannot, and should regret to have this Club, recommend the cultivation of silk, to any considerable extent, until the people are disenthralled from the shackles of political mountebanks and costermongers, and educated in the science and genius of the God-given nobility of a government whose aim and purpose is the prosperity and the happiness of the people; the protection of the weak against the strong; the innocent against the vicious; the producing against the consuming and accumulating classes, and what is called the governed, against those who govern—falsely called the servants of the people—in the practical developments of our misgoverned republic.

For the last forty years, Mr. Chairman, allow me to say it, I am not speaking as a politician—in truth, there is nothing I more detest, than what is called politics in these last days—what I am about to say, I utter as one of the nominally conceded sovereigns of this mighty commonwealth—as a man endowed by God with the inalienable right to life, liberty, and the pursuit of happiness, and therefore I say, that for the last forty years, to my certain knowledge, politically, governmentally, the entire resources of this government, physical, intellectual and moral, have been devoted to the subversion of every one of the above specifications of the true functions of a democratic government. I can prove what I say, but this is not the time, or the appropriate occasion; and, therefore, I simply say, that until the masses of the people are educated in the science of true political economy, which is nothing more than enlarged domestic economy, or sound husbandry, we would be doing injustice to those noble hearted capitalists that are ever ready to embark in those enterprises that give further promise of the development of the resources of our country and its industry, and more surely and thoroughly establish its liberty and independence of the pauper labor of despots and tyrants. Why, sir, it should be the ambition of every citizen of the United States to withhold every cent of the net earned product of liberty from the support of kings and potentates; at least limit them to the necessities beyond the capacities of our soil, climate and industry to produce. And never, sir, until the people are educated to this point, and that infamous lie—that source of all villainies, of all iniquity, slavery, is destroyed, will I recommend an extensive culture of silk, nor its use, beyond the absolute necessities, and they are very few. To cultivate silk successfully it must be protected by a law of the General Government; and no such law has, or ever will grace the record of our national statute book longer than to develop the fact that it remunerates free labor, so long as that body of death is borne through the streets of this republic upon the shoulders of Liberty.

As to the capacity of our soil, climate and the artistic genius of our citizens, it needs no more argument to establish than that of cotton, flax and wool, simply governmental protection, that in ten years would place us as independent of Great Britain, Europe and the East, in view of silk, as we are in that of wheat, corn and potatoes; and would be one of the heaviest blows we can strike against tyranny and for liberty—save and except, always, the destruction of the kingdom of Dahomy, in the lap of Liberty in these United States.

No, sir, there have been millions enough sacrificed at the shrine of that infamous institution; aye, millions enough to conduct a war with 500,000 soldiers, with democratic economy, for ten years, have been offered up upon the altar of slavery through the influence and agency of men claiming to be democrats, and laboring for the independence, prosperity and happiness of the people of their country. Sir, I speak that which I do know. It so happened, in the providence of God, that in the year of 1842, when the labor of this country was depressed beyond all precedent, and would inevitably have resulted in provision riots had not Congress given relief; that I was in the sanctuary of the nation, consecrated to God, in the name of liberty and fraternity, when the discussion of "the black tariff of '42," as it was appropriately christened (because it was the boon of slavery,) was in progress, and listened to most of the speeches, pro and con, and with more than ordinary interest to that of Silas Wright, Senator from my own New York, on the side of free trade, and saw him turn around and vote for the very principle he had opposed in argument. By that vote, and the influence he held at that time, the tariff was secured. We all know with what vigor and elasticity every kind of business sprung into life, and what a career of prosperity we entered upon; but, alas! alas! only to be destroyed by the same hands within four years. Until this time I had conceded honesty, integrity and manliness to the great majority of the members of the two Houses of Congress, but more especially to those of the Senate. Then and there I discovered it to be a den of political gamblers, mountebanks and costermongers, with a few noble exceptions—and oh, how few!

Prior to that I was very much in the condition of the good old mother of Israel in good old Puritan New England. When her horse was running at full speed down a dangerous declivity, she said she "trusted in Providence until the breeching broke, then she gave up all hope." Her only mistake was, that she trusted in the breeching until it failed, then she trusted in Providence, and was saved. I trusted in the wisdom and integrity of the members of Congress until I discovered that they were a club of gamblers; the sanctuary of the nation their club-house; the people the cards and dice they shuffled and threw; the industry of the people the stakes, and the winners the political coster-mongers and their allies. Since then my only trust is in God. From these considerations, therefore, I say no, sir, not another dollar will I seek to divert from the channels of known and successful pursuits of industry, until we can have at least security for the future, saying nothing of indemnity for the past, unless it can be shown that protection is not absolutely necessary. If there is any gentleman here that can enlighten us on that subject, I shall be most happy, for one, to hear him. I do not believe there is a person here, male or female, that needs to hear an argument to convince him or her of the capacity, practicability or importance of silk culture in the United States; hence there are but two points to look at, as I have before said. Does it need governmental protection? If so, then our first business is to secure it, and that permanently.

The same subject was continued until the next meeting, after which the Club adjourned.

January 20, 1862.

Mr. R. G. Pardee in the chair.

FLAX DRESSING.

Mr. James E. Mallory exhibited a model of Sanford's machine for dressing flax, and read a paper thereupon. (See report of Polytechnic Association, January 16th.)

Mr. Carpenter said he had seen this machine in operation, and thought it would create a revolution in the growth of flax. He thought that its power in turning out flax would be greater than that claimed for it by Mr. Mallory, and would exceed sixty lbs. per day. It would, also, certainly save one third of the fibre. It takes but little off except the shives. The society had offered a premium for the best machine for turning out this fibre, and he hoped a committee would be appointed to examine Mr. Sanford's machine and report upon it.

Mr. Robinson moved the following resolution, which was adopted:

Resolved, That in the opinion of this Club, this machine is calculated to be of very great advantage to the agricultural interests of America, and, therefore, we commend it to the attention of our brother farmers.

Prof. Nash said that when he heard of this machine he was prepared to refute the statement that it saved all the fibre, for it had always been the case in machines that he had seen, that much of the fibre at both ends of the flax was torn off by the extra force that was required to remove the shives from the middle. But he found that this machine takes the flax and finishes a certain length of it at a time, so that no part of the fibre is operated upon longer than is necessary to entirely clear it of shives.

The question was asked whether the steam blowing gun would not compete with Mr. Sanford's machine for separating the fibre.

Mr. Mallory said that Mr. Lyman's steam gun was only used for flax cotton. For this purpose it was a success. He assisted at an experiment with it at Jones' Wood, and a large maple log was put in the gun and fired off. For a moment he thought everybody was killed, the explosion was so tremendous. It cut off large limbs of trees, and struck near a horse-car, which it would have demolished if it had hit it. Pine slabs were next put in the gun, which was braced against a large tree, and aimed at another tree. When it was set off the particles were spread over the tree, and it was finer than flax. It is very useful for the purpose of separating fabrics for paper. Anyone who wants to make flax-cotton can do it after the shives are removed by Sanford's machine, by a common fulling mill. The fibre of the flax is only about one eighth of an inch in length.

Mr. Carpenter offered a resolution, appointing a committee of three to examine this machine, which was adopted, and Messrs. Mapes, Nash and Robinson were named by the chairman.

FRANKLINITE IRON APPLIED TO HORSE-SHOES.

Prof. Mapes said that since he had come into the room he had been shown an improvement in horse-shoeing, of which he would say a few words. The points of the shoe were made of a material obtained from the Franklinite ore. The iron made from this ore, after the zinc is extracted, is harder than steel, and was at first considered useless for manufacturing purposes on this account. It was afterward discovered, however, that it would melt at a temperature lower than any other form of iron. It was found, also, that it can be united by heat with the surface of wrought iron, the compound retaining all the properties of wrought iron. Mr. Selleck, who has been experimenting in the matter, now places on each calk of the horse-shoe a small piece of this metal, which, when placed in the fire, flows upon it, and is incorporated with it. It was put into use, and when three shoes pointed with steel had been worn out, the Franklinite iron on the other shoe stuck out like a pea, the iron about it being worn down. There is no such thing as a horse slipping with such a shoe. If you attempt to wear it down with a file you find that you might as well scrape it with a bar of soap: you can make no impression upon it. Mr. Selleck has also been able to incorporate this ore with wrought iron so as to be put to very important uses. It is known that no amount of heat that can be obtained in a forge fire will melt wrought iron so that it will flow. Now Mr. Selleck has found this curious fact, that though wrought iron could not be thus melted, yet when from five to ten per cent of Franklinite is incorporated with it, it can be melted with all the facility necessary. The compound thus obtained has all the appearance and all the properties of steel. Cast iron will take up a certain amount of zinc if presented to it moderately; but when it is taken up no amount of heat will drive the zinc out; and when this Franklinite is separated from all the zinc that will come from it, there is still a portion of that metal left in the ore, which cannot be got out.

Dr. Trimble asked if the horse-shoe could be made so as to prevent horses from slipping in Broadway, for if so it would be something greatly needed.

Mr. Selleck said he could make a shoe that would either prevent the horse from falling, or cut the pavement up.

Mr. Carpenter said he thought this metal might be applied to innumerable uses on this principle, and suggested that a committee be appointed to investigate the subject.

A motion to that effect being adopted, Messrs. Trimble, Quinn and John G. Bergen were appointed on that committee. On motion the regular subject of the day was postponed.

THE CULTURE OF THE PEAR.

Prof. Mapes read an essay by Mr. Quinn, offered in competition for the premium proposed by the American Institute for the best essay on the subject of "The Culture of the Pear," Messrs. Peter B. Mead, John G. Bergen and Gabiel Marc, were appointed a committee to report thereupon.

TRANSPLANTING OF TREES.

Prof. Mapes said a friend of his, who was a careful experimenter, had mentioned a circumstance to him which he would state as a subject of reflection for the Club. This gentleman thought last year that he would try an experiment in transplanting trees in the night. He took ten cherry trees, in bloom, and commenced at four o'clock in the afternoon to transplant them, transplanting one every hour until two o'clock. The trees that were transplanted during daylight lost their blossoms, while those transplanted in the night retained their blossoms, and bore full crops of fruit. Later in the season he took ten pear trees, with the fruit on them, one third grown, and transplanted them in the same way. Every one transplanted after dark held its fruit, while the fruit dropped from the others.

Adjourned.

[Same subject as last week.]

January 27, 1862.

Mr. Edward Doughty, of New Jersey, in the chair.

FLAX.

Mr. Burgess exhibited a linen sheet which had been fifteen or twenty weeks in the year in actual use for twenty-nine years. It appears now likely to outwear any ordinary sheet: it cost twenty-two cents per yard: it is warmer to sleep under than a blanket.

Mr. Carpenter.—I am satisfied that we have no fibre, excepting perhaps silk, of equal durability with flax. Two tons of flax straw, producing seven hundred lbs. of fibre, can be grown upon an acre. This is worth, as produced by the Sanford machine, about $15 per hundred, showing a profit of over $100 per acre to the farmer, for the seed will pay all the expenses of growing the crop. Unlike the root crops, the demand for the result is unlimited. We may supply the world with it if we find it sufficiently remunerative. A specimen of fibre has been handed me by Chas. A. Bunting, from the inner bark of the palmetto tree, which seems to be strong, and valuable for many purposes.

FRUIT JELLY.

Mr. Robinson exhibited a specimen of jelly, made from the Iron apple, a pleasant, well flavored sour apple, and colored with cranberries, as a good substitute for currant jelly, both in taste and in appearance. Any good sour apple will answer the purpose. A good proportion is a quart of cranberries to a peck of apples. If the Iron apple is properly taken care of it will keep until August. At this season of the year it is necessary to bring them into a warm room to ripen them, as you would pears. It is worthy of observation, that every apple that keeps well, and keeps its flavor well, is coated with wax, rendering it impervious to the air. It may be scraped off the surface with a knife, and will burn.

Mr. Hite.—Why not coat apples artificially with wax when they are deficient in it?

Mr. Robinson.—It will keep eggs, and I see no reason why it should not keep apples.

Mr. Carpenter.—It is well known that potatoes exposed to the air acquire a green color. I have seen within a few days potatoes which had been coated with varnish, and had been exposed for two months to the air and light, in which scarcely any change was perceptible. Vegetables have been also coated with wax and with good effect. I have no doubt that it would have a tendency to preserve fruit, by preventing evaporation; for I suppose the cause of decay to be that the moisture is evaporated, and the air then penetrates the fruit and decomposes it.

GRAFTING WAX.

Mr. Hite.—A splendid grafting wax may be made in this way: Melt together twenty-eight parts of common pitch and twenty-eight parts of Burgundy pitch; put in fourteen parts tallow and sixteen parts beeswax; then stir in fourteen parts of yellow ochre, finely pulverized.

Mr. Burgess.—That gets so hard that it cannot be removed. I think a better grafting plaster may be made of equal parts of mutton fat and beeswax. In cold weather this mixture gets very hard, but in warm weather it softens, and the tree can grow. I have used it for twenty years. When a limb is cut from a tree apply this, and the tree will grow and throw it off.

Mr. Carpenter.—I have used one lb. of tallow and one lb. of beeswax to two lbs. of rosin, and found it to answer the purpose admirably. Some use equal parts of tallow, beeswax and rosin. I have never tried it without rosin.

TEA AND COFFEE.

Mr. Carpenter suggested that the price of tea and coffee was rising so rapidly that the question became important whether we could not find a substitute.

Dr. Trimble said the increased price was to support the Government, and he hoped that would not be taken as a reason for finding a substitute. On the contrary we should drink all the more.

Mr. Pardee stated that a gentleman in Ohio had succeeded in raising coffee very similar to the Rio, excepting that it seemed young and green. It will produce about thirty bushels of coffee to the acre. A great deal of the tea drank in this country is not tea at all. There is no more tea about it than there is about a load of hay: it is a manufactured article; and even that which is tea, is so adulterated that there is a very small proportion of real tea in it. The Souchong tea is undoubtedly the best, and is very wholesome. But not one woman in ten thousand knows how to draw tea. The best tea that I ever drank, the lady told me, was made in this way: I put the water on and heat it just as quick as I can, and get it thoroughly boiling hot; then I take a teapot, entirely clean, and pour it full of the boiling water, and throw into it a small teaspoonful of tea for every individual I expect to sit down by the table. I close the lid and let it stand upon the fire exactly ten minutes, then the tea-bell is rung, and the tea is put upon the table.

Mr. Carpenter.—Dr. Trimble pays nothing to the Government for the tea and coffee he drinks, for they are manufactured in this city. A great proportion of the tea and coffee sold here are not fit for a dog to eat. Much of it is poisonous. Old material, rejected twenty years ago, is now bought up and manufactured into beautiful green tea. Green tea may be a slow, but it is a sure poison. I think we should have something that we can fall back upon, which is not detrimental to the health.

Mr. Robinson.—Upon the Atlantic coast, in Virginia, North Carolina, and further south, there grows a common shrub known by the old Indian name of Yupon. When well prepared it makes a good, valuable and exhilarating tea. There is a slight bitterness or astringency to it, which is a little offensive to a person not used to it; but not an iota more than our ordinary tea or coffee would have to a person who had never drank either before.

Dr. Trimble.—That is drank by people who are sick, and who want to be made sicker. As to everything being adulterated, we cannot be deceived in this way. We can get good coffee, and it is a wholesome beverage. The reason it disagrees with some people is, because they drink it too weak, and too much of it. Coffee should be taken strong, and not much at a time, unless you are taking constant exercise in the open air.

Mr. Lancaster.—If ladies have been practicing so long in making tea, without success, I think we had better find a substitute for it. The best substitute for tea, that I know of, is pure cold water.

Mr. Gale said that he had been a merchant, dealing in teas forty years ago. Where there is one good box of tea, there are large numbers of boxes not worth the freight. The best tea he had tasted was prepared in this way: Take a large teacup, pure and white, and clean, and put your tea into it; pour on boiling water; cover it up instantly and let it draw.

Mr. Carpenter.—Farmers who buy ground coffee buy beans and peas in a damaged condition. If they will take beans and peas in a good condition, and parch them, they will get a better coffee than can now be bought in the market for less than thirty-two to thirty-five cents per pound.

Mr. Gale said that farmers bought large quantities of ground coffee, and after it is burned and ground peas and beans could not be distinguished from coffee.

Mr. Robinson.—Then they are just as good.

Mr. Carpenter.—I believe that ninety-nine lbs. out of every one hundred lbs. of ground coffee are beans, peas and chicory. Chicory is a root largely imported from South America. In England the medical faculty decided that it was detrimental to the health, and a law was passed prohibiting its sale; but thousands of tons of it are consumed here by farmers and their families. It is peddled all through the country to the farmers and to the merchants.

Prof. Mapes.—The seed of the okra, when burned brown, and not black, is a great deal better than the lower range of coffee.

PREMIUMS.

Prof. Mapes offered in competition for the premiums: Cahoon's broadcast seed-sower; the Wethersfield seed-sower; two cutting machines; also an improvement in the grinding of grain. It is well known that flour is injured by being ground between two surfaces. This machine appeals to momentum, at a speed that overcomes cohesion. The shell of every grain of wheat is cracked around its equator; and on examining it with a magnifying glass you find slits in each half, spread open like a basket. The difference in the specific gravity separates these shells from the flour. When corn is passed through this machine, the scales, the oleaginous matter, and the flour, are deposited in their different places.

On motion of Mr. Carpenter, a committee, consisting of Messrs. Robinson, Bergen and Gale, was appointed to examine and report upon these subjects.

MISCELLANEOUS.

The subject, "Silk and Flax," was selected for the next meeting.

Mr. Burgess stated that in London at least a thousand pounds per day of old tea leaves are gathered and dried to be sold for tea. He suggested the *Viburnum Prunifolium* as a substitute for tea. The leaves are to be gathered when three-fourths expanded.

Prof. Mapes.—Dr. Charles G. Page, of Washington, a few years ago made known the fact that passing leaves through a pair of rollers before they are dried, thus slightly crushing them, will cause them to preserve their color and their aroma. Probably an ordinary domestic rolling-pin would answer the purpose.

Adjourned.

February 3, 1862.

Mr. Edward Doughty, of Newark, N. J., in the chair.

TEA AND COFFEE.

Mr. Carpenter exhibited a sample of American made tea, such as is largely consumed in this city and in this country, and supposed to be genuine. Originally it came, no doubt, from China, but it was so poor an article that it was probably brought as ballast. It has been sold in this market for two or three cents per pound: it was originally a black tea, but has been converted into green tea: it is said to have been used in China, the grounds being saved and dried to be sent to this country: it has lately been sold for forty to fifty cents per pound. Imported teas have advanced to such an extent that retailers cannot sell them at a profit, and so they mix them with this. This article must certainly be detrimental to the health; I think it is poisonous.

A gentleman remarked that the prohibition in England against mixing chicory with coffee, was not upon sanitary, but upon moral grounds. He did not regard chicory as any more injurious to the health than coffee itself; and if this Club were to consider the question of chicory at all, it would be most appropriate to consider the best mode of cultivating it.

Mr. Fuller.—Is this any more doctored than the imported green tea? I have seen that blue the hand.

Mr. Carpenter.—It is the practice in China to color it with prussiate of iron, and it is dried upon copper. Both these substances are known to be detrimental to the health; and scientific investigation has long since determined that much of the green tea brought from China is not fit to drink. The teas generally, which are used in this country, I think are detrimental to the health; and I think, if the people must have something to drink, there might be substitutes which they might drink with less injury.

Dr. Trimble.—I have been in the habit of drinking green tea for many years, I like it; I never experienced any ill-effects from it; I go to dealers who I think are honest, in whom I can have confidence, and I think I have obtained the article I desired. There are plenty of tricks and traps in New York city.—Champagne is made from the poorest cider and whiskey; and New York is full of such transactions. As to chicory, I think the objection to that in England was that the people were defrauded.

Mr. Steele.—I have seen in one bin, in a coffee establishment, six hundred bushels of peas; but they never came out again as peas.

Mr. Fuller.—The only damage done was the swindling, for peas are better than coffee: and so in almost all cases of adulteration, the articles are better after adulteration than before.

Mr. Carpenter.—You lose sight of the fact that damaged peas and beans are used in coffee.

Mr. Fuller.—The way to remedy it is to go to responsible men; men whom you can rely upon.

Mr. Carpenter.—I have sometimes found that there is danger of having too much confidence.

Mr. Fuller.—I will tell you a swindle in our line: A gentleman came to our nursery last year, and wanted to buy the cheapest strawberry plants we had. He took them over to Broadway and sold them to greenhorns, under great flaming handbills, "wonderful new plants, just imported from France." I saw members of the American Institute in there, who ought not to have been deceived.

Mr. Gale.--Some of us are judges of tea, but there are tens of thousands in this city who are not, and who are obliged to take what they can get. I think the subject is worthy the attention of the Legislature. The masses of the people ought to be protected.

Mr. Cavanach suggested that the adulteration of seed, by which so many are deceived every year, should be considered in the same connection.

Mr. Fuller.--There are plenty of laws if they can only be enforced.

Mr. Cavanach.--A law of Congress, imposing a duty upon imported seeds, would save us from much of this evil.

PREMIUMS.

Mr. Halsted exhibited a seed drill, which can be adapted to sowing garden seeds, corn, and probably grain, together with a cultivator to be attached to it, and so constructed as not to displace the earth in the rows. This is offered in competition for a premium.

Mr. Fuller.—That would be a capital thing to run between strawberries. The knives are upon the right principle. One of them might be turned so as to cut off the runners at the same time.

Mr. Halsted stated that, in consequence of the shape of the knives, making a continual glancing cut, he had cut off half inch locust roots with it while pushing it by hand.

Referred to the committee heretofore appointed upon agricultural machinery, viz: Messrs. Robinson, Bergen and Gale.

Mr. Hitchings exhibited a model for heating conservatories.

Mr. Cavanach.--The great difficulty with steam is that it takes so long to get the heat up. With hot air we can get up the requisite heat in twenty minutes without difficulty. With steam it will take an hour or one hour and a half.

Mr. Hitchings.--As a usual thing, the water will remain warm, so that the heat can be got up in twenty or thirty minutes.

The subject of heating conservatories was referred to a committee, consisting of Messrs. Buchanan, Fuller and Grant.

ESSAYS ON THE APPLE AND THE PEACH.

Mr. Roberts read an essay upon the culture of the apple.

Referred to a committee, consisting of Peter B. Mead, John G. Bergen and Gabriel Marc.

Mr. Fuller read an essay upon the culture of the peach.

Referred to the same committee.

New subject.—The subject of the "Silkworm" was selected for the next meeting.

Adjourned.

February 10, 1862.

Mr. Edward Doughty in the chair.

FRANKLINITE STEEL—CHILLED STEEL.

Dr. Trimble, from the committee to which was referred Mr. Selleck's plan for making horse shoes, stated that from certificates which they had received, they were of opinion that it was a valuable invention for keeping the shoes sharp and preventing horses from slipping upon the pavement or ice.

Mr. Collins exhibited one of F. F. Smith's patent cast steel plows. These plows are manufactured by Collins & Co., 212 Water street, New York. They are cast by pouring steel into iron moulds which chill the steel, thus giving it a harder and smoother surface, causing it to wear better and to move through the soil with less friction. Each section is cast of varied thickness, giving the parts most exposed any desired thickness necessary for good action and durability.

Dr. Trimble inquired whether Messrs. Collins & Co., had tried the Franklinite steel for plows?

Mr. Collins replied that they had not.

Prof. Nash inquired whether the expense of the plow was much increased over plate steel?

Mr. Collins replied that the cost was greater, but there is an economy both in the greater durability and in the increased amount of work which can be done from the saving in the draft; for it perfectly scours itself even in the clinging soils of the west.

Mr. Robinson.—I think it may not be of any advantage to make the plates thicker in the parts exposed to wear; for if any portion is so worn away as materially to change the original shape, the plow may continue to drag along, but cannot do economical plowing. There is no other difficulty about scouring steel plows except that they wear through very soon. If a steel can be made so hard that it shall be almost impossible to wear it through, whatever the original cost of the plow, if it is anything within reason, it will be economical to the western farmer. A mould board may as well wear through and be thrown away as to wear down so as to lose the correct line of figure.

Prof. Mapes made a statement of the peculiar hardness of the Franklinite steel. Another peculiarity is its want of liability to oxydation.

Mr. Carpenter.—What is the increased expense?

Mr. Selleck.—It costs about one cent per pound more than ordinary iron. It costs six cents per pound in plates ready for use.

Dr. Trimble inquired if the chilled cast steel could be furnished for that price?

Mr. Collins stated that it would cost several cents per pound more. It remained to be proved that the Franklinite would answer the purpose.

MISCELLANEOUS.

Mr. Hite exhibited a specimen of evergreen honeysuckle, the Sempervirens, and also of the Chinese honeysuckle.

Mr. Carpenter exhibited a new variety of wheat from California, very productive. A field of one hundred acres produced 5000 bushels.

INSTITUTE OF REWARD.

Dr .David P. Holton presented sundry documents explaining a system for providing for the orphans of soldiers slain in the present war. A portion of the plan provides for the establishment of agricultural schools in the different sections of the country, which shall determine various disputed questions in the practice of agriculture and horticulture.

PRUNING—GRAFTING WAX.

Mr. Hite.—I have something to say to the members of the Farmers' Club to-day; and as it is the custom here to say as much as possible in a few words, I will proceed by proposing some information which I think will be of service to some one, inasmuch as the time is near at hand to practice pruning and grafting. It is my habit, generally, not to venture an opinion relating to horticulture, other than one founded upon my own practical experience.

To those who are willing to allow their own common sense, reasoning and reflection, to accompany their efforts, I address myself; for this art is so easily acquired that no one need say, that I cannot do this or that thing as some others do.

1st. I exhibit a specimen of grafting wax or mastic, which I have used alternately with other kinds commonly in use, and I find this the best of all others. And now I will tell you how it is made. The expense is within the means of every one. The combination of one hundred parts is arranged thus—twenty-eight parts of common pitch, twenty-eight parts of Burgundy pitch, sixteen parts beeswax, fourteen parts tallow, fourteen parts yellow ochre, 100.

The pitch is first put into an iron pot and placed over a fire of gradual heat, and when the pitch is melted, the tallow and beeswax are stirred into the pitch until the whole is melted, when the yellow ochre is gradually stirred in until it is well incorporated; I then take the pot from the fire and occasionally stir it until it is cool, when it may be formed into any shape suitable for use. It may be applied with a wooden spatula when softened by the warmth of the weather, and will remain where it is deposited and afford less harbor for insects than any other. This receipt was given to me sometime since, and on reading that most estimable work upon Arboriculture, by M. Debreuil, which I have recently obtained, I find this receipt given as the best in use among the cultivators of France.

I have another solution which I have conjured up myself some year since, for the preservation of the wounds made upon the ends of limbs at the time of pruning trees, an application of which renders the wood impervious to the action of the weather until it is completely healed over. It is made thus: Take a quantity of seed lac, or shellac, or equal parts of each, and place it in a kettle, or more properly so called, a water-bath, something like a common glue pot, and saturate the lac therein with a mixture of four parts water to one part of spirits of ammonia, (hartshorn) in quantity just enough to moisten it, and let the mixture stand three or four hours in a warm place; then place the pot over a fire adding hot water at the time to the mass as it is dissolving, stirring until it is melted. The water that is introduced in this way will decide the consistency which, when cool, ought to be like thick cream, or more like tar. The whole mass should be continually stirred from the commencement until it is taken from the fire and cooled. If it should not all be melted, or if it appears too thin, stir in a small quantity of pure spirits ammonia just before it is quite cool, and it will thicken it; then put it away in a bottle for use. It is applied with a small brush, when it will dry immediately and become impervious to water.

It is an admirable composition to suppress or smother the eggs or larvæ of insects which may be concealed in the fissures of the bark of trees, when applied as above.

Another method of preparing shellac, is to take one ounce of borax. dissolve it in hot water, place it in the water bath above stated, and then put therein five ounces of shellac, place it over the fire, stir until dissolved. It answers the same purpose as the above.

Mr. Chairman—as there has been so much said about pruning, here and elsewhere, what I might say upon the subject may not enlighten any one ; but I may say that the course I have been pursuing for a few years past, is clearly sustained by the work on Arboriculture, above mentioned. I have been so often laughed at by inexperienced culturists, that I have often felt a sort of diffidence in asserting what I thought to be the true mode of cultivating fruits, &c. Being so thoroughly sustained by those culturists whose talents are acknowledged as authority wherever known, I will now speak with some considerable degree of confidence of the course I am pursuing, as the only one that is calculated to end in favorable results.

Of course, I cannot occupy the time of the meeting at present, only to repeat briefly a few extracts from an essay upon the subject of pear culture, which I have submitted to the committee of the Farmers' Club, of the American Institute, for their approval or rejection, as they in their wisdom may decide. If it is approved, it may be published with the accompanying illustrations, which will combine all that I could say here in the course of the next three hours. But to the task first above mentioned, I mean to speak of winter pruning, properly so called ; to that which follows the great frosts and which precedes the first movements of vegetation—that is, towards the end of February. If we prune before the great frosts come, we expose the cutting to the air, to moisture, and to frost, long before the first movements of the sap, which should come to heal the wound, and it follows that the bud on the end of branches, is often destroyed.

The consequences are not less fatal if we practice the operation during the hard frosts; the instruments cut the frozen wood with difficulty; the incisions are torn and do not heal up; mortality ensues below the bud near the incision, and the bud is destroyed. If we wait till the budding commences, the inconveniences are still more grave; the sap from the roots has pervaded all the parts of the tree, and that which has been absorbed by the branches we remove, is lost. In pruning so late, we are liable to harm and break a large number of wood and flower buds. Lastly, the sap thrown back from the summit to the base, may tear the tubes and give place to gum. Pruning in February is especially important for the peach tree, whose buds, situated at the base of the fruit branches, are frequently dormant for want of the powerful action of the sap. By pruning early, the sap acts with force on the buds unfavorably situated, fixes their evolution, and leads also to the development of the latent buds on the old stem; thus we prevent the stripping of the trees.

Still, we may prune very late and even wait till the buds begin to grow long, when we operate on trees that are too vigorous, and cannot be made to fructify easily. A part of the action of the sap is then used to the benefit of the suppressed branches. It acts with less force on the reserved buds, and these take more easily the characteristics of fruit branches. We note an exception in favor of the southern climate, where the precocity of vegetation necessitates pruning before winter. If we had so many trees that we could not prune them all in February, rather than exceed this period, it would be preferable to anticipate it. Then we should cut before winter, the fruit branches only; then we should wait till February to cut the wood branches. In every case it will do to follow in pruning, the order of vegetation of the different species. Thus we should prune first the apricot, then the peach, the plum, the cherry, the pear, the apple, and lastly, the grape.

The operations of summer pruning, are practiced during the vegetation of the parts of the tree which are to receive it. To give these indication at this time, would prolong the time usually allotted during the hour appropriated to miscellaneous business.

Perhaps, however, it would not be amiss to say a word at this time about planting in connection with pruning.

CHOICE OF TREES.

If we take the pear tree already grafted in the nurseries, we select them healthy, strong, and of one year's graft, or of two years at the most. The older they are the less easy they take root again, and their growth is always less vigorous. They should not be pruned until the second year after they have been planted. Pruning them before that would only remove the greater number of their branches, and the quantity of leaves they should develope would be considerably diminished. Now, as these are the leaves which the roots engender, the latter will take but little development, and the bud whose vegetation the pruning is intended to benefit, will be poor and unhealthy, not fit to aid in forming the woodwork of the tree. On the contrary, if the pruning is postponed until the following year, the tree will take new roots, and when deprived of a part of its branches, the sap, abundantly furnished by the roots, reacts with force upon the growth of the reserved buds, and we will obtain in a single summer, branches longer than those of the two years' growth, in following the first operation. We now have a favorable opportunity of giving to the tree a desirable direction.

Mr. H. also exhibited specimens of the grafting wax heretofore described by him, and of the solution invented by himself for application to wounded limbs, to preserve the freshly cut surface from the action of the atmosphere.

SILK AND SILK WORMS.

Dr. Trimble read the following paper:

There seems a propriety in discussing the Textiles at this time. Passing events are disturbing all commercial values. The present demand for some of these fabrics is greatly in excess of the supply, and producers are anxiously watching prices. The farmers always want to know what to plant to most advantage. The war now in progress, should it last, will probably work mighty changes in agriculture, commerce and manufactures, as well as in "ideas." With sea-island cotton selling in this market for sixty cents per pound, and the common sort at twenty-five, you will find people sending for cotton seed to plant, and it will very likely be planted in places where it will produce almost nothing at best; and should the war end before the experiment be matured, the most bountiful crops would not pay expenses. The cotton producing latitudes of other parts of the world, will be stimulated to their utmost capacity; the growth of wool, flax, hemp, and even silk, will probably be greatly increased. I look upon it as a duty of this Club, and all similar institutions having in view the guiding of industry and enterprise, to advise caution against any great change in this respect.

The modern facilities for raising, equipping and transporting vast armies, are making wars much shorter than formerly, and the present is not likely to be an exception. But what the result of this war will be, no man can now tell. I see it stated in a leading southern paper, that the speedy establishment of the independence of the Confederacy is certain, and that the people of the North will then be their obsequious serfs, differing but little except in color, from their present slaves. *In such a contingency*, our employments will not be at our own option. This view of the case feels rather rough, although the same writer assures us that we shall be treated with great kindness—their type of manhood being of so high an order that they could not do otherwise. Others say that the Government must be re-established within its former limits "just as it was." Present signs indicate that such is the only object of those in power. If that is all, millions of men will be of the opinion, that the war will not have been worth its cost. I, for one, believe that the predisposing, exciting and proximate cause of this great rebellion, is human slavery; that the war is, in reality, a contest between free and forced labor. We, as farmers, are interested in it as a question affecting labor, in addition to the question of Government. A surgeon knows but little of his profession that attempts to heal a wound without first removing the cause. If this war can be made to blot human slavery with all its monstrous crimes, utterly out of existence, then it may end; but if it is to lead only to some arrangement, merely to patch over this foul and festering plague spot, then you will find this war will be "still beginning, never ending, still destroying."

I should say to all farmers at this time, make no radical change in your business, except to improve your lands. At present, there is an interregnumen in the reign of king cotton, his power for the time being is in the hands of a regency that has but little faith in the divine right of kings. With the opening of the cotton ports of our country, any unusual quantities of the other textile fabrics would not be likely to find a profitable market. Still, each will be wanted. Every one of them, but especially silk, will be always wanted.

If our cotton region should be opened to northern enterprise and free labor, without the danger of further political troubles, cotton would come down to the level of other agricultural productions, probably not higher than five cents per pound, and would be the cheapest of the textiles; the others then would be only used as necessities or luxuries. If all the men who deserve it should be hanged, there will still be a considerable demand for *hemp*. If there should be more wool than is required to make all the people comfortably warm in weather like this, we are still liable to be hungry—a very "unfortunate sensation," and recurring at very short intervals—then we can eat the sheep. The good matrons who have marriageable daughters, will always be found buying large quantities of house linen. But those daughters will have silk, no matter how much it may cost or how cheap cotton may be. Those of you who have noticed the ladies at the show windows of your silk stores in Broadway, or watched them seated at the counters where the samples are arranged in such tempting profusion; those of you who have seen, as I have, the look of intense satisfaction, the sparkling eyes, or heard the exclamations of delight, all such will agree with me that only dollars commensurate with their wants, are then required to make a silk bazaar, the highest type of paradise for woman on this side the stars. Talk about "beauty unadorned"—nonsense. We have beauties as fair as the fairest—as faultless as the Venus of Conova, but they would pout, and fret, and worry, till the house would become intolerable were silk dresses denied them. We have but little patience with the frivolous who think only of dress; but we have still less respect for the habitually careless. A becoming silk dress adds to the happiness and power of the young woman, and she knows it. The matron feels that a silk dress gives her dignity; the quakeress who has been taught to look upon plainness of apparel as almost a religious essential, will have her silks. They may be plain in color, almost to drab, but they must be of the best texture. The women know that there is no other clothing material so durable or so beautiful as silk. Silk they will have, and if we do not make it in our country, we must make something else to exchange for it. Here the word "must" comes in, and we may as well understand its full significance at once and make the best of it.

The experiment of making silk was once tried in our country to a very limited extent, but became involved so soon in so wild a speculation as to bring it into disrepute before it was fairly tested.

Except fig leaves and the skins of animals, silk is probably the oldest clothing material. Four thousand years ago it was in general use in China, but the period of its first introduction there is not known. The first introduction into Europe, was by a traveler concealing a few eggs of the silk worm in a hollow reed which he used as a cane, and bringing them to Constantinople. This was in the sixth century of our era, and previous to that time it was not there known to be the produce of a caterpillar. Silk is cultivated in all parts of China except the extreme north. The export from that country (China) in 1858, was 78,154 bales, or, 9,376,000 lbs. The power of export from that country is indefinite, but would seem to be inexhaustible. The work of feeding the worms and reeling the silk, is performed by the peasants. The domestic use of silk in that country (and all classes, even the poorest in some parts, use it freely,) is chiefly of the Tussah and other wild kinds. These wild kinds, as nearly as I am able to discover by an examination of their plates of butterflies, are similar to our four varieties of silk worms, producing large cocoons of a very strong fibre, but spun as tow would be, and not so easily reeled by the single thread as the cultivated variety.

Probably the silk worm lately imported by the Emperor of France, and now cultivated in Algeria to make clothing for his army, is a similar one. Such a worm of immense growth, is now found in the island of Madagascar; it is fed in the fields on a kind of pea and makes a cocoon of great size. Persian silk is considered poor, but is much used by the natives. That from Asia Minor is excellent. Syria, Cyprus, Crete, Tripoli and the Morea, are great silk growing countries. Poland and Prussia raise some, but inferior. England has tried it, but with little success.

The climate in which the culture of silk is attempted, should be mild, the soil light, with a hilly or even mountainous surface. The report of a French jury on the subject of silk, in 1855, makes the following remark: "Every day shows more and more the advantages to the "health of the silk worm" in the breaking up of the large establishments for breeding them—that is, let them be raised by the peasants in a small way, but the larger the establishment for reeling the better."

Silk worms have been fed upon lettuce and will live, but are not healthy. The pulsations known by the motions of the sections of the body of the worm, will run down when fed on this plant almost one-half—that is from about forty-five to twenty-five per minute.

Mulberry trees do best in a dry region, and what is wonderful, their leaves are scarcely sought after by any other class of caterpillars except the silk worms. The oak has some seventy varieties of insect depredators, the apple thirty or forty.

The mulberry tree will bear to be stripped of its leaves every year for ages. There are four varieties of it cultivated in different parts of the world for the feeding of silk worms.

One hundred silk worms at birth weigh one grain, and after the fifth or last moult, the one hundred will weigh 9,500 grains. It requires thirty days for all these moultings.

Our native silk worms have but one generation a year; they live through our winters in their cocoons in the crysalis state; they are all moths, that is, as butterflys, that only fly at night. They have the characteristics of night flying butterflys, without the little knobs on the ends of their antennæ. In hot countries, several generations of the siik worm are produced in each year. In Madras, they have eight or ten; the butterfly itself, the perfected insect, living but a single day—those beautiful wings, each containing 100,000 feathers, to be expanded for so brief a period, and that only at night.

We have, as natives of our own country, four silk making caterpillars:

The Eecropia, found on apple, cherry or plum trees.

The Polypheme, found on oak, elm or linden trees.

The Luna, found on walnut or hickory trees.

The Promethea, found on sassafras trees.

These nocturnal beauties might probably be considered the most useful to man of all the race of insects, for they are not to any extent injurious to vegetation, and their abundance in any country might be rendered an important resource of wealth and luxury.

Large sections of many of our States, and especially those parts of the Carolinas and Georgia bordering on the mountains, would seem to be exactly adapted to the growth of the mulberry and the cultivation of silk.

Some gentlemen here tell us that the cultivation of fruit is more profitable; that is certainly true in the vicinity of such markets as this, provided you have the knowledge and the perseverance to conquer the insect enemies that are now so fearfully threatening that business. Others say that grain can be raised to more advantage; that, however, may become a question of transportation. Corn is now raised in portions of our country where it is used as fuel. The eighty cents per bushel that it would bring in the New York market, would be but little more than enough to pay the cost of bringing the fifty-eight lbs. here. Can any one of you tell what would be the value of fifty-eight lbs. of cocoons, or of the reeled silk, in this market, and which would cost but little more for transportation than eighty cents worth of corn?

But in many sections of country where the land is uneven and the soil light, fruits and grain can hardly be raised to advantage even if convenient to a market. The great, rich West, has such boundless advantages. These higher lands can be of no value if distant from cheap transportation, unless devoted to the cultivation of such a product as silk; and it would appear as almost a providential arrangement, that just such sections are exactly adapted both to the growth of the mulberry tree and the health of the silk worm.

Now, if in the course of human events, king cotton should be dethroned by some *insect regicide*, which has several times been threatened, and this Yankee nation be compelled to engage in the growth of silk, we certainly seem to have everything that can be required.

Much is said about the power of cotton. I once overheard a conversation on this subject, between two very excited individuals. One said, "what would you do if we would not let you have our cotton?" The other replied, "what would you do if we would'nt TAKE your cotton?" A third party stepped up and blandly said, let me compromise this matter. To the first one he quietly said—if you raise cotton and want to sell, I'll buy it of you and pay the cash. To the other he says—if you manufacture cotton and want some, I'll supply your spindles and give you credit. This third party is a merchant—that is his business—

he does it for the profit, *and never gets angry.* The men who supply New York with flour might combine and lock up the bread stuffs—and some of you might be hungry for a while. The distillers *might* refuse to sell their whisky, and a great many voters would suffer dreadfully for a time—but the commission men would soon find ways of unlocking these storehouses for a profit. The idea of any one agricultural product ruling the political concerns of the world, is a delusion, and the merchant knows it. Cotton is an important product undoubtedly; so is wool; but where does *silk* stand in this connection? For thousands of years, millions of people have been cultivating silk worms in Asia, 800,000 people in what was ancient Media, now Eastern Russia, find happy employment in the same pursuit. In Italy, France, and even in England, thousands upon thousands would have to change their employment or have nothing to do, if it were not for the silk worms. In 1840, it was ascertained that the city of Lyons alone, consumed in her manufactories 2,205,714 lbs. of raw silk. It takes four cocoons to the grain, making 4,292,400,000 caterpillars necessary to make it; and if all these threads were united in one and reeled on the earth at the equator, it would form a silken cable round the world of 52,505 strans. The annual value of the trade of Europe in silk, is £55,605,000 sterling, or about two hundred sixty millions of dollars in our currency.

Suppose some calamity should happen to the caterpillars and there would be no more in the world, some people would congratulate themselves that there were no more of the "great ugly worms," and the foliage of some of our trees would be more beautiful; soon, however, we should begin to miss the butterfly; then we should wonder what had become of the singing birds of summer; then we should read about sufferings in the manufacturing districts of England and France—and then of starvation amongst millions of people in the far East. Then commerce would be greatly deranged; then this great city of yours, "the resort and mart of all the earth," would be fearfully disturbed. Stewart's would cease to be the centre of so much attraction; Flora McFlimsey would be utterly disconsolate, and would have a right to complain that she had "nothing to wear." Young men's hearts would cease to bang against their ribs at the rustling of approaching silk; and then what would we do when wedding dresses were wanted? No; the cotton States might go out and take their cotton; and, what they are now finding a great deal harder to do, might stay out and keep their cotton, but they cannot make cotton king; the silk worm has something to say also about the ruling of this world.

New subject.—The subjects selected for consideration at the next meeting, were "pruning" and "hotbeds."

February 17, 1862.

Mr. Wm. S. Carpenter in the chair.

EXPERIMENTAL FARM.

Dr. Holton read a paper upon the formation of a Statistical Bureau by the government, and the establishment of a national experimental farm, accompanied by a series of resolutions.

Prof. Renwick moved to refer the whole subject to the American Institute, it being beyond the scope of this Club.

The Chairman feared that nothing would be gained by such a reference. Many efforts had already been made without success, for some progress in this direction. If such a school of agriculture could be established, great good would grow out of it; and New York is eminently fitted for its location.

The motion to refer was agreed to.

SWEET POTATOES.

Mr. Robinson read a letter from M. M. Murray, of Loveland, Ohio, calling attention to the importance of a more extended cultivation of the sweet potato at the North, especially in the vicinity of cities, and offering to furnish an essay upon its cultivation, and specimens of sweet Nansemonds grown in the latitude of 39½ deg. Sweet potatoes are now raised as far north as Chicago and Detroit,

On motion, Mr. Robinson was requested to write, accepting the offer.

Dr. Trimble.—The sweet potato observes the laws of latitude and of soil. In the latitude of Philadelphia, which is 40 deg., in consequence of the soil being peculiarly adapted to it, it is cultivated with success; but not so successfully as two or three degrees further south. In latitude 42½ deg., I had a soil peculiarly adapted to it—a rich sand with a warm exposure; and by starting the plants in hotbeds, I was able to raise them. The roots were large, but they were not good. They necessarily remained so late in the season, that like melons ripened in the cold, they were more or less insipid.

The Chairman said that he had supposed that sweet potatoes would not thrive in this latitude; but he had become convinced that it was a mistake. He had seen them growing twenty-seven miles north of New York, in different soils. It would be an important point, if the sweet potato could be made earlier by a judicious selection of seed. He had eaten very fine Nansemond potatoes, grown upon Staten Island, upon a heavy clay soil.

Rev. Mr. Weaver, of Fordham, said that a neighbor had given him some sweet potatoes, and urged him to plant them. He did so, selecting a light soil, and in the fall had an abundant crop.

Mr. Cavenach expressed the opinion that sweet potatoes could be successfully grown upon Long Island. A neighbor, in Brooklyn, plants them in a light clay soil, which has been filled in three or four feet deep, and has an astonishing yield.

Prof. Renwick said that sweet potatoes have been grown with success for many years as far north as 40 deg. 50. min.

GRAPE CULTURE.

Mr. Robinson read a letter from G. P. Norris, of Wilmington, Del., offering to prepare a paper upon the culture of foreign grapes under cheap glass structures. The offer was accepted by the Club.

The Chairman said that public opinion had very much changed with regard to the Concord grape, which seems to have improved in quality. The Hartford Prolific would be a popular market grape, if the berries did not rattle from the bunch, being a week in advance of the Concord in ripening. The renewal system of pruning he had used with success, and it seemed to have improved the Hartford Prolific in respect to the hanging on of the berries.

Mr. John G. Bergen.—I have twenty or thirty varieties of grapes, and I am satisfied that no general rule will apply to pruning all kinds of grape vines. The Isabella and Catawba are rampant growers; but there are other kinds that do not make one-third of their growth. The same rule could not be equally well adapted to both classes. He had found the fruit of the Concord equal to that of the Isabella in quality. The public will probably be disappointed in the Delaware, for it is too small to be an attractive grape in the market.

Dr. Holton said that in the neighborhood of Paris the vines are usually grown about the height of the shoulder. In Italy he had seen them grown upon mulberry trees, which were cultivated to feed the silkworm, thus affording a double crop from the same ground. At Fontainbleau there is a grapevine called the King's vine, extending upon a wall for half a mile, the branches falling to the ground and taking root at intervals.

Prof. Nash said that in France the stakes are placed as closely as we plant corn. Although they are not more than four feet high, yet the vines may be trained to as great a length as upon any other system.

FLAX CULTURE.

Mr. Robinson read a letter from D. Wellman, Jr., of Watertown, Conn., in which he says:

"It is high time we at the north should look about and see if there is not a substitute for cotton, which will answer our purpose equally well, or better; and if there is, use it instead of cotton, and let the south and the world know that we are not dependent on them to furnish us with material to clothe us.

"There seems to be no difficulty imagined in *growing* flax. The only question is, can it be manufactured into cloth at an expense which will bring it within the reach of the poorer classes? That it can be manufactured by machinery there need be no doubt, and this will operate favorably to the consumer.

"Mr. Dawson, a manufacturer of woolen cloth in Waterbury, Conn., says that flax can be made into cloth by machinery to advantage; and I am of opinion that much, if not all, the productive labor preparatory to the spindle and loom can be very much facilitated by Yankee invention.

"What hinders us from making the experiment?"

CULTIVATION OF SORGHUM.

Mr. Robinson read a letter from C. M. L. Andrus, of Somerset, Mich., who says that he procured in 1860 an iron mill, and that season run some ten barrels of excellent syrup, which induced the planting of so much the past season, that I was unable to run for all that applied, being obliged to send many away. We run, however, between twenty-five and thirty barrels of syrup, most of it of a quality that sells readily for seventy-five cents per gallon by the barrel. None that have it would be willing to exchange it for the best southern syrup to be had here in the market. I kept an account of all that knew how many rods they had planted, and the average was over one gallon per rod, or 160 galls. per acre. Some was at the rate of 212 galls. per acre, and of a quality that has granulated. I think there is an advantage in cutting off the tops very low down. I cut my own as low as the third and fourth joints from the top, and although run as late as November 12th, after it had been frozen hard many times, and thought to be spoiled, it made the best syrup that we have run this season, being quite thick with sugar, and as pleasant as the best sugar-house syrup, and yielded, after cutting so low, at the rate of 170 gallons per acre, more than making up in quality what is lost in quantity. From my experience with sorghum, I am satisfied that ten acres of suitable land planted to cane, in an ordinary season, will produce more real profit than one hundred acres, farmed as most farmers manage in the State of Michigan.

Mr. R. stated that it had now been demonstrated that the whole west can be furnished with all the sugar they require from their own farms, and at a cheap rate, while the sorghum will be a paying crop to the farmer.

Dr. Trimble remarked that the cultivation of sugar cane, or sorghum, depends in a great measure upon the expense of transportation. Here land is too high priced, and sugar can be too easily obtained from other sources, for sorghum to be a profitable crop; but in the west, where the cost of transportation is so great, and land costs far less, it seems to be worthy of the attention of the farmer.

Dr. Holton said that sorghum had been raised successfully for several years as far north as Milwaukie. The great difficulty at first was the want of appliances for pressing out the juice. This difficulty was now overcome.

NEW PLOW.

On motion, a committee, consisting of Messrs. Doughty, Robinson and John G. Bergen, was appointed to examine and report upon Messrs. Collins & Co.'s steel plows.

FRAUDS.

Dr. Trimble offered the following resolution:

Resolved, That a committee of three be appointed to inquire into and report upon the frauds of this city, practiced especially upon the farmers and other visitors from the country.

Mr. Robinson.—I move to amend so as to include the frauds practiced by the farmers upon the people in the city; and, particularly, in putting twenty-five per cent. of wood upon hay. I have known a bale of hay weighing two hundred and fifty pounds, with seventy pounds of wood upon it, which was not even fit to burn.

The Chairman stated that there are establishments for preparing hay for the market, which make no charge to the farmer for putting it in bales, deriving their pay from the wood which they substituted; that is, furnishing the farmer bales weighing as much as the loose hay which they received.

Prof. Renwick suggested that the committee should consider the fruit baskets used by the farmers.

Mr. Robinson suggested that they consider, also, the vegetable baskets, called bushels, but holding only five-eighths of a bushel.

Mr. Cavanach asked that the committee should investigate manures, superphosphates, guanos, &c., and expose the frauds there.

The resolution was adopted, and Messrs. Trimble, Carpenter and Gale were appointed as the committee.

MUSHROOMS.

Mr. Robinson read the following extract from "The London Gardener's Chronicle:"

"At a recent sitting of the French Academy, November 2d, M. Chevreuil produced a magnificent bunch of esculent mushrooms, from the grounds of Dr. Labordette. His method of cultivating is thus described: He first develops the mushrooms by sowing spores on a pane of glass covered with wet sand. Then he selects the most vigorous individuals from among them, and sows (or plants) their mycelium in a cellar in a damp soil, consisting of gardeners' mould, covered with a layer of sand and gravel two inches thick, and another layer of rubbish from demolitions about an inch deep. The bed thus prepared is watered with a solution of two grammes (one gramme is equal to 15.44 grains Troy) of nitrate of potash per square meter (1.1960 square yard), and in about six days the mushrooms grow to an enormous size."

FRUIT ORNAMENTATION.

Mr. Robinson read the following extract from the "Scientific American":

"At Vienna, for some time past, fruit dealers have sold peaches, pears, apples, apricots, &c., ornamented with armorial bearings, designs, initials, names, &c. The impression of these things is effected in a very simple manner. A fine fruit is selected at the moment it is beginning to ripen; that is, to take a red color, and paper in which the designs are neatly cut out is affixed. After awhile the envelope is removed, and the part of the fruit which has been covered is brilliantly white. By this invention the producers of fruit may realize quite large sums."

Mr. Hite.—I have seen this practiced, and it is capable of producing very pretty results.

The Chairman.—The same thing may be done by scratching the surface. I have often marked melons.

Mr. Cavenach.—There is danger of injuring melons or fruit by scratching. I would not recommend it.

APPLES.

The Chairman exhibited the "Well apple," grown by Morris Baisely, of Westchester, a medium sized yellow apple, which will keep a year, and several other apples, among which was the Northern Spy, which he considered a valuable apple, having changed his opinion since last year.

New subjects.—The subjects of "Sorghum" and "Sweet Potatoes" were selected for consideration at the next meeting.

Adjourned.

February 24, 1862.

Prof. J. A. Nash, of Brooklyn, L. I., in the chair.

CULTIVATION OF FLAX.

Mr. Carpenter exhibited specimens of flax and of hemp, prepared by Mr. Sanford's machine, heretofore described, and read extracts from the directions for the proper management of the flax crop, compiled by the committee of the Society for the promotion and improvement of the growth of flax in Ireland.

Preparation of the Soil.

One of the points of the greatest importance in the culture of flax, is by thorough draining, and by careful and repeated cleansing of the land from weeds, to place it in the finest, deepest and cleanest state. This will make room for the roots to penetrate, which they will often do to a depth equal to one-half the length of the stem above ground.

After wheat, one plowing may be sufficient on light, friable loam, but two plowings are better; and on stiff soils three are advisable—one immediately after harvest, across the ridges, and two in spring, so as to be ready for sowing in the first or second week of April. Much will, of course, depend on the nature of the soil, and the knowledge and experience of the farmer. The land should be so well drained and subsoiled, that it can be sown in flats, which will give more even and much better crops. But until the system of thorough draining be general, it will be advisable to plow early in autumn, to the depth of six or eight inches. Throw the land into ridges, that it may receive the frost and air, and make surface drains to carry off the rains of winter. Plow again in spring, three or four inches deep, so as to preserve the winter surface for the roots of the flax. The spring plowing should be given some time before sowing, to allow any seeds of weeds in the land to vegetate, and the harrowing in of the flax seed will likely kill them, and save a great deal of after weeding. Following the last harrowing, it is necessary to roll, to give an even surface and consolidate the land, breaking up this again with a short-toothed or seed-harrow, before sowing, which should be up and down, not across the ridges, or anglewise. These operations can be varied by any skillful farmer to suit peculiar soils or extraordinary seasons. The object is to have clean, fine soil, as like as possible to what a garden soil should be.

Rotations recommended by a gentleman of considerable experience in the culture of flax.

Average soils:

1. Grass.
2. Oats.
3. Potatoes or turnips.
4. Wheat.
5. Flax.
6. Clover hay.

Poor soils:

1. Grass.
2. Oats.
3. Potatoes.
4. Flax.
5. Hay.

Sowing.

The seed best adapted for the generality of soils is Riga, although Dutch has been used in many districts of the country for a series of years with perfect success, and generally produces a finer fibre, but not so heavy a crop as Riga. In buying seed, select it plump, shining and heavy, and of the best brands, from a respectable merchant. Sift it clear of all the seeds of weeds, which will save a great deal of after trouble when the crop is growing. This may be done by farmers, and through a wire sieve, twelve bars to the inch. Home-saved seed has produced excellent crops, yet it will be best, in most cases, to use the seed which is saved at home for feeding, or to sell it for the oil mills. The proportion of seed may be stated at one Riga barrel, or three and a half imperial bushels to the Irish or plantation acre; and so on in proportion to the Scotch or Cunningham, and the English or Statute acre. It is better to sow rather too thick than too thin, as, with thick sowing, the stem grows tall and straight, with only one or two seed capsules at the top; and the fibre is found greatly superior in fineness and length to that produced from thin-sown flax, which grows coarse and branches out, producing much seed, but a very inferior quality of fibre. The ground being pulverized and well cleaned, roll and sow. If it has been laid off without ridges, it should be marked off in divisions, eight to ten feet broad, in order to give an equable supply of seed. After sowing, which should be done by a very skillful person, as the seed is exceedingly slippery, and apt to glide unevenly from the hand, cover with a seed harrow, going twice over it—once up and down, and once across or anglewise, as this makes it more equally spread, and avoids the small drills made by the teeth of the harrow. Finish with the roller, which will leave the seed covered about an inch—the proper depth. The ridges should be very little raised in the centre, when the ground is ready for the seed, otherwise the crop will not ripen evenly; and when land is properly drained there should be no ridges. Rolling the ground after sowing is very advisable, care being taken not to roll when the ground is so wet that the earth adheres to the roller.

Weeding.

If attention has been paid to cleaning the seed and the soil, few weeds will appear; but if there be any, they must be carefully pulled. It is done in Belgium by women and children, who, with coarse cloths round their knees, creep along on all-fours. This injures the young plant less than walking over it (which, if done, should be by persons whose shoes are not filled with nails). They should work, also, facing the wind, so that the plants laid flat by the pressure may be blown up again, or thus be assisted to regain their upright position. The tender plant, pressed one way, soon recovers; but, if twisted or flattened by careless weeders, it seldom rises again. The weeding should be done before the flax exceeds six inches in height.

Pulling.

The time when flax should be pulled is a point of much nicety to determine. The fibre is in the best state before the seed is quite ripe. If pulled too soon, although the fibre is fine, the great waste in scutching and hackling renders it unprofitable; and if pulled too late, the additional weight does not compensate for the coarseness of the fibre. It may be stated, that the best time for pulling is when the seeds are beginning to change from a green to a pale brown color, and the stalk to become yellow for about two-thirds of its height from the ground. When any of the crop is lying and suffering from wet, it should be pulled as soon as possible, and kept by itself. So long as the ground is undrained, and imperfectly leveled before sowing, the flax will be found of different lengths. In such cases, pull each length separately, and, if possible, keep it separate in the pool. Where there is much second growth the flax should be caught by the puller just underneath the bolls, which will leave the short stalks behind. If the latter be few, it is best not to pull them at all, as the loss from mixture and discoloration by weeds would counterbalance the profit. If the ground has been thorough-drained, and laid out evenly, the flax will likely be all of the same length. It is most essential to take time and care to keep the flax even, like a brush, at the root ends. This increases the value to the spinner, and, of course, to the grower, who will be amply repaid by an additional price for his extra trouble. Let the handfuls of pulled flax be laid across each other diagonally, to be ready for the

Rippling.

Rippling should be carried on at the same time, and in the same field with the pulling. If the only advantage to be derived from rippling was the comparative ease with which rippled flax is handled, the practice ought to be adopted; but, besides this, the seed is a very valuable part of the crop, either for the oil mill, or for feeding purposes at home. The apparatus is very simple. The ripple consists of a row of iron teeth screwed into a block of wood. This may be made by any handy blacksmith.* It is to be taken to the field, where the flax

* The best ripples are made of half-inch square rods of iron, placed with the angles of iron next the ripplers, 3-16ths of an inch asunder at the bottom, half an inch at the top, and 18 inches long, to allow a sufficient spring, and save much breaking of flax. The points should begin to taper three inches from the top.

is being pulled, and screwed down to the centre of a nine feet plank, resting on two stools. The ripplers may either stand or sit astride at opposite ends. They should be at such a distance from the comb as to permit of their striking it properly and alternately. A winnowing sheet must be placed under them, to receive the bolls as they are rippled off; and then the ripplers are ready to receive the flax just pulled, the handfuls being placed diagonally, and bound up in a sheaf. The sheaf is laid down at the right hand of the rippler and untied. He takes a handful with one hand, about six inches from the root, and a little nearer the top with the other. He spreads the top of the handful like a fan, draws the one-half of it through the comb, and the other half past the side; and, by a half-turn of the wrist, the same operation is repeated with the rest of the bunch.

Some, however, prefer rippling without turning the hand, giving the flax one or two pulls through, according to the quantity of bolls. The flax can often be rippled without being passed more than once through the comb. He then lays the handfuls down at his left side, *each handful* crossing the other, when the sheaf should be carefully tied up and removed. The object of crossing the handfuls so carefully, after rippling, when tying up the beets for the steep, is that they will part freely from each other when they are taken to spread out on the grass, and not interlock and be put out of their even order, as would otherwise be the case. If the weather be fine, the bolls should be kept in the field, spread on winnow-cloths, or other contrivance for drying; and if turned from time to time they will soon dry. Passing the bolls first through a coarse riddle, and afterwards through fanners, to remove straws and leaves, will facilitate the drying. If the weather be moist, they should be taken in-doors, and spread out thinly and evenly on a barn-floor, or on a loft, leaving windows and doors open to allow a thorough current of air, and turned twice a day. When nearly dry, they may be taken to a corn kiln (taking care not to raise it above summer heat) and carefully turned until no moisture remains. By the above plan of *slow* drying the seed has time to imbibe all the juices that remain in the husk, and to become perfectly ripe. If it be taken at once from the field, and dried *hurriedly* on the kiln, these juices will be burned up, and the seed will become shrivelled and parched, little nutritious matter remaining. In fine seasons the bolls should always be dried in the open air, the seed thrashed out, and the heaviest and plumpest used for sowing or crushing. The light seeds and chaff form most wholesome and nutritious feeding for cattle. Flax ought not to be allowed to stand in the field, if possible, even the second day; it should be rippled as soon as pulled.

The Courtrai System.

This mode of preparation requires to be very carefully executed, as inattention will reduce the value of the straw, and yield inferior fibre. When made up for drying in large sheaves, the straw is much injured, the outside stalks being much discolored by the heat of the sun before the inside of the sheaf is dry. The flax stems should be put together in bunches, about one-half larger than a man can grasp in one hand, spread a little, and laid on the ground in rows after each puller; the bunches laid with tops and roots alternately, which prevents the seed-bolls from sticking to each other in lifting. It should be stooked as soon after pulling as possible, and never allowed to remain over night unstooked, except in settled weather. The stooking should go on at the same time as the pulling, as, if flax is allowed to get rain while on the ground, its color is injured. A well-trained stooker will put up the produce of a statute acre or more, in good order, in a day, with two boys or girls to hand him the bunches. The flax should be handed with the tops to the stooker. The handfuls, as pulled, are set up, resting against each other—the root ends spread well out, and the tops joining like the letter A. The stooks are made eight to ten feet long, and a short strap keeps the ends firm. The stooks should be very narrow on the top, and thinly put up, so that they may get the full benefit of the weather. In six or eight days, at most, after being pulled, the flax should be ready for tying up in sheaves of the size of corn sheaves. It is then ricked, and allowed to stand in the field until the seed is dry enough for stacking. To build the rick, lay two poles parallel on the ground, about a foot asunder, with a strong upright pole at each end. The flax is then built, the length of a sheaf in thickness or breadth. The bottom poles should be laid north and south, so that the sun shall get at both sides of the rick during the day. In building, the sheaves should be laid tops and roots alternately, built seven to eight feet high, and on the top a single row of sheaves lengthwise, or across the others, and then another row as before, but with the tops all the same way, which gives a slope to throw off rain; finish by putting on the top a little straw tied with a rope. In this way, if properly built, it will stand secure for months, or it can be put in a barn, if preferred: in either case, the seed is to be taken off during the winter, and the flax steeped in the following May.

Mr. Carpenter proceeded to remark that as the seed will pay for all the expense of cultivating the flax, and as the seed will be good when the bolls begin to turn brown while the fibre will be nearly as good, it is important in this country that we should be able to use both.

The Chairman called attention to the fact that the Sanford machine lays the fibres remarkably straight and parallel.

The Chairman.—I do not believe that flax culture will ever obtain in this country unless we can make both fibre and seed available.

MAKING OF VINEGAR.

Mr. Robinson read a letter of inquiry upon making vinegar, stating that two millions of dollars annually are spent in this country in the manufacture of vinegar.

Mr. Fuller.—I have some cider which has been under the process for a year and a half, and it is not vinegar yet.

Prof. Renwick.—Twenty-five years ago vinegar was made in a week or two, from molasses and water, and no doubt is still so made. The mixture was fermented by the action of yeast into a weak vinous liquor, of which large surfaces were exposed to the air, by passing it through vessels filled with shavings.

Mr. Robinson.—The writer of this letter tried filtering through shavings without success. It remains sweet yet.

Mr. Pardee.—I never had any difficulty in making vinegar rapidly. I put in one-fourth water, and a little mother of vinegar if I could get it, and then took a few strips of stout brown paper and soaked them a day or two in molasses, and dipped them into the bunghole for a nucleus for the mother to form upon. I do not think I ever used any that had been less than two months preparing in a warm chamber. After the vinegar was once formed, I would draw off perhaps a barrel a month, filling up the casks with fresh cider, which would become good vinegar in a few days, and continued to do this for five or six years. I learn from Wells & Provost, who furnish vinegar to the government, that they have a method of manufacturing it by a chemical process, in a week or ten days. It is not made from cider—and they claim that it is better than cider vinegar, because it is free from animalculæ.

Mr. Carpenter.—A neighbor of mine who has made a fortune from manufacturing cider vinegar, keeps his stock continually about the same by drawing off five gallons of vinegar from each hogshead every week, and filling up with new cider. That converts cider into vinegar fast enough to be profitable.

Mr. Robinson.—The trouble is to know how to begin.

Dr. Trimble.—The making of vinegar might very properly come under the supervision of the committee on frauds. I have understood that some establishments make it from the sawdust of hemlock logs. Some chemical composition may be discovered some day that will make good vinegar; but I do not know that it has been done yet.

Prof. Renwick.—Much better vinegar has been made from hemlock sawdust, or from the sawdust of any wood, than can be made in any other way. By distillation, we obtain pyroligneous acid, from which, by a well known chemical process, acetic acid is obtained. That is diluted with 15-16ths of water, and flavored with anything which may be desired, and makes a good vinegar, which is entirely free from animalculæ. But I believe in the United States it costs more than cider vinegar.

Mr. Carpenter.—A neighbor of mine states that the decayed flowers of the hollyhock will convert cider into vinegar.

Mr. John G. Bergen.—If the apples are ground for cider before the weather is too cold, and if a small quantity of the cider, with a little pomace at the bottom, is left in the tub, that will become vinegar from exposure to the air. There is a starting point, and that can be used to make vinegar of the rest.

Mr. Hite.—I had the same trouble that Mr. Fuller has had; but I put it out last summer in the sun and it turned to vinegar.

Mr. Fuller.—Mine has been in the sun. The difficulty was that it was too strong.

TIME OF PRUNING.

Mr. A. M. Powell stated that he had five hundred dwarf pear trees in Columbia county, and inquired at what time they should be headed in?

Mr. Fuller.—I should say, do it immediately. If you wait until the sap starts, they are very apt to bleed a little.

Dr. Trimble.—Suppose there should be very cold weather after it is done?

Mr. Fuller.—I do not think it would hurt them. I should cut them off at any time in the winter. When we cut early we do not trim quite so far down. We leave an inch or so above the bud.

Mr. Powell.—Do the wounds heal over as readily as if cut later ?

Mr. Fuller.—It does not heal over ; it only dries up the pores so that there shall be no escape of the fluid of the plant. It would do no harm to cover the wounds with shellac; but I do not know that it would do any good.

Mr. Powell.—Some of my friends say that if cut now there will be a decayed centre, which there would not be if the pruning were deferred until the sap commenced to flow freely.

Mr. Fuller.—I did not refer to cutting off anything more than a year old, because large limbs should never be cut from a tree excepting in extreme cases. I referred merely to cutting back last year's growth.

Mr. Robinson.—But suppose that a man has not pursued the right course in the beginning, what then? Every man is not a nurseryman.

Mr. Fuller.—I would cut off those large limbs the moment I waked up to the belief they should come off.

Mr. John G. Bergen.—I should cut off large limbs in the summer; I think they will heal up better.

Mr. Carpenter.—My experience has been that in cutting off large limbs in the winter some of my trees died from the freezing and opening of the wound. I have trimmed trees when in blossom, but there was then too great a flow of sap, which would run out and poison the new wood. I think the best time is the latter part of June or in July, when the sap is a little thicker. The last year's growth I would cut at any time.

Mr. Robinson.—I have found the wounds to heal over best upon apple trees, when the trees were in full bearing and the apples were half grown. If you thus cut away part of the fruit, the same vigor that would have gone into the limb to perfect the fruit, will go to heal the wound.

Mr. Fuller.—That may do if it does not cause the tree to throw out a late fall growth which cannot ripen. I suppose that the time between the spring and fall growth in the summer, is better on the whole than any other time.

Mr. Hite.—If I had a large limb to cut away, I would cut it in the winter a foot longer than I intended to leave it; and in the summer I would cut away the rest and put on a little mastic to protect it.

Mr. Robinson.—That is a bad doctrine, for those spurs would never be cut away.

The Chairman.—If large limbs are cut off in winter, there is more external injury to the tree; but if you cut them in the summer I think there is an internal disease, which, in its ultimate effect, is still worse. May we not lay it down as almost a universal rule, not to cut off large limbs? Even if you buy a place which your predecessor has neglected, is there not a better way?

Mr. Carpenter.—I think it would be better to trim off the small shoots and leave the large limb.

THE PEACH.

Dr. Trimble called attention to the failure of the peach from the yellows. He suspected the yellows to be a disease originating from the ravages of the peach worm. If so, it might be necessary to change the stock in order to obtain healthy trees.

Mr. Carpenter attributed the disease to planting the peach upon exhausted soils, or in not properly supplying it with nutriment.

Prof. Mapes attributed it to the use of putrescent manures. It is essential to the healthiness of the tree that it should be rightly planted, and that it should be well cultivated.

Mr. Smith, from Connecticut, said that he was convinced from his own experience, that the yellows may be communicated from one tree to another while they are in blossom. A tree, therefore, afflicted with the yellows, should not again be allowed to blossom near other trees. There had been a secret method of curing the yellows communicated to him by the inventor, and referred some time since to a committee of this Club. But the inventor having since died, the matter did not come before them.

NEW FRUIT BASKET.

Mr. Robinson called attention to specimens of quart fruit baskets, sent by the maker, Mr. Henry Mellish, of Walpole, N. H., who furnished them for $2 per gross. Thes are cheap enough to go with the fruit.

Subject for discussion.—The subjects, "Sweet Potatoes," and "Sorghum" were continued.

Adjourned

March 3, 1862.

Mr. W. S. Carpenter in the chair.

SWEET POTATOES.

Mr. Robinson distributed specimens of Nansemond sweet potatoes, received from M. M. Murray, of Loveland, Ohio, and read the article prepared by Mr. Murray, by invitation of the Club, upon the cultivation of this potato:

To the Members of the American Institute Farmers' Club:

Sirs: Allow me to present for your consideration the propriety of commending a more extended cultivation of the sweet potato at the north. Evidences of its successful cultivation have been received by me from almost all the northern States, for several years past; and those who have once ventured a trial, have generally continued to grow them. I see not why the markets of our northern cities may not be fully supplied from northern soil. The crop certainly has proved one of the most profitable wherever tried.

The soil selected for growing them should, in all cases, be dry-drained, either naturally or artificially; and if a southern slope or exposure can be had, all the better. The crop is rarely injured by drouth; in fact, it succeeds better in a dry season. In tilth, sweet potatoes need a condition of soil suitable for growing a good corn crop, and two to three bushels will thus be grown where but one of corn would grow. Often a greater difference of yield in favor of the sweet potato is obtained.

The tubers, or seed potatoes, have to be sprouted in a hot-bed. From the 1st to the 15th of April is the proper time to put them sprouting, or from four to five weeks before you wish to set the plants in the field. If the soil is moist in the ridge at the time of planting, no water is required, but the soil must be pressed quite hard against the roots of the plant. Ridges to plant on should be made by throwing two heavy furrows together with a plow, or on a small scale may be hoed up by hand. This work should be done when the surface of the soil is moist. Three and a half feet apart is a proper distance for ridges--plants every fifteen inches on the ridge. To make the most of the plants, break the ridges every two feet and hoe up into conical hills, putting one plant in each. One barrel of seed sweet potatoes, properly sprouted, will furnish plants enough for an acre, often more, and cost $5. Those choosing to obtain plants ready grown can estimate 6,000 per acre for hills, and from 8,000 to 10,000 for ridges, costing $1.50 per thousand. The plants can be shipped very great distances with entire safety. Plant as soon as safe from frost, or from May 15th until June 15th. Commence cultivating about ten days after planting. Use an adjustable cultivator between the ridges, and follow with a shovel plow to keep them in shape, finishing with a hoe on top of the ridge and around the plant. Two or three dressings of this kind at intervals of two weeks or more will be needed. Soon after the vines commence running, they will cover the ground and take care of themselves, when they may be left undisturbed until digging time.

The Yellow Nansemond and Kentucky Early Red are the only varieties that I can commend for general cultivation. Samples of these varieties I forward for your inspection. More ample directions for cultivation, including preparation of hot-bed and sprouting the sweet potato, furnished gratuitously by addressing

M. M. MURRAY,
Loveland, Clermont county, Ohio.

DIRECTIONS FOR THE CULTIVATION AND PRESERVATION OF THE SWEET POTATO.

Directions for keeping Sweet Potatoes.—To keep the sweet potato for use through the winter, or for seed, requires much care and experience. A thing that can hardly be told in all its particulars. One great requisite is to have the potatoes gathered before they are injured by frost, or by remaining in cold soil, after the vines are killed, and cease to keep the tubers in growing condition. Another very important item is to have them carefully handled. Handle like eggs. It looks tedious, but it will pay. Rough handling surely will not. If they are dry when brought from the field, they may be put up the following day; if moist, they should be allowed to dry twenty-four hours or so before putting up. If muddy and wet, a longer time is needed. Throw out all cut and badly bruised ones.

There are many methods of keeping them. I will recommend sand—coarse sand is best, and the more free from vegetable matter or soil the better. The potatoes may be placed in boxes or bins of any convenient size, only that they must not contain potatoes more than sixteen inches in depth—better only twelve—and if placed one above another must have an air space of at least two inches between the bottom of one and the top of the other. They should be raised from the floor, say four inches, and not nearer any wall than three inches. Sprinkle a little sand in the bottom of the box, then fill half full of potatoes, then shovel in sand until the crevices are well filled, then fill up with potatoes and finish with sand, having an inch of sand above the top of the potatoes. The sand should be dry, dusty, and screened if possible, so that it will run well. The best time to secure it is in the months of August and September. Dry it on a platform of boards, in the sun, and store it away in a dry place, against time of need. It will require about one-third as much bulk of sand as there is of potatoes to be put up. To keep well, the sweet potato needs an even temperature of from fifty to sixty degs. Fah. They must have something near this, or your labor is lost. If you only wish a few each year for seed, you will find it cheaper to buy at reasonable prices than to try to keep them. Potatoes for the table may be kept in good condition until Christmas by simply being put away carefully in barrels, or boxes, and set in a warm, dry cellar, with nothing mixed with them. If some dry sawdust is scattered in with them, as they are packed, around the edge, it will prevent drying too much, but it should not be put in the centre of the barrel, as it might generate too much heat. Do not overhaul them, even if you discover some rotten ones; it would only make matters worse. Remove them only as you want them for use.

Mr. Robinson said that it was an important fact alluded to in this article, that sweet potatoes, moved after having been put into winter quarters, are sure to begin to decay in eight or ten days.

Mr. Burgess corroborated this statement. He had bought some very fine sweet potatoes in the fall, and put them away; but in two weeks every one was rotten.

The Chairman said that sweet potatoes might become an important crop, as they produce largely, and are not subject to disease. It is difficult to keep them; but with care they can be kept until spring; they can be kept in dry sand at a temperature of about fifty degrees. Mr. Thompson, on Staten Island, cultivates them successfully on well drained but rather heavy soil. In order to grow the tuber short, he contends that the ground must not be too mellow. He prefers to plant upon ground that has not been broken up at all: he scatters long manure upon a line, and with a plow turns a furrow over it, upon each side, raising the ground eight or nine inches in the centre, and plants the potato sprout upon the top of that ridge.

Mr. Robinson.—Sweet potatoes should be kept in a dry, temperate atmosphere. Our furnace-heated houses contain exactly the right atmosphere for keeping them.

Dr. Trimble said that sweet potatoes could not be profitably raised north of forty degrees. They can be cultivated to much better advantage further south.

Mr. Doughty, of Newark, N. J., had raised sweet potatoes for several years, and had obtained better crops than from common potatoes; but lately he had been unsuccessful, probably from having planted later kinds.

NEW POTATOES.

Rev. Mr. Weaver exhibited specimens of the Josh Moore potato, which he considered a superior baking potato.

The Chairman said that there had been new and improved varieties of potatoes lately introduced, which he had tried and could recommend. Mr. Goodrich has spent fifteen or twenty years almost exclusively in producing new varieties. Out of over fifteen hundred new varieties, he recommends no more than six or eight for adoption by the public. Of these, the Garnet Chili is quite equal to and more productive than the Peachblows, and quite free from rot. The Kuzko White, and the Pinkeye-Rusty-coat, are also excellent potatoes. These potatoes are only four or five years from the ball; and my observation is that a potato does not come to its perfection for eight or nine years. After that we can expect no further improvement. If these seedlings continue to improve, as others have done, I want no better potatoes. In my experience seedlings are comparatively free from rot. That disease has been produced, I think, by propagating the old varieties for half a century or more, without even selecting the best seed.

Mr. Robinson stated that he had procured four new seedling varieties last year, but they had all rotted. The Josh Moore potato would not sell well on account of its yellow flesh.

The Chairman stated that the Prince Albert, which is a large white potato, is one of the finest baking potatoes.

Mr. Burgess.—Of 25 seedlings I brought to East New York from England, all but one rotted. As to yellow potatoes, I believe that they contain the greatest amount of nutriment.

Prof. Nash said that we raise potatoes by layering; for this potato is not a root, but part of the top. So that all the potatoes of a race are one plant. Its long cultivation produces weakness, and finally disease. Probably the yellow potatoes contain more nutriment than the white; but no potatoes are economical food. They are eaten as a luxury, and are expensive even as a luxury.

The Chairman.—I can hardly endorse that estimate. It is admitted that an acre planted in potatoes will produce sufficient to sustain seven persons; while the average yield of wheat per acre is only sufficient to sustain $2\frac{1}{2}$ or 3 persons.

Mr. Henry suggested that high manuring increases the liability to rot; and that the seed should be changed every year.

The Chairman.—I never plant the potatoes I raise. I would pay five dollars a barrel for western seed even if I sold my own for five dollars.

Mr. Burgess.—Seed for heavy land should be taken from sandy land, and *vice versa*. We do not pay sufficient attention in this country, to the fact that potatoes, like apples, are in season at particular times. Potatoes which are in season in the spring are not fit to eat in the fall.

GIRD'S BUDDING KNIFE.

Mr. E. D. Gird, of Cedar Lake, N. Y., exhibited a new budding knife for orchardists. The blade has a curved piece across the end, so that on pressing it upon the back, it forms at once both the longitudinal and transverse cut. Keeping the end of the blade in its place, and raising the handle, the curved piece is brought underneath the bark, raising it for the insertion of the bud. So that the two cuts are made and the bark separated from the wood, at a single operation. There is also a blade for cutting off buds without cutting into the wood, the form of the blade being fitted to the curved surface of the limb.

FLAX DRESSING—MILKWEED.

Mr. Mallory exhibited specimens of American flax, dressed upon the Sanford machine. Also, specimens of Irish flax, dressed in Ireland, and some of the same dressed upon the Sanford machine. The latter produces about 30 per cent. more fibre; and the fibre thus produced, loses but one-third as much from hackling so as to be fit for spinning. It is not necessary to pull flax. There is no fibre within two inches of the ground, and the roots are in the way. It should be cut with a reaping or mowing machine. The fibre of the common milkweed promises to be valuable. The length is about equal to that of the Sea Island cotton; and they are tapering, with points so delicate as to float in the atmosphere. This is the fibre of the stalk, and not of the seed vessel. It has also been ascertained from experiments, that the juice of the plant yields a substance similar to India rubber. The stalks may be passed through crushing rollers to extract the gum, and then rotted and passed through the Sanford machine. He had tried about 100 lbs. of it this year; and it might be even more profitable than flax. He should make a more extended trial the next season.

GRAPE CULTURE.

Mr. Robinson read an article furnished by Dr. George Pepper Norris, of Wilmington, Del., upon the cultivation of foreign grapes in cheap glass houses, in which he says:

"Structures in which foreign grapes can be successfully grown without fire-heat, can be so cheaply constructed that no farmer who has any ambition that way need be without one. The superior quality of the fruit, the greater security against the early spring frosts, and the length of time we are able to preserve the fruit after it has matured, all combine to render buildings of this kind very desirable.

"Grape-house, or cold vineries, are of two shapes--the lean-to or the span-roofed. The former are generally liked best, and are usually thought cheapest, especially if there is an old back garden wall, against which they may be built. Cheap structures may be made of wood. The foundation should be laid of stone, at least three feet below the surface.

"A cheap, good back wall can be had by placing cedar or chestnut posts well in the ground and nailing thereon inch plowed and grooved flooring-boards. On the top of the back wall is placed a wall-plate, on which the rafters are to rest. On the front wall-plate will hang two feet wide glass sash, to open or shut at pleasure. The back wall should be nine feet high, and the front one three feet. The roof must be entirely of glass, and can be cheaply made by using hemlock or yellow pine rafters five-feet apart, between which strips of board two inches by one inch shall rest. The glass may be fourth quality, and the size 10x12, and should be bedded in putty and sprigged in. A door in one end will complete the house. A temporary structure, which will answer quite well for persons who are renters, may be even more cheaply made, by placing a few hot-bed sashes slantwise against any back wall with a southern exposure, under which very good grapes may be grown. A well constructed border is a pre-requisite for success, whether the culture of the native or foreign vines is attempted."

Mr. Fuller said that the glass should be of the first quality, bedded in putty, but not puttied upon the top; fastened in with tin, and painted at the edges.

Prof. Mapes said that curving the lower edges of the glass would prevent the rain from forming lenses to cause the sun to burn the plants after a shower.

Mr. Cavanach.—I do not believe in putting up cheap houses. A cheap one will cost money, and a little more will give us a much more permanent structure.

The Chairman suggested that grapes must be thoroughly ripened in order to keep well. The Concord grape, grown in New Jersey, will keep better than the same grape grown in Massachusetts, for that reason.

New subject.—"Modes of cultivating row crops," was selected as the subject for discussion at the next meeting.

Adjourned.

March 10, 1862.

Mr. William Lawton in the chair.

VINEGAR.

Mr. Pardee called the attention of the members of the Club to a mode of making vinegar free from mineral acids. By it vinegar is made in twenty-four hours. A mixture of one gallon of whiskey and ten gallons of water, is passed through beach wood shavings a number of times at a high temperature, and this is the only secret in the preparation.

I also mention a new preparation that is said to equal the best Java coffee, at a cost less than ten cents a pound. Mix molasses and water in equal parts, stir in wheat bran until the preparation is as thick as possible; place the mixture in shallow baking pans half an inch thick and bake. A gentleman who prides himself upon his taste for good coffee, was not able to distinguish the difference between the two.

Mr. Carpenter.—I understand that the syrups made in the city are preferable to all others in making this substitute, and that the New Orleans molasses will not do for the purpose.

Professor Nash thought that the mode of making vinegar mentioned by Mr. Pardee, was not new, it had been known for the last fifteen years. White lead manufacturers make the acid used by them in a similar manner. I understand they only pass molasses and water through beach or oak shavings.

As substitutes for coffee, roasted wheat, corn, peas, and various other grains are used. The mode stated by Mr. Pardee he thought well of.

Mr. Carpenter.—I have for the last few weeks been experimenting with a number of articles as substitutes for coffee; the best I have found is rye roasted, but not ground. The remains make a good feed for poultry. Persons who buy coffee ground do not know what they use. All manner of articles are used to adulterate coffee, such as chicory, nuts, grain, &c.

Professor Renwick introduced to the Club Dr. Wynne, who has been appointed Consul at San Salvador.

Dr. Wynne.—The coffee grown in San Salvador is of a very superior quality. The coffee plant requires a moderate temperature, which is attainable on the highlands of that region. Strawberries and raspberries are not found in any quantity in Central America. I propose to take out many kinds of trees and vines and make experiments upon them, which I shall be happy to communicate to the Club, and any suggestions from the members, I shall be pleased to receive.

Mr. Carpenter spoke on the acclimation of plants. He doubted if the character of any plant had been changed. Plants from Japan are known to flourish in Canada.

Dr. Wynne.—I shall not attempt to change the character of any plant, but I mean to introduce plants and vegetables into San Salvador that are not growing there now.

Professor Renwick alluded to the tomato, egg plant, okra, that had been introduced by the refugees from St. Domingo about 1794. They could hardly be said to be acclimated, for any tropical plant of sufficiently rapid growth, will ripen in our summers.

Mr. Pardee.—I hope Dr. Wynne will experiment on the strawberry by raising many varieties from seed. The Chili and Montevidio strawberries possess very fine flavors. The Peabody grows very full in New Orleans, but when brought north and treated with our stimulating manures, does not produce well.

Mr. Carpenter hoped that no remarks made by him should be understood to deter Dr. Wynne from trying the experiments mentioned by him. He should be glad to hear the results of the experiments.

Mr. Burgess wished the attention of the Club called to the cultivation of the Spanish chesnut. The fruit that I present is to be found for sale in our streets, and I would recommend every farmer to plant five or six of these nuts. The trees grow to a large size, and the timber is equal to the oak for many purposes.

Mr. Trimble.—These nuts look large, but as to flavor, they possess none. The trees grow in our country, but are liable to be blown down.

He objected to the attempts made to supersede coffee. Better let the experiments alone and buy the pure coffee.

Mr. Dodge.—I am in favor of coffee and opposed to all substitutes.

Mr. Carpenter.—Not one person in a hundred drink pure coffee. Most of the ground coffee sold is adulterated to an alarming extent.

Mr. Robinson.—I think a good substitute is our common corn. By using half good coffee and half corn, it is very hard to distinguish between the two.

Prof. Mapes.—That proves, the adulteration with corn, is superior to that adulterated with other substances.

Mr. Carpenter.—I wish to remark that I tried the samples of potatoes brought to the Club at its last meeting, by the Rev. Mr. Weaver, with the Peachblows. I consider the former as a very superior potato. If they should cook as well in the fall of the year as they do at this season, I would recommend them as a valuable addition to our varieties.

Mr. Weaver.—The seed potatoes I procured from Mr. Bailey, of Plattsburgh, N. Y. They are called the Josh Moore. I used this potato in my family last fall and could perceive no difference between the quality then and now. We prefer them baked.

The subject of the day, "cultivation of row crops," was then considered. The chairman called upon Professor Mapes to open the discussion.

Prof. Mapes.—I have spoken upon this subject so often, and my views are so generally understood by the Club, that I feel a diffidence in opening the subject. I subsoil the ground, and after planting say cabbages, I disturb the soil by a horse hoe. I prefer using a mule to draw it, for the feet of this animal are smaller than those of horses. For potatoes, I prepare the soil for planting; but before I put in the seed I run a subsoil plow through each furrow. In raising beets, carrots and parsnips, after they appear above the ground, let the subsoil plow be run through the center between the rows; this will loosen the soil.

To teach a mule to do this work, I place two joice on the ground three feet apart, and make the mule pass through them half a dozen times; then I turn one of the joice, making the space four inches narrower, and proceed in this way until the joice is twelve inches apart. By this means, with a boy, a mule and the tools mentioned, they will do more work than fifty men with hoes. When the crops are fit to gather, if a subsoil plow is run between the rows, the roots can be drawn by hand at a very rapid rate.

Mr. Carpenter.—In relation to row planting, I fully endorse all Prof. Mapes has stated. I think our farmers can raise a larger crop by planting in rows than by any other mode. A neighbor of mine planted corn six inches apart, in rows three feet apart, and he thinks the crop is full ten per cent. larger than when planted in hills.

I find that by planting potatoes twelve inches apart in rows twenty-four inches wide, I grew a greater crop than by any other means.

Prof. Mapes.—I never could find a man to tell me why corn is planted in hills. Corn is not improved by hilling; flat planting with us is in general use. If in planting potatoes you hill the plant up, you induce the stem to throw out new tubers, but the results will be very unsatisfactory, the tubers will be very small.

Mr. Burgess.—I must differ from the views expressed here to-day in relation to drill planting. The smaller roots may succeed, but I prefer to sow turnips, Mangel Wurtzel, &c., broadcast.

Question for the next meeting.—Prof. Mapes proposing the "cultivation of the lima bean," which was adopted; also the planting of trees."

The Club then adjourned.

JOHN W. CHAMBERS, *Secretary.*

March 17, 1862.

Judge R. S. Livingston, of Dutchess county, N. Y., in the chair.

ONION CROP.

A letter was read from Dr. O. W. Drew, Waterbury, Vermont.

"For many years the onion crop has been an entire failure in Central Vermont, and we have depended on Boston for a supply. When the plants get three or four inches high, they begin to turn yellow and die, and then the bulbs become rotten and full of maggots. Many experiments have been tried with lime, salt, ashes and plaster, without benefit.

"Last spring I sowed a bed with red onion seed; when the plants were about four inches high, I found they were affected as usual. I poured a full stream of boiling water from a large tea-kettle directly upon each row, and repeated the application. The plants looked bright and trim as after a May shower. I lost no more of them, and had as fine a crop of onions as I ever saw, and the first I have been successful with for ten years.

"Perhaps this remedy is well known, but timid people may be afraid of so heroic treatment."

Mr. Robinson.—I have tried this experiment on peach trees with success.

Mr. Pardee.—I think the water was applied to the roots, and not to the tops.

Mr. Trimble inquired where the maggot was found?

Mr. Robinson.—In the bulb.

Mr. Cavanach.—The onion is a very tender plant. I should suppose that the hot water would destroy the tops.

Mr. Carpenter.—I think the writer understands what he says. If the top should die, the bulb would throw out another top.

Mr. Weaver.—The experiment is worth trying. I think the onion is very hardy. I have onions that have stood the frost. I do not think the hot water would kill the onion.

FRAUDS IN COFFEE, SPICES, ETC.

Mr. Trimble, from the committee on frauds, made the following report:

The committee having the subject of "*Frauds*" under consideration, and finding it too voluminous for one essay, propose to divide it into compartments—giving the first to "coffee."

The tree, bearing this useful and world-cherished berry, is said to be indigenous in Southern Abyssinia, growing wild over the rocky surface of the country. The roasted seed has been used from time immemorial. In Persia as early as A. D. 875. In Arabia, in the beginning of the fifteenth century, and a century later we find it in general use in Constantinople. The first coffee-house in London was opened in 1652, by a Greek named Pasqua, and twenty years later it found its way to France. There, and in other countries, it is now the daily and almost *necessary* drink of hundreds of millions of people. Of the increase of the cultivation and export of coffee, we may judge from the fact that the European consumption a few years ago amounted to 168 *millions* of pounds—while it takes 600 *millions* of pounds to supply the coffee-drinking world, at the present time.

A remark or two on the coffee tree may not be uninteresting. It delights in a dry soil and a warm situation, attains in different countries the height of eight, ten, and sometimes twenty feet, bears a dark and shining foliage, and (under favorable circumstances) yields its fruit for twenty years. If used and not abused, it may be considered one of "Heaven's best gifts" to man.

It exhilerates—strengthens—allays hunger, and imparts to the weary traveler both comfort and repose. The genuine berry contains three valuable ingredients, viz: a volatile oil, (developed in the roasting,) tannic acid, and the substance called "theine" or "caffeine" (which is common to both coffee and tea.) In this (as its original state) it is probably cheaper than any of its substitutes, which (wanting those elements) are *not coffee at all;* but alas! it is seldom allowed to stand on its own merits. The desire to avoid the "tax," (which makes coffee an expensive indulgence,) aided by that "love of money" which is the "root of many evils," prompts to "tricks of the trade," beginning with those "who cheat a little to make an honest living," and ending with those who cheat without visitings of conscience. From the *first*, who advertise "pure coffee at 20 cts. per lb.,") you may breakfast on a beverage made from five pounds of coffee and two pounds of "chickory." From the *last*, you may be thankful if the peas and beans burnt and ground for your morning draught were not discolored and spoiled before you bought them as "*a genuine article.*"

Frauds to an increasing extent are practiced on those who buy "ground spices." The "mustard," so nicely "boxed" and labelled, is not mustard at all. In most cases it is the meal of yellow kiln-dried *corn*, ground fine and flavored with cayenne pepper.

"Ginger" is often made of similar ingredients, with the addition of some of the original article to give it taste and smell.

"Ground pepper" is frequently made of pilot-bread, burnt in the baking or damaged by a long voyage—and there is one firm in *this city* engaged in buying this refuse stuff from ships, and selling it again as "pepper," after a sufficient amount of the "genuine" is mixed with it to "*swear by.*" To guard against these impositions (or one of them), we propose to re-establish the good old coffee-mill. It will prove a better guard against the grocers than an army of policemen; and if you are fond of prolonging morning reveries, what could be a more agreeable reminder of getting up time than the coffee-mill?

The newspapers are now freely discussing substitutes for coffee. Burnt rye, wheat, barley, sweet potatoes, chestnuts, acorns, burnt bread—each has its advocate, and *all* may answer for those who, with limited sensibilities, know not *what coffee is.*

Not one of these articles will make coffee, and if their merit is being *cheap, water is cheaper.*

The seeds and roots of many West India and South American plants have been introduced as substitutes for coffeee. The only one we have time to notice is the "succory," "chickory," or wild endive—a weed with large pale blue flowers, and having a white tap-root, like the parsnip or oyster plant. This root abounds in a bitter juice, which has led to its use as a subsitute for coffee. It is found to be much improved by cultivation, and is now so much used as to have become an important crop. You may find it growing in some of the counties of England, but much more in Prussia, Belgium and France. It is grown also in parts of South America, and its cultivation is being introduced into our own country, especially on Long Island. This root, when dried, roasted and ground, so exactly resembles genuine coffee as to be a first rate article for adulterating purposes, and has now been used so long in that way, as to have created a taste, and there are many people who think they have been cheated if their coffee has not the flavor given to it by chickory. They have become educated to like a *bitter coffee.* It is now estimated that France uses annually twelve millions of pounds; and in some parts of Germany the women are becoming regular chickory-topers.

Some of the ingredients of this weed bear a partial resemblance to those of tea and coffee; but when taken unmixed, by those unaccustomed to it, it is disagreeable and nauseous to a high degree. The taste, however, is soon acquired, and as it has some strengthening and tonic properties, it is probably not injurious if taken moderately, but by prolonged and frequent use, it produces heart-burns, cramps in the stomach, loss of appetite, acidity in the mouth, weakness of the limbs, tremblings, sleeplessness, and a drunken cloudiness of the senses.

An admixture of chickory in coffee can be detected by putting it in cold water—it is soluble, and imparts its color to the water in proportion to its quantity. The coffee is insoluble in cold water, and of course gives it no color. Johnson tells us, in his Chemistry of Common Life, another reason why the use of chickory should be avoided by those who can afford to buy pure coffee, is found in the fact that pure chickory is as difficult to be met with in the market as unadulterated coffee. Venetian red is very commonly employed to impart to the chickory a true coffee color; and it is curious to observe how the practice of adulteration extends itself from trade to trade. The coffee dealer adulterates his coffee, with chickory, to increase his profits; the chickory maker adulterates his chickory with Venitian red, to please the eye of the coffee dealer; and, lastly, the Venitian red manufacturer grinds up his colors with brick dust, that by greater cheapness, and the variety of shades he offers, he may secure the patronage of the trade in chickory.

In conclusion, we ask every housewife to help us in our efforts to break up this nefarious trade. Buy no more coffee ready ground. The pure article, at its full price, is cheaper than any other mixtures, no matter how low the price asked.

In buying these ground mixtures, you not only cheat yourselves, but you put money into the pockets of dishonest dealers, that you suppose goes towards paying the just and necessary tax now required by our governtment to save itself from threatened destruction.

If you cannot afford the genuine article, roast your own rye or barley, or drink milk or water, but give no more money for these fraudulent mixtures.

Mr. Lawton moved the acceptance of the report, and in doing so, said he was gratified to see that the committee had done a great service to the housekeeper in bringing to their notice the immense frauds that were made in the articles of food.

He was opposed to all substitutes being sold as the genuine article. Coffee and tea were both of that class of enlivening beverages which is instinctively desired by all nations.

Although the quantity of the principle caffeine in coffee is only from two to five per cent. yet as the substitutes do not contain any of this principle, all imitations are devoid of the essential element of coffee, however near to the original in flavor, the various decoctions may approximate.

He hoped the committee would follow up this subject, and from time to time bring their labors before the Club.

Mr. Carpenter, as one of the committee on this subject, said that he had gone into the investigation without fear or favor; every word of the report was true; the committee had called to their aid persons who were familiar with these frauds.

Mr. Henry spoke in favor of the use of chicory. This root is imported from Germany, and is sometimes called succory. It is a species cognate to dandeline, and is used extensively by the Germans instead of coffee. I do not think chicory injurious; my family prefer it to Java coffee.

Mr. Pardee.—I wish the report had treated more on the substitutes, than on adulterations. Coffee is a nervous stimulant, and numbers of men and women have had to abandon its use entirely. If a healthy substitute is found, why not use it?

Mr. Cavanach approved of the report, and mentioned a fact that seemed to have been overlooked by the committee. He had been informed that the liver of animals burnt and ground was used to adulterate coffee.

Mr. Robinson.—I have known the deleterious effects of coffee, and for years I have not been able to drink any, but I can recommend it as a disinfectant. Bad odors are removed by burning coffee.

Mr. Trimble.—I have no doubt persons are injured by the use of tobacco, and lay the blame to coffee. The object of the report was to warn our people, and guard them against the stupendous frauds in nearly every article used for food.

A member whose business knowledge has made him familiar with the "tricks of the trade" related other frauds that would add to the interest of the report, but we have room only for one. Within a few weeks a vessel arrived in New York from some South American port having on board a quantity of coffee, and as is usual from these ports, hides formed a part of the cargo. These were placed over the coffee. During the voyage these hides became very offensive, and filth drained so freely from them that the coffee was found to be a most disgusting mass. But this seemed to make but little difference to the dealers; a well known manufacturer of ground coffee bought it all; and it is just about this time being distributed over the city of New York, to give a relish to the morning rolls.

Mr. Burgess.—In the adulteration of spices, charcoal is used to a great extent.

Mr. Fuller.—I am opposed to this whole matter of discussing the adulterations of food. Let our people buy their coffee in the berry, and grind it themselves; the same applies also to spices. I know the hulls of mustard seed are used to a great extent by spice grinders.

Mr. Carpenter.—Tea is also adulterated. We sampled some a few days since, and found it to be very deleterious. It acted as an emetic to a number of persons who tried it.

Mr. Geddes.—I think facts are important, and one fact properly authenticated, is worth more than any discussion had here without facts. I hope the report will be published, it will awaken the attention of our people to the frauds in the preparation of articles of food, and will do good.

On motion, the report was accepted.

Mr. P. G. Bergen called the attention of the Club to a seed of a new fruit advertised extensively, called by the seller Alkakengi, purporting to be a new plant discovered in Illinois.

Mr. Fuller.—This new fruit from Illinois is nothing more than the common ground cherry *Physalis viscosa*, it was called Alkakengi by the botanist Tournefort, and there is where this gentleman who advertises the seed, got his name for an old well known plant.

The subject of the day was then called up, viz: "The cultivation of the Lima bean."

Mr. Lawton.—I am in the habit of putting out 100 poles of Lima beans annually. My method is, to take a crowbar and make holes about four feet apart, put in the pole firmly, and then plant four beans to the hill. I plant them from the 20th of May to the 1st of June.

Mr. Cavenach asked if the mode of checking, by nipping off the ends of the vine, had been adopted by members of the Club?

Mr. Trimble.—I think we raise no vegetable that will produce a better crop than the Lima bean. Used as a vegetable or made into soup, there was no bean that excelled it in flavor. I do not nip off the ends of the vine, but let them run up the poles, then turn them down, and after a time turn them up again. I have always had an abundant crop. I place my poles 3½ to 4 feet apart. Then I manure the ground and plant. If the beans are started in a cold green-house, and then transplanted on a warm day, you get them earlier than in planting them in the old way.

Mr. Carpenter.—I generally start my beans in the hot-bed. I observed a new plan adopted by one of my neighbors, last year. He is in the habit of using poles five or six feet high, with rails tied on the top, horizontally. The beans, thus treated, bear an abundant crop. I am in favor of summer pruning, by nipping off the tops of the vines, inducing lateral shoots to grow.

Mr. Fuller.—The plan of nipping the tops of the vine, in my experience, is the proper course to pursue.

Mr. Cavanach.—Last year I planted the Lima bean about the 20th of May, in drills. The beans were three or four inches apart in the rows. For the want of poles, I used pea-brush, and the vines run all over it. I had a very good crop.

Mr. Carpenter distributed grafts of the Spanish chesnut, and of various kinds of apples.

Mr. Fuller hoped that attention would be paid to the grafting of this chesnut. If grafted on native trees, they will bear in about three years. If the chesnuts are planted, it will require from ten to fifteen years before they come into bearing.

Mr. Henry.—These trees grow in New Jersey very well. There are some trees growing at Baskenridge, which produce good nuts that bring a high price in market.

Mr. Trimble.—Our native chesnuts are as far superior in flavor to the Spanish chesnut, as that is superior in size to ours.

A quantity of vegetable seeds put up by the United States Patent Office, received from the Hon. F. A. Conkling, was then distributed to the members.

Subject for the next meeting: "Spring flowers and the neglected fruits of our country."

The Club then adjourned.

JOHN W. CHAMBERS, *Secretary.*

March 24, 1862.

Mr. Edward Doughty, of New Jersey, in the chair.

EXPERIMENTAL FARM AND SCHOOL OF AGRICULTURE AND HORTICULTURE FOR PATRIOT ORPHANS.

Dr. Holton called the attention of the Farmers' Club to the initiatory measures taken immediately after the bombardment of Fort Sumter, for establishing an Institute of Reward.

The Institute embraces several objects; primarily, the collecting of statistics of orphanage, and particularly of orphanage in relation to patriotic deeds, and the founding of Orphans' Homes which will afford ample educational advantages and training for the ordinary business of life. Such provisions being regarded not in the light of almsgiving, but as tokens of appreciation of the patriotic devotion and services whereby these children have been deprived of their natural protectors.

With one of these Homes, it is proposed to connect an experimental farm and school, under the patronage of State or General Government, in which those patriotic orphans, whose talents and attainments give promise of eminence in any art, science or calling, may receive "Prize Positions" or scholarships.

These objects and plans having been presented at a former session, and now being reduced to form and detail, an invitation is extended to the members of the Farmers' Club, and others sympathizing in these objects, to examine the same after the adjournment of the public exercises, during any portion of the hours from two to four o'clock on Monday of each week, and to co-operate in completing the system and plan for the organization and conduct of the proposed experimental farm.

Mr. Robinson moved that a committee of three be appointed to take into consideration the subject, and report to the Club; which motion was carried, and Messrs. William Lawton, Henry O'Reilly and Charles A. Seely, were appointed said committee.

RUSSET APPLES.

Mr. Carpenter presented to the Club, several golden Russet apples. These apples, he stated, are now in a fit state for use, especially for cooking purposes.

A discussion followed in relation to the value of Russet apples, in which Mr. Robinson, Mr. Pardee and Mr. Lawton took part.

Mr. Louis Koch, a German gentleman, formerly of this city, but now a resident of the Republic of Mexico, was introduced to the Club, by the secretary, and was requested to inform the members in relation to the agriculture of that country.

Mr. Koch then gave an interesting account of Tobasco, the State in which he resides, and of its productions. He remarked that he arrived in that country last August, and had settled on a plantation on the Tobasco river, about six miles from its mouth. This river empties itself into the Gulf of Mexico.

He had returned to New York for the purpose of purchasing agricultural implements and machinery.

The mode of cultivation pursued in Mexico was very rude. They had hardly any implements of agriculture. The Indians use a long, heavy knife, called a *machette*, with which they cut the brush. When dry, the brush is burned, and then the seed is put in with a sharp-pointed stick. The soil is sandy, and very productive. The coffee tree produces from 15 to 20 pounds of berries in a season, while in the Brazils five to six pounds was deemed a fair crop. Each coffee tree has to be protected from the sun by a shade tree. Rice produces three crops in a year from one planting. The sugar cane grows to a great height, I have measured some stalks that were thirty-six feet high. Sweet potatoes are very abundant, of a monstrous size, and of a very superior quality. The Yucca also grows in abundance. Corn can be planted nearly every day in the year, and the ears are very large. Notwithstanding the ease with which it is grown, enough of it for home supply is not raised.

He stated a singular fact in relation to the change in fruit. If you plant the seeds of the apple, they produce fruit in three years. The first fruit obtained were small apples, but afterwards the fruit became in character exactly like the wild guava, from which is made the guava jelly. This native guava tree resembles the apple tree in appearance. He also planted pear seeds, but only got guava. Cherries change to a fruit unlike the original, being yellow colored, and very sweet.

Mr. Koch takes out with him a small steam engine, a mowing machine, a saw-mill, rice huller, machines for grinding, and the most approved agricultural implements.

Mr. Robinson thought the change in the character of the fruit very remarkable, but he had seen the Baldwin apple, as grown in Massachusetts, quite a different apple when grown on the prairies of Illinois.

Mr. Koch.—I have purchased a great variety of fruit trees, grape vines, and vegetable seeds, for the purpose of demonstrating whether I can grow any thing true to its kind in that climate. I intend to graft the apple and pear upon the guava tree. I shall take great pleasure in transmitting to the Club the results of my experiments.

Mr. Carpenter asked, what was the temperature of Tobasco?

Mr. Koch.—Tobasco is situated in about latitude 18° north, and the range of the thermometer from 65° to 95°. The rainy season commences in May and continues until October, during which time a great part of the country is covered with water. One great drawback to the prosperity of the country consists in the numerous varieties of insects and reptiles. These are very troublesome and annoying.

Mr. Pardee asked if there was much sickness in consequence of so much rain.

Mr. Koch.—We have intermittent fever, but it is soon cured. My own health has been very good since I have resided there, which I attribute to the wearing of flannel next the skin.

Mr. Robinson moved that the thanks of the Club be presented to Mr. Koch for the instructive information furnished, which was unanimously adopted.

DESSICATED VEGETABLES.

Mr. Henry presented specimens of American dessicated food, made on Long Island. This article is now extensively used for feeding our army, and in his opinion, is likely to drive the French preparation out of our market.

The regular subject of the day was then taken up, viz: "The neglected Fruits of our country."

Mr. Robinson said he had a matter that might be very appropriately discussed under this head; it was,

"What kind of grapes shall we plant." I have been induced to undertake to answer this question now, in consequence of receiving the following letter of inquiry from a German friend who called to consult me on a subject nearest to his heart.

"I have two sons to whom I wish to leave each a vineyard. I came from Steinberg, and my sons inherit a love for the vine; but your favorite American kinds are not good to our palates. Now, will not the American taste soon so far improve as to reject such poor flavored kinds as the Isabella and Concord, and just as the vineyards come into bearing, will they not be found worthless, and the taste all gone to Delaware and Diana, which remind me of our own Traminer and Rissling, which refresh like wine? Please tell us, and by so doing, tell many in Monmouth county, who, like us, desire to know. Have you had the long and extensive observation that it is necessary to form an opinion, or can you tell me who has?"

This is the most important agricultural question of the present day. It is important because it has now become as certain as any thing of the future, that America will surely become a great vine-growing and wine-producing country. That this event will certainly happen we are just as sure, as we are that France is already a great producer of grapes. The extent of vineyards already planted is greater than the mass of people have any conception of; and of the extent of preparation for planting no one has an idea, except the very few whose interest or taste has led them to inquire. We are assured by the best authority in this country, that there are now planted, and in preparation for planting, at least a thousand acres of land in the small State of New Jersey, and that in only a few counties, and yet grape-growing in that State has been as yet hardly thought of, and so little talked about that its own citizens are not generally aware of the progress of this new and great industrial pursuit of a few of the people. Yet in a few years the grape crop of New Jersey will become one of the most important of that State, and the product of its vineyards will not only furnish New York with an abundance of fresh fruit, but will put a strong check on the importation of wines.

There has been within a year past one tract of twenty thousand acres of forest land, in Cumberland county, opened to settlement and a town laid out in its center called "Vineland," because the proprietor believes the soil well adapted to the growth of grapes, and intends to encourage all the settlers to devote their attention to their cultivation. We should not be surprised to see five thousand acres of this tract planted, or prepared for planting with vines within five years.

Monmouth county, too, will soon become as famous for its great crops of grapes as it has been in past years for its peaches.

Pennsylvania is also moving, in all its breadth, from the Delaware to the Ohio, in its preparation to become a wine-making State.

New York has already several vineyards of considerable importance, which furnish its cities with some hundreds of tons of fresh grapes, and some of them have made wine to a limited extent, which we hope never will be any greater until their proprietors learn to make something more worthy of the name of wine than the sweetened alcoholic beverages which they have produced.

In Connecticut, there is at this time a very decided "awakening" upon the subject of grape-growing, and large quantities are already produced, and the intention of making it eventually a wine-producing State is evident.

Of the extent of grape-growing in the vicinity of New York, an idea may be formed from the quantity of fresh grapes known to have been sold the last season by some of the leading commission houses. The editor of *The Vineyard*, published at Jersey City, has ascertained by careful examination that seven dealers, principally in Washington market, sold of the crop of 1861, one hundred and ten tons. This does not cover much more than half of the quantity sold in this city, as it includes none of Dr. Underhill's crop, which we estimate at twenty-five tons at least; nor does it include the sales of some produce commission houses which we know sold large quantities of grapes, nor any of the small lots sold by owners directly to hotels, private families, and retail dealers. It is therefore quite safe to calculate that 200 tons of grapes of the growth of 1861 were sold in the city of New York, and, with the exception of a few from Delaware, all of the growth of the three States we have named.

Of the extent of grape growing in the vicinity of Cincinnati the most of our readers have some idea, from seeing that that city is beginning to supply a considerable portion of the growing demand for American wine, and that some of the wine made there is equal in quality to any that can be imported at the same cost. It is also indisputably true that wine has been made within two or three years at Cincinnati that is appreciated by connoisseurs equal to the very best ever produced in France, Spain, or Italy. This, it is needless to say, is made from the comparatively new Delaware grape, which is now acknowledged by the best wine-makers at Cincinnati to be the best wine grape ever produced by out-door cultivation in America.

So far, the principal wine grape of this country has been the Catawba, and wine has been made from it that will stand the test, and be pronounced good by all cempetent judges. The best that any one has produced, in quantities sufficient to put into market, is that made by John E. Mottier, at Cincinnati. He is an old Swiss vine-dresser, who has been all his long life engaged in the business, and has established an enviable reputation as a wine-maker at Cincinnati, where there are between two and three thousand acres of vineyards, seven-eights of which are covered with Catawbas. This variety, after the long, patient and expensive trials of Isabella, Lenoir, Herbemont, Norton's Seedling, and particularly the Cape or York Maderia grape, and various other sorts of native and hardy grapes, to say nothing of the many foreign kinds that have been tried, had, until within a year or two, seemed to have become established as the wine grape of Ohio and adjoining States. It has been extensively planted in Missouri, and many persons in the Western States, as well as some extensive growers nearer our city, where they depend more upon selling fresh grapes than upon wine, have thought that, if they could get a vineyard well set with Isabellas and Catawbas, they should never need to think of anything better. Indeed, many have contended that there are no other sorts of equal value for out-door culture in America. If this is so, then the question is answered—"What shall we plant?" We cannot hope to change the opinion of those who are already wedded to these two last named varieties so strongly that they will not even inquire whether there is any better sort; nor can we hope that any man who has a vineyard of those will root it up to plant any other variety—though that has been done. But we do hope that those who are now thinking about the matter, or who have determined to plant a vineyard, or a single vine for family use, or a dozen vines to produce grapes to sell, will not do so until they have answered our question to their own satisfaction.

To assist them in the matter, we will lay before them a few simple facts. We will take the case of Mr. Mottier, for one. His purchase, after a satisfactory trial, was 1,200 of the lowest price Delawares (Dr. Grant's No 4), in the spring of 1860. In the autumn following he was so pleased with their growth, not having lost any worth mentioning, that he writes as follows:

"They have," says he, "made a uniform growth, better than Catawbas of two years; and I now want to engage 1,200 more, and will say to you that, for general vineyard, I have determined to plant nothing but Delawares hereafter. I only regret that want of knowledge or misinformation kept me out of this variety so long. It cannot be overpraised." From Mr. Mottier's experimental vines he has made wine which, without age or name or anything to distinguish or recommend it, but placed among a large number of bottles of wine from Catawba and other grapes, was unanimously pronounced far superior.

Frederick Schnicke, of Cincinnati, is another old Swiss vine-dresser. He says: "I can give you my opinion of the Delaware grape in one word. It is the best kind, not of American only, but of the world. Next to Delaware I place Lincoln, then Lenoir, next Herbemont, and then perhaps, Catawba. But I think Diana, when it becomes more plenty, may stand by Delaware."

With Mr. Schnicke, the Catawba ranks last, notwithstanding he had been using it many years for wine, and all his interest at that time was invested in a vineyard of Catawba grapes.

Isabella always ranks below Catawba, both for the table and wine. Then "what shall we plant?" may be considered answered as relates to those two sorts.

The Concord grape was recommended some years ago by Charles Downing as "a good market grape." This was on account of its size and general attractive appearance being in its favor with those who only judge by outside appearances. Mr. Downing now sorely regrets having made this qualified recommendation, because it has caused some persons to plant of it extensively, and now that they find that they can get better sorts, they regret that they did not do so at first.

As the Concord, as well as Hartford Prolific, both of which are of the New England wild variety of fox grapes, grow very strong where some other sorts would die, we may recommend every family that desires an assortment to plant one vine of each; and so would we of Isabella and Catawba. Indeed it has been through these coarser sorts of grapes that an appetite has been created for the best sorts already known, and the constant effort to develop new sorts from seedlings. We know one man who has within the last seven years grown some three thousand seedlings and brought them to bearing, and rejected all but seven, and of those only, considers one super-excellent.

It is a patient labor of a long life to get any new seedling fruit that possesses qualities superior to others already known. And after a new grape is developed, for men in ordinary circumstances to undertake to propogate it in sufficient quantity to supply the whole country, would require another lifetime.

Very few persons have any idea of the expenses and labor of propagation. Let us glance at the establishment of Dr. Grant, upon Iona Island, three miles above Peekskill, on the Hudson. This has been the great center of propagation of the Delaware vines, which have been multiplied faster than any other sort ever were multiplied before, and for the reason that the doctor has the greatest facilities for the purpose in this country, or perhaps any other. He has an acre covered with glass houses; not low, glass-covered beds, or sheds, but tall buildings, with glass roofs and sides, in which he can grow 200,000 vines a year. Of course he grows them for sale, and such men as Robert Buchanan, and Messrs. Motier, Bogen, Werk, Schnicke, and other old and experienced wine-makers, buy them. More than 100,000 of the number are Delawares, which sell from fifty cents to three dollars each, which is less than half what they have been sold at in former years.

The next most salable plants are the Dianas, of which about fifty thousaud will be sold for planting in the spring of 1862. Then comes the Anna, Rebecca, Herbemont, Lincoln, Lenoir, and several sorts of lesser note and lower prices, but with comparatively few purchasers.

The strong proof of the excellence of the first-named is in the constant demand, and that a good deal of the demand comes from those who have already planted vine yards of the sorts that were so popular ten years ago, but now find their account in rooting them out and filling the ground with vines that will produce better fruit and prove far more profitable.

We might give many more reasons; but have we not said enough to make all who are disposed to plant vines, whether for a vineyard, or to grow fruit for market, or to produce grapes for their own family use, to ask the question and get a satisfactory answer as to what sort they shall plant?

Remember, under all circumstances, when about to make your selection to plant, that taste must be consulted, and that is progressive; that one who never tasted a good grape may be contented, as I was in my boyhood, with the Fox grapes of Connecticut. One who never tasted any but the old style yellow muskmelon, may not desire to grow the green-fleshed, delicious nutmeg melon.

Remember that, if your own sense of taste has not progressed so far as not to relish such grapes as the public sought after ten years ago, there are individuals of the great public, and very soon their name will be legion, whose tastes are already progressed, so that they will not buy the product of your wild vines if you plant them, and succeed in producing fruit. Then why not plant the best at first, and not have to dig up and throw away some years of labor upon sorts that prove so nearly worthless as those that have been tried and rejected by some of the best grape-growers in this country. I pause here to introduce another witness, who answers the question of what shall we plant better than I can, because she answers from actual experience. I had written this far in answer, when I fortunately received the following valuable and interesting letter, which I recognize as coming from a very intelligent American lady, Mrs. Therese Nairin, the wife of a French gentleman who knows what good grapes and good vines are, and who now hopes to have as good ones at their new home on the Hudson river:

"Four years ago last fall you may remember to have met me with Mr. Downing at Newburgh. I then and there thought you a little enthusiastic, as a new convert might be on the subject of Delaware and Diana grapes, but Mr. Downing concurring with you I procured as follows: four Delawares, two Dianas, two Rebeccas, two Annas, two Concords, two Hartford Prolifics, two Lincolns, two Union Villages, two Elsingburgs, two Isabellas, and two Catawbas, which Mr. Downing told me would make a good beginning for a supply for "family use." I treated them according to directions furnished, and give you the result. I should say the Concord and Hartford Prolific were taken because Mr. Downing said they would be excellent for market. I have found them just that, only they will not sell after the first trial, so I dug up Hartford Prolific a year ago, and Concord last fall. The Isabella and Catawba performed about as usual, each of them giving specimens the third season, and something of a crop the last. The Isabella every season lost its leaves sooner than the others, and the fruit, although black, was flavorless, or not good, in comparison with your favorites. Catawba was better in these respects, but the bunches were uneven, from the rot. Anna was moderately productive, and very decided in its rich Muscat of Alexandria flavor, but like its prototype, some of its bunches were uneven. Rebecca has not yet produced much, and I fear is tender. A few of its bunches were very beautiful, it lacks in pronounced flavor and is not markedly refreshing, and you like it better the first year than the second—in this respect differing greatly from Anna, which fixes in the memory and calls you back to it as to something *good.* These and Diana keep remarkably, retaining their briskness until March, or later. Union Village is monstrous in size and bears early, and beyond belief, its first crop lacked flavor like Isabella, but the last was very good—good all the way to the centre, and ripe much before Isabella. Elsingburg and Lincoln ripen early, and are so spicy and rich without the least of unripeness in the centre, and my fastidious foreign friends find no fault with these, but praise them highly. I shall speak another word about them soon.

"About the flavor of Delaware and Diana I shall not say one word, for

'None know them but to love them,
None name them but to praise.'

"Delaware and Concord plants were large layers for immediate bearing, and with the Hartford Prolific, bore specimens the first season, but only from three to five bunches each. Those of the Delaware were small, but transparent, most beautiful and good. Diana had a little clearness, and was tolerably good, but not better than good Catawbas, nor much earlier, and my faith in Diana waned. Concord, bunches pretty large, and began to ripen one week earlier than Isabella, but the skin gave a decidedly unpleasant feeling to my mouth, and its fragrance, too, was quite disagreeable. On tasting a few of the berries, the first sensation was of a good degree of sweetness, but the unripe slug in the middle was very large, tough, and very disagreeably acid; even the part in which resided the sweetness left an unpleasant taste and sensation, which became more noticeable on further acquaintance. The next season the Delaware gave from fifteen to twenty bunches each, after judicious thinning; bunches larger, no imperfect berries, and fruit more spicy and refreshing. Diana, this year, quite clear and beautiful in appearance, and most excellent in flavor, so that some thought it almost equal to Delaware. Concord not perceptibly better than before, and far less satisfactory to my taste than ever; in fact, by the side of the two just named, quite distasteful. At the same time found Isabella flat and poor, and noted the astringency of Catawba more than before. The third season I had enough fruit to begin to try by weight, but not very exactly, because some of the Delaware were picked before I thought of weighing.

"Delawares taken at four pickings, beginning September 1st, four vines, twenty-six lbs.; Diana, September 6th, two vines, twelve lbs.; Concord, September 6th, two vines, six lbs.; Anna, September 6th, two vines, six lbs.

"From six pounds of the Delaware I made a little more than two quarts of wine, having a miniature press, with box and screw, made on purpose. I also made a little from Diana and Concord, but the quantity was perhaps too small to afford a test. Delaware had second fermentation in June, and became a fine, rich, dry wine. Diana the same, but less pleasant than Delaware. Juice of Concord became unpleasant, and something like vinegar.

"The fourth season (1861) I thinned the Delaware, so that but two bunches grew on one shoot, and found no difficulty in apportioning the shoots, so that each one occupied its allotted space without interfering with its neighbor, and it was a beautiful sight. I had something more than forty pounds of grapes from the four vines, and not one unsightly bunch, and scarcely an imperfect or unripe berry. The leaves all remained perfect until the ripening of the fruit, and nearly all the fruit remained shaded from the sun. I had about fifteen pounds of Diana thinned as above, nearly all of them handsome bunches, but varying considerably in size and form, and all of the fruit was beautifully transparent, and many of the berries were entirely without seeds and most exquisite in flavor. I can now indorse the praises of the Diana. Some of the bunches weighed a pound—very heavy for their size, and perhaps a little too compact, adhering firmly to the stem.

"The Concord vines also bore well, and some of the bunches appeared even larger than those of Diana, but not quite so heavy. The Concord grape is not attractive in appearance from the beginning, being quite opaque, and not becoming clear at ripening. One skilled in grapes would judge of its poor quality by its appearance. The flavor of Concord was no better than the previous year, and the odor more repulsive. Weight of the crop about ten pounds, ripen before Isabella, but not quite so early as

Diana. Made wine again from Diana, Concord and Delaware; from Delaware two kinds; the first from fruit taken at full maturity, about 23d of September; the second from fruit taken about 20th of October, and so over-ripe that it was of honeyed sweetness, with some of the berries a little shriveled. I send specimens of the wine. That marked I was that first described; that marked II the last, which you will find very sweet, but I think it will be much less so after second fermentation. I also send specimen of last season's wine, which I think you will find really good, and perhaps resembling "Lachryma Christi." I think you may set it before judges who are conversant with true wine, for their opiñion. It is nothing but pure juice, the corks having been dipped in brandy to prevent mold.

"I offered some grapes for sale, in small parcels of about six pounds each; the first day all brought about the same price—twelve cents per pound.

"I withheld Delaware and Diana, thinking them a failure for market. The third day I had an advance of double price, offered by those who had first purchased and fairly got the flavor; found that Isabella and Concord were no grape at all, and that Catawba was not as good as usual, and a few had found that Chasselas and Black Hamburg were not the best of grapes. I paid no dealers' commission, but sold about twenty pounds, at fifty cents per pound, and a few pounds of Diana gave high satisfaction at twenty-five cents; some even classed them with the Delaware.

"The Isabella continued to bring ten cents, Catawba twelve, and Concord eight—the latter not gaining by comparison. Delaware and Diana make excellent raisins, drying easily, and not disposed to rot. They also keep through January, without much shriveling, on shelves, in the same room in which you keep apples and pears, and with the same care.

"I have also kept account of the doings of Lincoln and Elsingburg, both of which I know are good for table and for wine, but results are not yet so definitely ascertained. You need not be astonished if you find Elsingburg making Hermitage and Lincoln Sauterne wine, or something as good. They are very rich grapes, and never forgotten by those who have once partaken of them.

"I send this long gossip not because it shows unusual results, but the contrary, and because they are in a degree definitely ascertained, and not mere guess. I am preparing a little vineyard, of one-fourth of an acre, planting three hundred Delawares and two hundred Dianas."

Mr. Fuller.—I wish to add one word of caution about attempting to grow the Lincoln, Lenoir and Herbemont grapes in the vicinity of this city; and I do not think they will succeed without protection. They are all good grapes for a warm climate, and make a very delicate wine; but you cannot transport it any distance without spoiling.

Mr. Carpenter differed from the observation made by the lady in relation to the Concord grape, at the convention of fruit-growers of Western New York, the Concord was deemed equal to the Delaware. It must be recollected that we are not all planting vineyards for wine making. I deem the Delaware indispensible to a small collection; the Concord should not be neglected; it has a good sized berry, and sells well in market.

Mr. Henry.—California is a large wine-growing State. Some of the wine made there is highly spoken of as possessing a high degree of excellence.

The subject for the next meeting, "The Neglected Fruits of our Country and Flowers." The Club then adjourned.

JOHN W. CHAMBERS, *Secretary.*

March 31, 1862.

Judge R. S. Livingston, of Dutchess county, N. Y., in the chair.

SUGAR MADE FROM THE SAP OF THE BOX ELDER.

Mr. Edgar De Peyster transmitted to the Club a sample of sugar obtained from the sap of the box elder. It was made in Colorado territory, in the same manner as maple sugar. In some localities the trees are very numerous. He says: "This is the first specimen I have ever seen, and I thought it might be interesting to the Club."

*OYSTER-SHELL LIME.

John Watson, of New Hope, Bucks county, Penn., wants the Club to discuss the following question:

"What are the chemical qualities of oyster-shell lime? And what amount to the acre is it profitable to use? I have an opportunity of purchasing five hundred bushels of oyster-shells, and a lot of old logs and dead wood with which to form a kiln to burn them. I propose to plow my field of twelve acres for corn

*To burn oyster-shells into lime wastes all the gelatine and nitrogenous matter which they contain. They form a far more valuable manure if crushed by mechanical means. J. R.

thoroughly, harrow down smooth and mellow, and spread the oyster-shell lime on top at the rate of forty bushels to the acre, and furrow out immediately. Is this the best mode of application on a heavy clay soil, or had I better use some other fertilizer for corn, and save the oyster-shell lime for wheat? I intend composting in the hills with short manures or ashes and plaster, or whatever else I can scrape up to do good."

Solon Robinson.—The qualities of oyster-shell lime are such as to render it fitter for agricultural purposes than lime from rocks. It is profitable to use any amount that a man can afford to apply, but those who have used lime the most have agreed generally upon about thirty bushels of slacked lime per acre, the dose to be four times repeated, and then rest. It should always be applied upon the surface and generally with wheat, and never composted with other manure.

Mr. Carpenter.—I have found lime valuable on a clayey soil, but not on a sandy one. In the former case to the extent of even one hundred bushels per acre. I find lime very beneficial on orchard land, and more so on wheat than corn. If lime is applied to corn, wheat should follow. Oyster-shell lime costs me five cents per bushel in a powdered state in the city. The results of my crops paid me well for its application—say from twenty to forty bushels per acre.

Mr. Lawton spoke of the value of oyster-shell lime. It was formerly sold in this city for three cents per bushel, but the price is now advanced.

SUBSTITUTES FOR COFFEE—BARLEY.

A. M. Carter, Johnstown, Rock county, Wisconsin, sends the following substitute for coffee. He says:

"Always reading the 'Proceedings of the Farmers' Club' with much interest, and in these times of war and high prices nothing can be of more interest to the people than substitutes for some of the luxuries of the table.

"At the meeting of March 3d, the subject of substitutes for coffee was discussed, and among all of them I did not see barley mentioned. Thirty years ago, or more, my father used barley coffee in his family for several years, and we used to like it; but it went out of use for some cause that I can't remember. About four months since I commenced using it in my family, and would not thank any man for better coffee. We roast it in an oven, and have to be a little more particular about the process than with Java or Rio, because the berry is smaller, but otherwise use it the same as with other coffee, using eggs to settle, or other substances, as people prefer. When we commenced using it we mixed half and half with Rio, but now use clear barley. I think that barley coffee contains that peculiar aromatic principle that is so fascinating in Java or Rio, and that people will not detect any greater difference in changing to barley coffee than from Rio to Java, and then you will avoid all the difficulty of the preparation of bran. We believe barley coffee to be much more healthy, and beside it is worth in our market only about thirty cents per bushel."

Mr. Pardee defended the preparation of bran as a substitute for coffee. Since the last meeting of the Club he has tried the baked bran cakes that he spoke of some weeks since, and was very much pleased with it. He could discover no difference between this and Java coffee. He advises every farmer to try it.

Mr. Carpenter asked what quantity was used.

Mr. Pardee.—A little more than of coffee. The cakes are baked in the oven until they are the color of well roasted coffee, and have the same odor. They granulate like coarsely ground coffee, and the beverage is prepared in the usual way.

"THE ILLINOIS COFFEE."

Solon Robinson.—A good deal has been said lately about a new plant in Illinois, the seeds of which were fully equal to coffee. This seed has been examined by Dr. J. A. Warden, of Cincinnati. He says:

"Thanks to the gentleman who has introduced this article, Geo. R. Huffman, of Effingham, Illinois. I have received a few seeds of this plant, which he has grown for two years past, having received it as the coffee of Australia. An examination of the seed shows it to be a vetch—natural order *Vicia*, genus Cicer. Hence it is an annual herb. The species to which these seeds belong is the *Cicer arietinum*, the chick pea, a native of Syria, Egypt, Italy, the Levant, found among the corn or grain. The seed has a projecting cheek, hence its resemblance to a ram's head, which gives the name. The seeds are eatable, raw or boiled, and constitute a considerable part of the food of those countries. It flowers in June and ripens in August; is grown in drills or sown broadcast."

VINEGAR—HOW TO MAKE IT.

A Tompkins county farmer tells us how he makes cider vinegar. He says:

"Cider made late in autumn cannot be made into vinegar before the following summer, unless you can keep a regular temperature of seventy or eighty degrees, and to make in a moderately hot cellar, at any time, is next to impossible, as it requires air as well as heat, and any shelter that will protect the casks from the sun is better than a tight building. Casks that will hold from three to four barrels are best; there is less surface to evaporate, and they take up less room than smaller ones. These should be filled at least three-quarters full—say about the first of June. Then provide yourself with a brass or copper kettle that will hold, say fifteen or twenty gallons, and fill it full from each cask; heat it to boiling, and return it to the cask, and repeat this once in two weeks for three months, and you will have good vinegar surely. Good cider that has not been watered in the process of making will bear one-fourth part water and make good vinegar, and quicker."

Dr. Hawkes.—The rapid process by which vinegar is made of whisky and water is by filtering the liquid through hard wood shavings in a warm room.

Prof. Mapes.—That makes good enough vinegar for white lead manufacturers, but it has none of the fine aroma of vinegar made from cider or wine, which all table vinegar should have. The sugar refiners sell the sweet water in which they wash their utensils to vinegar makers, and they leach it through beechwood shavings, which is the best of all wood for the purpose, in a room kept at 104° Fah., pumping up and running the liquid through again and again, until it has taken up sufficient oxygen of the air to make it acid enough to sell for vinegar. Some pump air through the leach tubs to facilitate the process, and thus finish it in twelve hours.

Mr. Trimble, from the committee on frauds, made a further report, treating principally on mock auctions, including those of trees and plants.

Mr. Robinson.—As the committee ask instruction, I would recommend that they visit the auctions to be held in this city for the next sixty days—such as sales of plants, trees, &c.

Mr. Carpenter.—I think a distinction should be made between mock auctions and legitimane sales by auction. Nearly all the tea sold in this city is by auction.

The regular subject of the day, viz., "The Neglected Fruits of our Country."

CRANBERRY CULTURE IN WESTERN NEW YORK.

Noble Hill, Caton, Steuben county, answers the following questions about cranberry culture:

"1st. Are cranberry meadows durable after the vines are firmly rooted? I learn from a trustworthy source that they have been picked from the same meadows for fifty-nine years.

"2d. What soil is best adapted to the cranberry, and how shall it be prepared? A low, spongy soil, one that will retain its moisture throughout the year. The sod, where there is one, should be pared off to a depth sufficient to remove all roots of grass and weeds. Now open shallow trenches from one and a half or two feet apart, and place the vines in them, covering them every six or eight inches, where they will take root and thus new vines be formed.

"3d. Does the soil need enriching, as in the case of other vegetables? The cranberry vine does not, like some overgrown annual plants, make heavy drafts upon the soil, but is satisfied to feed temperately upon water and decaying vegetable matter in it; from this it will be seen that the soil needs no enriching.

"4th. What constitutes a vine? This question would probably be answered differently by different persons; but vines that I transplant are constituted of a runner, from one to four feet long, with numerous branches and roots; this is what I call a vine.

"5th. Can cranberries be successfully transplanted? For the last four years I have set more or less vines, every spring, and in no case have they failed to do well, growing, in some cases, as far as four feet the first season.

"Finally, I believe there are hundreds, not to say thousands, of farmers throughout the country, who have low, wet lands, that are, and will continue to be, sources of annoyance to their enterprising owners, until they put them to the use for which nature has fitted them, viz.: cranberry culture."

GRAPES—VARIETIES TO GROW UNDER GLASS.

Dr. Geo. Pepper Norris, of Wilmington, Del., sends us the following list of grapes as the most suitable to grow under glass:

"The old Black Hamburg grape stands at the head of the list.

Downing says of it, that its large size and luscious flavor make it universally esteemed. It is especially adapted to grow where fire heat is not used. It even ripens in the open air in favorable seasons. It is a very vigorous vine and regular bearer, and freer from disease than other sorts, and should be in every collection.

"The White Frontignan is another justly esteemed variety, although not capable of bearing as much hardship as the Hamburg, but with a very dry border, will almost always yield an ample crop, and has the merit of being several weeks earlier than the Hamburg.

"The Black Prince is equally hardy with the Hamburg, with long, tapering bunches.

"The Syrian, with enormously large bunches, is a good late grape, although not so high flavored as the others, and north of New York, without fire heat, may be caught by frost.

"The White Nice is also large and late, and although not ranked first in flavor, is a very good variety. The vine is a most vigorous grower; the fruit, when ripe, amber color, and the pulp toughish.

"The Muscat of Alexandria, the finest flavored grape grown, although not so well calculated for the cold house as the others—frequently matures its crop in favorable seasons—should be but sparingly planted where fire heat is not used. Is a very good keeper.

"Among the newer and as yet not thoroughly tested, are the Muscat Hamburg, a cross between the Muscat of Alexandria and the Black Hamburg, a black grape of much promise—'a free grower, good setter, large berries, well-shouldered bunches.' The Golden Hamburg—its color is golden white, fair sized bunches, and a good bearer. The fruit has frequently, during the last year, been before our Horticultural Societies, and is highly esteemed. Although much praised, and well calculated for an amateur collection, doubt exists whether it will maintain its position as a standard variety. Champion Hamburg, Victoria Hamburg, Pope's Hamburg, Mill Hill Hamburg, and Willmot's Black Hamburg, with me, are identical with the old Black Hamburg. Buckland's Sweet Water is a new white grape, untested as yet here, but backed by the strongest English authorities, and well thought of by some of our grape growers, who are thoroughly competent to judge. Said to be a good grower, with fair sized bunch, and large berry.

"Pretty much the same character will apply to the Bowood Muscat. My vine, now fruiting for the first time, much resembles the Muscat of Alexandria, which it may turn out to be, or so nearly identical for all practical purposes as to render a separate name useless. The Barbarossa, a new English *late* grape of more than ordinary promise, is a very free grower, but will require the aid of fire heat to start it in order to mature its fruit. It is said by some to be a shy bearer, and will not do well in too rich a border. Trentham Black was seen in fruit last autumn for the first time; it has a remarkably large plum-shaped berry, with exquisite dark bloom, a fine appearing variety, but said to be a poor keeper."

Dr. C. W. Grant, of Iona Island, said: The list is a very good one, but I think the doctor confounds the Syrian and Palestine grapes. The Syrian never grows the large bunches mentioned, but those of only five or six pounds weight, the berries being colored like the Muscat grapes. The Palestine grape is a dingy amber color, and this variety does sometimes grow very heavy bunches.

It was stated here last week that the wine of the Lenoir and Lincoln grapes does not keep well, not having body enough. I have not found it so, and now have wine from these varieties five or six years old.

Mr. Henry recommended the cultivation of the Corinth grape, which make the Zante currants of commerce.

Dr. Grant.—This variety will not answer for out-door culture in this climate. I have tried it pretty thoroughly, and not found it hardy.

The subject of "The Neglected Fruits of our Country and Flowers" was continued for the next meeting. Adjourned.

JOHN W. CHAMBERS, *Secretary.*

April 7, 1862.

Mr. Adrian Bergen, of Long Island, in the chair.

AMERICAN GUANO.

A paper was presented by Judge Livingston in relation to American guano, imported into this city from islands in the Pacific ocean, who moved that the subject be referred to a committee to report to a future meeting of the Club.

Mr. Robinson would like to know the object of appointing a committee. This guano has been before the public for some years, and he has yet to learn that any advantage has been gained by the farmer from its use. He had been informed by a guano dealer that the principal use made of American guano was to adulterate the Peruvian. He advised that it be referred to the committee on frauds.

The following gentlemen were appointed the committee: Mr. Livingston, Mr. Carpenter and Mr. J. G. Bergen.

TURNIP SEED.

The following letter was received from L. E. Reynolds, of Mendon, Illinois:

"Some three years since I made inquiry of the Institute Farmers' Club in regard to some turnip seed, which I had saved from turnips which had lain in the ground through the winter. I had saved some six bushels, and made inquiry if they would grow turnips, or, as some said, charlock—a noxious weed which infects some farms at the east. I was advised by the Club not to sow, or try to sell it, as they thought it not trustworthy. I took their advice in one particular—I did not sell it; but I have continued to sow it ever since, and shall continue to sow as long as I have any left and it will continue to grow. I think it has been proved conclusively that turnips will not turn to something else, any more than wheat will. I raise as good turnips from said seed as any one else from other seed. The turnips have continued to self-sow on the same ground for four years, and good turnips come every year. I have about five bushels left yet. I sent a bushel to Kansas last year, and my neighbors lay in for a share yearly."

Solon Robinson.—This is a very important statement, as the opinion which Mr. Reynolds says the Club expressed is the one most prevalent among farmers.

HOW TO MAKE CIDER VINEGAR.

C. Snekell, of Portage county, Wis., gives the following mode of making cider into vinegar in a speedy manner.

"To a barrel of cider add one-half barrel of pure rain water, half a gallon of New Orleans molasses, half a gallon of brewers' or domestic hop yeast. Shake it well, and place it in your garret or wood house, near the south side, in as warm a position as possible, without exposing it to the weather. With a bottle inserted in the bung-hole, it will ferment in a short time. Shake t up occasionally. I adopted this mode, and, contrary to my expectations, in six weeks I had as good vinegar as I could wish.

Another mode I have known practiced: that is to set up the barrel in a warm place, and put another under it, letting the cider drop into the lower one, and by the time it drops out of the one into the other it will be good vinegar."

R. G. Pardee.—A large vinegar manufacturer of this city tells me that the cider made in some years, does not readily take on the acetic fermentation that is necessary to make vinegar.

Prof. Nash.—There are several stages of fermentation. Even the sourest apples produces sweet cider in the vinous fermentation, of which alcohol is the result. This is adulterated by exposure to the air. Then comes acetic fermentation, and vinegar is the result. If the liquid is too weak, it will soon pass into the destructive fermentation, and become worthless.

Mr. Carpenter.—I have received the following letter from our old friend, Mr. John Bruce, who was formerly an active member of the Club:

MARIPOSA, *February* 17, 1862.

"The severity of the present winter in cold and rains, is without precedent in the annals of the white men of California.

"All but the mountainous part of the country has been deluged, bringing desolation and ruin on thousands engaged in agriculture and its branches, destroying thousands of cattle, horses and mules.

"Our mountain towns in the mining regions have by no means escaped, but suffered in proportion to their proximity to mountain streams. To speak from personal knowledge, the Mariposa river running through this town, is here but two miles from its source, and for eight months of the year does not exceed two feet in width. It became so much swollen by the rains of this season as to attain a breadth of two hundred feet, and all those having buildings on or near its margin, had them swept away by the impetuous torrent.

"The first sufferers were my sons, whose store and the one adjoining were leveled with the earth, one-half being carried down stream with much valuable property. In consequence of the heaps of tailings thrown up by Chinamen who annually mine the bed of the stream in the dry season, the current changed its course to the opposite side where were situated a number of cottages with beautiful fruit gardens surrounding them. Here the torrent commenced as it were to scoop out these gardens, forming a semicircular bay, &c. Our dwelling place being the last, and on much higher ground, the water did not reach within twelve feet of it. It will easily be perceived that the centre garden of the half circle suffered most—the water excavating the ground from under the house to half its depth, leaving the front half suspended over the torrent. In all the mining towns, more or less damage was done in the destruction of mills, and dams and bridges. But as respects the great agricultural portion of the State, the *plains*, where, in my former letter I described the extensive farm work I saw being done, that portion of the State was said to be laid eighteen feet under water, ruining everything. In confirmation of this as a truth I have just been to see our county sheriff, Mr. Crippen, who returned from San Francisco during the flood, in a steamer. Mr. Crippen says that at Stockton he had business at Wells, Fargo & Co.'s office, and was conveyed to it in a boat. Mr. Crippen further said, he was credibly informed that the U. S. war steamer Shubrick was cruising on the Sacramento river and twenty miles therefrom over the plains, saving the people who had taken refuge in trees, rafts and such other most ready available means, whereby their lives might be saved.

"The agricultural interests of this State have received a shock that will take them a long time to recover from.

"The next thing I apprehend to be dreaded is a partial famine. From the unprecedented long continuance of the rain at one time, the farmers have thus far been unable to plow and sow their grain, which I am told by one of them should now be six inches above ground, and doubts are entertained that the crops of grain will not mature in season. Apprehensions of this must have entered the minds of the people of San Francisco, they having discontinued the shipment of grain to Europe, which was going on to some extent. From the observations I have made, I have come to the conclusion that all attempts to make this an agricultural country for a long time to come, must prove a failure, and that it is madness to attempt to compete with countries where cheap labor exists. Here, in Mariposa, no man can be hired to labor under three dollars a day, mechanics receive much higher wages. Nor will these prices abate so long as the mountains contain gold. The late rains have developed new diggings that will greatly augment the interest of miners, quadrupling the profits of the merchants who fail not to raise the price of their goods in proportion to the difficulty of obtaining them from San Francisco.

"I am now writing this in clear sunshine with the weather so warm that my writing table I have fronting the door, which is wide open. You speak of the many new varieties of the grape, pear, apple and strawberry of great merit and decided improvements, and you wish this may go on till our very hill tops are covered with the choisest of fruits.

"I am sorry to say that this part of California cannot avail itself of such benefits. Although our very hill tops, so far as I have seen, are throughout the year covered with evergreen trees and bushes, and in a month more will be carpeted with the most beautiful flowers, the soil being rich and presenting no impediment to cultivation, but unless some new and cheap system of hydraulics, whereby plants and trees not native to the soil can be irrigated during the long drouth of summer, till then our mountains must remain barren of plants other than those native to its soil.

"My present attempt at horticulture has been greatly facilitated by being enabled to purchase a great many choice bearing fruit trees that were swept by the torrent from the gardens of our near neighbors, and caught some distance below a lot of grape vines. I have yet no help, for love or money, except occasionally a Wally Indian, and they will work but a few hours at a time. But, as my horticultural experiments are only for the benefit of my own family, a failure to produce much will affect them only. From the heat I experienced last summer, I thought I would be able to raise tropical fruits out of doors, and I planted Sicily orange seed and choice lemon, which one of my daugters sent me from New York. But the amount of frost, snow and ice, an inch in thichness, taught me the impossibility of doing so.

"The oranges and lemons are prospering finely, in boxes in-doors; but, for ten months of the year, they would be perfectly safe out of doors. I will most gladly furnish to the Farmers' Club such rare seeds and bulbs as I can obtain with their qualities and uses, but will have to defer doing so till fresh seed can be obtained in the summer or autumn. It was in contemplation by the Institute to have a cabinet of useful and curious mineral and vegetable productions, in fact, a cabinet of natural history. If this idea has not been abandoned, I think I might be enabled to furnish quite an interesting addition thereto. The famed Yosemite falls and mammoth trees I have not yet visited, although no more than fifteen miles in a bee line from here; I contemplate doing so the incoming summer, when I hope to be able to obtain some valuable knowledge, as well as curiosities, all of which I will be most happy to present to the American Institute. In every mining town throughout this State, Wells, Fargo & Co. have an an agency and forwarding office. Anything of small bulk can be safely transmitted to you, through them, if you so desire, of which please let me know on receipt of this.

"JOHN BRUCE."

DESTRUCTIVE WORMS.—PROTECTION OF BIRDS.

Dr. A. K. Gardner read the following paper upon the measure worm:

Among the disagreeable circumstances which belong to city life, and more especially pertain to New York and its surrounding cities, is the nuisance from tree worms. This is so serious in its character, although limited in duration to no more than a few weeks in the year, as to have prevented our citizens generally from enjoying the shade and solace of trees and shrubs in their courtyards and gardens. The general taste of the people would induce them to plant trees along our streets. But the display of this taste is, if not utterly thwarted, at least very seriously interfered with, by the necessity of selecting those trees which are not liable to the annoyance of being infested by worms.

It is not necessary for me to enlarge upon the humanizing effect of ornamental trees and shrubbery, or on the increased value of a home or a city made attractive by its streets and gardens livid with umbrageous green.

Passing by the more poetical and attractive features of my subject, I will draw your attention to some views of a utilitarian character, and endeavor to point out some methods of removing the only drawback to the enjoyments I have hinted at, and which your own imagination will not fail to fill up.

For this purpose it will be necessary, first, to give as briefly as possible the natural history of the insects and worms which most infest the trees of this locality.

So far as I know, there is no tree which is entirely free from this species of vermin. The Ailianthus, although generally supposed to be exempt, has, however, for its enemy, as I have repeatedly seen, a species of army worm; but the ravages of these insects are very limited in extent, rarely destroying a sufficient amount of foliage to be perceptible to a careless examiner.

The principle worm that infests our trees is that which is so generally known as the "measure worm." It is indeed one of the geometra or span-worms, deriving its name from its method of locomotion, not crawling like a caterpillar, but measuring its length with each progressive movement. There are many varieties of this genus, and among them, that most familiarly known in New England, is the so-called "canker worm." This species is somewhat smaller than the worm of New York, and I think, is a longer lived animal, its span of life being protracted into the month of August, whereas the measure worm of New York is not to be seen after 1st of July, and generally disappears about the 20th of June. These worms disappear by "spinning yarn" from the trees to the ground, in which they enter, there undergoing the chrysalis transformation, to reappear after their change into the butterfly or miller.

The time occupied by the "canker worm" has long been noted, and successful efforts have from this knowledge been adopted to destroy them when in this form. The process is as follows: immediately upon their descent they change into the chrysalis, which lies dormant for a longer or a shorter period, as affected by the character of the season. But in the warm, thawy days of early winter or in similar days of early spring, the newly formed insects emerge from the ground, the female as a dark, wingless grub. She, laboriously, starts upon her pilgrimage to the summit of the tree, slowly crawling up the trunk, and is met in her path by the flying male. His duty of fecundation being finished, he speedily closes his short life, while she continues her path till she attains the ends of the branches from whence the young shoots will proceed, and there she deposits in regular rows, some fifty or more eggs, gluing them so fast to the limb that they can with difficulty be removed. She finishes her task by covering them over with a thick, gummy, dark colored crust, impervious to water. Then she too closes her ephemeral existence. When the warm spring sun has shed its revivifying rays over the earth and the trees begin to put on their leafy mantle, the eggs thus protected from the vicissitudes of the weather, which have been carefully concealed by their dark covering from the searching eyes of red-capped woodpeckers, the whistling bluejays, the sonorous chicka-dee-dee, and other winter birds, begin to be warmed into new life, and from them appear new worms in season for the coming leaves, and ready to pursue the round of metamorphoses which their lot has made for them.

It may be seen from this plan that by preventing the female from crawling up the trunk of the tree, the tree thus guarded is preserved from the worm, and by faithfully carrying out this watch the race might be entirely killed off. For this end the bark of the trunk is smeared with liquid tar or surrounded by troughs of lead filled with oil, or with a liquid called a "patent article," used also to fill gas metres to keep them from freezing up in winter, which is simply sea water, from which the common salt has been removed by evaporation. This liquid freezes with difficulty and scarcely evaporates in the open air, and thus serves either as a barrier, or to drown the grub if she persists in following out her destiny.

The measure worm differs from the canker worm in one very important particular. The male and the female of the former, in the second transformation, *are both winged*, both fly to the spot where the eggs are to be deposited, and thus the laborious tarring and the expensive girdling of trees with metallic troughs is utterly useless, as experience has shown in this city and in Brooklyn, where much money has been thus futilely spent.

This fact I discovered after diligently watching this worm for several seasons, and forwarded numerous specimens of the worm in its various forms in the year 1855, to the late Dr. T. M. Harris, then the distinguished entomologist and librarian of Harvard University, who made a careful study of this species, before unknown to him; classed it under its appropriate genus; gave it its special appellation, and it is now enrolled among the hundreds of thousands of recognized and characterized insects as the *Geometra niveo-sericearia*, or the snowy-white, silky geometra. A full description of this species, with the date of this scientific recognition, may be found in Hovey's Magazine of Horticulture, printed in Boston, for September, 1855. From this work I make the following condensed descriptive extract: It shows great neglect upon the part of the editor of the just published second edition of Dr. Harris' great work, on "*Insects injurious to Vegetation*," that no mention of this publication is made therein. One would have supposed that a journal, to which Dr. H. frequently contributed articles upon this his favorite branch of study, would have been carefully examined; and that this article, in which Dr. H. himself took especial interest, and which he wrote me he should embrace in the article Geometra in the edition which he expected, but, alas! did not live to edit, would have received the attention it demands. Such an omission is the more important, as the means declared beneficial in the attempts to remove the geometra are in the case of this species perfectly useless.

It is apparent, from what has already been said, that in order to exterminate this pestiferous nuisance, some other means must be adopted than those hitherto employed. In some remarks which I have elsewhere made upon this subject, some year or two since, I proposed that a light should be placed, during the few evenings when these millers are about, before a tarred screen; that being attracted, and flying towards the light, they might dash against and be permanently attached thereto. Some imperfect experiments have led me to think that these lights, particularly in the cities, where there is so much illumination, would be of doubtful efficacy in attracting these millers, whose natural traits are stronger than their curiosity.

But two methods remain which would be effectual. The first would be a bounty, which would be paid by the city council most cheerfully, if proper representations were made to them, for the worms themselves, and also for the millers. A dime or two a pint would be a great temptation to idle boys to collect them; and thus an immense number would be destroyed, and in a very few years the city would be completely freed from them. If it is of sufficient importance for the city to offer a bounty for the destruction of the superfluous dogs of the city, stimulated by an imaginary idea of their getting rabid during the summer, surely a slight reward for the destruction of a nuisance, upon which so much depends, will be easily granted by our intelligent city officials, whose duty it is to contribute in every way to the happiness of the citizens.

A second way is to promote their destruction by birds. In the country, where these sweet warblers are numerous, there is no such utter destruction effected as here, where but few birds are seen. The common council would here again gladly pass stringent laws for the protection of birds, severely punishing anybody who shall shoot, throw stones, or otherwise molest the birds, or disturb the eggs and nests in the parks, streets, and public or private grounds of the city. Next they should be petitioned to increase the number of birds on the island, by placing in all our parks suitable boxes for the breeding of these birds; should increase their numbers by purchasing such hardy, small birds, as wrens, chipbirds, etc., which will live through the winter in our city, and placing them in all our city squares and parks. Next they should be requested to import during the winter, preparatory in the spring, some of the small birds of Europe, which live on worms—such as the finches and linnets—to be placed in our parks for the double purpose of destroying the vermin, and for gladdening the ears of the people by their cheerful caroling. More especially would I recommend the importation of the sparrow, a bird of little beauty, resembling, but a little larger, our chipbird, and of much more sociability. Those who have traveled in France and England must have observed the flights of these little birds, which fill the court-yards of the hotels, picking chance crumbs and seeds from the ground, and which, when startled by the motion of the stage-coaches or diligence, fly to their nests under the eaves, or in boxes, placed like dove-cots upon the sides of the buildings. These birds are very prolific—among the most so of all tame birds, having several nests of five or six young during each season. One little wren has been known to destroy several hundred worms per day. Surely, then, no one can doubt the possibility of a plan for ridding the city of a most annoying evil, and substituting in their stead, at a trifling cost, these little twitterers—I cannot call them songsters—whose very presence, as they hop along the ground, or fly, laden with green, brown or yellow worms, and hairy caterpillars, will be a constant source of pleasure.

The sparrow is so prolific a breeder as to quite overrun portions of England, and rewards are offered for their destruction in many places. The cost of a thousand would be but trifling, and if distributed around our parks, and suitable measures be taken to prevent their destruction by boys and cats, the city would soon be full of them, and the worm nuisance entirely dissipated. These plans both seem to be not only possible, but eminently desirable. Should they commend themselves to your understanding, I trust that you will adopt some proper method of carrying them into immediate execution.

Dr. Trimble.—I doubt whether the birds would learn to live amid the smoke and dust of the city, even if the boys would leave them alone. I have made the subject of insects a study for some years past. I have great hopes that the measure-worm is soon to be destroyed, for I find that the ichneumon fly destroys them, and that there is also a parasite which lays its eggs in their bodies. I do not think we shall have one-twentieth part of these worms the present year that we had the last.

Mr. P. G. Bergen differed from some of the views expressed by Dr. Gardner. The sparrows I do not think are worm-eaters, as they belong to the hard billed class, which are seed-eaters. Only soft billed birds are worm-eaters. In some parts of Europe a price was put upon their heads, and that tens of thousands were every year destroyed.

Rev. Mr. Weaver, of Fordham.—I would not recommend importing sparrows, because they are a nuisance in England, where, although they are so plenty, they do not prevent great ravages of worms, which are as bad there as here. I would, however, protect our native birds in town and country.

Wm. S. Carpenter.—At the Shaker settlement at Watervliet, the discharge of a gun is not allowed, and the birds have learned to know that they are there protected, and flock in from the surrounding country, and there worms and other noxious insects are scarce. We ought to have stringent laws to protect birds.

Peter G. Bergen.—We have such laws, but we cannot enforce them. We have got to teach the people the value of birds, and why they should not be destroyed.

Dr. Trimble.—Although there are several real insect eaters among the family of American birds, I don't think there is any one but the wren that can be made useful in cities. Swallows are real fly-catchers. Sparrows are seed birds.

Mr. Carpenter moved that a vote of thanks be presented to Dr. Gardner, and that a copy of the paper be requested for publication in the Transactions, which was adopted.

Dr. Gardner thanked the Club for the manner in which his paper had been received. I know the sparrows feed on seeds, but when seeds are hard to be procured, they will feed their young on small worms, and consume a great quantity.

The subject of the day was called up—"The Neglected Fruit of our Country, and Flowers."

Mr. A. S. Fuller, of Brooklyn.—"It is the province of the pomologist to cultivate the various fruits that have been, and are still being collected, from all parts of the world. But it is his duty, in payment for those he now enjoys, to bestow a portion of his time and skill in improving the indigenous fruits of his own country. But, judging from the indifference with which the

American people regard their native fruits, I cannot believe that they know their intrinsic value, and that we have in them the material for laying the foundation upon which we might, if we would, build a structure that would be an honor as well as a lasting benefit to the country. We not only have an abundant number of species, but many of these species contain innumerable varieties.

"In valuable qualities they are equal to those possessed by any other country. Besides, the fact of their being natives render them less liable to the endemic diseases to which all exotic fruits are more or less subjected while being acclimated. The value of some of our indigenous fruits was long ago appreciated in Europe, and by the application of scientific culture they have become superior to all others of the same class found in any other country.

"To show what results we may reasonably expect by perseverance in the cultivation of any particular species, I need only point to the American strawberry.

"The plant was taken to Europe in 1629, and although the European species had long been known and extensively cultivated, yet they were of little value; and it was soon found that the American species were not only superior to the European, but were susceptible of being readily improved, and that too by the application of only ordinary skill in their culture; and to-day nine-tenths of all the varieties of this fruit, in cultivation, have been produced by foreign skill, and in a foreign country, but from the American species; and although we should feel grateful to those who have taken the trouble to improve our native fruits for us, yet it may be questioned whether these imported varieties would not have been much better adapted to our climate, if not superior in flavor and productiveness, if the so-called improvement had been made in their native country. This should be borne in mind, for if, while we are making an improvement in any one quality, a retrogade movement is going on in another, it becomes worthy of inquiry how can this be avoided, and is it possible to improve any particular quality as desired without a corresponding loss in another?

"This improvement of a few of the qualities, with a corresponding loss of others, has evidently been the case with most, if not all the fine strawberries of Europe. They have increased their size and productiveness, and in some instances their saccharine qualities; but they have lost much of their hardy character, beside that most highly-prized of perfumes, the peculiar fragrance of the American strawberry.

"Some of the imported varieties of strawberries could hardly be recognized by their fragrance as belonging to the strawberry family; and it may be questioned if this peculiar characteristic would have been lost, or the hardihood of the plant so much injured, if the improvement had been made at home. I, for one, think not, for the new varieties that have been produced here show that such is not so likely to be the result.

"The strawberry may be taken as a fair sample of what may be expected of other native fruits, if an equal amount of skill is applied to their cultivation.

"Among our indigenous fruits, which seem to recommend themselves to our special care, are the following: The Plum, Cherry, Thorn Apple, Persimmon, Custard-Apple, Grape, Cranberry, Whortleberry, Gooseberry, Blackberry, Strawberry, and Raspberry. America has of each of these from two to twenty different species, and why cannot we with this number equal, if not excel in number and excellence, all other countries. There are still many other fruits worthy of attention, but the few I have mentioned must suffice for the present.

"The many species of nuts, such as the chestnut, hickory nut, black walnut, butternut, beechnut, &c., should also, receive the attention that their many excellent qualities deserve.

"But it may be thought to be asking too much of individuals to undertake these improvements, depending upon their success for remuneration, and doubtless it would be; but have we not a government which is annually expending thousands of dollars in sending out itinerant nurserymen or botanists to Europe, to purchase seeds, to be distributed through the country at an expense to the public of more than one hundred times their value.

"Why cannot a portion of this money, so foolishly expended, be paid to some enterprising collector, to travel through our own country and gather seeds, grafts, cuttings, and plants of our truly valuable indigenous fruits?

"Let a scientific cultivator, or a number of them, receive these plants and seeds, and propagate and distribute them as fast as they prove worthy of cultivation.

"Ten thousand dollars a year, judiciously expended in this way, I am confident would be of more benefit to the country and the world at large than all the Agricultural Department at Washington has ever done, or ever will do, for the country, if conducted in its present inefficient manner.

"Almost all other countries have, through their governments, given aid to such an enterprise as I have indicated; and have they not been richly rewarded, and do they not at the present time cultivate many choice fruits and flowers that have been collected or produced by persons in the employ of foreign governments? How many of such can we show at the present time that can be truly said were introduced or produced through the aid and patronage of our government?

"We ask for the name of any tree, shrub, fruit, plant, vine, or flower which has been, is, or promises to be of the least practical value, or is worthy of cultivation, that has been introduced to the American people through the Agricultural Bureau of the Patent Office Department.

"But let us hope for better things in the future; and, while we petition government for aid, let us not wait for it, but engage earnestly in the cause of progression and improvement. For this subject is one that cannot be overrated, and I confidently believe that, if a proportionate share of labor is given to the culture of native fruits as well as foreign, there will be an accumulation of choice varieties, the product of which will be highly remunerative.

"I hope that every one who takes the least pride in the productions of his country, and possesses the means of experiment, will not neglect the indigenous fruits of America."

Mr. Lawton thought it useless to look to government aid. Whenever a nurseryman or a florist discovers an improved fruit or flower, they get their reward from immediate sales. He alluded to Hovey's seedling strawberry, and had no doubt that gentleman had made a large sum from this valuable strawberry.

Mr. Pardee.—I agree with all Mr. Fuller says, and hope at a future meeting we shall discuss the apricot, nectarine and plum.

Dr. Holton.—If a plan could be adopted by our government whereby a dozen practical horticulturists could be employed in different parts of our country, with a sum appropriated to test every new tree, fruit or flower before being introduced into the community, a vast sum would be annually saved by our people. Let a part of our Central Park be appropriated for this purpose.

CULTIVATION OF FLOWERS.

Mr. R. G. Pardee.—I want to impress upon those who design to plant flowers this spring the importance of frequently stirring the soil. It is of more importance than manure. I have already dug up and stirred my ground twice, and I should like to do it five or six times before planting the seed. The rule should be, keep stirring and pulvering the soil. Do not wait till you are ready to plant your delicate seeds, and then stir the soil only once. That is less than a farmer would do for corn. How much more important that the earth should be well prepared for flowers. Then be careful to get the best seed. Although there are forty kinds of asters, there are but two or three worth buying. Ditto of pinks. Then there are many things sold by seedsmen for flowers, that are not worthy of a place in any collection. The people need a great deal of information upon the subject of flower cultivation, and it should be talked about at every meeting at this season.

"The neglected fruits of our country and flowers" were continued as the subjects for the next meeting. Adjourned.

JOHN W. CHAMBERS, *Secretary.*

April 14, 1862.

Mr. Hawkhurst in the chair.

A NEW FRUIT BOX.

Mr. H. G. Allen presented a new fruit box, made by the Oneida community, Oneida county, N. Y. These boxes are very neat and strong, in the form of a fig drum, without a cover. They are sold at the rate of ten dollars per thousand.

Mr. Robinson suggested that it would be an improvement if they could be made with a flaring top, so that the empty boxes might be packed one within the other.

A NEW SUBSOILER.

S. B. Pierce, of Homer, Cortland county, N. Y., exhibited a very beautifully finished plow, with a subsoil attachment, contrived so as to set it by turning a screw at any depth from one to ten inches below the bottom of the turning plow. This he stated would require about one-fourth more power than it does to draw the plow without the attachment, but will add more than a fourth to the value of the work, and probably induce some farmers to subsoil their plowing who would not do it with a separate plow, and man and team. It can be attached to any plow at a cost of four dollars.

Prof. Nash.—I have no doubt it will be better than the Michigan plow, though that is good; but it is not always beneficial to turn the earth from below the first furrow upon the surface. This plow will loosen up the bottom of the furrow that has been tramped by the ox and compressed by the plow, and I have no doubt will prove worth more than the cost of doing the work. Wherever the top soil is inverted much below the usual depth of plowing, it injures the first crop materially.

Mr. Carpenter.—From the opportunity I have had in examining this attachment, I consider it a great improvement, as it saves the labor of running a separate subsoiler. I like to turn the subsoil up for corn if I have plenty of manure to apply to the top.

Solon Robinsen.—This plan of attaching a subsoiler to a common plow is good, but not a new idea. I gave this Club an account of its practical working some ten years ago. It was first applied by a common blacksmith at Norfolk, Va., and answered an excellent purpose in all kinds of soil. It was not patented then; it is now; and now that farmers will have the opportunity of buying the patent, it is probable they will adopt the improvement.

PEAS GROW UNDER SNOW.

Dr. Trimble, of New Jersey, exhibited growing peas, planted March 15, to show how they will grow notwithstanding the cold and snow storms since they were planted.

BUG-EATEN PEAS.

The doctor has experimented with them, and finds that only one in six or seven planted will grow. He does not believe in using such seed.

THE VALUE OF HAY FED ON THE FARM.

O. Crawford, of Globe Village, Mass., inquires the value of hay (good upland) as a fertilizer, to be fed out on a New England farm, rather than to sell the hay and buy patent manure.

Prof. Nash said that Mr. Brooks, of Massachusetts, proved by a series of experiments, that it was better to feed hay on the farm than to sell it at twenty dollars a ton. As a general thing, farmers who feed their hay on the farm are more thrifty than those who sell hay to buy manure.

Mr. Carpenter.—I shall dispute the gentleman upon this point. I don't know a more thrifty set of farmers than those of Long Island, who have practiced selling hay all their lives, and buying manure, which they haul from the city, or get by water nearer their farms. There are many men upon Long Island who have grown rich selling hay. They keep very few cattle, and consider this a very good system of farming, and I am inclined to agree with them. If you look at the hay market in the adjoining square, you will find it full of wagons loaded with hay, which I think answers the question.

Mr. Robinson.—I don't believe any system of farming can be as prosperous without feeding stock upon the farm as with. I don't believe any farmer can afford to haul such coarse manure as they do from this city, and haul hay from their farms ten or fifteen miles distant.

Dr. Trimble.—I believe there is no greater error in farming than hauling hay to market and buying manure to haul back again. There is no county in the United States where farmers are more prosperous than in Chester county, Pennsylvania—there the farmers won't sell hay. They grow hay, and feed it at home, and fatten bullocks to sell. This system enables them to graze large numbers in summer which is profitable. Many farmers in England have proved the value of feeding hay at home. The practice of selling hay is sure to exhaust the farm.

Prof. Nash.—Farmers near towns may possibly afford to haul manure, they cannot do it thirty miles, nor can they afford to sell hay at any price and buy manure. I am sure from personal observation, that Long Island farmers could pursue a more profitable course than selling hay.

Mr. Pardee.—I have noticed on Long Island, where farmers appear to be thriving in spite of bad management, if they grow rich by selling hay, it is at a slow pace. I am well satisfied that some of those who make $500 a year by that, would make $2,000 just as easily by a different course of farming. I am sure that no farmer can afford to haul hay ten miles, and haul manure back again.

Wm. S. Carpenter.—I believe it is a good practice to sell hay, and if some farmers followed the practice of feeding all at home, they would run out. Cows often eat their value in hay in one winter, and a ton of hay will not make more than three dollars worth of manure.

Mr. Pardee.—Let us see about this. Suppose hay is worth

$20 a ton, then it may not answer to feed cows which afford no milk. But hay a little way from the city could not generally be sold for over $10 a ton. It will take one and a half tons to winter a cow. Cows which at the beginning of winter are worth not over $15, are worth certainly $30 in the spring. That pays for the hay, and leaves the manure and what milk they have given in winter as profit. I believe under such circumstances farmers can afford to feed hay.

Prof. Nash.—It may be bad policy for Long Island farmers in the vicinity of New York, to feed hay instead of hauling it to the city, but I should not have much faith in the statement if all of them said so. I know one man, on the south side of Long Island, who, by a small outlay of labor in gathering sea-weed, grows 125 bushels of strawberries per acre. He has neighbors who sell hay and buy manure, and grow corn with more labor than it requires to grow his strawberries, and their land never produces half the value of his strawberry crop.

FOUR SORTS OF APPLES.

Mr. Robinson.—Notwithstanding all that has been published in relation to the best varieties of apples for cultivation, a gentleman, residing between Seneca and Cayuga lakes, asks "what are the best four varieties of apples for that region?"

Mr. Pardee answered this question by recommending as first in order the Rhode Island Greening; second, the Baldwin; third, the Tompkins County King; fourth, the Roxbury Russet. I resided between these two lakes for many years, and know that the above are the most suitable kinds.

HOEING WHEAT.

A. B. Travis, Oakland county, Mich., says he has tried experiments for several years in the way of hoeing wheat in the spring between the rows which are drilled in, and it has proved very profitable. It does not hurt the growing wheat to be partially covered with fresh earth. The heads upon the rows had grown much larger—the kernels larger. The wheat weighed more per bushel, and made more flour to a given weight of grain, than the same wheat upon unhoed land. The hoeing is most profitable upon clayey or heavy soils, and Mr. T. thinks that upon such land, hoeing will increase the yield 25 to 30 per cent. Finding hoeing by hand slow work, he invented a machine by which it could be done by horse power. Several of his neighbors bear testimony to Mr. Travis' statements.

The subject of the day was then taken up, viz.: "The neglected fruits of our country."

Mr. Pardee.—I intend to say a few words to-day on the whortleberry. I think this fruit might be improved by cultivation, as many other wild fruits have been, for instance strawberries, raspberries and blackberries. All fruits and flowers improve by cultivation. Some attempts have been made to cultivate the whortleberry, which have not proved satisfactory; perhaps it is because the selections have not been judiciously made. There is a great difference in the wild sorts—partly owing to the soil they grow upon. With the same perservance as has been applied to the strawberry, cultivators may be equally successful.

Mr. Carpenter thought it would be necessary to resort to seedlings to get improved whortleberries, as all of our choicest fruits are seedlings; for instance, the New Rochelle blackberry, the Sickel pear. To improve fruits we must improve the tree.

Dr. Trimble.—I really do not think the whortleberry is neglected. If you go into the country during the time this fruit is ripe, you will find hundreds of women and children gathering them. I think they grow in the right place; we certainly cannot afford to use our gardens to cultivate this fruit.

Prof. Renwick.—It appears to me to be the disgrace of the horticulturists of America, that our native fruits and flowers are either neglected altogether, or are returned to us from foreign countries, after having received the improvement by cultivation, which we have been too careless to bestow upon them ourselves. An overreaching disposition in early life, and public employments at a more advanced age, have afforded me occasional opportunities of seeing our fruits in their savage state, and less frequently of plucking our flowers while in their short-lived beauty. The wild arborescant fruit which I have met in greatest abundance is the plum, and in the western part of our own State, ere the plough and the mattock had destroyed them, the varieties were numerous, and the trees far from scarce. That some of them were capable of being improved to the highest degree of excellence, we have several instances, which I believe to be well authenticated. The most interesting of these is the Gage plum. According to the traditions of the American family into which Thomas Lord Gage (the general of revolutionary celebrity) married, he being then a major, on returning from America, after the conquest of Canada, took with him the young trees from which all the fruit of that name in England were derived. This is a far more probable history than that of their having been introduced from France, as they made their appearance in the English nurseries soon after Gage's return. If France possesses a fruit of cognate character, may it not have been introduced from the country of the fur nations where the Gage appears to be indigenous, by the way of Canada.

Of all the Gages, the finest I have ever eaten was one in the garden of my most esteemed friend, the late John DeGraff, of Schenectady. He called it by the name of Schuyler, and informed me that he had obtained the grafts from a tree growing in the garden of General Schuyler at Albany, which tree, it was asserted, had been brought by that general from the Susquehanna river. There is also a dwarf variety of plum indigenous on the sand hills of our coast from *Plum Island*, in Long Island south, southwards. This has a high and agreeable flavor, and might, beyond doubt, be made a fine fruit by cultivation. Wild cherries of many varieties are also found in our woods. As to flowers: we owe the American Rhododendron of our gardens to plants brought back from Europe, and, after admiring it clothing vast slopes of the Catskill's, with its splendid flowers, I met the first cultivated plant I had ever seen or heard of in Glasgow, in 1815. The Kalina, of even greater beauty, has not entered our gardens; the Girardea, the very pride of our woods in June, is not known in our catalogues, and the Commissioners of the Central Park have carefully extirpated the beautiful Azaleas which filled every moist dingle of their domain.

Dr. Trimble.—Amongst the really valuable fruits that are neglected in our country, the apricot stands first. This superb fruit, as it is found in France, Italy, Persia, or California, is hardly inferior to anything that grows, either in quality or beauty. Should apricots such as we have seen, be placed in a show window in Broadway, most of the people passing would stop to admire their beauty—many would go in to ask what they were, and those who would buy them would have to pay several dollars a dozen. Yet, this fruit will grow in orchards, on good sized trees—and these trees will bear abundantly almost every year—are not liable to the diseases that make the peach so short-lived, nor the knots that so disfigure the plum or cherry.

The fruit bud will bear a greater degree of cold than the peach, without being disorganized, yet who eats an apricot in this country except as a most costly luxury?

The *plum tree* is as hardy as the apple or pear, and by no means a short-lived tree. It grows well almost over our whole country, and although it bears better, and the fruit is superior in flavor in some sections than in others, plums might be as plenty as blackberries everywhere, if properly taken care of; yet how few ever taste the really good varieties, or know from experience that the Green Gage once so common, really surpasses in excellence, all the fruits that grow. Nearly all the plums now found in our markets are brought in barrels, and are the small common kinds—austere as green persimmons and only fit for preserving.

Who eats a *Nectarine?* Who knows anything about a nectarine?

It might as well be placed amongst the lost arts, as to any real knowledge the people have of this most beautiful of all the fruits.

Yet the tree that bears the nectarine is just as hardy and can be grown wherever the peach will flourish. And why are these fruits so neglected? It is the *curculio*—and what is the *curculio?* A mere speck of an insect—a little beetle—that it takes four to weigh a single grain, or 25,000 to make a pound. And it is this same insect that is so fearfully threatening the apples, and, though in a less degree, *all* the other fruits.

Other insects, as the Hessian fly, the grain aphis, the army worm or the grass hopper, threaten us with famine at times, and some seasons do immense injury, but suddenly disappear, only to return after long intervals. They are managed and controlled by a wonderful provision in the insect world, by which they are kept within their due limits—none are permitted to preponderate for any length of time at the expense of others.

This curculio, or plum weevil, as it is sometimes called, is not subject to the laws regulating the above named classes, and increases, and will increase just in proportion to the food supplied it by multiplying the number of fruit trees.

The nursery busines has sbecome an importaut one in our country—thousands upon thousands of acres are covered with young fruit trees. Catalogues are published containing interminable lists, and *all* good. Elaborate instructions are given when and how to plant, and we are constantly told in all the agricultural papers, especially those patronized by, or under the control of the nurserymen, of the wonderful profits of fruit growing, but scarcely anything is ever published of any practical value relative to these insect enemies. One writer will tell us that fumigations will scatter them—another says, syringe your trees with mixtures containing whale oil soap, and another tells us to plant our trees so that they shall lean over water. We could mention such nostrums by the dozen.

Could the insect enemies of the fruits and fruit trees of our country be effectually checked, all the people could enjoy these luxuries at very moderate prices compared with the present, even if no more trees should be planted for years.

Mr. Robinson.—A good remedy for curculio is to plant your orchard in a lot where swine can be inclosed, so as to eat the falling fruit. And do not say that we cannot grow plums; good ones, too, not the poor, sour things generally sold in the New York market.

Mr. Carpenter.—I think we have enough of neglected fruits without going into the woods for the whortleberry. The strawberry, raspberry and blackberry are very much neglected; our farmers in general do not cultivate these fruits.

"The neglected fruits of our country" were continued as the regular subject for the next meeting.

Mr. John G. Bergen distributed grafts of the celebrated Bergen pear. Adjourned.

JOHN W. CHAMBERS, *Sec'y.*

April 21, 1862.

Mr. Wm. Lawton, of New Rochelle, in the chair.

PROSPECTS OF FRUIT.

Mr. Wm. S. Carpenter stated that he had been making a tour through the region northeast of this city, and finds a remarkably fair promise of all kinds of fruit. Apple trees, that bore a large crop last year, appear to be very full of buds this year; the very warm weather of the past week has brought every thing very forward. Apples are not so much injured by frost as some varieties of pears.

COVERING STRAWBERRY PLANTS.

Mr. Carpenter.—I desire, to-day, to make a few remarks on the subject of covering strawberry plants. I have been in the habit of covering mine with hay, straw, sedge, moss, and have been successful with my crops, but thick mulching is apt to destroy the plants. Forest leaves I consider better than straw or hay, but the leaves must be kept in place with brush. One of my neighbors, who grew a large crop of turnips, mulched his strawberries with the tops. These plants seemed in excellent order this spring.

John G. Bergen, of Long Island, said that he could not understand why the green turnip leaves should have proved better than anything else, unless it is upon the same principle that we observe in several other cases where green plants are the best manure. This is the case particularly with the grape-vine, its own green boughs being the best of all fertilizers.

As to covering strawberries, he said, I observed the other day in Mr. Fuller's garden, that those left uncovered were in as good condition as those covered, except not quite so forward. The winter before the last many strawberry plants were winter killed, and I observed that mostly, where they were covered. This spring I observe that strawberries look very well, and equally so, as a general thing, whether covered or not.

The Chairman said that, in all his experience, he had not been able to see enough advantage to pay for covering.

Dr. Trimble.-- I protect my strawberry plants by putting well-rotted horse stable manure around the plants in the fall, and raking it off in the spring.

Wm. S. Carpenter.—I should like to have it all raked off, as it is the worst sort of manure for strawberries.

INQUIRY CONCERNING INDIGENOUS AND UNCULTIVATED PLANTS.

Mr. L. Masquerier.—I would inquire of the Club what notice has been taken of the following indigenous plants of our country:

Has any experiments been made upon the rosin weed, or compass plant (Siphinra) that grows so abundantly on the prairies of the west, as to whether its copious resinous juice can be a useful auxilliary to that of the pine tree, and be to it as the sugar cane is to the maple tree?

Is the water or Indian rice of Minnesota cultivated, and why may it not become as abundant a crop in the lake region of the north as the common rice plant is in the salt meadows of the south?

Is there any attempt made to improve, by cultivation, the prairie grass which seems to be a species of rice, but growing upon dry soil. It produces a very lean grain, but cultivation might improve it as other grains and the potato have been. It grows twice as large and tall from between the turned over sods where the prairie is first broken, as it does on that which is untouched. This grass constitutes what may be called the tall grass region of Illinois, Iowa and Missouri. But upon the upper half of the Platte, Kansas and Arkansas rivers, far superior grasses for grazing set in, called the Buffalo, Bunch, and Gramma grasses. They turn to hay in dry weather and thus feed the Buffalo and other granivorous animals both summer and winter.

Is there any attempts to introduce them here? They might, where there is a longer continuance of moisture, grow a larger grain and, perhaps, become cereals, as well as grazing grasses.

There is a twining plant called the pea vine, bearing a finely flavored pea, growing in all the woods bordering the prairies, but I have heard of no attempt in its cultivation. The stock are very fond of grazing upon the whole plant. It grows on a stiff stem, several feet high, and then branches into several twiners that will take hold of adjoining ones, and thus be held from falling to the ground, favoring the convenience of its cultivation.

But, in 1849, I saw a plant, growing in the prairie, ten miles south of Booneville, Cooper county, Missouri, which has not, so far as I can learn, been noticed in any botanical work. It does not resemble the grass family, but must be classed in some of the orders of the exogenous herbs. It rises on a stem one or two feet high, and ramifies gradually, terminating in many little straight twigs. In the forks of each pair of twigs, a single round grain grows about double the size of a grain of wheat, having a taste somewhat like wheat, but is more brittle. Its leaves are roundish, about the size of a white locust leaf. It seems to grow mostly in the rather moist than in the dryer part of the prairie. Cattle seem to prefer it to the grain of the prairie grass. This might, perhaps, be a cereal, worth, if cultivated more than the buckwheat crop, which, according to the census reports, may now amount to $12,000,000 per year.

I have written, for several years past, to several friends there, to send me some of the seed and a specimen plant, but they say the prairies are now so eaten out by cattle, and turned into fields, that they cannot find it. But, I think, it might be found further out, between the Pacific railroad and Osage river. I wished to have presented the seed to some of the Farmer's Club to experiment upon; and I now make this statement with the hope that some cultivator, having time and means, will hunt it out, and prevent it becoming extinct.

But as clothing is second only in importance to food, fibre-yielding plants should demand our discovery and cultivation as well as the cereal. Why is there nothing done with the wild flax that Fremont observes, in his journal, growing on the Kansas river? While we have forty or fifty leading plants, that furnish food, we have only the two, flax and hemp, that furnish lint with cotton for clothing. The economy of society is fortified by having a variety of plants growing in different seasons, that may supply the place of those that may fail through drouth. There are whole orders of plants remarkable for the toughness of their fibres. There are the *asclepiadaceæ* for instance, containing, according to Lindley, one hundred and forty-one genera, and nine hundred and ten species, some yielding the strongest fibres known, and yet we are not using one of them. I have obseved growing around New York, at least three species, all having an equally strong centicle fibre or lint, and yet no use is made of them. Mr. Schaeffer, in the Agricultural report of the Patent office, considers the lint of the milk-weed equal to flax or hemp, or at least good for paper pulp. Is there any one who can experiment upon it further, by sowing it thicker, and see what cultivation will do for it? It being perceived it could be cultivated easily and cheaply, and should the oil and gum of the seed answer as well as that of flax, why would it not be a good auxilliary? It is rumored that a farmer in Wisconsin improved the strength of the fibre of the pod by cultivation.

PRESERVING TENDER EVERGREENS.

Mr. Carpenter stated that he preserves tender evergreens by loosening the roots upon one side and turning the tree down, and covering it with earth.

TOBACCO CULTIVATION.

Solon Robinson read a letter of inquiry upon the subject of tobacco cultivation, which elicited a spirited discussion upon the question of growing a plant that has done so much injury to the world. Mr. Robinson contended that the cultivation was a curse rather than a benefit to Connecticut.

Mr. Roberts said he was opposed to tobacco in all cases, but must contend that the farms of Connecticut had been improved by the cultivation of this plant; the farmers had better houses; their fences and outbuildings were improved by the money derived from its cultivation.

Solon Robinson.—Yes, I acknowledge all that, but contend that the same degree of industry applied to some other crops would produce better results in every respect. I consider everything connected with tobacco bad.

Judge Livingston.—I grow a little of it in my garden every year, for use in my hot-house, and consider it worth cultivation for that purpose.

Dr. Trimble.—Perhaps it may be a useful and profitable crop, but I hope this Club won't give any information about its cultivation.

CHEAP STRAWBERRY BASKETS.

There were three specimens of strawberry boxes or baskets before the Club to-day, part of which have been noticed before, to wit: that of Mr. Mellish, of Walpole, N. H., shaped like a flower-pot, $2 a gross for two-quart size, and $1.75 for one-quart, is very handsome, but not very strong. Those of the "Oneida Community," at Oneida, N. Y., made of a hoop nailed together and bottom pegged in, like the "Boston boxes," without lids, at $10 a thousand, are strong, neat-looking, and very cheap. The new one exhibited to-day, is made by D. Chadeayne, Corfu, Genesee county, N. Y., of two thin strips of wood laid crosswise, and bent together and held in place by a rim of tin. They are cut so as to be tapering, and have holes in the sides and lids. The price of quart sizes is $3 a hundred; without lids, $2.50. At this price, they cannot compete with the other two, nor with Cook's patent.

FRUITFUL TREES.

Mr. Carpenter stated that he had pear trees, eight years old, that produced $24 worth of pears per tree; and apple trees, five years old, that produced $3.50 worth of apples each. He said all good fruit finds ready sale, at large prices, in this city, and it is not unusual to get a barrel of pears from a single tree.

WHAT A WOMAN CAN DO.

I have for many years, for the most part, cultivated a flower-garden, thinking it much better for my constitution, which is not strong, to exercise in the sweet, free, open air, rather than be confined within the walls of the house. I determined to try my skill in planting. So, after having the ground plowed and fertilized, I planted 1,560 hills of corn, covering nearly one-fourth of an acre of land, which, with but little help, I hoed myself, three times. My corn grew very well, but was somewhat eaten by the worms, and badly blown down by a severe wind, after it got so heavy that it could not get up again, which damaged it considerably. When it was fit to harvest, I invited some of my friends to an afternoon's husking, such as I have heard tell of in the country, though I never attended one before, having been brought up in a city. The afternoon came, as beautiful as ever an autumn afternoon need be, and about twenty-five neighbors spent the time as pleasantly as the day. We husked twenty-eight bushels of ears of good sound corn, not measuring that which was not perfectly good. I not only found the exercise healthful, but a real enjoyment, and hope that many others may be benefited as I have been, and add as much to the crops of the country the next season. Ladies, try and see how much better you can do, and how much better you will be.

The regular subject of the day, "The Neglected Fruits of our Country," was called up.

Dr. Trimble spoke in favor of cultivating the apricot. The apricot was one of the first fruits to blossom. The branch I hold in my hand is nearly in blossom, but I doubt if the tree from which I took the branch will bear one apricot; a little insect, called the curculio, will destroy the whole. If you want to raise this fruit, you must keep hogs, who will eat the fruit that has fallen. In gardens, the fruit should be gathered daily and destroyed. I find no better way than jarring the insect off upon a sheet and killing it.

Rev. Mr. Weaver said that for a long time the curculio had been so troublesome in the vicinity of Burlington, Vt., that no plums could be grown. A year ago last fall, there was a great change, and all the trees were full. Who can tell why?

Dr. Trimble.—I attribute it to a great drouth the previous year, having experienced the same result one year on the Hudson. At such a time, the larvæ perish in the dry soil, by the heat and want of moisture. I have proved this by experiment, by putting the eggs in a pot of earth in a room where it kept dry.

Dr. Trimble then proceeded to discuss the subject of the "Curculio," as follows, viz.:

Few persons probably know the meaning of the word "*curculio,*" and when told that it is the name of a little insect, less than the common house-fly, many will not care to read further—for most people consider all insects too small to be worth much consideration. But should we be told that during the next month there will come some great wild animal that will tear from the orchards and gardens, in all the United States, (except only in California and Oregon,) all the young apricots, nectarines, plums and the greater portion of the apples, we would read all about it, and be much excited. There would be another "great arising," as there was a year ago, when the government was threatened with destruction. Now although no such animal will appear, all this mischief will be done. Millions of dollars worth will be destroyed—all of us will be on short allowance, and many will have no fruit at all.

This is an evil that has now existed for many years, and is constantly increasing, and still but little has been done or written to guard these valuable crops from the threatened destruction.

Most people who have made careful observations for a series of years, believe that we may only expect a full crop every other year, and that even years, are the fruit years. Two years ago, 1860, we certainly had an unusual supply of nearly all kinds, and many supposed the curculio had disappeared. Not so; it commenced operations as usual, and probably as much fruit suffered that year as any other; but with so much to begin with, there was generally an abundance left; there was even part of a crop of plums on some trees.

In many apple orchards the ground was thickly strewn with punctured fruit, but still there was plenty left. The cherries and peaches, as is usual when the crops of plums and apples are abundant, suffered but little. The apricot being the first fruit large enough for the attacks of this insect, will always suffer, and requires the utmost vigilance to save it any year. The nectarine though not so early, is a special favorite from its smooth and tender skin; it also is seldom saved, except when under glass.

The writer of this paper has had a long war with the curculio. He has battled with him through fifteen campaigns, and, except the three first, when he relied upon the weapons of quackery, has always conquered. He has used the various washes, and fumigations of horrible odors, has built fortifications of cotton and tar, and troughs filled with oil round the bodies of the trees, and placed whole loads of offensive manures under favorite fruits, and on one occasion bored holes in the bodies of trees and plugged in charges of sulphur. Even at this time he occasionally jarred the trees over sheets, as directed in some of the books, and killed large numbers of the enemy, but subsequent experience proved that this last was not effectually done; the consequence was, no apricots, no nectarines, no plums, and but few apples, except little knarly things.

But since those three years, the *jarring* process was systematically resorted to and has proved a perfect remedy. The fruit crops since have never failed; even the apricot and nectarine trees never losing any portions of their crops from this cause, and frequently overloaded.

The *black knot*, that disfigures the plum orchards in so many parts of the country, and finally destroy so many trees, is also caused by the curculio.

The *rot*, that carries off in a few days so many kinds of plums just before they ripen, and when we think the crop secure, is caused by the same enemy.

If the curculio passed a part of its life, as some other insects do, exposed to the attacks of the ichneumon, some one of these parasite flies might come to our rescue. But its larvæ are so deeply imbeded in the fruit, that the smaller varieties of these flies could not reach them with their ovipositors, and the young curculio is too small to answer as a nidus for the larger ichneumons. And then, too, they penetrate into the earth to the depth of several inches, as soon as they have come to their growth and leave the fruit. As the ichneumon is not known to use the bodies of the imago, or mature insects of any kind, as a deposit for its eggs, it is not likely to choose the curculio. Still, as there has been a notice lately published by some gentleman in Canada, that he has found parasite insects in the larvæ of the curculio, I will not venture to say that it is impossible; and if it should prove true, let all the people rejoice. There was a time when an insect pest threatened the entire destruction of the wheat crop in America, and in the midst of the most fearful alarm, a little ichneumon fly took charge of the matter and settled it effectually. If this curculio question could be settled in the same way, the whole people of America might partake freely of all the varieties of our glorious fruits, at an expense merely nominal compared with the present. The total destruction of this little insect would add more to the comfort, the health, and the happiness of the whole people of our country than has been brought about by any one cause since the extinction of the Hessian fly.

In France, parts of Italy, in Persia and Independent Tartary, they have apricots as we have peaches in our Middle States. In the more mountainous parts of these countries, they flourish best; in this country the cultivation of this delicious fruit has not been understood. We have supposed it could only be grown under glass, or as a wall fruit, although it will flourish high up in mountain regions, and the less early the spring the better.

In some parts of Europe, plum trees line every road, and the fruit is so abundant that they can send dried plums or prunes to us so cheap, that the beautiful boxes they are packed in are worth nearly the cost. In those countries *they have no curculio.* We have the same kinds of fruit trees, as favorable a climate, and soil as good, but a large portion of our population, in a majority of seasons, have but little fruit of any kind, and but few ever see an apricot. Now the question arises: *What can be done?* We may hope for the discovery of some cheap and effectual remedy. We may hope also for some cure for consumption or cancer, and we have no right to suppose that we shall always hope in vain; but we are obliged to say that such cures are not now known. We do not wish to discourage others from experimenting with the various remedies so boldly recommended, but merely to say that our experience has been so unfavorable, that we have no confidence in any of them.

Suppose you discover a fumigation so disagreeable that it would drive the curculio from your trees; it would not kill them, and back they would come as soon as the smoke had cleared away. And the idea of keeping up that kind of war for six weeks is absurd. About the same may be said of the various washes that are to be thrown into the trees by hand engines or syringes. Tar upon the bodies of your trees would prevent them creeping up for a day or two until it became glazed, but they are already in the trees, and seldom creep either down or up. And they can fly, and pass from one orchard to another. No. The curculio attacks our fruits with but one object—to perpetuate its race. The young fruit is its proper nidus, and if you drive it from one tree it will find another. Each female curculio has several hundred eggs to dispose of, and if she can, will take as many hundred young plums for their portions; and I think I see her laughing at you at the idea of disagreeable odors stopping her in the performance of that duty.

The curculio is a hard, black, rough beetle. A handful of them, when at rest, with their legs and proboscis folded under them, might be mistaken for a handful of hemp-seeds. Like other beetles, their wings, when not in use, are covered by a case or shell; the proboscis is long in proportion to their size, and is the instrument with which they puncture the fruit, and is not, as some suppose, an ovipositor.

Persons familiar with the curculio seldom see them fly, though it is supposed that they pass from tree to tree, or from orchard to orchard, upon the wing. Sometimes, when jarred from the tree, they will open their wings, and instead of falling, will come down at an angle, and light on some distant part of the sheet, or on your person, or sometimes even fly off to another tree. They seldom use their wings in passing from one part of the tree to another. In cool weather they walk about deliberately, but in the middle of hot days they are in a greater hurry. In cold wet weather they are perfectly quiet, and are concealed under portions of bark, or in the crevices of old wounds or knots in the body or large branches of plum-trees. Like other insects, in their last or winged state, the object of life is to arrange for the continuation of their race. In their larva or grub condition, they were nearly all stomach, and eating occupied their entire time; now, they have no stomach of any account, and they scarcely eat at all; consequently, they soon become exhausted, and towards the last are but mere shells.

The mark upon the fruit made by the curculio is crescent-shaped, (and from that circumstance she is sometimes called the Turk,) and looks like the indentation of the little finger-nail of an infant, and the reason it is so is, that the insect, while making it, remains standing on the fruit, in the same position, only moving its head. When this crescent-shaped incision is completed, she introduces her proboscis its full length, from the centre of the crescent towards where she stands, and immediately under the skin of the fruit, and at the bottom of this puncture enlarges so as to be suitable for the reception of the egg. This done, she turns and deposits the destined egg at the entrance of this tube; then turning again, with her proboscis pushes it gently to its proper place. What remains now is to secure the precious deposit from any danger from exposure to the air or weather, as would be likely to occur by the growth of the fruit opening the wounded part. This she does by carefully sealing up the entire incision with a kind of wax, of which she seems always to have the requisite supply. We have often, when watching this operation, and especially at that part of it when her proboscis is buried up to her very head, been struck with her resemblance to the woodcock when his beak is entirely imbedded in the ground.

The curculio seldom deposits more than one egg in a fruit. Whether the duplicates or triplets that are sometimes found in our fruits belong to the same mother, is hard to say, but we suppose not. If a curculio, however, is confined in a bottle with but one plum, she will puncture it all over, so that it will sometimes have the appearance of a nutmeg-grater. The time occupied in each operation is eight or ten minutes, and is repeated some twenty times each day for several weeks.

In the early part of the season, while the weather is cool, the curculio egg will not hatch in less than ten days or two weeks, and any time during that period it may be taken out with the point of a penknife, or what is better, a rather blunt toothpick, or it may be broken by pressing with the thumb-nail over the spot where it is deposited, and if your ear is a right good one, you may even hear the snap. In either way you may save the fruit; the wound soon grows over, scarcely leaving a blemish. It is well to know this, especially if you have young trees bearing for the first time, and you are anxious to test the fruit. It can even be done repeatedly; but remember, it *must* be done before the hatching, and in very warm weather this takes place very quickly, even as early as four or five days, and the moment the young insect is free, it makes its way rapidly towards the heart of the fruit, leaving a pathway at first so fine as hardly to be visible. If you see *gum* about the orifice of the wound, it is too late, the mischief has been done.

Fruit punctured by this insect continues to grow even after the larva has penetrated to the centre, but finally its vitality, if it is *stone* fruit, becomes destroyed, and it falls to the ground, though not till the young insect is almost full grown.

With the cherry, the fruit matures almost as soon as the grub of the curculio, and those who eat the first that appear to be ripe, will often encounter this worm, and it is needless to give all such people any description of its personal appearance.

Here the cedar birds, the robins, and even the crows, come in to our advantage—let them alone. The boys will be getting out their guns, and sending for powder and shot—stop them; these are only premature cherries, generally red on one side only, and in that side a worm; let the birds have them—your crop of cherries will be better the next year.

You will find plump, fat, full-grown specimens of the larva of the curculio in your apricots, in your earlier apples, in the early York peaches, and in some of your plums. Apples in June and July will be falling by millions: some are only blights—an effort of nature to guard against overbearing; but most of them will be wormy—the embryo curculio of the next year. Pears and quinces suffer less than the above, but you may often see the crescent mark on these also; and should the more favorite fruits fail, these varieties could and would be used to prolong the race. We have seen the crescent mark even on berries in the woods, and when all the fruits fail, or before any of them are ready, she will deposit her eggs in the bark of the plum-tree itself.

However strange and unnatural it may appear, that the same insect should resort to a nidus so different as a fruit and the bark of a tree, still the testimony is too strong to the fact, to leave it longer in doubt.

We must not only have a season without any fruit, but the trees also must be destroyed before we can hope to be rid of curculio for want of a nidus in which to deposit her egg. But it may be asked, what is the proof of all this?

We have seen the curculio making the crescent mark upon the tree. We have watched day after day, and seen the growth of the knot round that mark. We have seen the gum exude from the orifice. We have taken the full grown larva from these knots and could distinguish no difference between them and the larva taken from the plums—have placed them in vessels filled with earth and kept them separate from others, and watched them during the progress of transformation.

They go the same distance under the ground, make the same kind of a cell in the earth, assume the pupa condition in precisely the same way, and come out the perfect insect in the same time. You may examine the two either with or without a glass, and there is no apparent difference. Mix them together, and you cannot separate them. Thus, we think it may be considered as fully proved, that the same insect that punctures our fruit causes the black knot on the plum tree also. It seems both strange and unnatural, but the insect world is full of wonders.

We have stated that the *rot*, sometimes so destructive to the plum crop, is caused also by the curculio. Some persons will dispute this proposition, and tell you that it is the weather only. We admit that the weather has much to do with it. A crop of plums will be destroyed much sooner in hot wet weather (what is called dog-day weather) than when the atmosphere is dry and pure. We have seen beautiful crops of fruit almost ready for the market, and when the owner was congratulating himself that he was out of danger, disappear in a few days; and this is more often the case with those kinds that grow in clusters and where many touch each other. The experienced fruit grower will watch his trees closely at this season; where he sees a plum decayed, or only a speck upon it, he will carefully punch it off with a pole —and if his experience is like ours, he will find, that in the centre of where the decay commenced, will be the crescent mark of the curculio. If that plum remains upon the tree, all the others that touch it, either directly or indirectly, will rot also sooner or later, according to the weather. Where the eggs of the curculio are deposited in plums so nearly grown that the pits are becoming hard, they seldom hatch. We suppose the acid of the fruit at this time destroys the egg, and it in turn becomes a poison to the fruit. This is our theory, and whether true or not, the destruction of our plum crops is sometimes so great from this cause, as to call for the closest attention. Watch your trees every day, take off every specked plum at once; some even now will be found to have the grubs of the curculio in them; be careful to destroy them.

Much has been written about the curculio in this country, but most of it very crudely. We have met with some of those writers that have confessed never to have seen one. Had this insect existed in Europe, it would, from its great importance, have been thoroughly investigated by entomologists; but here we have had but few to devote their lives to this science, and our indigenuous insects are but little known. My own investigations until recently were confined entirely to the means of preventing its ravages upon fruit; lately we have paid more attention to its habits of life; have not only summered, but wintered with it.

The larva (or worm we find in fruit) when full grown, eats its way through the skin, and immediately penetrates the ground. If the earth is sandy or loose, it will sometimes go to the depth of eight inches, and seldom less than three or four; there it prepares for itself a kind of cell, something similar to the cell of the mud-wasp. and this is its cocoon; here it undergoes its metamorphosis. In a few weeks the white maggot, without wings or legs, will be a black beetle, ready either to run or fly. If you have them in confinement, you may feed them with leaves or any of the fruits, and you may see that they eat, though very sparingly. You will generally find them perfectly quiet, but touch them, and instantly they are full of life. This will be the case all winter if you keep them in a warm situation; but out of doors in our climate, they are perfectly dormant. Where the vast army of curculios pass the winter, it is hard to say positively, but we have found them in the crevices of the rough bark of trees, in walls, and even under the shingles on the roofs of buildings.

We have often supplied the young curculio with fruits, but have never known them puncture them, or make the crescent mark; hence, we infer, that the opinion of some that we have two generations the same year, is a mistake.

Those who cultivate the apricot know that it blossoms several days before the other fruit trees, and the young fruit grows very rapidly from the start, but we have never seen this fruit so early but what the curculio was ready to pounce upon it as soon as it was large enough to bear the puncture; consequently, the curculio is ready to deposit eggs many days before any of the fruits except the apricot are large enough for her, and during this period of waiting we have seen her, or some other beetle so near like her that our experienced eye could detect no difference, making the crescent mark on the bark of the twigs of the plum tree themselves, and that led to the subsequent investigations that proved to our satisfaction that the curculio causes the black knot also.

In some places but little inconvenience is suffered from the curculio. When we have had the opportunity of investigating, we have found the soil a stiff clay, and conclude that the larva was not able to penetrate deep enough to be secure either from drought or some other contingency during its period of transformation.

Some people plant plum trees over water; some pave the ground under them, and say that by these means they secure crops. If so, it can only be explained by insect instinct, which in this case teaches the parent that her little ones will not be safe in falling in such places, and she therefore chooses other trees. Our own understanding is so at fault in all attempts to comprehend the wonders of the instinct of insects, that we will not dispute this proposition, and to prevent others from sneering at what may seem so absurd, we will relate an instance of the instinct of another beetle still more wonderful.

The cockchaffer is a favorite food of rooks and crows; now if the chaffer sees one of these enemies approaching, and has not time to escape, instead of simulating death, as the curculio does, by drawing up her limbs and trunk, and seeming like a little round bud, he will sprawl his legs out at full length, and look for all the world just like a dead chaffer ought to, knowing, from instinct, that rooks will not eat bugs unless they kill them themselves.

In visiting the New York markets, we see fruits from almost every part of our country. The apricots, peaches, plums, and early apples from Georgia, the Carolinas, and Virginia, have been marked by the curculio. Later in the season, when the same fruits come down from the north, the same unmistakable mark is visible. Every year a large portion of the apples are what the country people call gnarly—have been tampered with by the curculio; many of them stung in several places, and so misshapen in consequence, that but a mere section of the apple will have a natural appearance.

One summer in our experience we escaped the curculio. We found here and there a few at first, but not one in a hundred of ordinary seasons, and we had a crop of fruit without trouble, and that was to us a new sensation—as if we should experience one season's exemption from mosquitoes in Newark.

In our efforts to trace this strange circumstance to its cause, we remembered that the year before there had been *no rain in that immediate neighborhood.* We had been often threatened with showers, but they had always failed us, and the ground had become as dry and parched as the Libyan deserts. Since then we have gone through a series of experiments, and have found that the curculio will not live through its period of transformation in earth that is kept perfectly dry. The drought of the preceding season was undoubtedly the cause of our exemption from the pest that year. Had we used some of the curculio remedies so much in vogue, they might have had the credit. And all the credit they all have is due to some such adventitious circumstance.

Our whole fruit crops seem, in some near future, to be in a great measure, at the mercy of this *insect*. And the question arises, what can be done?

As we approach our plans of managing this question, we wish to take both a scientific and common-sense view of the whole matter. If we could destroy *all* the young insects, (the worms or larvæ,) found in the fruits for one year, we should not expect to find the full grown curculio the next season, *and this is possible*. This young insect, or grub, in search of food, penetrates to the centre of the fruit, and by feeding there destroys its vitality so that it falls from the tree prematurely, *and in almost every instance* some days *before that worm has finished feeding upon it*. During that interval it can be destroyed with less trouble and more certainty than at any other time. Suppose that every fruit grower in the State of New Jersey should have all his fruit bearing trees of every kind within such enclosures that he could turn his stock of hogs amongst them during the time this stung fruit was falling—let those hogs be fed sparingly—(we do not mean that they should be kept squealing hungry, but sharp,) so that they would be constantly in search of this falling fruit—that fruit would certainly be destroyed, and with it that mighty crop of embryo curculios. This may be said to be impracticable, and that is certainly true in the present want of knowledge, but still it is a supposable case. If this were done, the curculio question would be settled for the time. But if impracticable in a State or county, it may be done in a neighborhood—it certainly can be done by an individual. Where your trees are so situated that your hogs cannot run at the proper time, as in your garden, then let the falling fruit be gathered by hand, *every day*, and fed to them or burned. Some suppose the poultry is valuable to destroy the curculio. Poultry is certainly destructive to many kinds of insects, but there is scarcely any period in the life of this insect that it is within the reach of your fowl—they certainly will not eat this green, worthless fruit because there is a little worm in the centre of it—however dainty the morsel would be. The interval of their exposure, between passing from the fruit and entering the ground, is too short to allow much chance of being discovered. The same remark will apply to birds also.

In this battle for the security of our threatened fruit crops, our great advantage, lies in the power of destroying this enemy in its helpless or immature state—it is "the ounce of prevention worth a pound of cure."

Thousands of little fruits just formed fall soon after the blossoms; these are only blights, and are of no consequence—but in ten days or two weeks later, in every neighborhood where the cúrculio exists, you will find the crescent mark beginning to show itself. That mark is the sign manual of the curculio, and tells the whole story. Just under the skin in the centre of that crescent, an egg has been carefully placed and secured; in a few days that egg will become a grub, at first too small to be visible to the naked eye—soon it will be found at the centre of that fruit feeding constantly and growing rapidly, and in a little while longer that fruit will fall to the ground, and there it will lay a day or two, or sometimes longer before that grub leaves it. This is your time and be sure to use it. Let no fruit having this crescent mark upon it, whether apricot, plum, apple, cherry, peach or pear, remain upon the ground—gather them all, every day, in your garden—see that your friends, the hogs, have the chance in your orchards, where to pick them up by hand would be too irksome—and if trees of indifferent fruits are so situated that they cannot be attended to, cut them down, and the sooner now the better. A single apple tree of no value, in some remote field, may be a nursery for thousands of these curculio enemies every year—let no such trees stand after the middle of June. Prevail upon your neighbors to act with you—have if possible, a neighborhood combination of fruit-growers, that will study the theory and put in practice the remedies, for this and other insect enemies of fruit and fruit trees.

It may be asked what will all this advice avail for the coming crops? Nothing; it is given to enable you to save future and especially feeble crops.

From the backwardness of the present season, and the immense number of blossoms, we shall probably have plenty of the more common fruits without much trouble; another year there may be but few blossoms, and if the curculio is permitted to multiply as it will have the chance, when fruit is so abundant, it will then leave us nothing.

Some say those instructions may be all very good, but we have nectarine, apricot and plum trees from which we never get any fruit—what can we do to save the crop the *present year?* Can it be saved? We answer yes, without any hesitation; but you must follow our directions, and pay no attention whatever to any of the curculio remedies. The late David Thomas, of Western New York, one of the most intelligent and experienced nurserymen and fruit growers in our country, originated the plan of trapping the curculio by spreading canvass under the trees and then *jarring* them. This little insect, like most others, has an instinct of self-preservation. In this case, when an enemy approaches, she gathers her little limbs under her and falls to the ground, remaining quietly concealed amongst the grass as long as the danger lasts. A sudden tap on the tree alarms her. Such a sudden jar upon your plum tree in the early part of June, will also loosen the blighted blossom buds that are now dry and black—they and the curculio will fall off together, and look much alike as only to be distinguished by close inspection. Whether the instinct of the animal teaches her to fall in such company so as more effectually to escape detection, is a problem in metaphysics we shall not now stop to determine; but Mr. Thomas took advantage of it to secure his fruit crops, and invented a simple apparatus to enable him to do it. Ellwanger and Barry, the great nurserymen of Rochester, use the same means and nothing else; the writer of this depended upon it for a dozen years in succession, and with uniform success; having large orchards not only in plums, but apricots and nectarines also, uniformly loaded with perfect fruit, every year, while his neighbors could raise none of either. To spread a sheet or piece of canvas under a large number of trees as often as it would be necessary in the curculio season, would be very troublesome, especially in windy weather; to simplify this operation, bind sticks or poles to two sides of your sheet, and it is easy to imagine how much more easily you can spread it out smoothly, and that it would then lie still in spite of the wind. Now, to enable you to use such a piece of canvas under a tree, cut one of these rolls in the middle and slit the canvas from that point to the centre, then by taking one of these short rods on each side of the tree, you make this cut portion straddle the tree, and then your trap is ready—lying smoothly on the ground, and, if large enough, equally under all the branches.

If the trees in your orchard are young, a sheet six or eight feet square will answer; full grown plum or apricot trees will require one, ten or twelve feet. The canvas fixed, the next thing is to get your enemy upon it; this is done not by shaking the tree, but *jarring* it suddenly. If it is small, the palm of the hand answers the purpose, three or four taps are enough; large trees require a mallet, it would soon become painful to the hand. Remember, however, that the tree must not be struck directly with a mallet, you would cause a bruise that would be a serious injury. Saw off a stout branch, leaving a stump one or two inches long, and if you will pare off the edges of this stump so as to present a convex surface, it will bear the blows of the mallet longer; and, by careful management, you make it last the whole season.

The beginner, in the pursuit of the curculio, will often overlook them as they lay on the sheet. The little thing folds itself up so closely and so quiet as to be readily mistaken for the dried buds that are falling from the trees at this time; but in a few days the eye becomes experienced, and the instinct that teaches them to escape observation by being so still, soon ceases to avail them.

The next thing is the crushing process, between the thumb and the finger. Like other beetles, the curculio is hard and crisp, and requires some force to mash it.

Some people have a conscience about the killing of insects—we have. We would not kill a spider nor an humble bee; neither of them would do us any harm if let alone, and we know they are useful.

The fruits are not only luxuries, but have become a part of the necessaries of life; the curculio would take them all without any hesitation, if she wanted them. Man was created with dominion, and we think, in this case, is justified in pronouncing against her; and whenever we get a curculio fairly between the thumb and the finger, we carry out this decision.

By observations carried on through a series of years, it has been found that the curculio commences upon the apricot about the middle of May, and a week or ten days later on the plum and nectarine.

If you have determined to secure your fruit it will be well to begin before it is large enough to be injured, for the insect is lying in wait for it, and can frequently be taken before any mischief has been done. We have seen a promising crop entirely destroyed in a few days.

The length of time necessary to carry on this war will vary, but will require more or less attention almost till the time of ripening. If you attack them vigorously from the first, you may have them so much diminished in number in two or three weeks, that the labor afterwards will not be so irksome; and, if your trees shall be so plentiful set with fruit as to be benefited by thinning out, you may, if you choose, permit the few that remain to have a chance to perform the duty they were created for—prevent the trees from overbearing. There will be some risk in this, however, as the curculio and you are not governed by the same motives. She does not estimate the value of fruit by what money it will bring in the market as you do, and, therefore, you must be cautious about trusting it wholly to her management.

During wet days, and some cold windy days, the curculios are inactive, but when the pleasant weather comes, and especially the very hot days in May and June, how soon they make up for lost time. All insect life is active in proportion to the heat of the weather, and we have sometimes thought, when the safety of a hundred bushels of apricots depended upon the labor of a few hours, when the thermometor stood at 120 in the sunshine, that nothing else on earth could be so invigorated by heat as the curculio.

The business of securing fruit from the curculio is a laborious one, but how in this world can we secure anything else as good without labor?

If you have large orchards of apricots or plums, when the soil and climate suit these fruits, the prices they will bring you will justify the expense of protecting them.

In neighborhoods where the curculios has undisputed possession, as in most parts of this State, the number that can be taken by this jarring process, in the early part of the season, will sometimes be almost incredible, but you will soon find the numbers to disappear.

Those who have no knowledge of entomology will be likely to mistake this little insect for many others, especially the smaller beetles. The worm we find in chestnuts becomes a flying insect the next season, much like the curculio. Some have said that the pea-bug is the same as the curculio, and they certainly look very much alike, but any one who will try them by the crushing process between the thumb and finger, will know that they belong to different classes of insects.

If you have determined to save your fruit from the curculio, watch your trees often. If you have some promising fruits in your garden, run out with your small sheet before breakfast, and give your trees a tap; if you find any then, go again before you attend to business; run out before dinner and before tea. As your beautiful fruits grow and promise such luxuries in the autumn, you will become more and more interested, until, like Scott's Blinkhoolie, in the Abbott, you will come to think no life so pleasant as that passed among the pears, the peaches, and the plums of your fruit garden. There is nothing so beautiful to adorn your dinner table, after the substantial part has been disposed of, as the fruits taken from your own garden; and if you have more than you want for your own use, what is there to compare with the fruits of your own raising *to give away?*

Mr. Carpenter.—If you want to raise good fruit, you must wash the tree and prune it, and you will produce fruit that will pay. I do not cultivate the apricot, nectarine or plum, because I know I should get no fruit. The pear will pay better than either of those mentioned.

THE BERGEN PEAR.

John G. Bergen presented grafts of this pear for distribution, which is considered as one of the best grown on Long Island, coming a little later than the Bartlett, and being almost equal to that in good quality.

A box of plants received from the Patent office was then distributed, consisting of choice evergreens, flowering shrubs and plants, the Tea plant, Spanish chesnuts, Osier willow, &c.

On motion, the Hay crop was decided to be the subject for discussion at the next meeting. Adjourned.

JOHN W. CHAMBERS, *Sec'y.*

April 28, 1862.

Mr. Wml Lawton, of New Rochelle, in the chair.

A BARREN GRAPE VINE.

Mr. Lester, of this city, asks for information in relation to a grape vine. "I have a small grape vine in my yard which blossoms full every year, but no fruit ever set, the blossoms are very fragrant for several days, then they wither and drop off; can the Club suggest a remedy?"

Prof. Mapes.—The remedy would be soluble phosphates and potash. Ground is often rich enough, and perhaps too rich, but lacks some essential ingredient to produce fruit, which may be supplied by some mineral substance.

CONDIMENTS FOR STOCK.

A gentleman in Brooklyn asks the value of condiments for cattle.

Mr. Solon Robinson.—The experiments by Mr. Law have already been published. It was not food, and it had been thoroughly proved to be of no benefit to healthy stock, therefore he objected to the cheat of calling it food. If sold as medicine, those who desired to give it to sick animals could buy it for that purpose. Sold as food, it is a cheat, and of no advantage whatever.

Prof. Mapes.—I think that declaration is a little too strong; the subject has not yet been finally settled; some find advantages from its use, while others condemn it. I used a barrel of "Thorley's food for cattle" without a particle of benefit, but perhaps it was because my cattle did not need any condiments; for others have used it, we are assured, to great advantage. It is true of cattle, as it is of land, that they sometimes do not appropriate all the food they consume. Grain is often voided whole; or cattle may, as they often do, eat grain without thriving, and then some condiment may be beneficial. We know very well that oats and carrots, fed in equal portions to a horse, serve a better purpose as food than oats alone; yet analysis would show that oats were far more valuable than carrots. The truth is, they act as a condiment, and enable the horse to assimilate all the food in the oats and hay. We know that cooked food for some animals is more valuable than uncooked, because it enables the animal to extract more of the starch and sugar. So with carrots and oats; for it has often been proved that a horse fed six quarts of oats and six quarts of carrots would do as much work and keep in as good order, as when fed with twelve quarts of oats. Yet analysis would seem to prove this result impossible. It is barely possible that some condiments mixed with food may have the same effect as mixing the carrots, by assisting the digestion of the animals.

I do not think we should condemn every condiment that is brought before us. We all know that cattle raisers use Condition powders.

R. G. Pardee.—That is the case with the human family. Some have such powers of digestion that they can assimilate any food however coarse. Others seem to require condiments. It is a question of some importance to know how far it would be beneficial to use condiments in cattle food. In the use of carrots, some who have used them almost as the sole food of animals for a time have decided that they were not valuable. They have mistaken their use. They should not be relied upon as food entirely, but as condiments, as we use fruit to aid in the digestion of other articles. How many people are injured by badly-cooked food, instead of by the food itself. We want our food so prepared that the stomach can assimilate it without taking an inordinate quantity. It is the same with cattle food.

Prof. Mapes.—Many animals take condiments, or medicine when they require it, and perhaps something of the kind may be artificially prepared and given to advantage. We see cats resort to a plant, that has thus acquired its name of catnip. Dogs at times eat grass. Horses swallow earth, and swine eat old rotten wood.

R. G. Pardee.—Still, I think it bad policy for any owner of cattle to rely upon any condiments to save food. It is always better to feed cattle upon healthy food and try to keep them healthy. Castor oil is a very good family medicine, but it won't do to rely upon it, though some families who use it, never need a physician, nor other medicine.

The Chairman thought we should look into the subject of condiments. All animals require care in their keeping, they should be taken care of especially during stormy weather. For himself he was opposed to the use of condiments in every shape.

Mr. Pardee.—I do not consider that condiments mean medicine, but the proper admixture of food.

HOW TO MAKE VINEGAR.

A letter was read from T. B. Miller, Clayton, Indiana, which give some information on this subject. We extract the following:

"Pull out the glass bottles from the bung-hole of your vinegar barrels, keep out all such trash as brown paper, rye mush, wheat bran, hop or brewers' yeast, and I will tell you how we (i. e. my wife) make vinegar, and this comes from an experience of over twenty years, so simple that all can have it, without money an without price.

"Fill nearly full any vessel, jug, crock, pan, tub, or barrel, with pure rain or soft water, sweeten it with any kind of molasses, (the quantity is not material,) set it in a moderately warm place, or in the sun, cover with sieve, gauze, or net, to keep out flies and gnats. In due process of time it will be vinegar, when it must be put into a suitable vessel and stopped close. To convert cider into vinegar—if made from sweet apples, it is only necessary to set the barrel in a warm place and knock out the bung; if from sour, stir in a little molasses, and when sour enough bung up tight. Vinegar barrels should be well painted, as they are liable to be eaten by worms.

"It will be proper to state that it is the action of the atmosphere, which in time converts the sweetened water into vinegar, hence the greater the surface of water exposed to its influence the sooner it will sour. There is a thick scum rises on the top of the vinegar when making, which is the 'mother,' and should not be thrown away."

PAPER FROM STRAW.

Prof. Mapes called the attention of the Club to a subject of great importance, viz: the manufacture of paper from straw. It is of interest to farmers to know what improvements are making in the process of converting straw into paper. The southern states were formerly a great source of supply of rags, and that being cut off has stimulated invention to find a substitute, and it is likely to be entirely successful with straw. The difficulty heretofore has been in bleaching. Now, by the use of soda, in a closed cylinder, with steam, the straw pulp is rendered quite white, and soft as that made from rags. This will make a demand for straw, and make grain-growing more profitable. It will be much better for us to use home-grown straw for the many millions of pounds of paper required, than it is to make it of imported rags.

FEEDING SILK-WORMS.

Rev. Mr. Weaver, of Fordham, inquired whether silk-worms can be fed upon the leaves of the black mulberry. He said his object was not to make silk to any extent, but to illustrate to children the way that silk is produced.

Solon Robinson.—The worms can be successfully fed upon the leaves of the common mulberry, such as grows wild in our forests, but the quality of the silk will not be as good.

The regular subject of the day, "Can the Hay crop be more profitably fed on the farm or sold," was then called up.

Prof. Mapes said that it was a question that must be decided by the circumstances of each locality. In some parts of New England, stable manure is valued at five dollars a cord, while hay is not salable at more than ten dollars a ton. There, it would be most profitable to feed the hay on the farm. In New Jersey, where I live, manure can be bought for one dollar a cord, and hay sold at fifteen dollars or eighteen dollars a ton, and there it is more profitable to sell the hay and keep up the fertility of the land by purchasing fertilizers.

I can grow three tons of timothy per acre, and I can make it profitable to sell the hay and apply something else to the land. I believe wherever hay is worth ten dollars a ton, it is better for the farmer to sell it than it is to feed it.

It seems to be a question with many farmers how little manure they can manage to get along with, instead of "how much can I use with a profit?"

Some farmers use but ten loads where they could make fifty more profitable. I know market-gardeners who use 150 loads of manure to the acre, and it is a common thing for men to pay a rent of fifty dollars an acre per annum for garden land. Such men could not afford to feed hay on the farm to make manure; but they can afford to raise it, and most farmers could afford to use it more freely.

If you look at the market-gardeners near this city, every load of truck they bring to market, they take back a load of manure.

Mr. Hawkhurst thinks that no one can afford to feed hay when he can sell it for ten dollars a ton.

Prof. Mapes.—The farmers at the west cannot sell their hay for five dollars a ton, or their corn for twenty-five cents a bushel. It is better to feed cattle and send them to market.

John G. Bergen and Adrian Bergen, of Long Island, coincided with Prof. Mapes, and said that many farmers on the Island average $15 a ton for hay sold in the city, and, at that price they can not afford to feed it at home; but they can afford to buy manure, and do so to keep up the fertility of their farms.

IMPROVED HAYING MACHINES.

Prof. Mapes.—The improvement in haying machines enables farmers to make hay cheaper and better than formerly. Most of them know something of mowing-machines, but there is another important machine for them to know, as the hay crop is increased by a better system of farming, and that is the "tedding machine," which stirs the hay by horse-power. By the use of this machine, hay cut by the mower, after the dew is off, may be cured fit to go in the barn the same day, if put up with salt. Hay-caps and horse-forks, too, are great helps to the hay-maker. So is the subsoil plow, for with it old meadows can be renovated without turning the sod, by running it every three feet, and manuring.

John G. Bergen.—Hay may be cured in one hot day, but as a general thing it must have more time, if cut when in the best condition, that is, before the blossom falls. Clover cannot be cured in one day by any process.

Adrian Bergen.—I am satisfied that it is best to cut grass early, and use salt, half a peck to a ton, to cure it. Stock prefer it when salted, and it keeps better.

Mr. John G. Bergen wished to know the proper time to cut Timothy hay.

Mr. Adrain Bergen.—I cut my Timothy before it blossoms. If, by this process, I do not get as much per acre, I get a very superior kind of hay.

Mr. Solon Robinson read a letter from Cairo, Illinois, from which the following passages are extracted:

"In a recent number of *The Illinois Farmer*, printed at Springfield, by M. L. Dunlap, Esq., is the most remarkable article ever appeared in any agricultural paper, or in any publication whatever. It discusses the question, whether *corn at ten cents is profitable for fuel.* The conclusion reached is, that coal is the cheapest; that at nine cents, corn would be cheapest; but, unless the coal or wood is of first quality, the wife should be at liberty to send to the corn-crib. This will be new to most readers—it is equally new that corn will burn at all. I am informed that it makes a good fire. I am happy to say I have never seen it burn.

Nothing more than this is needed to show that we have raised too much grain. Most of the farmers know it, but every one is not persuaded what can most profitably be raised instead. This letter aims to supply the seeming want.

COTTON.

In the southern parts of Ohio, Indiana and Illinois, the plant will be largely cultivated. Here, among the people, no seed can be had; usually it has rotted at the gins; now it is gathered up, and is going to be planted. But it can be obtained at all the stations. Let everybody try it; thousands are certain to succeed and to do well.

TOBACCO.

The use of tobacco is undoubtedly an evil—nothing can be clearer—and the reason why it is so prevalent is, because it is so slight an evil. Then, let us raise tobacco, and thereby strengthen ourselves to overthrow not only the greatest evil but the most awful crime.

On good soil it can be raised everywhere. Connecticut settled this question ten years ago, and every year since has raised a better article and got higher prices than Virginia has done. Those who have no more than half an acre of land should raise all they use. Tobacco is going to be high; in the leaf it is worth over ten cents now; it will be worth twenty cents within a year. It can be grown at a profit in any free State at five cents per pound. Tobacco planters have got rich at four cents.

Look out for breakers in the way of high prices and taxes, and reflect how better you can meet them than by raising tobacco. Let every man, even if he has to "stretch his conscience" a little, plant tobacco, for it always brings the cash. There are tobacco seeds in every seed-box in stores, and often the plants can be got of neighbors as one does cabbage plants. It will not be quite too late to sow the seed while you are reading this, that is, in latitudes north of forty degrees. But these remarks are timely for next year. During the summer clear off a piece of new land, cut out the small trees and deaden the old ones is a quick way, and sow turnips in the fall, or make preparations to manure an old field, and have it ready. The effects of this war will last for years; the war itself may. It usually takes a farmer a year to prepare for a new crop; often much longer. But *every one can do a little* this year. Fancy the immense amount the north would raise if every farmer planted only one hundred hills.

I know many farmers who will plant from one to five acres. They would not have put out a plant if it had not been for the war.

I give you a receipt to prevent tobacco worms, as practiced by many with success, and it shortens the labor on the crop fully half. The worm is hatched from a fly which appears in the evening before dark. About sundown build little fires through the field on stumps, or between the rows; the flies will rush into the blaze, and that will be the end of them.

BEANS.

Small white Navy beans will be wanted. It requires no more labor to raise beans than it does wheat; perhaps a bushel of beans can be raised easiest. They will bring, at least, one-third more, and usually the yield per acre is greater. Put in a quarter, a half, a whole acre, or ten acres. No crop pays better, is surer, or leaves the land in better order.

FLAX.

There is a strong belief in the minds of many that flax is yet to be crowned king of these realms. There are divers ingenious loyal friends of his laboring night and day to place the crown on his head. Most ancient—in blossom most beautifully blue—how the memories of childhood are restored, when we talk again of flax! When raised for the seed alone, and year after year, it has always been as profitable as wheat. But men will raise wheat, hoping every year to get twenty-five or thirty bushels an acre, and they are deluded like buyers of lottery tickets. Of flax, Virgil says it burns the soil; but if he lived in these days, and raised wheat at 50 cents a bushel, he would call it a burning shame. I hint to the farmers that they had better be thinking of flax-brakes again—of linen sheets and towels, which last, on an average, as long as a human generation—of, too, pantaloons and shirts, easily dirtied, but easily washed, and so cool as one walks to the meadow with a scythe on the shoulder in the early morning. There have been more true patriotism and more true love beneath homespun linen shirts than beneath cotton ones, and my opinion is that Yankee ingenuity will cause linen to reign at the end of the world the same as at the beginning of it. Farmers! by all means raise flax; in so doing, you will be looking forward and be wise.

WOOL.

He who sends a young, good-wooled sheep to the butcher, is doing his country a wrong. Sales of such should be made to those who have none, or to those who can keep a few more. Sheep should be propagated and handled with as much care as if we had but a few flocks in the country. There are tens of thousands of localities in the west, ungrazed, where, on each, a man can keep 200 sheep at 30 cents a head per year, and in too many other places farmers are raising corn instead of sheep. Wool is worth 45 cents. Corn—I spoke of that before—but a pound of wool can be produced for what it will cost to raise a bushel of corn, or to get a few sticks of cord-wood. The motto of every farmer should be to raise sheep and kill dogs.

More than all—and this is a very important matter—the soil of a farm where many sheep are kept continually, increases in value; it is continually impoverished when grain is raised. The very best part of the soil of hundreds of thousands of our farms is annually transported to Europe in the shape of grain, much of it is exchanged for wool, and all of it, for what we ought to hang our heads in shame for not producing. It is desirable, since we are about it, that this war last long enough to cure us of this folly, and to learn us how to be a self-sustaining nation. And when the war ends we want to see this result—we want to see a man, on buying a piece of broadcloth, know that it is made of wool, and we want to see him hesitate on buying a piece of cotton cloth for fear there may be wool in it. The mythological story of the Golden Fleece conveys the idea of the golden profits of sheep raising.

ORCHARDS.

Now is the time to plant orchards, because many will neglect or be unable to do so. It is a most fortunate moment for this business, and one who has a taste for it need not fear results if he plant good trees, and will inform himself of valuable and late methods of treatment. Some fancy the business likely to be overdone, but this story has always been told, and yet there are no 100 trees of good fruit anywhere in the country which are not worth more than any ten acres of grain. I know of an orchard of fine bearing trees, 4,000 in number, which were set out four years ago this coming May. Foolish and lazy farmers, what have you been doing that you have not orchards of fine fruit? Among six millions of people in the west, forty-nine families in fifty are without apples in winter, much less have they pears and early peaches. A nation given to fruit-growing always is educated and wealthy; exclusively grain-growing, ignorant and poor. The highest civilization is impossible where there are few orchards. Arouse, farmers, emulate the soldier marching daily to new conquests, and by your industry and intelligence force from an unwilling Nature her magnificent treasures.

The following were adopted as subjects to be discussed at the next meeting: "Improved methods of surface culture, and economy in keeping poultry." Adjourned.

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.

First. A Club for the promotion of manufactures, arts, and for the discussion of mechanical subjects, is created under the name of the Polytechnic Association.

Second. 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.

Third. 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.

Fourth. Every member of the American Institute shall become a member of the Polytechnic Association, by signifying his intention to the chairman thereof.

Fifth. 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.

Sixth. 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.

Seventh. 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.

Eighth. The meetings of the Polytechnic Association are free of all expense to those who attend them.

Ninth. 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 meetings.

Tenth. 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.

Eleventh. 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 publications may be ordered in its discretion.

Twelfth. 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.

Thirteenth. 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.

Fourteenth. 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.

Fifteenth. 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.

Sixteenth. In all cases not provided for by the rules, Jefferson's Manual shall be taken as a standard.

Seventeenth. 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.

Eighteenth. The minutes of the previous meeting shall be read at the opening in order for correction, unless otherwise directed by the meeting.

Nineteenth. No argument is allowed between members. Facts alone are to be stated.

Twentieth. All questions of order are decided without appeal, by the presiding officer.

May 1, 1861.

Professor Cyrus Mason in the chair.

The *Influence of Climate on Invention* was the subject set down for discussion at this meeting.

Mr. Mason having introduced this topic, opened by reading the following paper:

Man received the earth, with its various climates, as a gift, from his Creator; but upon condition that he should adapt it for his use, and furnish it out of the raw materials provided to his hands. Near the equator his task is light; his wants are few and easily supplied; but as he advances towards the poles his wants increase; and during the long winters of some climates they become so many, and so painful, that they govern his whole course of life. His wants are his severe task-masters, and he eludes them only through his ingenuity. His need of inventions is measured by the severity of his climate, and his motives for making them grow stronger, the nearer he approaches the limit beyond which he is unable, by all his exertions, to attain a prosperous and cheerful existence.

Inventions of one class have occupied men in every degree of latitude, from the equator to the polar regions, namely, those of contrivances to make a climate better suited to the preservation of persons and property than the general climate of the country they inhabit. The naked race, found by Columbus near the equator, had contrived cellars to keep their fruits dry and cool during the rainy season, and huts above ground to preserve their persons from dangerous moisture. By comparing these simple contrivances with the inventions made and in progress in our climate for similar purposes, we shall see that the ingenuity of each people generally rises to the measure of the wants of that people, and no higher. But we are laboring to this hour, and more earnestly than ever, to perfect our processes for making artificial climates, for summer and for winter, around our persons and the objects that minister to our enjoyment.

A description of the inventions which are employed in making the best house for our climate, and adapting it to winter and summer use, would fill a volume; and yet, there are thousands of ingenious men still at work on contrivances for improving many parts of the process.

The single operation of lighting up our long winter evening has induced more inventions than ever were thought of within the tropics, where they scarcely need an evening light.

Our green-house is the result of numberless inventions, every one of which has added something to our facility for enjoying the sight of tropical plants while in their growth.

Look at the ingenious arts conceived in making our winter garments. They are almost numberless. The economies they have wrought within our remembrance have made room for millions of people, who could not have been clothed without them.

The machinery invented and prepared in wintry climates extends its influence into tropical regions, and draws away from them the rich growths required for use under our northern skies. And this reaction of inventive genius toward the equator is the new feature of the earth's civilization, which promises to multiply beyond all former example or expectation, the numbers of prosperous people, who may live on the surface of the globe. At the head of this new experiment stands the Empire of Brazil, drawing to itself the arts of Europe and America, and working out, in equatorial regions, a destiny which is the growing admiration of mankind.

But the firm and permanent reliance for the increase and preservation of ingenious arts rests on the countries which have a winter to provide for. Our arts work the mines of Mexico, while Mexico sends no art to us. And, perhaps, we owe it, in some measure, to our winter, that our political weakness has not fallen as low as theirs—that they are receiving a master from the old world, while we are able to preserve our nationality.

Bad government and bad religion may overwhelm the arts of a nation; and, if that nation lies near the tropics, it may be desolate during long ages; but, if it lies in a wintry climate, it will rise again by its own inherent impulse, and find its lost arts, or invent new arts. The southern side of the Mediterranean has often been the burying place for arts invented on the north side; but, the countries north of the Mediterranean have risen, and are yet rising even where oppressed by the burdens of bad government and bad religion, and under the rugged nurture of a wintry climate they are steadily advancing the civilization of the human race.

Praise is bestowed on ingenious nations and individuals. Inventors make new room for men to occupy, and we can afford to make them famous. But, the more we investigate the causes of human conduct on the several parts of the earth's surface, the more shall we perceive that climate has done much to make them differ. Men bound to labor, are the class of inventors; men just above want are the leaders of the host of inventors; and the climate sharpens their wits to a keenness next to the edge of the sword. Because of our inventions, we look around us on vast accumulations of wealth, at once the admiration and envy of our non-inventive neighbors. The contact of our accumulations with theirs, lies near the bottom of the present conflict. Our machines are naturally pacific; but it is the record of French history that Watt and Arkwright subdued Napoleon, and Watt and Arkwright were Roundheads.

Mr. Garbanati would attribute differences between nations more to institutions than to climate. Men from southern climates have been found to be better able to bear fatigue and exposure, and when their resources are taken from them, become exceedingly industrious. The Anglo Saxon race can adapt itself readily to any climate from the Arctic regions to the heats of Central Africa. When men enslave others and make their slaves do their work, they lose the inventive character.

Mr. Fisher.—In order to make invention useful, it must pass through different minds. The inventive faculty seems to preclude the faculty of sober judgment, and practical skill in details. Inventions therefore must pass through the hands of a practical engineer, to reduce them to a proper shape for use. And even he will be aided by consulting the master workman, who will prune away expensive portions and make the machine cheap as well as practicable. Finally the capitalist furnishes the means of introducing the invention to public use. It would be well if inventors could be convinced of the necessity for the aid of these other classes in making their inventions practical. There must be a market for inventions or they will be still-born. Inventions must be encouraged; and thus the influence of climate will stimulate invention, if it acts upon the community and creates a demand for invention.

Mr. Veeder said that it had been remarked by Daniel Webster that the slave labor went to the south in this country, not necessarily because the climate called for it there, but because there was a demand there for the labor. The cultivation of the cotton plant may have incidentally created the difference; without it something else may have grown up in the south tending to stimulate invention. One kind of invention stimulates other kinds; and may not freedom of the mind to act, be a greater incentive to invention than climate? May it not be that free white labor in the south would have made it a thousand times more fruitful in invention than it has been?

Mr. Churchill.—The cause of invention is not merely necessity, but necessity in the presence of a remedy. History seemed to show that many important inventions originated in hot climates; such as paper and the science of hydraulics, which came from the Nile. In working metals, in cutting diamonds, in irrigation in India and China.

Prof. Mason said that such inventions came from races who had come from cool climates, and that the arts and sciences would not remain flourishing in a torrid climate.

Mr. Garbanati.—One city produces cottons, another steel, another pottery. A certain district of France has embarked in the raising of essences. This is not in consequence of any peculiarity of climate or adaptation; but the first invention is an incentive to others, just as business or trade is better where a number engage in it. Thus trade in this city is now rushing up town; the leading men go, and others follow to catch the trade.

Mr. Fisher remarked that there was no real invention in Egypt; but when art went into Greece, there arose splendid inventions.

Mr. Rowell said that a hive of bees being sent to California, laid up a hive-full of honey the first summer; but never did it afterwards.

Mr. Seely.—The archeological evidence is that in this country the tropics were once the centre of the civilization of the continent and of the cultivation of art. In the time of Julius Cæsar, the Britons, and the inhabitants of Germany were barbarians, and all the civilization and refinement were in the south. The line of civilization and art seems to have been traveling northward for the last two or three thousand years. Institutions seem a better explanation of our condition than climates. Were it not for slavery, there might be manufacture and invention down to the Gulf.

Mr. Stetson said that probably some of the hardest work ever done by Anglo Saxons was done in California during the heat of the gold excitement. The climate was the hottest ever known; and yet the Anglo Saxons out-worked the negroes, Irishmen, and everybody else that could be found. As to the northern extreme of invention, upon inquiry with regard to patenting a sewing machine in Sweden last year, he had been astonished to learn that there were but eight sewing machines in Sweden, and no demand for more, the people there not understanding machinery. So in Russia, it had been found that Fairbank's scales were unappreciated from the lack of mechanical and inventive skill.

Mr. Stewart said that of the small number of patents taken out by citizens of the southern States, most of them were taken out by men from the north. Dr. Simons, now in this city, had invented certain surgical apparatus, and appeared to be the only really southern man who had shown any considerable degree of inventive genius.

The following report was presented and read:

New York, *May* 1, 1861.

Your committee, on Mr. John B. Duane's sod seeder and broadcast sowing mechine, after careful examination of a working model of the above machine, respectfully submit the following report, viz:

1. That the machine is a combination of the following parts, viz: A set of cultivator teeth; harrows; seeding apparatus; seed conducting board; roller; and fertilizer distributor. All these parts being so disposed that their operations follow just in the manner necessary to leave the field sowed and finished in a high state of cultivation.

2. That the cultivator teeth, with their stem which forms a knife edge, seem to be well adapted to do the work easily, by producing a central cut and a gradual lifting of the ground, thereby overcoming obstructions much more easily than with teeth of the old shape.

3. That the harrows being pressed to the ground by springs, and the teeth thereof standing at an angle of about sixty or seventy degrees, seem to be well calculated for doing their work. The teeth are set in two boards, and being narrow and numerous, will certainly crush and divide lumps of earth that, under the common harrow, are apt to be pushed aside. The teeth are also better adapted to free themselves from bunches of roots or grass, etc., by slipping over them instead of accumulating them, than those of the common harrow.

4. That the seeding apparatus, with its distributing arrangement, seems to be superior to most others, for the disturbance of the seed at and around the delivery openings is very effective. The delivery is sideways from the seed box, and the disturbance created by teeth working in the seed at a right angle with the

box while another set of teeth is working vertically over the delivery plate. The teeth are attached to two reciprocating bars, the former set to that nearest the seed box, and the latter to the bottom of both of the bars. The delivery plate consists of two movable plates with almond shaped openings which can be made large or small by simply turning a screw. The machine may thus be adapted to all kinds of seed from clover to oats and peas. There is another reciprocating box for sowing clover and timothy seed at the same time. The reciprocating delivery apron of the latter is divided into several channels and has at the end a number of pins for the better and more equal distribution of the seed. This apron is open to view, so that it can always be known, by simple inspection, if the delivery of the seed is going on as desired, in the opinion of the committee, is a decided advantage.

5. That the seed-conductor board, by a simple reversion, will direct the seed so as to be either plowed in by the cultivator or covered only by the harrow or drag.

6. That the two rollers being hung side by side to the frame by a joint, can be made to maintain a position parallel with the ground, whether the machine is at work or the teeth are lifted out of the ground. The frame and the several parts of the machine are so balanced on the center of the rollers, that nearly the whole weight reposes on the rollers.

7. That the fertilizer distributor consists of a hollow cylinder with four or more slots lengthways in which toothed bands, or saws, work reciprocally. As this cylinder has a reciprocating motion, the plaster, guano, or other fertilizer receives all the while a disturbing motion that brings it between the teeth of the saw. The latter forces it out in such quantities as may be desired by being adjusted to a greater or less extent of vertical motion.

As far as the mechanical contrivance of this machine is concerned, your committee finds it to be exceedingly simple. The parts are few in proportion to the manifold work the machine is intended to perform. It is but little liable to get out of order, and is easy of repair. A man, or even a boy, may perform a great amount of work by only guiding the animals. Two horses seem to be sufficient to draw a machine four feet wide. The resistance of each part, in proportion to that in machines for the same purpose, of former shapes and actions, seems to be a good deal less. The machine performing all the work (except plowing) necessary for putting a crop into the ground, there must be a great saving in time and labor, and the farmer is enabled to finish his work at one operation. The machine, however, is only calculated for use on lands free from large stones.

It is the opinion of your committee that this machine is another step in advance of the arts and sciences, in their appliance toagriculture, and is well adapted to be recommended to the favorable patronage of our farmers.

JOHN P. VEEDER,
THOMAS D. STETSON,
LOUIS KOCH.

New subject—On motion by Mr. Dibben, the subject of "Steam Guns" was selected for the next meeting.

Adjourned to quarter before eight o'clock, on Thursday evening, May 9th.

American Institute, Polytechnic Association,
May 9, 1861.

Mr. Jireh Bull in the chair.

AMERICAN TURBINE.

Mr. Jonas Smith exhibited a model of the American turbine waterwheel. (See report of Farmers' Club, for April 29.) One of these now in operation, with a six foot head, and six foot wheel, has a 28-horse power, costing about $400.

Mr. Billings stated that there was a working model in operation in this city, and asked for a committee to examine it and report upon its merits.

The committee was appointed, consisting of Messrs. Johnson, Dibben and Seely.

OREIDE.

Mr. Seely exhibited a specimen of the oreide from which cheap jewelry is now made in large quantities. It consists merely of a brass in which the zinc and copper are so proportioned as to produce the color of gold; the magnesia, sal-ammoniac and other substances which are added, not being metallic, and, therefore, not modifying the result. The jewelry is gilded, and when the gilding is worn off, it cannot fail to tarnish like any other brass.

CENTRIFUGAL GUN.

The subject for discussion, "steam guns," was then taken up.

Mr. Dibben said that the only practical mode of using steam for guns, which had been yet proposed, was in connection with the centrifugal gun. He should, therefore, confine his remarks to that. All centrifugal guns are composed of a hopper through which the balls are introduced; a descending tube which conveys the balls, one by one, to a revolving disk, and a passage or barrel through which the balls are ejected in succession. The barrel is largest near the revolving disk, and is curved in such manner that the ball shall enter it in a tangent to the revolving disk, and it is proposed that it should quit it in a tangent to the circle within whose periphery the cavil and disk are included. Mr. Dibben was of opinion that the latter condition was impossible. That the great difficulty in the use of the centrifugal guns is to give the balls the desired direction without impairing their momentum. The balls will all have the same direction, if the barrel is moved, horizontally; that is, they will all strike in a horizonal line; but the lateral deviation will be very great and uncertain, depending upon the velocity of the ball at the moment of discharge. It, therefore, becomes incapable of efficient service. In an experiment, he had seen, the first balls went through an inch plank, at the distance of one hundred yards, but the last ones only indented it. The balls weighed an ounce or more, and the diameter of the disk was a little more than five feet.

Every precaution is now taken in fire-arms to secure accuracy of aim. It is not now a question of one hundred yards, but of three or four hundred yards. We not only make the ball of just such a size and shape, make the bore smooth and true, and provide for accurate loading; but, not satisfied with this, we rifle the barrel to overcome what remaining inequalities may exist. And with a good scrapnel shot, we may, at a distance of five hundred yards, cover a line of men so that every man of them shall be shot down, the shot going with accuracy a certain distance, and then exploding, sending a shower of balls all within a certain angle.

The steam gun is objectionable, not only on account of its inaccuracy of aim, but for its want of portability, and for its vulnerability. The boiler is a large mark, and a single shot from a fair distance would entirely destroy its operation. The advantage claimed for the steam gun is, that it requires so few men to do the work. But in warfare there are always plenty of men to fight, if we can only find the money to pay them.

The ball will have a rotary motion, upon leaving the disk, in consequence of the greater momentum of that part of the ball which at that moment happens to be farthest from the centre of the disk. Military authorities say that the bullet should have an initial velocity of 12 to 1,500 feet. With light rifles the speed probably reaches 2,000 feet. With such speed as that, the centrifugal gun falls into the background.

Mr. Stetson.—The tendency of modern improvements is to enable us to throw projectiles farther with a less initial velocity. The charge of powder is somewhat reduced; yet, in consequence of the elongated and pointed form of the shot, there is less atmospheric resistance, and the projectiles go as far and produce as much effect at the distance of 1,000 yards as those of the old shape did with a greater initial velocity. Probably the velocity from some rifled pistols does not exceed 600 feet. The charge of powder that instead of being one-fourth to one-third the weight of the ball, is so much reduced, that, with the Hotchkiss projectile, a twelve pound ball requires but thirteen or fourteen ounces of powder, ranging from half a mile to a mile very accurately.

The expansive force of gunpowder is very great, having been shown sometimes to amount to 100,000 lbs. to the square inch.* No such force as that of gunpowder can be produced by steam. Nor can we produce the centrifugal force due to such pressure without destroying the machine. We can only obtain a comparatively small velocity.

In order to throw a projectile with a given velocity, a force is required equivalent to lifting it a certain height, independent of friction, for that velocity will be expended in raising it that height; or, inversely, if it is allowed to fall from that height, in a vacuum, that velocity will be produced. To produce a double speed in any mass requires a quadruple power, the power required being in the ratio of the square of the velocity. It is thought by some that we may be able, with centrifugal guns, to throw bullets at the initial velocity of six hundred feet, which will kill at short ranges. But we cannot throw a stream of bullets,

* Count Renaford's experiments make the force of confined gunpowder 500,000 lbs.—J. R.

like water through a hose pipe, with that velocity; for merely to overcome the inertion of the balls, a horse-power will only throw $1\frac{1}{4}$-ounce balls at the rate of one per second; and we must have several horse-powers to overcome the friction. If the machine is small and convenient, the number of bullets thrown must be necessarily very small.

As to the difficulty of directing the motion, he would not venture to say what could or could not be done. He could not say that human ingenuity might not discover some means of overcoming that difficulty.

Mr. Stuart remarked that some years since he had had occasion to investigate a centrifugal theory, based upon the principles that double the power produces double the velocity, and thus produces four times the radial force.

Mr. Nash said that a steam gun could not be effective unless sheltered, for the moment a cannon ball touches it, there is an end to it. He described the execution which could be done with cannon, or even with rifles, by having a telescopic sight. He had seen it applied to a rifle forty years ago, and it was found in practice to be exceedingly good.

Mr. C. W. Smith.—The theory that action and reaction are equal, would seem to indicate that if the ball weighs one-one hundredth part as much as the cannon, the recoil should give the cannon one-one hundredth the velocity of the ball. But friction, and the fact that the power is not applied instantaneously, prevents this amouut of recoil from ever practically taking place. A steel gun might be made very light, to have sufficient strength; but the recoil would be very much increased. He explained the advantages of the Hotchkiss projectile in reducing the amount of recoil, the first shook being expended in the expansive action upon the lead, and the charge of powder being considerably diminished.

New subject.—On motion of Mr. Seely, the subject of "Ice, and methods of refrigeration" was selected for discussion at the next meeting.

Adjourned.

American Institute, Polytechnic Association,
May 16, 1861.

Prof. Cyrus Mason in the chair.

DEATH OF DR. D. MEREDITH REESE.

The Chairman having announced the death of Dr. D. M. Reese, long an active member of the American Institute, and a member of the committee on Arts and Sciences, under which the Polytechnic Association is organized—

Mr. Butler offered the following preamble and resolution:

"*Whereas*, in the dispensation of Providence, the American Institute, in the death of Dr. D. M. Reese, is bereft of one of its active members, and one of the committee on Manufactures, Science and Art, and it being deemed proper that some action should be taken by the Polytechnic Association on the subject,

"*Resolved*, That the Chairman of the Polytechnic Association, Prof. Mason, be requested to prepare a paper to be read at the next meeting of the American Institute."

The resolution was adopted.

NEW DISINFECTANT.

Dr. L. A. Thompson presented a new disinfectant, which he considered worthy the attention of the Association.

NEW FILTER.

Dr. Thompson proceeded to describe a new filter constructed by him. He stated that water should be filtered not only for drinking and cooking purposes, but for personal washing, and for washing fine articles of clothing. Fine linen goods dipped into unfiltered water are stained by the animal and vegetable substances suspended in the water. Dr. Thompson's filter is so constructed as to prevent the water as it passes through, from forming gullies, and to cause it to percolate uniformly through the whole mass of charcoal and quartz, which thus retains its efficiency for a long period. He asked for the examination of this filter, and of his disinfectant, by a committee, offering to send the Association a filter and specimens of the disinfectant for trial.

The following committee was appointed, viz: Messrs. Stetson, Seely and C. W. Smith.

SAWING SHIP TIMBER.

Mr. H. S. Vrooman exhibited and explained drawings of machinery for sawing ship-timber. The principle of the machinery is, that the timber is secured in the ways, permanently, and moves as for straight work, while the saw is moved automatically so as to produce the required result. There are two adjustable guides, and after these have been regulated to produce any desired pattern, the sawing proceeds as readily as for straight work.

Mr. Stetson said that in most vessels, every stick of timber has a separate and distinct shape, and a separate name. The ribs, for instance, vary with the curve of the vessel; but the variation between two adjoining ribs is small. This machinery affords peculiar facility in this case, because the adjustment required is so slight in passing from each rib to the next. Whether this, which is the theory, can be accomplished in practice can best be ascertained by inspection. He would, therefore, in behalf of the inventor, move a committee to examine his working model.

The following committee was appointed, viz: Messrs. Haskell, Johnson and Fisher.

CLIMATE *VS.* INVENTION.

Prof. Mason concluded his remarks upon this subject. He said:

In speaking a fortnight ago upon "the effects of climate on invention," the general doctrine I laid down was that invention has always been substantially limited to the temperate zone. The question was raised whether domestic and governmental institutions might not very essentially influence invention, whether by unfavorable institutions there might not be a very great restraint upon invention, even in those climates where invention would otherwise take place. I have no doubt it is so. The regions of Virginia and Tennessee are not so far south as to check invention, and if deprived of their slave labor, those climates would have necessities that would naturally lead their inhabitants to be inventors. I should say therefore that the line of invention has been crowded northward by the presence of that institution. Yet that does not falsify the general doctrine that in warm climates where inventions are not called for, they do not naturally occur. If men were not migratory, they would remain in a semi-barbarous condition in all the warm climates upon the earth. It appears to me obvious that nothing like what we call civilization ever can occur in those climates, unless carried there, as I now propose to consider as the second branch of the subject, by "the reaction of invention on non-inventive climates."

I suppose it will be admitted by all that for the last century, inventions have been obviously and manifestly limited to the temperate climates of America and Europe. That these inventions have not been wanted by the nations of the tropics is obvious from a great number of facts. The aversion of tropical races to machinery has been illustrated, not only in Africa, but in Central and South America. The introduction of anything but the crotch of a tree to plow with, in Chili and Peru, has been a matter of extreme difficulty; and the engineer of the first railway there, told me that it was weeks before they could induce any native to get into a car. The aversion was simply that they were satisfied without those things.

We are told that powerful and effective machines have been found in the tropics, as in Egypt, and that wonderful engineering has been done there. So there are powerful and wonderful machines now to be found in Brazil. Men with those machines have gone there from colder climates. And when a railway is wanted now in India or Egypt, the cars and the locomotives come from Massachusetts. But would the finding of these machines or these locomotives in after years, justify the opinion that there had been an Egyptian race capable of inventing or of constructing such works? History shows us that whenever machines have gone into tropical climates, they remained there no longer than until the disappearance of the men from colder climates who carried them there. They are no longer in use in those countries.

As to the extent of the machinery carried in ancient times into tropical India and Africa, I allege that those machines were few and small. We find there great buildings and some sculpture. Egyptian art has suggested nothing which could at all subserve our modern civilization. In the Egyptian Museum you find nothing suggestive in the slightest degree of anything valuable or useful. I would not give the sewing machine for all the arts they ever had. And if in modern or ancient times machines have been found in tropical climates, it has been from reaction from cooler climates. Within little more than two years, England, France and the United States, have sent machinery to Brazil, worth more than $20,000,000.

What has been the effect of this reaction upon our own Gulf States? Sugar, which cost 12 to 15 cents without the steam engine, is now made for three. And I will venture to say that one solitary man from New Haven has brought this present mischief upon our country, by raising the value of the negro from $200 to $1,500; and Whitney may be said to be the maker of about three million negroes, who never would have been born but for his invention. The reaction from our workshops has changed the entire condition of the Gulf States by making them so largely tributary to the cheap clothing of mankind, and the cheap production of rice, sugar, and coffee, to feed all mankind. This reaction of the Northern States upon the Gulf States and the West India islands has probably added more to the population of the globe than the entire present population of the United States. Population increases not only at the north, but in the non-inventive regions. The machine carries with it the man to tend it, and others to co-operate with him, invites the merchant, draws the ship. It covers the Southern States with a population, one-tenth of which is not native, and which will not be driven out even by this war. What is more, to this Massachusetts regiment which has gone down there to keep the peace along the border, there will happen just what happened to the Grecian general who left 30,000 behind to people the countries to which they went; just what happened in the Revolutionary war, which carried my grand-father and my father to the banks of the Hudson, and was the occasion of my being born there. We are constantly pushing southward a civilized population, that at first returns in the heat of the summer, but afterwards becomes acclimated and remains there.

Reacting from our climate, machinery can be made even more effectually in the tropics than here. It can be applied to the production of sugar, cotton, rice, indigo, tobacco, with greater facility than to planting corn or raising wheat. The production of the tropical regions to feed the world, and to contribute to the enjoyment of civilized life of all mankind, when the rail tracks shall have been laid down, when the machinery shall have gone there, is utterly incalculable.

I look at the present war as being more dependent for its result upon machinery than any war ever was before. Each party has the power to bring to the scene of action in a few days from remote regions, such forces as the world has never dreamed of before. But war is only an incident. After the fighting we come again to peaceful action; and in my opinion that peaceful action will be far more energetic than ever before since the world began. It is not all mischief that is coming upon us. Losing our income, we shall gain new habits of industry and economy. New inventions, not of war but of peace, will pour over the face of the civilized world, including the tropics, which must contribute their portion to the common welfare. Although at present, in the beginning of a war that may be of tremendous force, yet I look beyond it and see a great and peaceful world in the future. As the Secretary of State lately said, I look underneath all this excitement upon the surface and see a peaceful solution of the whole matter.

Mr. Churchill said that in his former remarks he had had no reference to machines but to such inventions in tropical climates as were demanded by the civilization of that day, such as the invention of paper in Egypt, of the melting of metals, polishing of jewels, and digging of canals for irrigation. These inventions are not of the same class as those of the 19th century, but were among the pressing necessities of that day. We may now clearly trace the part to be taken by the tropical climates when they cease to be occupied by barbarous nations and become a part of civilized humanity. A good machine must have a good man by the side of it. The tropical climates must be looked to as the sources to supply the raw material to feed the machinery, invented, manufactured, and repaired by the north. The production of the south depends upon the demand by the north.

Mr. Fisher cited as an illustration of the reaction of invention upon tropical climates, the efforts to introduce in India at the present time either the traction engine or some other means of getting the cotton to market, in anticipation of the failure to receive it from the southern states.

ICE AND METHODS OF REFRIGERATION.

This subject was postponed to and made the special order for the next meeting. Adjourned.

American Institute, Polytechnic Association, }
May 23, 1861. }

Mr. Jireh Bull in the chair.

FISHER'S STEAM CARRIAGE.

Mr. Fisher.—Since I last mentioned my steam carriage to this Association, I have made alterations in it, and have, within a few days, made a trial trip. It was proposed here to form a small club to assist me in making these alterations, and in finishing the carriage; but there were few who offered to join the club, and I did not wish to annoy people, or mortify myself by solicitations. I, therefore, have had no assistance, except fifty dollars from Col. Hoe, who was so liberal as to offer it, on condition that I would exhibit the carriage in his neighborhood when it is completed.

The effects of these alterations are, first, to lessen the noise of the steam blast; second, to render the carriage more manageable in crooked places; and, third, to render it proof against heat and moisture—the frame, which was of wood, being now of iron, and seven feet shorter than the old wooden frame.

The means by which the steam blast is in a considerable degree quieted, is that devised by Gurney, consisting in what he called a blowing box, or chamber, holding five or six cylinders full of steam. Into this chamber the cylinders exhaust; and the steam, instead of entering the chimney at nearly the full pressure, is expanded, and flows in a comparatively steady stream, like air from a smith's bellows. This device has been tried on locomotives, but found to impair the force of draft; but it has the advantage of lifting fewer sparks from the fire, is in other respects advantageous, and is, to some extent, used. I feared that it would not give steam enough; but was agreeably disappointed to find that, with the door wide open, the fireman reported that he could not keep the pressure below 180 pounds. We were not running fairly, but had to stop for horses, and ran over beds of road metal, in order to keep clear of the railway, in ascending Bergen Hill; but the stops did not help to increase the pressure; for I had found that the natural draft would not raise the pressure above 160, when the boiler is naked, and it is observed that locomotives that burn coke stand for hours without sensibly blowing off steam, when the pressure is limited to 130 pounds.

The inclination of Bergen Hill was stated by some persons present to be 1 in 15. There were long beds of broken stone on it, which common carriages avoided, keeping on the rail track; and the carriage ran up over these beds, thus proving a tractive force sufficient for ordinary purposes. On a level, on a bed of stone, we were running very fast—some thought more than 20 miles per hour—when the exhaust was so rapid as to tear open soldered joint of the chamber of copper one-fiftieth of an inch thick, an accident that arose from the economy of using an old water-tank as material for the exhaust chamber. This left us without the steam blast, notwithstanding which we returned, about a mile, at a speed equal to an omnibus, having seventy pounds pressure when we arrived at the locomotive works.

It is the opinion of Mr. Davis, superintendent of the works, that the engines are well-proportioned to the weight, and that there is boiler surface enough for much greater speed than is required; in fact, we ran over beds of stone faster than we shall be allowed to run on smooth roads when carrying passengers, and this speed was attained with the door wide open, and the boiler, pipes and cylinders naked. When these parts are clothed, and the blast-pipe adjusted, I believe there will be abundance of steam, with very little back pressure.

Comparing this performance with that of Ogle's and Macerone's carriages, which were of about equal weight, we see abundant encouragement. Their boilers had 250 feet of surface, mine has 159 feet; they ran on better roads, and yet seldom attained so high a speed. Their boilers vaporized about five pounds of water per foot surface per hour, and mine—which is the vertical tubular boiler—appears to steam as fast as the best locomotive boilers, which vaporize fifteen pounds per foot per hour. Add to this the advantages of the link, and we see that the improvements that have grown up since their time, place us in a position so favorable as to compensate for the inferior quality of our roads. And further, the cost of this improved machinery is less than half what they had to pay for theirs.

Besides these improvements which I adopt from the locomotive, I claim that my parallel connection is important, not only to preserve the carriage from damage by jolting, but aslo to diminish the resistance. Morin found that at nine miles per hour a carriage with common springs ran with half the power it required when its springs were blocked; and my connection enables me to use springs as flexible as those of the best common carriages. But all former steam carriages and locomotives have been constitutionally unable to use springs of much flexibility, or to last long with stiff springs; and it was agreed that unless good springs could be used, steam carriages could not endure high speed; and the English have given up fast carriages, and are now at work on engines to run at four or five miles per hour.

There is one exception to this: Mr. Rickett, who has built carriages for the Marquis of Stafford, and the Earl of Caithness. But I observe in his labors evidence that he is baffled by the old difficulties. Here are engravings of those carriages. That of Lord Stafford has chain gearing, that of Lord Caithness has spur gear.

Mr. F. stated that there were various projects for traction engines before the public besides his own, and as they were important for military transportation, he asked that a committee should be appointed to examine and report upon the subject.

The Chair appointed Messrs. Dibben, Stetson, Rowell, Butler and Churchill as the committee.

ICE AND METHODS OF REFRIGERATION.

Mr. Seely.—The field of invention in this direction has not been well explored. A practical system of refrigeration would be of immense service to health and bodily comfort. I believe the time will come, in a climate a little warmer than this, when refrigerating apparatus will be as common as stoves, and will be considered almost as great a necessity. If we put a piece of ice in the centre of a room, it seems to throw out cold in every direction. We have only to enclose this in something ornamental and it will be neater and handier than a stove. The products of the combustion of coal are a great nuisance; but from the consumption of ice we have only water, which may be used in cooking or washing. Ice is cheap enough in New York city to be used so practically now. Ice is cheaper than coal. It costs but two or three dollars, while coal costs five to seven per ton. The management of the ice would be extremely simple. The cooling apparatus should be put in the garret, for cold air comes down. And there would be less waste of the cold air than of heated air.

Several methods have been proposed of producing ice artificially in summer.

Thus: Water is exposed in India in shallow vessels upon a cloudless night, and the small pellicle which is formed upon the surface from the evaporation and radiation, is carefully gathered and sold. This is very expensive.

Ice has been produced by dissolving various salts (the nitrate of ammonia, for example) in water, or in acids. After examination of this method by a French society similar to ours, it was decided that the ice produced in that way would cost over five cents per pound. Dr. Gorrey proposed to condense air, to squeeze the heat out of it, so to speak, and to allow it to expand in contact with water, which it would freeze. With his ingeniously constructed apparatus, he has produced five or six thousand pounds of ice in a day; but at a cost a good deal higher than the natural ice—a cost of forty dollars per ton instead of three dollars. Prof. Twining has a plan for making ice by the evaporation of ether. He has built several machines; and, I presume there is no doubt they are better than any others.

The theoretical cost of the manufacture of ice is very easily calculated. There is a relation between all the physical forces by which one may be measured by another. A certain amount of electricity is worth a certain amount of heat. So many foot-pounds are equal to so much heat, or so much electricity, or so much cold; for the same amount of power which would be required to increase the temperature of a body by ten degrees, would be required to diminish it by ten degrees.

It has been proposed to generate heat by mechanical means. Water has been boiled by the heat produced by friction. Water may also be frozen by mechanical force. Knowing how much heat a given power will produce, we know how much cold it will produce, and consequently how much ice.

The apparatus of Mr. Gorrey or of Prof. Twining, if applied merely to cool air ten or twenty degrees, which would be all that would be requisite, would probably be of more value than applied to the manufacture of ice, because there need be no loss by radiation.

Mr. Fisher.—A pound of coal will melt one hundred pounds of ice. Or it will melt sixty pounds and raise it to the temperature of fifty or sixty degrees, when it will be no longer useful for cooling. So that a ton of coal will do as much as sixty tons of ice. I apprehend that if we used ice for cooling the air, we could get it much cheaper than we now do; for that which we now use is derived from the best of water, and brought a long distance; whereas, for mere refrigeration any ice will answer equally well. It appears to me desirable to inquire whether mechanical methods, such as the compression of air, may not be used, so that coal, instead of ice, may be used for cooling.

Mr. Dibben.—The cooling of houses by ice is not new. Though it may not be in use for cooling private residences, yet it is used to a considerable extent in this city for cooling packing-houses, where they cut up and pack in the summer time thousands of tons of fresh meats, simply by having a good non-conducting exterior to the house, having double or triple windows, and having a reservoir or cistern of ice for the air to pass through. The temperature in that way may be kept down to forty or fifty degrees all through the summer. But as a practical thing in our houses, I doubt whether it would be beneficial to our health. Generally in the summer season, the air is within eight or ten degrees of the dew-point, or point of saturation. Lower the air ten degrees, and it would begin to deposit moisture. I am inclined to think that this moisture would produce various derangements of the human system. Again, we must remember that in order that the cooling of the air should be economical, the windows must be closed.

For the large cities, Charleston, Savannah, New Orleans, wherever there is direct communication with the Hudson river and with Boston, there can be no competition in the making of ice. But for small country towns an ice machine might perhaps be worked to advantage.

Mr. Koch described an apparatus for producing ice artificially, consisting of two hollow spheres connected by a pipe. One of the spheres contains ammonia, and the other is submerged in water. By the application of heat the ammonia is evaporated until the pressure is sufficient to liquify it upon the other side. As soon as the heating apparatus is taken away, the ammonia becomes vapor and goes back. This would freeze the water. Then the process may be repeated.

Mr. Seely suggested that the change of temperature desirable in summer is very far less than that in winter, so that the same means will produce a far greater effect. Mr. Dibben's objection appears far more formidable than the mere question of cost. But the operation would be such as to prevent the air from becoming so moist; for in passing over the ice the air becomes cooled and immediately deposits its excess of moisture upon the ice or cooling surface, and, as it is gradually warmed in its descent, it expands, and the dew-point is lowered; so that the dew-point would be as far below the temperature within the house, as if there had been no cooling.

Mr. Dibben.—Five degrees reduction of temperature would be all that would be required to make a very sensible difference. I think it would be better to change the air moderately and give us more of it. Mr. D. proceeded to describe the eastern method of hanging up mats, &c., to cool the air by evaporation, and an apparatus of his own, producing the same effect with the use of porous earthen ware.

Mr. Johnson described a method of refrigeration, by placing in the window a box filled with ice, and pierced with pipes to admit the air from the outside, so that all the admitted air must pass through the pipes.

Mr. Seely remarked that the plan cited by Mr. Koch was a very pretty experiment to show a class in chemistry; but practically it would be useless, on account, in part, of the fact that the heat must be removed at each operation.

Mr. Churchill considered the question of moist air very important. He had found that a draft is seldom injurious at a high temperature unless it is damp, but that a person subject to neuralgia, for instance, would find a damp draft of air verypainful.

Mr. Rowell stated that the temperature of the earth fifty feet below the surface is but fifty or fifty-four degrees, and proposed that the Croton water should be carried down that distance by a bend in the pipe, to cool it.

Mr. Fisher.—It would soon warm the earth so as to be inefficient.

Mr. Rowell.—Not if it come to a stratum of water. That would keep it cool.

The same subject was continued. Adjourned.

American Institute, Polytechnic Association,
May 30, 1861.

Professor Cyrus Mason in the chair.

BREAD MACHINERY.

Mr. Fisher called attention to a new plan for making bread which had been lately introduced in a bakery on the Third avenue. Water mixed with flour is impregnated with carbonic acid gas pumped in under a pressure of 150 lbs. to the square inch. The mixture can be kneaded and put into the oven without delay. The bread is good in texture and quality, and will keep sweet longer than bread made in the ordinary way.

Mr. Dibben considered the effect of the mode of raising to be so different from raising with yeast, that persons with weak stomachs would object to it. Its novelty would be its chief attraction.

Mr. Seely considered the practical result in raising the bread to be substantially the same as in raising it with yeast. It was a question *de gustibus* more than of anything else. Persons with weak stomachs might be so influenced by their prejudices as to find the bread difficult to digest. The experiment has been tried of using atmospheric air instead of carbonic acid gas, but the bread came out of a dark color, a circumstance which chemists have been puzzled to account for.

The Chairman stated that he had invited the proprietor of this new machinery to come to the Association and bring a sample of the bread, and that the subject would then be resumed.

Mr. Johnson said that Mr. Garvey had suggested mixing the flour with water merely, and then raising it by placing it in a vacuum. Mr. J. had tried the experiment successfully. When the dough is thus raised, and the air is let in upon it, it falls somewhat, but still is very light.

ICE AND ITS FORMATION.

The Association resumed the consideration of the question of "Ice, and Methods of Refrigeration."

The Chairman requested Mr. Seeley to state the variety of temperatures of the formation and melting of ice.

Mr. Seely.—I believe it is settled that ice will melt uniformly at the same temperature, 32 deg., but the freezing point, while never higher than 32 deg., may, under certain circumstances, be 15 deg. below. Water, when peculiarly still, may be liquid at the temperature of 17 deg. But if the water be then moved in the least, by a breath of air, or the dropping in of a grain of sand, it will instantly become solid. Water which is impure will have a different freezing point. Adding alcohol, or certain salts, to water, will reduce the temperature at which it freezes, very much.

Dr. Vanderweyde had witnessed the sudden freezing of water, which had remained liquid at 23 deg., by jarring the floor. The temperature of the water was immediately raised to 32 deg., just enough water freezing to evolve latent heat sufficient to bring the temperature of the whole up to 32 deg.

The Chairman cited the fact that ice will be liquified under pressure, even below 32 deg., as explaining the movement of the glaciers along the valleys of Switzerland. It had been found that these glaciers move from 2½ to 500 feet per annum, horizontally, from the more confined towards the wider mouths of the valleys. It was found, upon setting down a line of stalks directly across the valley, that in a few days the line would be curved, the central portion moving the most rapidly. Mr. Thompson discovered, in his laboratory, that pressure applied to ice, without any change of temperature, would dissolve a portion of it, which would immediately become solid upon the removal of the pressure. He took a bar of ice, and by the application of pressure bent it into the form of a hoop, still of solid ice.

Dr. Vanderweyde stated that a heavy block of stone, lying upon ice, with the temperature below the freezing point, will, by its weight, melt the ice below it so as gradually to make its way into the ice.

Dr. Stevens.—Glaciers were found to move faster by day than by night, and faster in the summer than in the winter season. They never thaw; but there is an expansion of the ice by heat. I do not understand that there is a pressure from the mountain side in towards the middle.

Dr. Vanderweyde.—In my opinion there is a pressure of the ice upon the ground where it is lying. There is a slight quantity of ice melted, and as the ice field is inclined, there is a slight motion of it. Notwithstanding the valley becomes narrower, the motion will be down the valley, and the ice will conform to the shape of the valley. As the ice presses against an immovable rock the ice will be thawed in front of it, and frozen again behind it, where the pressure is removed, and thus the body of ice is permitted to move.

Mr. Fisher.—All bodies radiate heat, and also receive heat from other bodies. Heat is passing up through the earth continually, and through the ice; but anything laid upon the ice has the effect of clothing it and retaining the heat. That I should consider a more plausible explanation than the mere pressure of so light a substance.

The Chairman stated that on the next evening he would be prepared to give an account of Mr. Thompson's experiments demonstrating the liquefaction of ice by pressure.

He then proceeded to consider the formation of ice, and to compare it with the crystalization produced by the cooling of iron, and with the crystalization of stones. He had observed the toughness of newly formed ice. Upon examining a cake of ice, it will be found that the upper portion, less than an inch in thickness, which is first formed, is solid, while the remainder of it is full of pores, like honey-comb. This lower portion of the ice is formed of large crystals, which bear a striking resemblance to the crystals of a pig of the Franklinite ore which has been heated and thrown into water. The outer sixteenth of an inch will bear frequent bending, while the remainder of the pig will break at a blow. Shaving off a single inch from the top of a thick cake virtually destroys the strength of that cake of ice. Hence in the spring, after the warm weather or the rain have thawed the upper stratum of ice, it is brittle and easily broken through, even although it may be twelve or fifteen inches thick. The upper crystals run horizontally, giving strength to the ice, while the lower crystals are larger and run perpendicularly.

Mr. Veeder suggested that the ice upon the surface is more rapidly formed and therefore does not form so perfect a crystal. But after the ice is sufficiently thick to form a coating to the water below, the process is much more slow, and the crystals have time to take their perfect form. It was formerly the practice, in storing ice, to cut off the top, calling it pithy ice. But it is found better to keep it on.

Mr. Seely said that water is at its greatest density at a temperature between 39 deg. and 40 deg. When exposed to a cold atmosphere, the water upon the surface sinks until the whole reaches the temperature of 39 deg. After that the coldest water, being the lightest, remains on the top, and being a slow conductor of heat, there may be a temperature of zero in more than two inches of ice, while half an inch below the ice the temperature of the water may be 33 deg. The first ice is formed rapidly, and there is no perfect crystalization. After that the water cools more gradually, and being kept still, the crystals are larger and assume a definite form. Water freezes in needle-shaped crystals, always crossing each other at the angle of 60 deg.

Mr. C. W. Smith asked for an explanation of the formation of ground ice.

Dr. Vanderweyde compared it to the deposit of dew. The bottom of the stream radiates its heat through the water, becoming colder than the water, and at last cold enough to freeze the water in contact with it.

Mr. Smith had observed the phenomenon only in rapidly flowing streams, and his own explanation would be that the ice crystals, formed on the surface, are washed away by the current, while the rocks upon the bottom form centers of crystalization to which the particles of ice can attach themselves.

Dr. Vanderweyde said that might assist in the operation.

Mr. Dibben explained the formation of ice at the bottom of running water, under certain circumstances, in another way. For instance, in New York bay, there is an incoming tide for six hours, of salt water, of a temperature perhaps as low as 25 deg., cooling the surface of the earth below; then the tide turns, and comparatively fresh water comes down over that very earth, and is consequently frozen. It is worthy of mention that ice, in a still place, is more brittle than that where the water is in motion. After the surface is covered the particles of water cannot move freely, and the crystals will be differently formed. It is very probable that the last formed crystals thaw first.

Dr. Stevens related the disastrous effects resulting from anchor or ground ice in Southern New York, where it is the general opinion that anchor ice never forms where there is a large amount of snow on the ground. The ground seems to be colder than the stream.

The subject of "Ice and Methods of Refrigeration," was continued.

The Association adjourned to meet on Wednesday evening next at a quarter before eight o'clock.

American Institute, Polytechnic Association, *June* 5, 1861.

Prof. Cyrus Mason in the chair.

CAR-BRAKE.

On motion of Mr. Veeder, the committee appointed March 6th, on a new car-brake, was discharged from the further consideration of the subject.

PARKS' TELEGRAPHIC APPARATUS.

Mr. Johnson presented the following report, which was adopted.

To the Polytechnic Association of the American Institute:

The committee to whom were referred certain alleged improvements in the telegraphic art, respectfully report, that they have examined the system presented by Mr. A. E. Parks of Brooklyn, and find that its most important feature, is an alphabet which chiefly differs from that of Prof. Morse and others, in being written on two lines in such a way as to make the position of a character on the upper or lower line an element of distinction, thus enabling us to dispense with one-half of the ordinary characters. The instrument employed by Mr. Park's is specially contrived for the use of his alphabet.

Our opinion of the invention is favorable, and we take pleasure in commending it to the Association.

June 5, 1861.

JOHN JOHNSON,
CHARLES A. SEELY,
P. H. VANDERWEYDE,
FRANK DIBBEN.

DE BRAME'S REVOLVING CANNON.

Mr. Dibben stated that there was a gentleman present, Mr. De Brame, who had invented a new revolving cannon. He had witnessed experiments with it, several members of the Polytechnic Association being present, and they had invited the inventor to exhibit and explain his model to the Association to-night.

At the invitation of the President, Mr. De Brame came forward and explained his model:

In the revolving cannon, my main object was to produce entire coolness everywhere. Six chambers form the breech of the cannon; and after one has been discharged, and the cannon is revolved, it is open at both ends, so that the gases which have been in the chamber can escape by the draft or ventilation through it. At the next turn, the chamber is left free to be swabbed out by the gunner, &c. There are always four chambers open to the air, so that each chamber is cooling through four successive discharges before it is reloaded. The next thing to be done is to secure ventilation of the barrel, which remains fixed. To accomplish this I have hit upon a very strange device. It occurred to me that the object of the barrel being chiefly to give direction to the shot, it was not necessary for it to be closed. I have, therefore, retained of the barrel only the bars constituting the rifling of the cannon, keeping them in place by surrounding them at proper intervals with rings. These bars, of course, will give the same direction to the shot as if the barrel were closed, while the air passes freely through, and therefore the barrel cannot get heated.

I have been told by many persons that the expansive force of the powder ought to follow the ball up to the muzzle, and if there were any holes in the barrel a portion of that expansive force would be lost. I am not much versed in the principles of artillery, but I can tell you the results of my own experience and experiments. By surrounding these bars with this tight fitting covering, I can convert it into a closed barrel, in which the element of fraction will be precisely the same. I have charged this cannon with single, double, and triple charges of powder, and fired into targets made of a thousand sheets of paper, first with the closed barrel, and then with the open barrel. I have made these experiments before many scientific gentlemen, and yesterday before three members of the Polytechnic Association: Messrs. Stetson, Dibben, and C. W. Smith. I requested Mr. Dibben to prepare the charge of powder, that he might be sure that the same quantity and same kind of powder should be used in both cases. We found, as these gentlemen can testify, that the penetration was considerably greater with the open than with the closed barrel. This result I have found not only with this small model, but with larger pieces. I have taken two Hall's carbines, identically alike, opening the barrel of the one and leaving that of the other untouched, and have found that the projectile would come with at least as great force from that which I had opened as from the other.

The advantage of having a barrel that cannot get heated is very considerable. The Armstrong gun will shoot very accurately for a few rounds; but the history of the Crimean, the Austrian, and lately of the Chinese war, shows that however accurately these and the French rifled cannon may perform at first, after thirty or forty rounds the aim cannot be depended upon. The reason is obvious. If the particles of metal are ever so slightly expanded upon one side more than upon the other, it curves the barrel sufficiently to injure the accuracy of the aim. With free ventilation, this injurious effect cannot be produced.

I have added to my cannon a little device suggested to me by an article in the *Scientific American* six or eight weeks ago, which stated that sharp shooters at 800 yards distance could shoot down, within sixty seconds, every horse, and disable every man of a battery. I have added, therefore, this protecting shield or screen, which ordinarily lies between the trunnions and the wheels, but when to be used by flying artillery, may be very quickly unfolded, and will be proof against the balls of Miniè rifles, protecting the gunners and horses. Of course, I should not expect so light a structure to be proof against cannon balls; but its elasticity and strength will be sufficient to protect those who are behind it from sharp shooters. This little model is made upon a scale from the six-pounders used in the army. Seven and a half times its size corresponds to the size of the six-pounder. It is evident, therefore, that there will be the same amount of room for the folded shield on the six-pounder as on the model.

The performance of this little piece has been witnessed by Gen'l Wm. Hall and his staff, and also by Colonel Rowan, C. B., of H. B. M.'s artillery, now in this city, who was in the Crimean campaign, and is a thorough scientific man.

I omitted to mention that the principle of this cannon removes the objections to revolving cannon which have hitherto proved insurmountable. It has been found that revolving cannon could not be fired oftener than single barrels, on account of the heat, and the free ventilation will prevent that. It will be observed, too, that the weight of a revolving gun will be very materially diminished by opening the barrel in the manner I have described.

Mr. Stetson.—Mr. De Brame has explained this so fully and clearly as to leave very little for us to say, further than to certify to the facts in the experiments we witnessed. We saw the piece charged and fired repeatedly. The charges were prepared under the immediate supervision of Mr. Dibben, so that there could be no deception about it. We found that the penetration without this cap was greater, the difference being distinctly recognized by counting the sheets of paper through which the balls passed. It would require further trials upon a larger scale to determine whether the theory is true, but all the experiments with this model were favorable to the invention.

The sheet iron curtain is a separate invention, and seems to be entitled to be regarded with favor. It is no new thing to use readily removable shutters in fortifications; and I think they have been used on board ships in the American service, and used with very good effect when vessels were engaged in close action. It is evident that such a curtain can only be used with a breech-loading cannon, for it would be of very little use if the gunner was unprotected while charging the cannon. The question what will be the effect upon them of the recoil of the gun, and whether any provision will have to be made to prevent their being shaken to pieces, will be best determined by the test of trial.

Mr. Haskell suggested that the cap which closed the barrel did not entirely prevent the air from passing the ball between the bars.

Mr. De Brame.—I will remedy that.

Mr. C. W. Smith expressed the opinion that the quality of the powder was an important element in answering the question. The friction of the barrel, especially for expanding balls, affects the result. The result of the elaborate series of experiments of the British government was, that the most convenient length for cannon is from seven to eleven times the diameter of the bore.

Dr. Vanderweyde said that if the barrel is closed and too long, the ball would be retarded for the last part of the distance by the resisting pressure of the air in front of the ball becoming greater than the continually diminishing force of the powder. In such a case, making the barrel shorter, or opening the sides as in the model exhibited, would allow the escape of the air in front of the ball, and permit it to move freely from its inertia. This cannon certainly gives us the advantage of the greater accuracy of a very long barrel, without the disadvantage of the resistance of the air. It would seem as if the force of the powder would be expended through those openings; but the experiments seem to show that the powder burns too quickly for that. The friction, of course, is less, for the ball flies along upon a kind of rail with only enough friction to direct its course.

Mr. Rowell had witnessed experiments with rifle barrels to ascertain at what length the charge exerted the maximum force upon the ball, and the result was a barrel twenty-two inches in length was found to be the most effective. The remaining length of the rifle barrel then is only useful to direct the ball, and might be opened without injury.

Dr. Vanderweyde suggested that it would be an interesting experiment with this revolving gun to fire it with its maximum charge over white paper, to determine whether any of the powder escapes unburned.

Mr. Be Brame.—I will try that experiment.

ARTIFICIAL FORMATION OF ICE.

The Chairman spoke of the importance of the subject of refrigeration, upon the transportation of fruit. The fruits imported from warm climates are now more than one half destroyed by exposure on the passage. This year, the importation being unusually great, three-fourths on an average, of all the shipments, have been destroyed. Those which are received in a sound state are very unlike the fruit where it is grown, because they are picked in an unripe state and ripen very imperfectly. We need refrigerating vessels, which shall go to the southern ports loaded with ice, and removing three-fourths to seven-eighths of their cargo of ice, shall bring back a load of ripe fruits suited to our market. By this means, the fruit business which is now so precarious, might be made more profitable and certain, and the community largely benefitted. A somewhat similar plan has already been adopted in land transportation. Every third or fourth day a car arrives in this city from the far west, loaded with dressed meat and game; and they arrive in the finest condition. They are here stored in a building so prepared that they can be kept with safety until they are required for use.

Prof. Twining explained his method of forming ice by the evaporation of ether. His attention had been called some fifteen years ago to the making of ice; and he had tried two methods: first, the expansion of air; and second, the evaporation of some liquid. The first method he had not found available in practice; but by the evaporation of ether, he could freeze a pail of water with extreme rapidity. Indeed, in his first experiment, the water froze too rapidly, producing a porous substance like hoar frost. It must freeze more slowly in order to form clear and compact ice. His method had been used in forming cakes of ice twelve inches square and six inches thick, and these could be obtained in twenty-four hours. Such cakes could be furnished in any number that might be desired. They weigh thirty pounds a piece. The vessels in which the ice forms are never broken by the expansion of the ice, because the water freezes from the outside, the interior being all open water. The cost of the ice depends upon the magnitude of the establishment. With coal at $10 a ton, and labor at $1.25 per day, an establishment making fifty tons per day, would make the ice for $2.50 per ton. It costs the merchant who buys at retail about $13 a ton at New Orleans. At San Francisco, large cargoes are brought from Sitka sound, and sold at $40 to $100 per ton. Boston ice cannot be carried there for $60 per ton. In Australia it is worth $160 per ton; and frequently cannot be obtained there at all.

Mr. Leslie exhibited a model of Bartlett's Polar Refrigerator. It has a central ice chamber of a wedge shape, the point being downwards. The sides of the ice chamber are of corrugated metal, on which the moisture in the provision chambers is condensed, causing the confined air to be dry.

The Chairman suggested the importance of well arranged experiments with the different refrigerators in the market, to determine practically what are their comparative merits. Sellers of refrigerators generally represent that a less quantity of ice is necessary than families find to be so, in practical use.

Mr. Dibben considered ventilation as important as keeping cold or keeping dry, to get rid of the putrefying gases.

Dr. Vanderweyde stated that for every pound of moisture condensed, seventeen pounds of ice must be melted. It is therefore important in conducting experiments to note the humidity of the atmosphere. The soluble gases will pass off merely from the condensation of the moisture of the air, and the removal of the condensed moisture; but there are other gases arising from decay which are insoluble and which will remain unless there is ventilation.

Subject for discussion.—The subject selected for discussion at the next meeting, was, "Cooking and portable apparatus for cooking." Adjourned.

American Institute, Polytechnic Association,
June 13, 1861.

Mr. Jireh Bull in the chair.

COPPER-PLATE PRINTING BY MACHINERY.

Mr. Johnson exhibited specimens of steel-plate and copper-plate engravings, printed by machinery. The plate is put upon an endless belt passing horizontally over rollers. While inverted it is first inked, and then the excess of ink is taken off by a felt belt. The plate then passes round, coming above the rollers, and the impression is worked off. The apparatus was invented by Mr. Neale. The cost of printing is very much reduced, for the machine can print ten times as many as can be printed by hand labor.

Mr. Tillman.—Similar attempts have been made in lithographic printing, and have been successful to a certain extent. This is an ingenious machine, and will be useful for many kinds of work; but I doubt whether work of the best description could be done in the manner proposed. A little human intellect is necessary to regulate the wiping off of the ink to get it precisely right, so that engravings of the highest description must still be printed by hand.

Mr. Seely stated that this machine was regarded by practical engravers as a success. The difficulty in lithographic printing by machinery had been the heating of the stone, which injured the results.

Mr. Fisher said this machine would be very valuable for maps, coarse engraving, fashion plates, and many other classes of work. The cost of small steel engravings is not much greater than that of copper-plates; but the durability is very much greater While a copper-plate will not give more than 1,000 good impressions, a steel plate will produce 150,000.

Mr. Tillman.—Lithographic printing can be done just as well upon zinc or even steel as upon stone (although the name implies that it is printing from stone), and then, of course, it would stand in the same light as copper or steel plate.

Mr. Churchill remarked that recent improvements in the art of multiplying engravings have so much diminished the cost of the plates, that it opens a new field for machinery in printing from plates.

COOKING AND COOKING APPARATUS.

Mr. Seely.—There are no inferior animals who cook their food, or prepare it in any way. I will not except the bee and the squirrel. Even these only collect their food, they do not subject it to the action of heat or to any chemical agency. I suppose cooking to be a human invention, and probably it was discovered by accident. Even now there are nations which do not practice the art of cooking. Vegetables, in my opinion, are generally spoiled by cooking. We make stews and preserves of fruit, either for the sake of variety or to preserve them. Nations which inhabit cold climates and eat oil, cannot improve it by cooking. But cooking is a necessity for civilization. The men of the sharpest intellect, and who can do the most work, are those who use cooked food. There is always a chemical change in cooking. In flour, all or nearly all the original chemical principles are changed, and portions before soluble in water, become insoluble. In cooking an egg, the albumen coagulates; and the same effect is produced in cooking meat. The best general rule with regard to cooking and to eating, is to cook so and to eat so that the food shall agree with us. What is one man's meat, is another man's poison; and each must learn for himself what is best.

Mr. Fisher inquired what was the proper temperature for baking bread.

Mr. Rowell.—An ordinary brick oven is heated to four hundred degrees before putting the bread in, and stands at about two hundred and forty degrees when it is taken out.

Mr. Banks exhibited Morrill's Æro-vapor cooking-stove and apparatus, for alcohol or burning fluid. It is a small, portable apparatus, making no smoke or smell, and the lamp, when filled, will burn five or six hours. Flatirons can be heated by it in four or five minutes, the heated air passing directly through the flatiron.

Mr. Tillman stated that persons using this or similar stoves should be cautioned as to the large amount of poisonous matter thrown off by them into the room. They generate a large amount of carbonic acid gas; and there should always be some provision for taking this out of the room, either by a pipe leading into the chimney, or in some other way.

Mr. Churchill remarked that the water produced in the consumption of alcohol would absorb a considerable quantity of carbonic acid gas.

Mr. Dibben.—The consumption of alcohol was much more harmless than the consumption of coal, or coke, or gas; for these contain phosphorets and sulphurets which are much more injurious than carbonic acid gas. An apparatus like this in a room would not be more injurious than a common stove, and not half as much as a couple of gas-burners. Cooking over alcohol, as in broiling beef steak, does not cause the meat to take a flavor from noxious gases. Coal is cheaper for cooking large quantities of meat than gas or alcohol. But for a small family, requiring a small fire for a few minutes only, the saving of the fuel employed in kindling the fire, and left to burn away after the fire had been used, together with the saving of time, will make alcohol cheaper than coal. Gas would be cheaper than alcohol, but it is objectionable on account of its quality.

Mr. Rowell said that the reason for the difficulty in browning meat in the oven was that the upper part of the oven was filled with steam. If a hole is made in one corner to let off this steam, there will be no difficulty.

Mr. Simpson had used a gas stove resembling this, having a partition near the back, and a ventilation in the back, taking the steam from the top of the oven. There was no difficulty in browning, excepting when the ventilator was accidentally closed.

Mr. Babcock remarked that gas would more readily brown than alcohol, in consequence of the water mixed with the latter.

Mr. Johnson said that the gas stoves had been put in many houses, and had generally been discarded in consequence of the perfectly villainous odor when in use. It ought never to be used in the house.

Mr. Seely considered that an unnecessary nuisance. If a brimstone match is lighted in a room, it is at once perceptible; but the gas may be burning all the evening, and there is not enough sulphur burned to attract anybody's attention. Portable apparatus for cooking on a small scale is not adapted for the use of the army; for then the cooking should be done for the company or the regiment, and not for individuals. Wood and coal can be obtained in the locality; so that they need apparatus which will be adapted to wood and coal, rather than to gas or alcohol.

Mr. Johnson.—When gas forms light there is no objection to it; but when it is used to form heat, and the products of combustion are not taken directly into the chimney, they are so offensive that this use of gas is abandoned by those who have tried it.

Mr. Seely.—The reason is that the flame is brought in contact with the article to be heated too soon. Hold a cold plate over a gas flame and it will be covered with lamp black, and there will be an odor from it, because the compound is only partially burned. A Bunsen burner, I think, can always be burned so as not to produce this odor.

New subject.—On motion of Mr. Fisher,

The subject of "Gunboats" was selected for discussion upon the next evening.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, *June* 20, 1861.

Prof. Cyrus Mason in the chair.

NEW ELECTRO-MAGNET.

Dr. Vanderweyde exhibited and explained an electro-magnet upon a new principle. The magnetic action of a wire conducting a voltaic current extends in all directions in a plane perpendicular to its axis. If, therefore, a spiral wire surrounds a core of iron, the magnetic action of the wire is only made available on one side of the wire, that of the other side being lost. In 1852, Nickle constructed an electro-magnet, having a bar on each side outside of the coil; both of these were connected with one end of the core. This electro-magnet was found to be stronger than one formed of the same quantity of iron and coil used in the common way. The effect of the outer bars was to render a portion of the magnetic action of the wire opposite the central core available. Upon a similar principle, Roberts constructed an electro-magnet, made of a block of iron about seven inches square, with deep grooves, the copper wire being wound around the portions of the iron thus separated, so that these portions are ultimately north and south poles. With this magnet, he suspended 2,676 pounds. But here the portions of the wire outside of the magnet have not the whole of their magnetic action brought into play. The new arrangement proposes to extend this principle so as to use all the magnetic power of the wire, by surrounding it with the iron. There is an interior iron core, wound with a helix, outside of which is an iron tube connected with the core at one end by an iron disk through which the extremities of the wire pass to the battery. The keeper is a disk placed upon the other end, fitting exactly both the core and the tube. The polarity of the surrounding tube will be the reverse of that of the central core; so that one pole will be in the center, and the other around the circumference. If the iron core were removed from this electro-magnet, it would have very little power, the action of the wires on the opposite sides neutralizing each other's effect; but the introduction of the core, first, cuts off this opposing action of the wires at the opposite halves of the helix; second, causes the core to become itself magnetized; and thirdly, by this magnetism induces a magnetism of the opposite kind in the outer tube, which is added to the magnetism induced by the coil. A magnet, therefore, of this form will be peculiarly sensitive to weak currents, and will enable us with the same battery to telegraph to a greater distance.

Mr. Johnson had made a horse-shoe magnet, with the ends turned inward, so as to point exactly opposite to their usual direction, bringing the keeper entirely inside of the magnet, and winding it to the poles, in the usual way. He had found it much stronger than the same wire would have been if the magnet had been in the ordinary horse-shoe form. This tended to corroborate Dr. Vanderweyde's theory.

REFRIGERATION.

The Chairman said that it was desirable that there should be an examination of the different refrigerators now in use, and especially for the purpose of ascertaining what is the importance of circulating a current of air within the provision chamber of a refrigerator. He had observed that in those refrigerators which have a circulating current of air, however small, the contents would be found free from any disagreeable odor; while in others, kept entirely closed, and the air kept still, there would soon be a disagreeable odor, even while the contents of the refrigerator remained substantially sound.

SAWING SHIP TIMBER.

Mr. Haskell presented the following report:

Report of the committee of the Polytechnic Association of the American Institute, appointed to examine the sawing machine of Mr. H. S. Vrooman.

The committee have examined the machine, and seen it at work; and have also examined the records of patents, to find what had been done before in machines of this kind; and have come to the conclusion that Mr. Vrooman's invention is the only one that automatically saws the shapes required for ship building, and other work in which compound curves are required; and that it is a highly useful machine, and as simple in construction as could be expected, considering what it accomplishes.

It is capable of copying any pattern in which the curves flow into each other, and the surfaces can be touched by straight lines at right angles to the length. The guiding apparatus can be in a short time adjusted; and, when adjusted, an indefinite number of pieces can be made exactly alike.

It is therefore well adapted for sawing ship timber, which requires the shapes to be much varied; and also for architectural and cabinet work, in which many pieces are required to be alike.

It may also be used to saw straight work, and for this use is in some points better than common machines; and a shop provided with this would, to the extent of its capacity, be relieved from the expense and incumbrance of a common machine for straight work.

There have been numerous wood shaping machines, highly efficient, and ingenious, which have produced forms similar to those of this sawing machine; but they waste timber, by cutting it into chips, and also waste power. The saw wastes only the timber from the saw kerf, and the power necessary to reduce that amount of timber to saw-dust; and in many kinds of work this will be found a great advantage.

June 20, 1860.

M. HASKELL,
J. K. FISHER,
JOHN JOHNSON,
Committee.

Mr. Fisher exhibited specimens of the work sawed by the model machine, some of the specimens being not only serpentine in form, but with the two portions of the reflex curve bevelled in opposite directions. He said that there seemed to be no tendency in the saw to follow the grain of the wood, but that it followed the prescribed path accurately. There was very little waste, either of wood, or of power in its use. It works rapidly and is strictly automatic; so that when once adjusted to any particular form, ten thousand pieces may be sawed of that exact shape. He saw no reason to suppose that there would be any more difficulty in the construction or operation of a full-sized machine for sawing ship-timber, than in the model.

The report was adopted.

GUN-BOATS.

Mr. Fisher said that at the present time the government is authorizing the construction of gun-boats which are not to be constructed upon the best principle. The boiler is to be so high that a portion of it will be exposed to shot entering the vessel above the water line. It is proposed to protect the boiler by coal; but the protecting power of coal is very small. A 32-lb. shot has been known to pass through 18 feet of coal. Steam gun-boats should have a high speed, for a short time at least; and at the same time should be economical. We should not construct vessels like the Collins' steamers to do work which can be done by vessels costing one-fourth as much. We need not construct as large vessels as we should expect to provide in time of peace, for the men who engage to serve in war will expect to work hard and expose themselves to hardships and dangers. We need not build them excessively large, in order that they may be more comfortable for the officers and crew. He should not think we need to build gun-boats at present larger than sufficient to carry one large gun and from 70 to 100 men. Such vessels need not draw more than six or seven feet of water. It is a mistaken idea that a low pressure boiler is any safer for a gun-boat. What is required mainly is efficiency, and want of efficiency is in itself want of safety. But the low pressure boiler is unsafe for another reason; that it must necessarily be more exposed to shot, and the damage from the escaping steam is very great in case of penetration of a shot into the boiler. A locomotive boiler to develop more power than can be developed in the nine foot boilers proposed, can be placed within four feet of the floor timbers. It would be necessary to cool the water or to use a surface condenser, but that difficulty has already been efficiently provided for. An equal amount of heating surface in a locomotive boiler will evaporate three or four times as much water as in the boilers usually adapted to marine engines. They are also much lighter. Connected with this is the question of working steam expansively. We are now told that there is no advantage in working steam expansively. But, although in engines not properly protected there is perhaps not much advantage in working steam expansively; yet in those properly clothed there is an immense gain from expansion. A large engine acting slowly, is in itself a surface condenser to some extent. But in gun-boats there is no difficulty at all in keeping the steam dry and cylinders hot: and if the proper heating apparatus should give out, it can be shut off in an instant and the work can proceed in the old way. Locomotives have been built by thousands, and are found to develop the greatest efficiency for vigorous work. These boilers are applicable in many cases where they are not used because people are afraid of them. But for gun-boats, there is no reason why they should not be adopted; for they will be safer as well as more efficient than marine boilers.

Mr. Montgomery expressed his views in relation to the proper boilers for gun-boats, adverse to the use of the locomotive boiler as being inferior to a boiler proposed by himself.

Mr. Garbanati said that the gun-boats of the olden time were merely flat-bottomed boats, or rafts, carrying a large gun, and found to be very effective in taking a vessel at anchor. The English government introduced the steam gun-boat in the Crimean war. We need gun-boats of a small draught of water, to run up rivers; and if we can use the locomotive boiler so as to obtain also great speed, it will be an advantage.

Mr. Fisher.—In speaking of the space required by the locomotive boiler, he had not referred to the shape of the locomotive boilers in common use, but with certain changes which would diminish the height materially, and which had been found successful in practice. Allan's boiler, for instance, which has been used upon a Scottish railway, can be put up within the height of four feet. The receptacle for steam, instead of being a dome above, may be placed on the same level with the boiler, there being no lack of room in this direction; and, it could be furnished with a pump to remove the water as it accumulates from condensation. He would not deny that other boilers might be used, or that they might be better than locomotive boilers; but the locomotive boiler has been so generally used that its efficiency is known and cannot be questioned. He had not felt at liberty at this time to undertake the discussion of plans which had been proposed but had not been brought into general use. There may be others which may be more economical of fuel; but what a gun-boat wants is not economy of fuel but to catch the enemy. When running easily the locomotive boiler will evaporate $10\frac{1}{2}$ lbs. of water to the foot of heating surface; when driven, it may not evaporate more than seven pounds.

Dr. Vanderweyde stated that gun-boats were very common before the introduction of steamboats. As early as 1825, before steamers were generally introduced, England, France, and Holland, had gun-boats, and they were in the Baltic also. They were sailing vessels having a large gun in front, and usually four small howitzers behind. They had then been in use for a considerable time. They were fast sailers, very strong built, and quite small. These gun-boats now to be constructed should be small; the machinery should be small and entirely under the water. It is a most dangerous thing for a gun-boat to have its machinery injured. Paddle wheels would be exposed; but the screw being under the water is safe.

Mr. Montgomery was of the opinion that gun-boats should not be made too light, but should have good sea going qualities and should be able to stand the recoil of the gun. They should be prepared for all emergencies and equally adapted to all. It is unnecessary however that they should draw more than seven or eight feet.

Mr. Garbanati.—I should think it would be better not to build all upon one model. We shall need very few out at sea, but shall want them to advance up rivers, and to go especially into such places as only vessels of light draught can enter.

Mr. Babcock stated that there were now two guns of very great size at Fortress Monroe; one called the "Floyd," of 15 inches bore, made of cast iron; and the other the "Union," the largest rifled gun ever built, being 14 inches in diameter.

New subject.—The subject selected for the next meeting, was "Steel guns, and the preparation of the material."

Adjourned.

American Institute, Polytechnic Association,
June 27, 1861.

Prof. Cyrus Mason in the chair.

SELF-CLEARING CARTRIDGE CASES.

Mr. Stetson exhibited drawings illustrating two constructions of metallic cartridge cases for ordnance.

If the cartridge case is made of any kind of cloth, there is a difficulty of the most serious character arising from the inflamed material remaining in the gun, and prematurely igniting the next charge. A metallic case is, also, a more perfect protection against moisture or accidental injury to the cartridge; and is, therefore, better than cloth, if it can be made to clear itself from the gun. But the back of the case is apt to stay in the gun. The first new construction was that patented by Mr.

Hotchkiss; and the other, the recently patented cartridge case of Fenwick & Moore. There is in both a wooden sabet next to the projectile. The Hotchkiss cartridge case is surrounded with flannel, so that, as it passes out, it sponges the gun. It is supposed that the gun, in which this is used, will need no other sponging. The back of the case is prevented from staying in the gun, by making it so weak in certain lines that it will break in these lines immediately upon the discharge, the force of the powder then coming upon the back of the gun itself, and the whole of the case passing out together. The charge is prepared for firing by driving a sharp point through the vent, with sufficient force to punch a whole through the metallic case. Fenwick & Moore's cartridge case has a conical back, leaving small empty chambers behind the cartridge, into which, when the powder explodes, the gas is first driven, the back of the case being made weaker in two places to facilitate its escape. The gas being thus introduced at once behind the metallic back of the case, forces it out of the gun. It is a question whether the powder exerts its maximum force with or without such a chamber; but it is unnecessary to make the chamber large enough to be a disadvantage in that respect.

Mr. Stetson.—The chamber can be reduced if it is found too large. I will remark that this drawing of the Hotchkiss cartridge-case is for a 12-inch bore, the size of the "Union," the large rifled gun at Fortress Monroe.

PROJECTILES, &C.

The Chairman.—Can any one give us a brief description of the Sawyer gun?

Mr. Babcock.—It is a gun of five inches bore, taken out by Capt. Bartlett. It is a 24-pounder, carrying a 48-lb. shell. The Sawyer shell is an elongated cast-iron projectile, coated with some soft metal, on which are cast the projections fitting the grooves of the gun. In placing the projectile in the gun, it is necessary to place these grooves carefully; and, in that respect, it is similar to the Whitworth gun. It is stated to have thrown a rifled shot 4,600 yards, which is less than three miles. Any rifled projectile could throw a shot from the Rip Raps to Sewall's Point.

The Chairman.—Will any gentlemean give us a brief summing up of the progress made upon this subject within the last year in this country?

Mr. Babcock.—Not much. That sums it up briefly.

The Chairman.—Is it true that the government of the United States is not at any point manufacturing the best and most approved cannon in use?

Mr. Babcock.—They are now rifling cannon on Governor's Island. An old cannon rifled is just as good as a new cannon rifled. At the Washington Navy Yard they have been manufacturing rifled cannon several years under Capt. Dahlgren's supervision.

Mr. Seely called attention to other explosive compounds than gunpowder. Gun cotton can be made more or less explosive than powder. In some respects it has advantages over gunpowder; but it explodes at so low a temperature, about 300 degrees, and the products of its combustion are so corrosive, that it is not much used. It might be made serviceable, for example, in charging a bomb. There is a composition called white gunpowder, which has been found to expand one-third more than ordinary gunpowder. There are very explosive compounds, which produce violent effects within a very short distance; but the amount of expansion is so little that they would be utterly unfit for gunpowder. Chloride of nitrogen, for instance, will shatter the plate beneath it to a fine powder; but, beyond that, has very little effect.

Mr. Johnson, to show that iron could remain good after long heating, cited the case of the wrought-iron gun made at Liverpool in 1857—a gun weighing twenty-five tons before it was bored, and which it required seven weeks to forge. The diameter of the bore was 13.05 inches, and the iron which came out of the centre was perfect iron.

STEEL GUNS.

Mr. Nash said that it had been found, by experiment in Paris, that a cannon made of cast steel would throw balls 13,000 yards. This was the official report of the gunners.

Mr. Babcock.—The French steel guns are made with a hammer weighing ten tons, and falling ten feet. Here we have guns made of cast-steel, or of a semi-steel, instead of hammering.

Mr. Dibben.—The process of welding pieces of blistered steel is the method pursued for hammered steel guns. The pieces are foggotted, and being brought to a welding heat, are drawn from the furnace and placed under a hammer. A heavy hammer, moving slowly, so as to act on the whole mass of metal under the hammer, and not merely on the surface, the heavier the hammer the better the forging; other things being equal. Steel cannon, seemingly of good quality are forged in this city. A projectile like the Hotchkiss' projectile may obviate this difficulty in a great measure. Much of the cast-steel in use is very little better than the cast iron from a common wind furnace; and a good cast-iron gun will probably stand as much as the semi-steel or German steel. There must be a certain weight to prevent too great recoil. The service field piece, made of bronze, is as light as can well be made an account of the recoil.

Mr. Babcock explained the construction of a gun, made in Brooklyn, possessing the advantages of the steel gun. It is a brass six-pounder, grooved out, and the grooves dove-tailed. Pieces of steel were then fitted into these grooves, projecting a little into the gun. This makes the bore smaller, and the projectile lighter; which is especially an advantage in rifling cannon for an elongated projectile which were only made heavy enough for round projectiles. These bars can be made of a good quality of steel, and will therefore wear longer and keep in order better.

Mr. Rowell exhibited a steel gun barrel, made in the Krupp's steel works in Prussia, which had been tested at Harper's Ferry. After various trials, upon putting in thirteen balls, the whole of the powder escaped through the vent without affecting the barrel. A heavier charge of powder was then used, and with sixteen balls, and a charge of one hundred and sixty grains of powder, the barrel burst. The balls are cylinders weighing one ounce. The fracture shows that there is no fibre to this steel. The gun is made upon the principle of having the crushing strength and the tensile strength exactly equal. Upon a trial in 1849, two hundred shots were fired as rapidly as possible, requiring four hours. The temperature, at the close, was only 109 deg. Fahrenheit in the interior. These cannon are made with a mantle to prevent recoil. This barrel recoiled three hundred feet at the charge with which it burst.

Mr. Fisher explained the results obtained in a manufacturing establishment, in which a tube had been expanded by the force of a piston playing in it, to a certain point, at which its strength had become sufficient to resist further expansion. The inner layers of the tube were first expanded, and the process was continued until the outside layer could exert its full power in resisting the expansive strain. A cast-iron gun begins to crack in the centre before it can expand sufficiently to cause the external layer to operate. Steel may be six times stronger than cast-iron, but when this principle is taken into consideration, the steel tube of but one-sixth the thickness, will be stronger than the cast iron tube. A tube can be made very much stronger by winding it with wire, so stretched as to operate through its whole length. This wire may be made square or flat. Jacob Perkins made an extremely strong vessel by taking half a dozen vessels so fitted that each had to be heated before the inner ones could be put in.

Mr. Stetson said that the strain upon the end of the gun, which is not assisted in this way, must not be forgotten.

The same subject, "Steel guns, and the preparation of the material," was continued.

Adjourned until Thursday, July 11th.

American Institute, Polytechnic Association,
July 11, 1861.

Mr. Tillman was called to the chair.

ALLOY OF CADMIUM.

Mr. Churchill said that Dr. Wood had recently patented an alloy of cadmium, fusible at low temperatures, and therefore capable of being used for soldering under hot water. His patent, however, appears to be too broad, for as long ago as 1851, a formula was published for an alloy of cadmium with tin, which was especially recommended for dentists' use.

The Chairman stated that, according to Silliman's Journal, Dr. Wood has produced an alloy melting at a lower temperature than any other heretofore made.

Prof. Seely said that the formula referred to was not properly for an alloy but for an amalgam; two parts of tin to one part of cadmium, to be dissolved in mercury. He should not, therefore, consider the criticism of Mr. Churchill as just.

Mr. Churchill said that the alloy was first to be made, and then mixed with mercury. He should not consider the fact that it was to be subsequently formed into an amalgam as doing away with his objection to the broad terms of Dr. Wood's patent.

STEEL CANNON AND THE NATURE OF STEEL.

Prof. Seely said that it had been supposed, until recently, that certain barbarians knew, practically, more about the manufacture of steel than we do, and that there were certain lost arts with reference to steel. There has been much doubt among scientific men as to what steel really was. During the present century, and until within ten years, steel has been considered a carburet of iron. Some ten years ago, an Englishman by the name of Binks, showed conclusively, that nitrogen is necessary for the production of steel. He did not show plainly that there is nitrogen in steel, but showed that we knew no way to produce steel without bringing nitrogen in contact with iron. He put pure iron into a porcelain tube with carbon, and heated it long enough to produce steel, under other circumstances. But he could not obtain steel; the carbon came out carbon, and the iron was as soft as when put in. He tried various elements, with carbon, and found that he could produce no steel except when nitrogen was present; while, if nitrogen was present, no matter in what shape, whether as a simple gas, in atmospheric air, or in organic compounds, steel was invariably produced. The amount of nitrogen in steel is so small that it cannot be detected by the most expert chemists. It is less in weight than carbon, and the carbon is less than one per cent. generally. Steel is therefore a compound of iron and carbon, and probably nitrogen; certainly nitrogen must be present in its formation. The credit of this discovery is due to Mr. Binks, although within the last year two or three Frenchmen have obtained all the glory of it.

Cast iron and steel are nearly the same thing, chemically. Pure iron melts with great difficulty, and hence other matters which melt at high temperatures mix with it. Silicium, sulphurets of iron, phosphurets of iron, alumina, and other substances, combine with it. Cast iron is a mixture of steel with all kinds of impurities. It usually contains a little more carbon than steel. The more carbon it contains the more fusible it is. For ordinary purposes steel is not required to have much fusibility, especially as this property is obtained at the cost of others more useful. Cast iron may be made having precisely the same amount of carbon and nitrogen as any steel; yet, it would not have the value of steel. When the iron first runs down from the ore, in a blast furnace, it contains its maximum of carbon. This is expelled in the puddling process, and other impurities are forced out in the tilting and rolling. If the puddling and tilting are interrupted at the point where the iron contains just the right proportion of carbon, it is called puddled steel. The question is which is the cheapest and best in the end, to purify the iron completely, and then to retrace the step and restore the carbon, or to arrest the decarbonization at the proper point.

Dr. Vanderweyde considered it a settled matter that nitrogen is one of the elements of steel. There seems to be a general law that an alloy will always be more fusible than the pure substance. Tin and lead alone are neither as fusible as a compound of tin and lead. So iron and carbon are more fusible than iron alone. And if other substances are added, it will be still more fusible. If silicium, sulphur, phosphorus, are added, they injure the quality of the iron and make it brittle. But other substances may be put in which will improve its quality. A small quantity of titanium put into cast iron, if there are no other impurities present, will make it almost as good as steel. The reason why nitrogen has not been found by chemists is that it is a very difficult substance to detect in consequence of its lack of positive qualities. It does not readily show itself or enter into combinations. All the compounds used to make steel upon the surface of iron contain nitrogen. For instance, the blacksmith uses the yellow prussiate of potash to harden the surface; and it will make the surface so hard that the file will not attack it. In case-hardening, scraps of horn and various other nitrogenous substances are used. It is often remarked that a chemist does not know the difference between cast iron and steel, but a blacksmith does. But the blacksmith has not the monopoly of the process of hardening; the chemist may use all the means which the blacksmith uses to determine the difference.

Mr. Dibben.—I can find cast iron that neither the chemist nor the blacksmith can tell from cast steel. Cast iron and steel are the same thing, only that cast iron contains more foreign matters than steel. Cast steel can be produced with so large a quantity of carbon that it will have the same appearance and properties as cast iron. If we take a good iron ore we may produce samples of puddled steel equal to any specimens ever made in the usual manner. It is cast iron only, that it has been hammered a little. Subject it to the same process of tilting and drawing, as the blistered steel passes through, and it will be equal to it. Most of the steel in the market is too *high*, as they call it; it contains too much carbon, and is too much like cast iron. Iron cut from a Swedish bar is often enough like steel to harden in the same manner. Mr. D. suggested that the function of the nitrogen in the formation of steel might be to render the carbon fusible, so that the iron may absorb it. Nothing can be superior for cannon to the puddled steel made from a pure ore. Some of the best ores are the magnetic oxides, often containing seventy per cent. of iron. These can be reduced to puddled steel much more cheaply than to cast steel by the old process of cementation. And such steel will be more uniform in its texture than blistered steel. The want of homogenity in blistered steel render it unsuitable for cannon.

Mr. Johnson.—Do not chemists consider the carbon and the iron to be attomically combined?

Dr. Vanderweyde.—We do not know. The strongest microscope does not detect any detached carbon. Still we cannot say that it is a chemical combination. In chemical combinations we find that the simple substances lose their former properties. Sulphur and mercury combining form vermilla; sulphur and copper, blue vitriol. In that view I should be inclined to consider it only an alloy.

Mr. Johnson.—Are not alloys, generally, chemical combinations?

Dr. Vanderweyde.—When the specific gravity of an alloy is unchanged by the union, it is supposed to be only a mixture; but where it is materially changed, there is supposed to be a chemical combination, and the more it is changed the more intense is that combination. Where the alloy has different properties from the two metals, the specific gravity is the most changed. For instance, tin and copper are soft metals, but they compose bell-metal, which is very hard.

The Chairman.—Does magnetism furnish a test between cast iron and steel?

Dr. Vanderweyde.—No sir; the finer qualities of cast iron are perfectly equal to the coarser qualities of steel in keeping magnetism. I have a good magnet made of thin iron plates cut in the horse shoe form, hardened with the yellow prussiate of potash. We can easily know pure iron by that test. Take a bar of perfectly pure iron and rub it over with a steel magnet, and the magnetism is gone the moment the magnet is removed; so that it will attract the north pole or the south pole equally.

Mr. Churchill considered crystallization as the best test for the mechanical homogenity of steel. Cast iron, with small granules, may be stronger than a purer iron in which the crystals are larger. If we chill cemented iron we produce a rapid condensation, which is just the condition in which small crystals are produced. We have three conditions: want of fluidity, want of rest, and want of time, each conducing to the production of small crystals, and each coincident with the greatest strength in different irons.

Mr. Harrison, from Massachusetts, inquired about the "Damascus steel." He had observed about it the peculiarity that if it is heated too highly, instead of being burned like the English steel, it will still make a pretty good tool. This steel seems to be flawey, and there will be fire cracks in hardening it.

Mr. Stuart stated that Mr. Wiard had met with remarkable success in making cannon from puddled and cast steel.

Mr. Wiard, in response to questions, stated that the gun referred to weighed, when finished, 700 lbs. The bore is 26 inches, and the length 18 diameters, or nearly four feet. He considered the puddled steel guns the strongest. The machine for rifling he explained by a drawing. The tool commences at the bottom of the bore and moves forward, drawing out a shaving which sometimes comes out in one piece, and may be drawn out like a watch spring. The twist commences at nothing, and ends with one revolution to nine feet. He explained his process for forging the steel: taking a square bar, five inches square, surrounding it with slats converting it into a longer octagon, and surrounding this with others converting it into a circle. A square bar of steel cannot be hammered into a round form without making flaws in the center; but by this method the form of the central bar is unchanged in the forging, and after the gun is finished the square is plainly visible at the end. The hole is drilled before the forging is completed, and the inside is then kept cool by a syphon pipe while the outside is hammered. Mr. W. also described an improved gun carriage, allowing a range of elevation from 35 deg. to a depression of 30 deg., instead of 14 deg. as now used in the service, and also preventing the aim from being injured by the recoil excavating the earth behind the piece. He also described an improved wheel, in which wedges, with adjusting screws are used to bind the spokes in the hub, and also between the felloes, to expand them to the size of the tire. A wheel may be taken to pieces to be repaired, and when the tire is replaced, in a few minutes it can be drawn up as tight as if drawn up by heat.

Mr. Johnson stated that the ratio of strength had been found to be one for cast iron, three for bronze, and five for puddled steel.

Mr. Wiard stated further that he considered it an error to reduce the weight of the cannon in using steel. The recoil would be increased by this. On the contrary, he should add to the weight with the increased strength.

Mr. Bliss moved that the subject of "Steel and its Uses" be taken up at the next meeting, in order that the question of refining steel may be more fully considered.

The motion was agreed to, and the Association adjourned.

American Institute, Polytechnic Association,
July 18, 1861.

Mr. Fisher was called to the chair.

STEEL AND ITS USES.

Mr. Bliss.—Probably there is no more valuable metallic body than steel, and none of whose value we know so little, compared with the advantages we have derived from it, and considering the time we have had to do with it. Few persons who use steel are aware of the extent to which it may be refined and made useful. About thirty-five years ago he had been called upon to perform an operation in dentistry which he was unable to do, because it involved the drilling of a hole in a solid piece of material as hard as flint. The gentleman took it and in a few days brought it back with the hole drilled in it. He ascertained who had drilled it, and went to see him, and learned how it was done. By working a pound of steel under the hammer, he had refined it so that he could make drills to "go through anything." Another gentleman tried the same experiment, and made a drill which he passed through the blade of his pocket-knife, without drawing the temper of the knife at all. In Boston, he noticed that the tools of a carver from England were left unfinished; and the carver told him that for nice work the tools should be left as the hammer leaves them. One half of the instruments from the manufacturer will break if put to the test; and he had for a long time made his own tools. With regard to tempering, the old plan was to make scythes and axes with a thick edge, leaving the farmers to grind them down, because they could not temper the sharp edges without burning. Fifteen years ago, in a file-shop in South Boston, he noticed some files apparently prepared for tempering, which looked as if they had been whitewashed. Going home with that idea, he coated some small instruments with the flour of pumice, and found that thus prepared the most attenuated points could be tempered without burning. A file is made hard throughout, without injuring the tooth.

Mr. Dibben said that there was another important fact with regard to refining steel by the hammer; that to make a good cutting edge, after hammering the steel, it should never be heated to so high a temperature again. In tempering a drill, the point should not be heated, but only the shank. Hammering hardens the steel; but if you afterwards heat it and temper it in the usual way, it will be the same steel that it was before hammering. There is iron that is absolutely drill proof. Some of the Franklinite iron has such a peculiar hardness, and such a peculiar structure, that it will destroy a drill which will pass through any ordinary hardened steel. No drill he had ever seen, would pass half an inch through Franklinite iron in an hour.

Mr. Bliss.—I am aware that we have to heat steel higher in tempering, than we do in working it, but if properly prepared it endures it and still retains its value for cutting purposes; but in tempering it, a great deal of skill is required so as not to overheat, especially where the edges are thin.

Mr. Rowell.—What kind of fire do you use in tempering tools?

Mr. Bliss.—I have used the blaze of alcohol, of oil, and various other substances, and tempered in wax, tallow, salt water, and various other things. I have not been able to demonstrate clearly which plan is the best.

Mr. Harrison.—A plan used more than any of these, is to heat a pot of lead red hot, so that articles can be put in it and heated to just the temperature that is required. All that is necessary is to plunge the article into it, and shake it about a few times, and then put it into cold water, to harden it as we want it.

Mr. Rowell stated that steel could not be burned in an alcohol blaze; it was impossible to spoil it. In burning a roll full of hard spots, which the tools could not cut, tools were made and hardened in quicksilver, which was successful.

Mr. Dibben.—Steel should be tempered at the lowest temperature at which it can be made hard.

Mr. Harrison mentioned the fact that the grain of hardened steel is somewhat coarser than of that which is soft; and that steel expands in hardening.

The Chairman stated that lead had been supposed to injure steel; and zinc had been found rather to improve it.

Mr. Harrison.—I should suppose that the extreme volatility of zinc would be an objection.

Dr. Brower classified iron as follows:

Red short.
Cold short.
Neutral. { Pure neutral. / Manganese neutral. / Zinco-neutral. / Mang. zinco-neutral.

The property of red-shortners, or being brittle when at a red heat, is usually said to be derived from sulphur. The property of cold-shortners, or being brittle when cold, is said to be derived from phosphorus existing in phosphate of lime.* When manganese and zinc are contained in a neutral iron, they have a tendency to overcome the effects of sulphur and of phosphorus. By the management of the puddling furnace the decorbonization may be so graduated that instead of a true fibrous iron a semi-steel is produced which has the appearance of cold short iron, and may be converted into a good steel. A great deal of steel is thus made which might not be merchantable for ordinary use, but which is at once made into sledge hammers, crowbars, and similar tools, for which it is adapted, and is thus readily brought into the market.

Mr. Tillman stated that according to the modern theory, carbon and nitrogen are both essential in the formation of steel, and therefore substances containing cyanogen, as the cyanite of potassium, are used in the hardening process. But Joseph Dixon, of Jersey city, boldly takes the ground that neither carbon nor nitro-

* Neither of these ideas appear to be sustained by facts.—J. R.

gen is necessary; that these are impurities as well as the sulphur and phosphorus; that in the manufacture of steel there is simply a molecular change in the iron; and that all that is necessary is simply to subject the iron for a considerable time to a temperature just below the melting point, which will so separate the particles as to facilitate this molecular change. After it has once taken that form, it cannot be brought back again to iron. Mr. Dixon says that he will take wrought iron, and without adding any carbon to it, will convert it into steel.

Mr. Dibben said that he had wrought iron, bought as such,—Danamora iron,—containing carbon enough to be worked like steel.

Subject for discussion.—The subject of "Steel and its uses," was continued for discussion at the next meeting.

On motion of Mr. Tillman, the Association adjourned, to meet on the second Thursday in September, at 7½ o'clock.

American Institute, Polytechnic Association,
September 12, 1861.

Prof. Mason, on calling the Association to order, delivered a brief and pertinent address, concluding as follows:

The Farmers' Club and our own Association are now well established, and growing branches of the American Institute, from whose labors the public will justly expect results answering to the increased facilities provided for us, and the additional work laid out for our accomplishment. It is intended promptly to complete the organization of this branch of the Institute. And it is hoped that the members most active in past years will be ready to continue their labors.

THE GEOLOGICAL AGE OF MAN.

Dr. R. P. Stevens said: One of the great lessons of modern geology is that the earth, in its past history, has been the theatre of countless generations of living beings; that these living organisms have appeared in regular sequence and order of progress from the lower to the higher in the scale of perfection. This grand procession has had well defined eras, marked by the predominance of certain forms of animais. The first has been called the Era of Shell-Fish, when molluscs were the highest types of animated nature. The second has receivea the name of the Fish Era, when the heterocercals, like the shark, were the highest type. The third has been called the Reptilian Era, when animals allied to the crocodile and lizard were the highest type. The fourth has been called the Mammalian Era, when animals allied to the elephant and rhinoceros were the highest type. Succeeding this last era in the order of time, comes what is termed the Drift Era, when all that portion of the American continent east of the Missouri river, and as far south as the latitude of New York city, was submerged beneath the waters of an ocean, into which arctic currents brought ice and icebergs, transporting rocks and gravel from the north. It was in this age that all the beds of clay, gravel and sand, now found overlying the solid rocks, were spread upon the earth's surface, over that portion of the American continent above alluded to. During the continuance of this period of submergence, it has been supposed that all previously existing land animals were destroyed. It was after the Drift Era, when the submerged earth came up above the waters, and dry land appeared once more, that man made his first appearance upon our planet. The evidence of this is negative. It consists in the fact that neither his bones, nor any of the works of his hands, have been found to any great depth beneath the surface. In none of the deep-seated and consequently the oldest rocks, have any of the remains of man, or any evidence of his existence, been discovered.

The remains of the human race, found in geological formations, may be divided into two classes; first, his works; and secondly, his bones. His works consist of buried and ruined cities, such as Herculaneum and Pompeii of Italy, and those found in Egypt and Syria; dwellings, rudely constructed of stone, found in Northern Europe and California; and implements of war, the chase and husbandry, found buried deep in peat bogs, in caves, or in gravel beds. Works of man have thus been found at considerable depths, at Abbeville and Amiens, St. Anchieul, Chatillon sur Leine, and Oise, in the Department of Percy, in France. In these localities, the rudely constructed flint implements of an ancient race, are found associated with the bones of the elephant, hippopotamus, rhinoceros, bear, lion, and hyena—animals now extinct in Europe. At L'Aubre, Department of Arcy, the fragment of a human jaw, with teeth, was found with similar associations. The rib-bone of the auroch, an extinct ox, was found, apparently wounded by one of the flint implements. In England human remains have been found at Hoxne, Rempart Hill, Bury St. Edmonds, in Suffolk; at Hornell Bay, Reculvers, Scroll Cliff near Whiteside, in Kent; at Bedford, in Bedfordshire; and at Rosemarsh, in Surrey. In all these localities, flint implements are found in beds of gravel, associated with the bones of the same animals as in France. Implements, with bits of charcoal, and bones of extinct animals, have been found in caves at Palermo, in Sicily; Kostrich, in the Alps; Bixham, in Devonshire, England; Kent's Noll, Torquay, England; and Kirkdale, Yorkshire, England. They were found in beds of bone breccia, or limestone, cemented with fragments of bone. The same kind of implements have been found in the river bottoms of England, and in the alluvial soil of the Nile in Egypt. In America, the works of man have been dug from beds of gravel, from twelve to eighty feet beneath the surface, in various places in California, on the banks of Cooper river, Georgia, and in the buried mines of Utah, New and Old Mexico, in Michigan, and at Aux Cayes, St. Domingo. The bones of man, petrified, have been found in the iron mines in Sweden, in peat bogs in England and Scotland, in buried cities in Italy, in beds of iron ore in Virginia, and in beds of limestone in the island of Guadaloupe. From the mass of evidence collected upon this subject, geologists have, with great uniformity, agreed that man is of recent origin; but how recent, at exactly what epoch he made his appearance, has not been satisfactorily determined. The order of geological epochs, connected with the grand developments of animal life, are well settled; but the respective ages of each, as compared with any unit of time in any chronology known to man, has not been ascertained. Human remains, and implements of the chase, of war, of cooking, and for other purposes, found in the beds of gravel, either bring the time of the Drift Era forward in the order of time, or carry man, in his mundane birth, as many ages backward, in the great procession of living beings which have, in successive ages, appeared upon the theatre of life, sported their allotted term of existence, and with their exit, given room and place for newer and higher orders. But whether we give man an older or a later time for his birth-date, the grand geological truth remains, that he appeared in the last day of creation, when the earth was clothed in verdure and beauty, stored with minerals and treasures, and fully prepared for pleasures, uses, and economies.

STEEL AND ITS USES.

Mr. Fisher..—Semi-steel was claimed to be cheaper than iron for the manufacture of ships, and for some other purposes, costing but little more per pound, comparatively, and being stronger. The Bessemer steel is also advertised at a cheap rate. The inventor states that he can manufacture it in masses of twenty tons; and that he can make steel plates of enormous length and breadth, at as cheap a rate as smaller plates. Hitherto in the manufacture of iron plates the cost increases with the size.

When small plates are ordered, Bessemer cuts them from the large plates. Thirty years ago the wear of the rail upon railroads was supposed to be too slight to be taken into account. Now, rails are sometimes used up in a single season. The rails may be made of cheap steel, and will be more durable. And such steel may be used for axles, for wheels, and for many parts of cars, and locomotives especially, instead of iron. Thus, locomotives may be made a great deal lighter. The durability of railway machinery may therefore be very much increased, and the cost of railway transportation proportionally lessened. This lightening of the locomotives will obviate one great objection to their use upon common roads. Pavements may probably be made cheaper of cast iron; but trams may be made cheaper of steel than iron plates, and can be protected against rust.

Mr. Dibben.—Mr. Bessemer has lately adopted a process somewhat different from that he has hitherto used, making his metal into iron and mixing it again with a certain quantity of cast iron, so as to give it a more uniform quality than he could obtain by his previous process. Puddled steel is merely high iron, iron with a little extra carbon in it, and I think too much merit is ascribed to it. When put into a ship it is inferior to common iron for a corrosion of the metal takes place in spots, produced, as some suppose, by electro-magnetic action, one part of the plate becoming positive and another negative.

Mr. Stetson said that the manufacture of cheap steel is yet in an experimental condition, being regulated by empirical rules. Some of the facts are known with scientific certainty; but the intensity of the heat and attendant difficulties prevent such an investigation of all the facts as may be made in a chemical experiment. When we speak of good iron, reference must be had to the use to which it is to be applied. For instance, a stove casting requires an iron that is very liquid when melted; but, for larger work an iron that is more viscid may be better. An advantage possessed by the English manufacturers of steel is that they produce a more uniform article than we do. Their steel may be no better than a large proportion of ours, but being more uniform, we can depend upon it with more certainty. The Sterling iron resembles that obtained by Bessemer's latest process, for it is manufactured of cast iron, into which, when melted, wrought iron is thrown. The Sterling iron is cast iron toughened.

Mr. Churchill stated that recent experiments show that when iron has been passed through the Bessemer process, and is cold-short, manganese will restore its strength, although the process removes neither the phosphorus, which has been supposed to cause cold-shortness, nor the sulphur.

Mr. Fisher remarked that in tubes, steel cannot be welded as well as iron. Steel tubes will split in the welding.

Subjects for discussion.—The subject of "Bridge-building" was selected for the next meeting.

The subject of "The effect of the present war upon the Mechanic Arts" was selected as an alternate.

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
Sept. 19, 1861.

Prof. Cyrus Mason in the chair.

NEW QUESTIONS.

The Chairman suggested, "Novel implements for the culture of the ground."

Mr. Churchill suggested, "Qualitative analysis by means of the spectrum derived from gaseous ignition."

The Chairman and Mr. Fisher,* read able and interesting papers on "The effects of the war on the Mechanic Arts."

Mr. Fisher's paper contained a plan of an organization for the improvement of the Mechanic Arts, from which the following portions are extracted:

"1. Trustees to be appointed to receive the assignments of inventions and improvements, which they will patent at the proper time.

"2. They will invite inventors, engineers, and contractors, to

* These papers were purely literary and speculative in their character; and are therefore foreign to the objects and purposes of the Polytechnic Association as defined by the "RULES established March 2d, 1854."

improve on the plans. Thus the inventions will grow upon paper until it is time to spend money upon them.

"3. Engineers and experts, whose reputation will influence capitalists, will be invited to examine and report on the inventions. Thus liberal men will be induced to contribute means of efficient trial and success if the inventions be good, and some useful instruction even in case of failure.

"4. Artizans will be invited to contribute models and experiments, and to work in their leisure time on the company's inventions, as an investment in them.

"5. Advertisers and advocates, such as the editors of newspapers, will be invited to make known to the public, with a view to subscriptions, such inventions as are approved by the experts."

"6. Money entrusted to the trustees for general use, to be applied by them on the recommendation of the experts, but subscriptions to be open for those who prefer to select the inventions in which to take an interest.

"7. Part of the profits on inventions to remain in the concern, at the permanent credit of the author, &c.

"8. When an invention is sold, judges to be named to examine the records, and award to the inventors, engineers, counsellors, and capitalists, &c., their just respective shares of the common gain, &c.

"9. Provides that in the election of officers the right of vote should depend on a valuation of the interests in the form of inventions, criticisms, advice, capital, and should be represented by certificates, such certificates however not to affect dividends."

Mr. Garbanati said that from 1811 to 1815, the country being shut out from intercourse with Europe, our manufactures increased rapidly. For a like reason the southern states will now be under the necessity of engaging in mechanical pursuits. The war will interrupt the supply of cotton, and other materials will take its place; and so far as capital is diverted into new channels, it will not readily return.

Mr. Veeder.—The principal reason for the failure of the efforts of Georgia and other southern states to manufacture their own cotton, was the want of intelligent operators. Now necessity will compel them to turn their attention again to the mechanic arts and to manufacturing.

Mr. Nash.—The mechanic arts cannot flourish with slavery, for their whole tendency is freedom. The mechanic arts would travel southward as fast as slavery disappears, if the climate would permit, but that may prevent it.

Mr. Stetson.—The consumption of our cotton after the war will depend upon the state of domestic quietude which may exist after the war, more than upon the efforts of other nations to produce a similar article. One effect of the war upon the mechanic arts will be to turn the attention of artizans more and more to usefulness and to economy, and less to the purely ornamental. While we are all engaged in production, we may feel able to afford many articles of elegance and luxury; but when the number of producers is materially lessened, whether by war or from any cause, the consumption must be less, or the wealth of the country will be diminished. Artizans and manufacturers, therefore, will find it for their interest to turn their attention to the production of articles of use, rather than of articles of ornament and luxury.

Dr. Stevens expressed the opinion that if the war should continue six or seven years, it would cause the entire destruction of the cotton manufactures of the United States, and a pecuniary loss from which this generation could never recover. It has been estimated that a change of a quarter of an inch in the length of the staple would be sufficient to destroy the value of our cotton machinery. No cotton can be procured excepting from the southern states which will be adapted to our present machinery; and hence cutting off our supply of southern cotton would destroy our manufactures of cotton. It would become necessary to create a new manufacturing interest; either to engage in the manufacture of flax or wool, or to begin anew the manufacture of cotton after the conclusion of the war.

Mr. Tillman.—The effect of the war upon the fine arts will be detrimental, but the general effect on the useful arts will be beneficial; and particularly on that class connected with agriculture, for the reason that the place of farmers who are taken from their labors will be supplied as far as possible by machinery. The effect of the war upon the manufacture of iron is to improve its quality, a material continuously good being required for muskets and other war implements.

New Subject.—Mr. Dibben proposed for the next meeting the subject of "Piers and Docks," which was agreed to.

Prof. Seely will make some remarks upon the subject of "Coal Tar." Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
Sept. 26, 1861.

This being the day appointed by the President for a National Fast, the Association adjourned to Wednesday next at half past seven o'clock.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
Oct. 2, 1861.

Prof. Cyrus Mason in the chair.

COAL TAR.—ORIGIN OF COAL.

Prof. Seely.—Coal tar is a most offensive substance to smell or to sight, but it is very valuable notwithstanding. We are, indeed, only beginning to learn some of its wonderful virtues. For instance, some of the most gorgeous colors worn by fashionable ladies are produced from coal tar. I have twenty-five or thirty samples of velvets colored by these dyes. The colors are all brilliant. We have from it the simple colors of the spectrum, reds, blues and yellows, and by their combination we may produce all other tints that are known. A few years ago coal tar was little used except for preserving wood and it is still very extensively employed in Europe for that purpose. They scarcely think of laying a railroad sleeper which has not been cured in what is called "dead oil," a product derived from coal tar. There are about fifty different and peculiar substances which can be separated from coal tar, some of which are very valuable. These substances do not exist in the coal itself. That seems to be a homogeneous compound, all the elements united into one substance, as sugar or as salt is one substance. But by heat the coal is broken up into these compounds. Coal tar is only a secondary product; that is, we heat the coal, not to obtain coal tar but to obtain gas; and the coal tar which is produced has been considered one of the greatest nuisances attending the carrying on of the gas manufacturing business. It was considered so great a nuisance in Philadelphia, that a remonstrance was extensively signed, representing that it would breed pestilence in the air, and poison the water and the fishes; even the present director of the Philadelphia gas works was one of the signers of that remonstrance. It was then emptied into the river to get rid of it.

The different products of which I have spoken, are generated in the coal tar by the action of heat. Some of the nitrogen of the coal will combine with the hydrogen, one atom of nitrogen to three of hydrogen, forming ammonia, and some of the oxygen will combine with the hydrogen, one atom of each, forming water, &c. In making gas, we also make all these different substances, and it is necessary to separate, as far as possible, those which are not useful for illumination. Some of them have not yet been successfully separated, as sulphur, for instance, which gives the gas an offensive odor in burning. There is free ammonia in all gas, and it is carefully separated. The water, as it condenses, will separate from the oily products. After the latter are removed, the coal tar is left. The substance which this coal tar contains, probably in the greatest quantity, is *kreosote*, which has an antiseptic property. The several substances may be entirely separated by chemical reagents; but it is found most easy to separate them by distillation. The most volatile substance rises first, and thus you obtain one substance after another until you have distilled away perhaps one-half of the original tar. In the actual manufacture, the first twentieth is reserved for a special purpose, and called "light oil." Then about one-fifth is a thickish, dark colored and very offensive oil, which is called "dead oil." This is used as an antiseptic in preserving railroad timber. It is of about the consistency and color of molasses. The light oil comprises various substances, boiling at a temperature varying from the boiling point of alcohol to the boiling point of water. When distilled once, naptha is produced, which is used in England for burning. By treating this naptha with sulphuric acid most of the color is taken out, and also most of the disagreeable smell, and it is then used for burning and for manufacturing varnishes. About five per cent. of the light oil is what is properly known as benzole. What are called benzole and benzine in America, have generally no benzole in them. The benzole which is separated from coal tar is the basis of all the colors which have been spoken of. In composition it is simply a hydrocarbon, C_{12}, H_6.

The general method of producing the colors is as follows:

One atom of hydrogen is taken away and replaced by an atom of nitrous oxyde, NO^4, which forms a substance called artificial bitter almond oil. The oxygen is then entirely taken out, and one or two atoms of hydrogen is put in its place, so that the formula becomes C_{12}, H_7, N. In that shape it is called "*aniline*," which is a thick oily substance, of spicy odor and taste

If exposed to the air long enough, it becomes a dye by oxydation. The oxydation is usually hastened artificially. Besides aniline, there are about a dozen other substances of similar nature, which will produce colors, though generally not quite so brilliant. Many of these substances were already known to the chemist. They are allied to indigo, and many of them can be produced from indigo, from the Spanish name of which aniline derives its name. Aniline may be obtained from dead oil, but it is preferred to obtain it from benzole. Some of these substances are solid. One of them, napthaline, is white, crystalizable and more volatile than camphor. It has a very disagreeable, penetrating odor, and it is to napthaline that coal tar owes, to a considerable extent, its offensive odor. If we had a ready means of separating the napthaline from dead oil, it would produce a very valuable burning oil. Another substance obtained from coal tar is picric acid, derived from the kerosote. The picric acid used in dying was formerly obtained by treating indigo with sulphuric acid, and was sold for a dollar or two per ounce, whereas this is sold for thirty or forty cents per pound. They have not yet succeeded in producing an indigo blue. The oxydable indigo, which is so much in demand for army clothing, has recently doubled in price. A color quite as brilliant as the purples from aniline may be produced from guano.

The Chairman.—A gentleman stated to me that he had derived from the distillation of oak, hickory and chesnut wood nearly all the substances found in coal tar.

Prof. Seely.—That is quite true. Most of these substances were first separated from wood tar. In wood there is a large quantity of oxygen, and in coal there is very little. The distillates from wood contain more of the compounds of oxygen. The coals contain more nitrogen than the woods, so that a large quantity of ammonia is or has been one of the products of the distillation of the former. The fact that coals contain so much nitrogen, seems to point to an animal origin, for nitrogen is not commonly found in plants.

Mr. Nash gave various reasons for supposing mineral coal to be of animal origin. He stated that the two best dyes were animal productions, the Cochineal and the Tyrian dye, which was an oyster.

Mr. Veeder suggested that the Trinidad lake of Asphaltum, appears to be a bed of coal in the process of formation. He considered coal as of mineral origin.

Dr. Stevens stated that chemists had found it necessary, in the first place, to define what they mean by coal, because there are so many different substances called by that name. Any substance containing more than fifty per cent. of carbon is called a coal. If it contains more than fifty per cent. of earthy matter it is called a shale. A coal containing a considerable proportion of bituminous substance is called bituminous coal. The carbon that is found in coal I suppose to have been invariably derived from pre-existing vegetables; and the bitumen to have been derived either from vegetable or from animal matter, or both. No animal deposits are found in anthracite coal, but, examined microscopically, the fibre of the wood can be perceived in the coal itself. Anthracite coal contains bitumen which has been expelled from it.

If we examine the great anthracite basin extending westward from the Delaware river, we shall find that at the eastern end it is pure anthracite, but that as we proceed westward bitumen is found in it in constantly increasing proportions, until at last it has gradually become a true bituminous coal. There is a coal mine in North Carolina, belonging to a later geological epoch than the coal fields of Pennsylvania. This is one of the most highly bituminous coals in America. This coal field is penerated by dykes of columna trap, and it is found that just so far as the heat of the trap has penetrated the coal has lost its bitumen and become anthracite coal.

At the time of the formation of the coal beds in the United States the whole territory was sunk down very nearly to a level with the Atlantic ocean, and the interior was occupied by a great basin, a prolongation of the Gulf of Mexico. This relation of land and water would give a climate of the character of that of Spain. An immense amount of vegetable matter grew, and especially of those plants which we now call peat, forming plants and mosses. After a sufficient amount of this vegetable matter had been formed to produce a bed of coal, there was a submergence of the American Continent, sufficiently to produce a layer of shale, or slate, or limestone, or sandstone. And it was underneath the waters of the ocean that the chemical changes took place which converted this peat into coal. Every bed of coal has beneath it a bed of fire-clay, which was the soil in which the plants, from which the coal was produced, grew. Nowhere, in

Pennsylvania, or Virginia, or Ohio, does a vein of cannel coal ever run into bituminous coal, or a vein of bituminous coal ever run into cannel coal. But sometimes a cannel coal will lie beneath or above a bituminous coal.

Subjects for next Meeting.—Mr. Rosevelt stated that at the next meeting he would read a paper upon the "Constitution of Nature."

The subject of "Piers and Docks" was continued for discussion at the next meeting.

Adjourned.

American Institute, Polytechnic Association, *October* 10, 1861.

Prof. Cyrus Mason in the chair.

THE CONSTITUTION OF NATURE.

Mr. Roosevelt read the commencement of a paper upon the constitution of Nature—to be concluded next week.

THE GREAT EASTERN.

Mr. Cleveland, who was a passenger in the Great Eastern, in her recent disastrous voyage, described the method devised by Hamilton E. Towle for steering the vessel after her rudder-head had been broken. Mr. Towle, after the engineer had been at work two days and a half endeavoring to repair the mischief, succeeded in obtaining admission to see the work that was going on. He found that the body of the rudder was supported by a collar resting upon friction balls. The engineer was endeavoring to unscrew this collar, but had not succeeded in raising it more than an inch and a half. Mr. Towle, fearing that there was no other support to the rudder, went to the captain and told him that he feared, if the engineer should succeed in getting the collar off, the whole rudder would be lost. The captain examined it, and stopped the work. Mr. Towle then attempted to convince the captain that chains could be fastened around the rudder-head, just above the collar, with sufficient friction to steer the ship, if suitable means were applied for moving them. The captain gave him every facility to try the experiment, but had so little faith in its feasibility that he, also, devised a method which he proceeded to try. This consisted in applying chains to the rudder itself, and leading them to the two sides of the ship. He did not, however, succeed in fastening the chains as he desired, and his plan was abandoned for the time. In the meantime, Mr. Towle had succeeded in his attempt. He had at first used a chain made of one and a quarter inch iron, but it was not strong enough. He then used a cable made of two and a half inch iron, the largest cable on the ship. The upper portion of the rudder-head was ribbed, and around this portion he wound the cable, driving in iron wedges between the links and between the ribs, until he had made a drum of three and a half to four feet in diameter. From the circumference of this drum he passed the cable towards the two sides of the ship, connecting it with large iron ports. By a tackle applied to these chains he could hold the rudder in position. Thus far it had been in the way of the propeller-screw, but now that could be used and the vessel set in motion. He then connected these cables with a wheel intended for steering the vessel, and with a gang of men at this wheel he could easily steer the ship. The connecting chains were frequently broken; but he stationed a man on each side of the ship, at the tackle, already mentioned, whose duty it was always to haul up the block, so that, if the connecting chains should break, the only inconvenience was that the rudder remained fixed in whatever position it happened to pass, until the chains could be repaired.

PIERS AND DOCKS.

Mr. Dibben.—I present this subject to your notice, mainly with a view of calling your attention to the condition of the piers and docks of this city. If you will make a tour of the water front, and examine the structures over which, probably, the greatest commerce of any single city in the world is passed, you will be obliged to admit that New York has little to be proud of in the present condition of her wharves and piers, nor will you see any signs of future progress. Now and then you will see a gang of men patching some old rotten and dilapidated pier, but every where an abundance of unsightly encumbrances, and everywhere natural advantages neglected and lost, mainly from the fact that most or all of these alterations are made without any system or unity of purpose. Many of these structures are well adapted to some particular or individual interest, while at the same time all greatly derange the general good. At the present time, several of the piers on the North river require repairs almost equal to rebuilding. It is a question of great importance what they shall be built of, and what shall be their size and shape. Nor is it unimportant to decide who shall build them; for it is evident that a matter of so much moment demands the services of a competent board of engineers; and until the direction of these works is so vested, nothing better than the former practice need be anticipated. We have a water-front, of the city proper, of about twenty miles, most of which is capable of being converted at a moderate cost, into clean and convenient basins and substantial piers, if the talent and skill of competent engineers be secured. Our basins are now merely cess-pools, requiring to be dredged out every season. It might have been said formerly that we did not know where to build our docks. That cannot be said now. Yet we allow one bulkhead to extend out one hundred and fifty feet beyond another; and but few of our drains empty at the head of the pier. The difficulty is that we leave the whole for anybody to do as he pleases. It was not so when we wanted Croton water; and when we wanted a Central Park, we had a separate and special board for that purpose.

To show what some great sea-ports are obliged to do in order to provide for commerce, let me refer you to the docks of Liverpool, formed partly by building quays within the low water mark of the river Mersey, and partly by excavation. These quays enclose basins which are entered from the river by locks. One of these locks is 82 feet by 400. All of this work is of solid masonry, of dressed stone, and extends over a front of about six miles. The basins cover between three and four hundred acres. On the opposite side of the river, at Birkenhead, are situated works of nearly equal extent. These basins must necessarily be built in this manner, in consequence of the great tide, the water rising and falling about eighteen feet at such tides. The docks of Liverpool were built by incorporated companies, the city having half the control and the company the other half.

The trade of New York would be much increased by constructing suitable piers. It has been said that a great deal of our water-front could not be relied upon for solid works of masonary. But certainly we ought to have better piers than we now have, and a better circulation of water in the basins. And we shall never advance until this matter is taken out of private hands and directed with some forethought and unity of purpose.

Mr. Nash.—At Liverpool they are compelled to build their piers and docks of stone, on account of their tide rising three times as much as ours. At London they want room. Their river is a mere creek, and hence they cut inland, dig out basins and wall them up. Here we have no occasion for that; and if we had, we have no land to spare. Our island is too small for its water-front, and we are all the time enlarging it. Again, here the matter is not under the control of the General Government, but belongs to the municipal corporation. There are very few cases where both sides of a basin are owned by the same individual. Again, there is a controversy between the city and the State, who owns the land under the water of our rivers, and there is a hesitancy to lay out money when our rights are questioned.

Mr. Roosevelt said that arches ought to be constructed next the shore along the whole line of piers, so as to permit an uninterrupted current to carry away the impurities in the basins.

Mr. Garbanati remarked that the narrowness of the streets leading to the wharves was a greater evil than the condition of the wharves themselves. It is better to leave the management of the piers to private corporations, because they are successful in whatever they undertake, and are not controlled by wire-pulling.

Mr. Tillman.—We have about thirty miles of dock-facing, which is much more than that of any city in the world. Up to this time our docks could not have been built of anything but wood. They are filling in upon the average, two feet per annum. Wooden piers injure the shipping far less than those of stone, and here they are not liable to be destroyed by worms as they are further south.

The President.—Boston is said to have the finest piers and wharves in America. They are built of granite blocks, and are all owned either by companies or by individuals. Upon contrasting our wharves with those of Boston, learning that our piers and docks are pledged for the city debt to the amount of five million dollars, and that the income is next to nothing, I inquired of the trustees the reason why so valuable property yielded no revenue. The answer was thus: Our piers and wharves belong to the city. We keep them in repair at the smallest possible expense, and levy a tax upon them just sufficient to pay the expenses. The result is, that the expense of wharfage in Boston is double that in New York, and this difference of expense is constantly influencing vessels from abroad to come here rather than to Boston or Philadelphia.

Subjects for Discussion.—The following subjects were selected for discussion at the next meeting: "The Great Eastern," and "The Crank Motion in Steam Engines."

Adjourned.

American Institute, Polytechnic Association, *October* 17, 1861.

Professor Cyrus Mason in the chair.

THE GEOLOGICAL SERIES—COAL.

Mr. Nash, by means of a drawing on the black board, made an exposition of his views of the position and order of the several metals and minerals in the geological series.

Assuming as fact, the theory now so well established by the analytic investigations of Laplace and Fourier, that the interior of our globe is in a state of igneous fusion, he found in it the source of the volcanos and earthquakes of the present geological epoch, as well as of a very large proportion of the formations and convulsions which mark the successive stages of the earth's history.

The first or lowest formation, in his opinion, was gneiss, a rock apparently stratified. Next in order he placed mica slate. Third, primitive limestone. Fourth, the green stone or horabbude formation. Fifth, a green stone slate. Next, or sixth in order, Mr. Nash placed the anthracite formation, of the United States, which he considered to be of a primitive order, maintaining that the rocks of this series are not secondary, and that the coal has not been acted upon by heat, but is a true mineral in its original state. Next, or seventh in order, Mr. Nash placed a formation of semi-bituminous coal, and with this formation he conceived that the earliest traces of animal and vegetable life were found. Eighth, the salt formation. Ninth, the secondary limestone. Tenth, the bituminous formation, which he considered to be of vegetable origin, in opposition to Dr. Stevens who ascribed it to the animal kingdom. Upon this he placed a series of layers of bitumen, shale and limestone. Eleventh, the old red sandstone, as found at Middletown, Connecticut. Twelfth, the sandstone and conglomerate rocks called millstone grit. He then stated that, in his opinion, the trap rocks which Dr. Stevens found in the coal formation of North Carolina, were of igneous origin, being protruded in a liquid state, like lava, from the molten mass beneath.

Mr. Nash, as he proceeded, pointed out the metallic substances which accompanied, and were characteristic of the several formations.

Dr. Stevens said, that in the coal basin of Deep river, in North Carolina, anthracite coal is found in the immediate neighborhood of the trap-rock; but, as you leave the trap-rock, the anthracite changes its character, yard by yard, until it entirely disappears, and nothing but bituminous coal is found.

Mr. Nash belongs to a different school of geology from myself, and we explain things quite differently. There is a conglomerate rock, called the coal conglomerate, because it always underlies the *true coal* formation of the United States. On the eastern side of the great coal barrier, this stratum of conglomerate rock may be 1,000 or 1,200 feet thick; but, mile by mile, as you proceed in a northwestern direction, it turns out, so that at Cuyahoga it is only about 80 feet thick. This conglomerate may always be known from its containing certain fossils, certain sea shells. Rising twenty to forty feet above the conglomerate rock, in the Lehigh coal basin, you come to a bed of coal three feet thick. If the coal is turned over, the conglomerate is found to be turned over with it. This vein of coal contains certain fossils. In the United States some 150 species of trees and plants have been found associated with our coal. These fossils are never confounded. The fossils, in different layers, are always distinct from each other. Follow the beds westward and you find them still holding the same relation to each other, although thinner; and we infer that the anthracite, the semi-bituminous, and the bituminous coals were originally one formation. As we travel eastward from Cuyahoga, we pass over the whole outcrop of the appalochean coal system. We find the conglomerate rock at Cuyahoga Falls, and a little south of it the first bed of coal, which is the coal used in Cleveland and upon Lake Erie. There are a series of eight beds of coal coming to the surface successively as you proceed towards the Ohio river. These beds of coal are all known and have all been worked between Cleveland and the Ohio river. They are all bituminous. Above these comes a barren stratum, and then three upper layers of coal. The lower of the three is the Pittsburg seam; the next is the

Alleghany, and the upper is known as the Uncertain coal, because it is sometimes found, and sometimes is not. There is a regular dip of eight or ten feet to the mile, and the Uncertain coal will appear on the tops of hills which come within the range, while it may be wanting on intermediate but lower hills. The whole country from the western edge of the Alleghany mountains to the Rocky mountains, seems once to have been a level plain. The rocks, which have never been disturbed, have all a general dip in a different direction. There is no appearance of volcanic action. It is a country of valleys rather than of hills; for it seems as if the valleys had been formed by washing the surface away, leaving the hills. Upon a branch of the Tuscarawas river, in Ohio, is a bed of cannel coal, in a basin of clay; and in Coshocton, thirty or thirty-five miles distant, there is a similar basin. Above the cannel coal is a bed of blue limestone, containing certain fossils by which it may be identified. They are all perfect and beautiful sea shells, entirely different from any now found in any of our waters. Just beneath that limestone is a little layer of four to six inches of bituminous coal. The difference between bituminous and cannel coal is merely in the amount of bitumen. Cannel coal makes good kerosene; but bituminous shale will make good paraphine.

To take up the relations of the inflammable oils: There are oil wells from which a natural oil flows at the rate of 500 barrels per day; and it is sometimes supposed that that must be the drainage from coal. The oil is found from 300 to 1,200 feet beneath the coal. I suppose it to be a chemical formation, constantly going on in the bowels of the earth. Bitumen contains a percentage of hydrogen, and a certain percentage of carbon. A very slight change in the relative amount of hydrogen and carbon will give you all the products from diamond, on the one hand, which is pure carbon, to the gas which we burn, which is a hydro-carbon.

Mr. Nash.—Have you never seen the conglomerate rock above the anthracite coal?

Dr. Stevens.—There are two conglomerate strata which may be confounded with each other; but the lower contains sea shells and never bits of wood, and the upper bits of wood and never sea shells. There is still another, above these, containing nuts resembling butternuts, but dividing into three instead of two parts. But even the three lower conglomerate may be found above the coal, from the doubling of the strata of conglomerate rock and coal upon themselves.

THE GREAT EASTERN.

Mr. Fisher said that if the rudder had been suspended in the centre, there would have been no twist, and it could have been worked very easily. If the rudder had been put in the bow, the screw might have been made four-tenths lower, giving it twice the surface and therefore twice the power. This would be better than employing two screws.

The Chairman (Mr. Tillman).—The ferryboats have a rudder at each end; yet they always use that at the stern.

Mr. Fisher.—Because the rudder is not suspended in the middle; and a rudder suspended behind the middle could not be easily turned without better fitting apparatus than is generally used upon ferryboats. If the rudder could be suspended entirely above the water-line it could be keyed up better, and there would be an advantage in that. It is stated the rudder part was of a bad quality of iron. The Great Eastern has no keel, because there is not room for one. As to her rolling, it will be well to learn how her ballast was stored before condemning her for that. I suspect that she had gone so smoothly in her earlier trips that no pains were taken about storing the ballast.

The Chairman (Mr. Tillman).—Mr. Cleveland considers her the safest vessel that he ever made a voyage in. This storm proved that she was very strongly built, for she did not tremble at all. The Great Eastern is generally conceded to be a success in one respect. The displacement of water is no greater than if she were but half the length, and the friction along the sides is but little greater. I am informed that the Cunard company are now building a steamer 500 feet long.

Subjects for Discussion.—The subjects selected for consideration at the next meeting, are "The Crank Motion in Steam Engines," and "Instruments for the Culture of the Soil."

STEAM CARRIAGE.

Mr. Fisher exhibited a drawing of his steam carriage for common roads.

Adjourned.

American Institute, Polytechnic Association,
October 24, 1861.

Prof. Mason in the chair.

Clinton Roosevelt delivered an essay in which he undertook to demonstrate the analogy between physical and metaphysical laws. All order in the Universe, he said, was the result of positive forces. Men did wrong because it was opposed to their present interest to do right. No matter how certain the ultimate punishment, if it was only far removed to the future, they would continue to do wrong. The remedy proposed was so to construct society that it would be their highest self-interest to do right.

PREMIUMS OFFERED FOR INVENTIONS BY THE AMERICAN INSTITUTE.

The Chairman.—It will be recollected by most of you that some years ago a committee was raised in the American Institute to consider the future labors and prospects of the institution. A report from that committee underwent considerable discussion, the result of which was that the minds of a great many members were not prepared to adopt the suggestion in that report. But as Lord Bacon says: "In all your inventions imitate time, which changeth all things, yet so gradually that no man seeth precisely where the change taketh place." So time has been modifying the action and labors of the American Institute, and the result has been the gradual carrying out of that report. In that report it was suggested that probably *fairs* had had their day of being profitable to the Institute, and that until some great exhibition should be made that would draw from other portions of the world, as well as ours, exhibitions of novelty in the applied sciences, there would be no revival. In May last, in view of the great civil disturbances, and especially in view of the great disturbance of the mechanic arts and the actual removal of an immense body of our mechanics from the city, the Institute passed a resolution leaving it to the discretion of the board of managers whether they should attempt to hold a fair of any kind during the current year. After much discussion, the board came to the conclusion that it was expedient to adopt a substitute for the fair. That substitute will be developed in a paper I am now about to read.

The Chairman having read the paper,*

* This paper in its amended form will be found in the proceedings of 31st October.

Mr. Lawton suggested an amendment to the proposed award for the best novelty for heating buildings—to add "and ventilating."

Also to add after the word "burning," the words "and deodorizing"—making it read, "burning and deodorizing coal oil."

The Chairman said he would report any suggestions that might be made by members of this association, to the board of managers of the Institute. Amendments of course could only be made by them.

The revised list of premiums will be given at the next meeting.

KEROSENE LAMP WITHOUT A CHIMNEY.

Joseph Thomas exhibited a lamp for burning kerosene or Petroleum oil without a chimney. The principle of this improvement consists in getting an extra quantity of oxygen, in the form of heated air, to the flame. The great quantity of carbon in the coal oil requires this. The lamp will burn common coal oil of 45 degrees of purity—and even as low as 32 degrees—without danger of explosion. A safety valve is adapted to the lamp to make it secure. The inventor claims that—

1. No chimney is needed on the lamp, thus saving constant expense and annoyance.
2. That the smoke and unpleasant odor, so offensive when oil is used in the ordinary way, are effectually prevented.
3. That a clear and bright flame is obtained without increased consumption of oil.
4. That the burner can readily be applied to any ordinary lamp.

CRANK MOTION.

The subject of the loss of power by the crank motion in steam engines, was discussed by Messrs. Warren, Rowell, Fisher, Tillman, Babcock, and Dibben, without eliciting any novel views or arguments.

Subjects for discussion.—Excavating machines for railroads; also dredging machines; proposed by Mr. Fisher. The influence of a protective tariff on national prosperity; proposed by Mr. Garbanati.

Subject for the next Meeting.—Implements for the tillage of the soil. Adjourned.

American Institute, Polytechnic Association, *October* 31, 1861.

Prof. Cyrus Mason in the chair.

AMERICAN GEOLOGY.

Dr. Stevens.—I have been requested to give a history of the formation of the American Continent, as deduced from the explorations of geologists in Canada and in the United States, and I will begin to do so to-night.

Prof. Hutton, at Edinburgh, is the author of the doctrine that all the rocks of the earth were formed by fire in its present form. And he found corroborative evidence in his own country, for the rocks of Scotland very generally bear evidence of having been changed, at some time, by the action of intense heat. But, in Germany, where the rocks are generally sedimentary, the doctrine was promulgated by Werner that all the rocks of the earth were formed by water. While these two doctrines were contending for supremacy, William Smith, a county surveyor in England, conceived the idea that he could identify geological strata by means of the organic remains contained in them. After twenty-five years research, he published a map of England, exhibiting formations classified upon this principle, which from that time has been received as the basis of the theory of the sedimentary rocks. I should explain the original formation of the earth somewhat in the following way :

There are sixty-six original elements of matter known to scientific men. Now, if we suppose that these were created pure, the moment that oxygen and hydrogen were created and came together, water would be formed. In the same way, silicon and oxygen would combine and form sand ; aluminum and oxygen would combine and form clay ; and so on until we reached all the chemical combinations now existing. But this is the chemical history of the globe ; geology finds the world created, and explains the history of its subsequent changes, and more especially the history of animal and vegetable life as connected with the early history of the earth. In this view it becomes a sublime science, teaching us the progress, from simple beginnings, upwards and onwards through every successive age, until finally, man made his appearance upon the planet.

In the earlier ages of the globe, it was impossible for man to live upon it, for there was nothing for him to live upon. If we begin at the Adirondack mountains, in New York, and travel westward down the Ohio river, and up the Missouri, and so on to the Pacific ocean, in the course of our travel we shall bring to view all the rocks known to geologists in their regular sequence. The same series will be brought to view in the same order if we cross the continent, passing in a southerly direction. The Adirondack mountains are composed of gneiss, granite, magnetic iron, and mica slate, all primitive, or as they are sometimes called Hypozoic rocks. The latter term is applied because they appear to have been formed previous to any life. These hypozoic rocks, in my opinion, represent to us the American Continent as it existed in that age of the world. They were then dry land, and sterile. The American Continent, although smaller, and not reaching so far towards the south, had then pretty much the same contour that it has at present. A large portion of New England, a portion of Missouri, and a portion of Texas, were islands, and there was a series of islands along the Atlantic coast. Next to the primitive rocks come the conglomerates, formed from fragments of those primitive rocks. As we proceed from the primitive formations towards those of newer date, we find these fragments more and more minute. Magnetic iron ore is found in large quantities in no other than three primitive formations.

PREMIUMS OFFERED.

The President read the following communication from the Managers of the American Institute:

In the second week of February next, the Managers of the Fair of the American Institute will make a public exhibition of such inventions and improvements brought before them as may be deemed worthy of public approbation.

To give a just encouragement to those ingenious citizens who are laboring for the improvement of Agriculture, Manufactures and the Arts, the Managers have selected those subjects on which improvement seems most needed for the public weal, and now offer the medal of the American Institute for such new invention or improvement on any of those subjects as shall be adjudged worthy of an award.

To aid their judgment in this matter, the Managers have divided these subjects appropriately into two classes, and referred the one class to the Polytechnic Association, and the other class to the Farmer's Club, requesting them to examine the articles or claims which may be brought before them, and to report on the same, in writing, to the Managers, by the 15th day of January next; the Board reserving to themselves the right of ultimate decision on all questions relating to the premiums. No award will be made, when in the judgment of the Board the competing article or essay falls below the standard.

[The list of premiums assigned to the Farmer's Club will be found in the report of the meeting of October 28, page 177.]

To the Polytechnic Association of the Institute, the Managers have assigned the following subjects:

1. For the best machinery for spinning and weaving flax. Large gold medal.

2. For the best lifting and force pump by hand power. Silver medal.

3. For the best invention for the amelioration of camp life. Gold medal.

4. For the best novelty in mineral building materials. Gold medal.

5. For the best machine for preparing mineral building materials. Gold medal.

6. For the best novelty of practical value extracted or manufactured from coal oil or coal tar. Gold medal.

7. For the best improvement in the making of iron or steel. Gold medal.

8. For any new preparation or application of India rubber. Large silver medal.

9. For the best lamp for burning coal oil without a chimney. Gold medal.

10. For the best refrigerator. Large silver medal.

11. For the best novelty in railroad tracks. Gold medal.

12. For the best machine for setting and distributing type. Gold medal.

13. For the best farm hygrometer, to cost not more than $2. Silver medal.

14. For the best mode of heating houses. Gold medal.

15. For the best original research or monograph on any subject pertaining to the science of chemistry or mechanics, or the practical applications. Gold medal.

Two discretionary premiums (gold or silver medals,)—to be determined by the Board of Managers.

FORMATION OF SECTIONS.

The Chairman appointed, as secretary of the Section of Mechanics, S. D. Tillman, and as secretary of the Section of Chemistry, Charles A. Seely. To the latter section was referred Thomas' Kerosene Oil Burner, exhibited at the last meeting.

PRESERVATION OF WOOD.

Mr. Churchill read a paper on the preservation of wood for railways; the statistics were obtained from tables on German railroads in 1859, presented to the Institute by M. Vattemare.

On sixty-four per cent. of the total mileage the wooden sleepers, &c., were prepared. In new work, on two lines of between 500 and 600 miles, chloride of zinc is being tried with pine wood, ordinarily, oak is the material used and sulphate of copper the general preservative. Creosote is only tried on a short line, but the work, generally, is unsatisfactory. Recent researches pointed to a longer immersion than that usually employed as necessary; sulphate of copper combines with the resin, and when long soaked with the nitrogenous part of the wood, this has been entirely removed by M. Kœnig, by using a large excess of the salt.

CRANK MOTION.

Mr. Rowell again exhibited his diagram, and explained his theory. The common theory is that for every quantity of steam admitted into the cylinder, there is produced an equal amount of power at the crank. This theory supposes the connecting rod to be always parallel to itself; but it will be found that in consequence of the oblique motion of the connecting rod, it will fall short of its place, and this will be a disturbing element. Again, the first tenth of the stroke, the crank will be moved three feet while the piston moves one foot, and consequently the power cannot be so great. Upon the North river steamboats, it may be observed that at the half stroke there is a quick flutter of the paddles in the water, while at the end of the strokes there is almost a cessation of their motion. In order to use the steam only in that part of the stroke where it is most effective, I have devised an adjusting piston to follow the regular piston at each end of the cylinder, so as to allow the steam to propel the piston for only 6-te ths of the stroke.

Mr. R. exhibited a model of this contrivance, which was subsequently referred t the Section of Mechanics.

Mr. Brewster.—Would that remedy the fluttering of the paddles?

Mr. Rowell.—No sir.

Mr. Brewster.—Would it not make them flutter worse? I contend it would, because you take the whole power from only two points, instead of a greater power at those two points, and a less power for the remainder of the revolution. I think, too, that there will be a loss from the adjusting piston. It takes some time for the steam to enter the cylinder, and by the time it has entered in sufficient quantity to become effective, the dead point has been passed for some distance, and the steam begins to act to good advantage. Besides, this new piston has three frictions instead of one; for each of the false piston ends must be made steam tight, and will cause friction.

Mr. Tillman.—I consider this arrangement very ingenious, although I think there is an increase of friction in it.

Mr. W. H. Bartlett.—There may be a certain distance from the dead point where the increased friction upon the journal of the main shaft, from the pressure of the piston-rod against the crank will counterbalance the pressure of the steam.

Mr. Dibben.—I think it could not increase the friction so much that you could not gain from the added power.

Mr. Stetson.—This depends somewhat upon the size of the engine, and the size of the shaft and crank relative to the length of the stroke. Exactly at the dead center, no amount of force will aid the engine at all; but from the friction upon the crank-pin, the force would tend to prevent the engine from moving. The angle at which the friction will counterbalance the pressure would be different in a propeller engine, with a short crank and thick crank-pins, from what it would be in an engine like that in the "New World," with a 15 foot stroke.

Mr. Dibben.—I did not take into the account what power it takes to start the engine. The engine friction is frequently considered a large proportion of the whole power.

Mr. Stetson.—To take an extreme supposable case, the crank-pin may be thickened until it becomes an eccentric, and you may make it so large that even at the half-centre the steam could not start it. Enlarging the crank-pin you increase the angle of non-effectiveness.

Mr. Churchill.—That is in consequence of the enormous surface subject to friction acting with a greater leverage than the connecting rod. Make the eccentric of three equi-distant rollers and it would be possible.

Mr. Babcock.—I think the angle at which the engine will start depends entirely upon the size and condition of the bearing surfaces, and not upon the force which is applied to them. Let a weight rest upon a level surface, and the greater the weight the more power will be required to move it. This is just as it is at the dead centre. Let the surface be inclined at a certain angle, and the weight will just slide. That angle depends entirely upon the condition of the surfaces. In other words, the angle of friction is constant with the same surfaces. When you get beyond that angle the greater the weight the more rapidly it moves. In the engine there is a certain angle of retardation, which depends entirely upon the condition of the bearing surfaces, not upon the size of the engine, or the length of the crank, or the diameter of the cylinder.

New subject.—The subject selected for the next meeting was, "The plating of metals," proposed by Mr. Stetson.

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
November 6, 1861.

Prof. Cyrus Mason in the chair.

CRANK MOTION.

Mr. Fisher.—Mr. Rowell did not distinctly define the amount of friction and leverage incident to the crank motion. Assuming the friction of revolving bodies to be ten per cent., as a mean of various estimates, if a wheel is so loaded that the centre of gravity shall be at one-tenth the distance from the centre to the circumference, a slight touch of the hammer would make it start. Assuming the diameter of the shaft to be twenty inches, one-tenth of the radius being one inch, adding half an inch for the crank-pin, and a quarter of an inch for the joint at the cross-head, we have a leverage of one and three-quarter inches, with which a slight jar would start the engine, the pressure of the steam being applied. This gives us three and a half inches dead space within which power would retard the engine. But beyond that there is a further space where the wear of the engine will be greater than the useful result. There should, therefore, be a leverage of two inches at least where the power would be lost.

The motion of the piston, for a motion of two inches or even six inches of the crank, would be very slight, and I believe that if the steam should not be admitted while the crank is passing that distance, it would be an advantage, provided sufficient cushioning is provided for.

Mr. Rowell.—The back pressure, which is the greatest at the dead centre, has not yet been discussed at all.

Mr. Tillman.—If the back pressure is increased, it will be so much diminution of the direct pressure.

Mr. Fisher.—When the lap of the valve is long, the exhaust opens before the piston gets to the end of the stroke, and practically back pressure ceases before the end of the stroke.

Mr. Rowell.—It is at the commencement of the stroke, when the steam is least effective, that the back pressure is greatest. In Mr. Babcock's illustration, at the last meeting, of the angle of friction, the surfaces were assumed to be flat. But in the friction of the crank-pin and shaft, the surfaces are circular, so that the friction is the same at any angle.

Mr. Tillman.—If we allow the piston to move at all without the pressure of the steam, we lose just so much of the force of the steam when it is admitted, for it fills up that space without performing any work. The true way is to let on the steam as soon as possible; because, although the friction is increased, the vast preponderance of the force applied tends to move the engine.

Mr. Parkhurst, as an illustration of the theory of the crank motion, exhibited a drawing showing a plan for varying the length of the crank so that equal motions of the piston should produce equal angular motions of the crank, and hence a uniform power.

Mr. Tillman.—Such a motion of the piston would jerk the engine all to pieces. The varying velocities of the crank are admirably adapted in this respect to a reciprocating piston.

AMERICAN GEOLOGY.

Dr. Stevens resumed his series of remarks upon this subject:

Many parts of New England, the whole of Labrador, a large part of the northern portion of North America, and portions of the Atlantic States, are underlaid by the rocks commonly called primitive, but now often called azoic, from their containing no relics of animal life. Granite is generally supposed to be the oldest rock known to geologists.* There are also found azoic rocks, which appear to have been formed from the breaking up and wearing down of the primitive rocks, being deposited by water as a sediment, and forming stratified rocks, among which are the slate rocks. These slates are almost infinite in their gradations. Even in the same quarry, admirable roofing slates may run into a mica slate of no value. In the Lake Superior region, where they lie at a very uniform dip, they have been found to measure no less than fifteen miles in thickness. I have measured one series in Massachusetts, a magnesian slate, which I found to be five miles in thickness; and Sir Wm. Logan supposes all the series then to reach a thickness of thirty miles. Commencing at the Adirondack mountains and passing to the Mohawk river, in the direction of the Catskill mountains, we find first the unstratified rocks; and upon these, layers of stratified rocks. Upon the latter we find the paleozoic rocks, those containing the earliest vestiges of life, sandstones, limestones and shales. The azoic rocks contain iron, always an oxide in the slate, never of a carbonate of iron. One of the oldest forms of iron ore is the magnetic. In this system of rocks, the magnetic iron is found in mountain masses. The whole region of Marquette county, in Michigan, may be said to be an iron formation The magnetic iron ore is diagnostic of the primitive formation. Magnetic iron is composed of the protoxide of iron 31, and of the peroxide of iron 68 per cent. Hematite, or the red oxide of iron, is composed of iron two parts, and of oxygen three. The protoxide of iron is so easily oxidized upon exposure to the atmosphere, that it turns into the red hematite, which is the diagnostic sign when you are exploring for iron. In New Jersey, iron is found combined with manganese and zinc, and called Franklinite iron. This contains sixty-six to sixty-nine per cent. of iron, fifteen to eighteen per cent. of manganese, and ten to seventeen per cent. of zinc. It is usually found associated with limestone.

The Chairman.—There is a vein sixty feet wide, which begins with sixty-six per cent. of zinc upon one side, and gradually changes until upon the other side it is sixty-six per cent of iron, the per centage of manganese remaining the same through the whole.

* There is true granite in the coal fields of Virginia, traversing the coal measures in dykes. This granite, therefore, is of later date than the carboniferous rocks. —J. R.

Dr. Stevens.—The next ore in value which is found in this system of rocks, is plumbago, which is found from six to twelve inches in thickness. It is carbon almost pure; and it is a question among many geologists how to explain the existence of carbon in a system of rocks, which, in their opinion, never had any vegetables growing upon it. Plumbago is found in Worcester, Massachusetts, in the true coal system; formed, as is supposed, by the conversion of bituminous coal into anthracite, and then by the metamorphed action being carried still further, in some places converting the latter into plumbago. Another mineral, in the primitive formation, is copper—the blue, black, yellow and green copper ores.

Zinc is also a metal belonging to the primitive formation, both in the form of calamine or silicate of zinc, and of carbonate of zinc. The mines of Tennessee are in this formation, and I believe those in Pennsylvania are on the borders of this formation. The zinc of the Western States is found wholly in another formation. The metals are often found associated—copper and zinc, copper and iron, copper, iron and gold, so that a vein at first worked for gold may pay to be worked for copper. This brings us to the theory of veins.

The Plutonian theory held that all veins were injected from beneath; that the centre of the earth is a vast magazine of all the metals, and by some of the vast forces of nature, which they hardly pretended to understand themselves, gold would come up in one place, iron in another, copper in another, silver in another, lead in another. The inference often drawn from this theory was that if a vein would pay to work upon the surface, the deeper you went the nearer you would come to the central mass and the richer would the vein become.* One consequence of a belief in this theory has been that an immense amount of money has been sunk in following out that doctrine. But I do not know that there is satisfactory evidence that a single vein upon the wide earth was ever injected from below. In many places in the United States we know it is not so, because the veins have been worked entirely out. It has been thought sometimes that that was because we did not go deep enough; that there was merely a break in the vein, and that if we could only reach it again it

* This inference was mechanically incorrect, for if veins were formed by injection the closest matter ought to have been projected to the greatest distance from the central igneous mass.—J. R.

would repay us for the expense. There is an evidence of the fallaciousness of the theory in a vein found in North Carolina. It was discovered by a hammock of red hematite upon the surface. The centre of the vein was gold; around that was copper, blended in with the copper and the gold was the sulphuret of iron, which is always found with gold. Sulphuret of gold is probably the original form of the ore, and in decomposition the sulphur leaves the gold and combines with the iron, leaving the pure native gold in flakes. The miners worked the gold all out; kept on deeper and worked the copper all out; persevered and still deeper they came to the end of the iron. They had reached the end of the whole formation. In Missouri there is a horizontal layer of limestone bearing lead; next below it is a layer of sandstone containing no lead; then comes a second layer of limestone containing lead; a second layer of sandstone without lead, and below that the primitive rock without lead. The Plutonian theory would be that the lead in that limestone came up through the sandstone, although there is no trace of it there. Again, in Missouri the refuse rejected by the old Spanish miners has been worked over the third time, and inside of the handles of the old knives, and in the old picks left there, has been found new lead. There is also in England the shaft of an old mine which had extended under the ocean and been abandoned, and finally filled up with sand from the ocean; and now the copper may be found extending right across that filled up shaft. In one of the iron mines of Sweden, exhausted and abandoned two or three hundred years ago, woodwork has been found coated with iron, and one of the ancient miners was found with his bones converted into iron. The theory of mines has undergone a great transformation, for it has been found by experience that in a large majority of cases the attempt to work to a great depth has proved an utter failure.

Mr. Nash cited instances of the finding of nuggets of gold which seemed to have been formed from particles washed from auriferous quartz.

Mr. Roosevelt stated that 10 deg. south of the Equator, on the Pacific coast, is a copper mine; and that seventy yards within that mine there was blasted out a human skull with three thousand feet of copper ore about it.

Subject for discussion.—Mr. Tillman suggested "Stevens' Floating Steam Battery."

The Chairman suggested "The Civil Service; its relation to Social Progress."

The subject of the "Plating of Metals" was taken up, and its consideration postponed until the next meeting.

Adjourned.

American Institute, Polytechnic Association,
November 14, 1861.

Prof. Cyrus Mason in the chair.

TENT FOR THE ARMY.

Mr. Garbanati exhibited a model of a tent with berths attached to the sides, which may be drawn up against the sides by day, to obviate the necessity of sleeping upon the ground. There are few soldiers killed by the enemy compared with those disabled by diseases contracted from exposure. In the Crimean war, it was but one to eight.

The Chairman.—Although the French army was less than two months in the field before assembling at Waterloo, and although the battle at that place was most destructive, it is my belief there were two who died on the way to the field to every one that died at the battle.

Mr. Garbanati proceeded: When the army encamps for the night, it must encamp at the most convenient spot, wet or dry, and the men must sleep upon the ground unless there is some special provision made for them. They will be very likely to have the rheumatism, and similar diseases. Nor does the evil stop there. Families do not inherit broken arms or the loss of legs, but they will inherit the diseases springing from the exposures of camp life, and for several generations after a war, the effect is to be seen and clearly traced.

The President.—I see before me a member of the seventh regiment who told me that after forty days exposure he was compelled to return home, and that in his opinion if he had had any means of placing himself above the ground at night he might have escaped the disease.

Mr. Churchill explained the French method of dividing up the tent so as to make it portable, and suggested that a very slight addition would make them efficient ambulances.

Mr. Garbanati remarked that the berths in this tent were to be easily removed, and would serve as litters to bring our wounded off from the battle field.

This tent was referred to the Section of Mechanics.

PHOTOGRAPHIC APPARATUS.

Mr. M. Ormsbee, of Boston, exhibited an apparatus for taking photographs, daguerreotypes, and ambrotypes, of any desired size or number with facility. A machine had been constructed upon the same principle, of larger size, which would take 616 upon one plate, so that it would be possible upon a sunny day to make 250,000 pictures.

The apparatus was referred to the Section on Chemistry.

IMPROVED GUN BOATS.

Mr. Fisher proposed that each member should be invited to bring a drawing of an improved gun boat a fortnight hence, the whole to be open to criticism and amendment. He advanced the theory that no invention is ever perfected by a single individual; and hence the desirability of co-operation.

AMERICAN GEOLOGY.

Dr. Stevens, in continuation of his lectures on this subject, exhibited and explained a map of the American Continent in the earliest geologic epoch, when in his opinion it first assumed shape, so far as it can be ascertained after the vast dilapidations and wearing which it has since undergone. In the Paleozoic sea, now called the Atlantic ocean, but then covering a large part of the U. States, were deposited the limestones, shales and sandstones of a subsequent era, to a thickness of from 650 to 10,000 feet. Up to that time there were no land plants. In those seas we first find the remains of ancient life. The seas were suddenly filled with various forms of life; rude to appearance in their forms, and yet according to their species as perfect as any forms of the present day. The minerals deposited in this age were quite distinct from those deposited previously. They consist mainly of copper, only found in this age of the world and characteristic of it, of lead, of gold in various places, and of certain kinds of iron, among which are the famous Tennessee tough iron, and what is called the lenticular iron ore.

The animal kingdom is arranged by Cuvier in four orders: Vertebratæ, the Articulatæ, the Molluscæ, and the Radiatæ. If we were to make an aquarium, we should first put into it a fish. It would soon require fresh air. Then put in a water plant, and it will absorb from the water the carbonic acid gas thrown off by the lungs of the fish, and in return would give off oxygen. But soon the water would become turbid from the presence of microscopic infusoria and plants, and we must introduce some animal to eat them up. Soon we should find our aquarium overstocked; and we must introduce some animal to eat up the surplus population. And finally we should have to introduce some animal to perform the part of public scavenger, and eat up the refuse. An aquarium thus peopled has lasted eight or ten years, and may perhaps last forever. It is this balance of life, that keeps the waters of the ocean pure, and not the agitation of the waves. In the very first record of life, in these ancient rocks, reposing immediately upon primitive rocks, we find animals forming this complete circle of life. The trilobites were the scavengers of those early seas, as the lobster is the scavenger of the present seas. So abundant were the animals of that early age that there are rocks twenty or thirty feet in thickness composed of their shells cemented together. There is a mass of rock twelve feet thick, extending across Western New York into Canada; and it is impossible to break off a piece of it as large as a butternut without breaking a well developed shell.

PLATING OF METALS.

Mr. Stetson.—The placing of one metal upon another so that there shall be established a connection between them may be accomplished by very obvious means, such as cementing or glueing. Common gilding is often done in that way, by putting the gold leaf upon a varnish; and that accomplishes that problem. The same thing may be done, if desired, upon metals. But it is very obvious that that is a very imperfect means of joining them for practical purposes, because any agency that will destroy or dissolve the cement will destroy the union between the two metals. A similar process is that of soldering. We use a metal fusible at a low temperature in the place of cement; and here too any agency, such as heat, which will destroy or soften the solder will cause it to lose its tenacity, and its value ceases. Another method of plating, is by covering the surface of the article to be plated with an amalgum of a metal. Gold or silver amalgum, for instance may be applied to brass or copper, and upon exposing the article to heat, the mercury will evaporate, and the gold or silver will be left. Articles may be washed with gold or silver by simply immersing them in some acid, holding the gold or silver in solution. But all these methods are adapted merely to give an ornamental surface; for they furnish little protection to the metal which is covered. For protection, a common method is to dip a solid metal into another in a melted condition; as in the coating of sheet iron with tin or zinc. A great difficulty in this process is in causing the melted material to lie evenly upon the other. If a screw, for instance, is dipped into melted tin, the thread will be almost invariably filled, thus destroying its value. The most successful method of coating screws with tin, had been to agitate them violently before the tin had time to set, at the same time pouring water upon them to cool them. But this is a bungling way.

The Chairman, (Mr. Johnson.)—Centrifugal force may be so applied as to accomplish it.

Mr. Stetson.—That is worth trying. Another question arises, whether we can plate an article a sixteenth of an inch thick, or more, and do it smoothly, so as to be able to cover the bearings of heavy shafts. The inside of the air-pump of marine engines is lined with brass in this way. A brass tube is made nearly to fill the inside of the iron tube, and is then hammered to expand it until it fits tightly. We thus have the effect of a brass pump with the strength of iron. The air-pump rod is made of iron and melted brass is poured around it. Another method is to take a rod of iron coated with tin, and pass it when hot within a tube of brass also tinned and heated, thus soldering the two together. This will do very well, if the rod is not afterwards to be heated. Electro plating is another process analagous to tinning; but we cannot deposite evenly more than a very moderate thickness.

Mr. Rowell.—In tinning tacks they are thrown against a wall with a great deal of force, so as to knock off the useless tin.

Mr. Churchill stated that almost all metals, with pressure and heat, may be made to weld together far below their melting point, when air is kept from contact with them. He also gave details of improvements in tinning and a recipe for a soldering liquid.

Mr. Seely suggested that in applying the centrifugal force in tinning screws, it would be necessary that the screws should be kept hot; and that would cause the tin to penetrate and injure the iron. Dip a thin iron plate in melted tin and it is soon dissolved. The less time the iron is heated the better. Another method of coating a rod of iron with brass is shrinking it on. The brass tube is heated and the iron rod is cooled, and thus being put together, as soon as they reassume an equal temperature they will be very firmly fastened together. Electro plating more than fulfils the problem of the alchemists; for practically it transmutes what we please into gold, giving the articles thus coated all the beauty, finish, and indestructibility of gold, while it adds the strength and lightness of iron if we choose; and that too at an expense far less than any of the processes by which the alchemists hoped to succeed.

Mr. Babcock explained the method and advantages of coating common iron with the Franklinite iron which is so hard that it cannot be drilled. In this form it is used for burglar proof safes.

Mr. Stetson described the process by which a large shaft of cast iron had a new bearing of tin cast about it. The operation had been perfectly successful.

Subjects for discussion.—Mr. Stetson suggested the question, "Tents and other portable dwellings."

The subject of "Crucibles," suggested some time since by Mr. Churchill, was selected for discussion at the next meeting.

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
November 21, 1861.

Mr. Tillman in the chair.

Mr. Johnson requested the Secretary to read an article from an English paper, copied from the *Mechanics' Magazine*, from which the following is an extract:

"We believe that the time will come when machinery *must* be introduced into English horology. There is no reason at all why the hand-labor of English workmen, admirable and unrivalled as it is, should be subject to the disadvantage of contending unaided against the machine-made clocks and watches of America, and we see no reason whatever against the introduction of machinery for the manipulation of the various parts of time keepers."

AMERICAN GEOLOGY.

Mr. Nash made some remarks respecting the formation of the mines of Galena, in Southampton; and Northampton, in Massachusetts.

Dr. Stevens commenced his lecture on American Geology, by exhibiting a map of the North American Continent, as he supposed it to have existed in the carboniferous era; showing, at that time, the Gulf of Mexico, as it is now called, extending up the Mississippi valley, and across the United States into the British possessions. The North river was, also, at that time, in his opinion, an arm of the sea, extending to the St. Lawrence, and separating New England from the rest of the continent. Only three orders of plants were then in existence, as far as known. These were:

First, Fucoids, or sea plants.

Second, Land plants, endogenous.

Third, Land plants, exogenous.

The fish exhibited is of the family of sword fishes. The organs, which resemble teeth, were not actually teeth, but an armature, on the outside of the jaw. The head was composed of solid plates. The eyes were very large, looking upwards as well as outwards. The scales were of solid bone, and the tail was *heterocercal.* This was, as far as known, one of the first class of fish created. The Garpike of Lake Erie, and a similar fish in the Raritan, are the only representatives of this class now remaining in American waters. It is allied to reptiles, and had many of the instincts of reptiles. Paleontologists would say that it was an indication that by and by reptiles were to be created. The scales of the garpike are so hard when dry that they will strike fire like flint.

The peculiar iron ore of this age is a carbonate of iron. In earlier formations iron is always in the condition of an oxide, and often magnetic, but no magnetic iron ores are ever found in the coal region. Nor are Galena, copper, silver, gold, or zinc found in the true coal strata. It seems as if no metal could be found in the formations of this age when carbonic acid gas was in such preponderance, unless it would readily combine with carbon; and iron is the only one that will.

A STEAM GUNBOAT.

Mr. Johnson exhibited a drawing of a gunboat with the important works below the water line, in accordance with Mr. Fisher's suggestion of last week. The draft is obtained by a horizontal smoke pipe, thereby relieving the gun deck. As a night-boat, fire from the smoke-pipe would not be visible, a blower being used as an exhausting source for draft.

Mr. Nash remarked that formerly it was considered impossible for ships to enter a harbor defended by stationary batteries without being destroyed. The fallacy of that opinion had been shown at Elsinore, and more recently at Port Royal.

CRUCIBLES AND FIRE-PROOF MATERIALS.

Mr. J. H. Churchill read the following paper:

The subject is of the greatest importance to the owner of glassworks—the manufacturer of steel—the assayer of gold—the worker in brass. Shareholders in gasworks, proprietors of veins of quartz, or of dry river bottoms, of lime kilns, of clay beds, of magnesia quarries, are all interested. Salt even contributes to the general result.

As one instance of this: A recent report to the Emperor of France estimates the difference of cost for fire-proof materials in making steel at thirty francs per ton between that country and England. Another, the cost of working ing up a quarter of a ton of platinum for the Russian government, was reduced five hundred fold by a process growing out of the work of M. Deville, by the use of lime cuprels and gaseous fuel. My connection with the subject is this: In contriving some experiments on a subject cognate with that chemist's work on the alkaline metals, I had occasion, two years ago, to examine carefully the principles on which his results were founded. I have since followed many of them back into the hands of metallurgists, who believed in alchemy. The best working authorities are, perhaps, Schlutter, Kirwan, Chaptal, Berthier, Hasenfratz and Deville.

The materials used in making crucibles are, chemically speaking, silica, magnesia, alumina, lime, graphite. They occur in nature, and geologists know them chiefly in combination, and deteriorated, as granites, gneiss, clay, slates, marl, quartz, plumbago, gas carbon.

Singly or in binary combinations they are very infusible—in ternary combinations with each other, or in presence of other matter, it is often otherwise.

Steatites, composed chiefly of silicate of magnesia, are more or less fusible in proportion to the quantity of alumnia they contain. Lime, however, is not very refractory in contact with silica. A principle of general application in the employment of fluxes, enables it to be made very useful. Calcareous sandstones are protected in iron furnaces by lime in the flux; excess of litharge preserves lime cupels from the action of glass of lead. Chemical affinity determines combination both within the crucible and with the materials of it, as in ordinary solutions with acids, yet bodies do not bear to one another the same affinities at different heats; thus, sodium is reduced by iron at a white heat, reduces oxide of iron at a red heat; is reduced by carbonic oxide at a cherry-red heat, and reduces it at a dull red—the last fact we owe to Deville. The fusible monosilicate of iron penetrates clays at a moderate heat; while with more silex, at a white heat, and in quantity not exceeding eight per cent. it combines chemically with silicate of alumina, forming a double salt, and, in Potter's language, "a glaze." This is what occurs in the Staffordshire bricks, which, with one exception, the vitrified bricks of Wales are, perhaps, those made at the highest heat, and are the least permeable, they are blueish in color.

The material of chief interest in brick is alumina, an element of epicene gender. It is now a base in clay, and again plays the part of acid in aluminate of lime. The first of these is nearly as old as any hills, and almost as varied in its properties; the last, is a modern fabrication, and pretty definite, it will resist any heat short of that of fusion of platinum.

Alumina combines with silica in other proportions than those of clay. Stourbridge clay, which has at least the most refractory reputation, will yield at a lower heat than alumina, with half an equivalent less of silex. Such a material was analyzed by Thomson many years ago, and it was said to have been brought from Chester, in Delaware. Clays vary much in nature, being soft and plastic in decomposed felspars; gritty in kaolin; hard in marl and slates, these are fire-proof in proportion to the excess of alumina. They vary in contraction, by drying, from one to fifteen per cent. The temperature for burning varies from ten degrees wedgwood in London bricks, to one hundred and twenty for Welsh bricks. Stourbridge and Staffordshire bricks are burnt at eighty-five and ninety-five degrees respectively.—Prideaux speaks of crucibles almost entirely made of silex as very successful; great pressure was used in their manufacture

Gas carbon is recommended to be burned into shape. The fluxes to be used by the metallurgist, the alkalis of the glass-worker, the opposite processes of reduction and scorification, the formation of chlorides at high temperatures, and the manufacture of cyanides, have such special action in each case that must be resisted, that, with variable materials, it is a tolerably obvious conclusion that they should have special applications. Fire-bricks and crucibles have a property belonging to them very available in this matter. I have mentioned the glazing properties of iron with silica in Staffordshire bricks; porcelain crucibles are glazed externally; further, as we plaster our houses to suit the eye, we may line our crucibles and fire-bricks to suit our work. The crucibles may be thin—too thin or too fusible to support themselves at the highest temperatures—a lining may be then made to help them. Gas carbon and lime have been thus applied by Deville. A lining may be made to absorb part of the flux or oxide, or will assist the purification of the melted metal. Bone-dust and sand have long been thus used in cupelling the precious metals; lime is now thus used in preparing the most refractory. It may be difficult to cause a small per centage of metal to collect in one mass, the polished paste of alumina and aluminate of lime offers no impediment; charcoal permits an easy collection of the separate globules, and it also preserves the contents from the action of oxygen and of the carbonic acid generated by the fire; lutes applied externally are also used for the latter purpose. In analysis, a platinum crucible, or the ouside of one of porcelain, has been used to effect a better distribution of the heat.

The permeability of crucibles varies much. The report quoted states that French steel manufacturers seldom use theirs for more than three pourings, on account of the increased porousness; with a charge which will yield 30 kilogrammes at the first pouring, they obtain only 27 at the second, and 24 at the third. Even density throughout is partly due to thorough vitrification, but is partly produced by mechanical means in the preparation of the clay. The "ring" which tells the thrifty housekeeper that there is no crack, tells the potter of uniform firing. The mechanical part of the result is obtained by reducing the materials to the same degree of fineness by grinding, pugging and sifting. When this is not attended to, the uneven expansion in heating produces warping, and even partial cracking. This process is often carried so far that the clay can be suspended in water. At one factory on the Thames, a few years since, it was pumped and then floated on for a quarter of a mile. The finest stock bricks were made from this clay at a price of 25s. sterling per 1,000. Floating clay is, however, only common in making porcelain; in this condition iron is separated from it with magnets.

Fire proof pottery consists of pulverized material—burnt clay, plumbago, sand, or aluminate of lime, bound together by a plastic clay. The last alone contracts both on drying and in firing—the contraction commences afresh when it is exposed to a higher heat; hence the importance of selecting the burnt clay from such as has been fired at as high a temperature as the crucible is intended to stand, and of using as large a proportion of it as possible to avoid warping and cracking in the kiln. Thorough drying is of the utmost importance, to avoid hollows produced by escaping vapors. The application of great pressure in moulding has enabled some manufacturers successfully to reduce the amount of the plastic unburnt clay. A most refractory brick has been made in this way containing ninety-five per cent. silicious matter. Deville prepares aluminate of lime by fritting together chalk and alumina. The cost of the last he estimates at about $3 per cwt. Gas carbon the same chemist purifies by treating it at a high heat with chlorine. Besides the use of aluminate of lime to mix with alumina to form the body of refractory ware, he also applies it as a lining. He makes a paste of four parts calcined alumina, and one part of aluminate of lime, well powdered and sifted, he quickly lays this on inside a clay crucible, spreads with a piece of ware, and compresses it firmly till perfectly polished, dries it and heats it to redness; this varnish protected the silica of the clay crucible from the alumina and fluor on which he had to operate.

Other successful improvements in brickmaking are drying by the heat from a cooling kiln, grinding marls, and rolling in lieu of pugging; these are applicable to the manufacture. That of most promise in use will probably be melting with gas, applied directly to the metal inside, with or without fuel on the outside. I am interested in perfecting this.

The paper was accompanied by specimens of crucibles of various makes, of one of curved outline to avoid any angle or change of thickness near the bottom, designed by the writer, and constructed for him at Greenpoint, N. Y., and also by diagrams of Deville's apparatus for cupelling with gas. Specimens of alumina, and of clay calcined, to show the change of color in proportion to the iron present; and of bricks acted on by silicate of iron, were also shown, as also both amorphous and crystallized quartz penetrated by iron at the heat of a coke fire, without blast.

Dr. Stevens.—I was informed at the steel works on Staten Island, that the expense of crucibles, determines in a great degree, the question whether the works can be carried on successfully or not. The clays used there for crucibles belong to the Cretaceous age of the world, and are a decomposed felspar. They do not differ chemically from the fireclays derived from the coal formation of England. The Stourbridge clay, which is celebrated for crucibles and firebrick, is found underlying a coal vein. It would be of comparatively little value were it not ground up very fine and passed under the inspection of the human eye, aided by powerful magnifying glasses, so that every particle of the sulphuret of iron shall be taken from the clay. If we had some chemical process which would take the sulphuret of iron out of clays at a small expense, it would be one of the greatest aids which could be furnished in the working of metals.

Mr. Johnson stated, that in New Jersey, a magnet had been used to aid in extracting the iron, and more recently the clay has been passed through a bolt. By these means a large part of the iron could be extracted.

The Chairman stated that the crucibles manufactured by Mr. Dixon, in Jersey City, are exported in considerable quantities, and are used in England, France and Germany. None of the materials employed by him are found in this country. They consist principally of plumbago, which is brought from Ceylon, and is the best in the world. The clay is brought from Holland.

Mr. Dibben.—Those crucibles are the most durable in the world. One of them will outlast ten of those that we imported from England fifteen or twenty years ago. I have known them to stand seventy-five meltings of brass. But these pots are not of the proper material for making steel. They are apt to make the steel foamy, or leave in it, after it is poured, small cavities that cannot be welded together afterwards. That I found by melting iron of the same kind in different kinds of crucibles. The clay pots would not stand my fire. I used wrought iron and cast iron mixed together. The metal had a small per centage of carbon, and was as clear of other materials as I could get it. The clay pots had too much silex in them, and it injured the metal. One of the greatest difficulties that Bessemer had to contend with, was that he used such a hot blast. The materials of the lining would mix with his steel, and he had to reline at every charge.

New subjects.—Mr. Stetson suggested the subject of "Explosive missiles of war," for future consideration. The subject of "Soluble glass," was selected for the next meeting.

Adjourned to meet on Wednesday next at 7½ P. M.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, *November* 27, 1861.

Prof. Cyrus Mason in the chair.

Mr. Enos Stevens presented a new system of written music, styled Tonography, representing every musical sound by a distinct letter, so that music may be printed like ordinary types. Referred to the Section of Mechanics.

CRUCIBLES, STEEL, FRANKLINITE.

Mr. J. H. Churchill said that the lime used for lining crucibles should be pure shell lime, with a very small proportion of silex. Lime perfectly pure will crack, but with the addition of five per cent. of silex it will stand a very high heat. He had not been able to discover in what way lime was supposed to injure steel. Swedish iron, say those who object to it, owes much of its superiority to its cold-shortness, from an admixture of phosphorus. Lime is sometimes used for removing phosphorus, in converting cold-short into soft iron from melted metal, as mentioned by Lt. Mather of Mexican iron work. If the removal of phosphorus would be an injury to some steel, it is possible that lime would not answer for lining crucibles to be used for it. Otherwise, it would be a very suitable material, and all Swedish iron does not contain phosphorus.

Mr. Tillman.—So far as I have been able to learn, plumbago pots are preferred for melting steel to all others.

Prof. Seely.—I believe Dixon's pots are as good for melting steel as any others, and better, excepting in cases where peculiar combinations are required. For specific purposes the proportion of clay should be specific; and for some purposes a peculiar kind of clay may be required.

Mr. Fisher inquired with reference to the practicability of casting steel into forms, so that but little work of the hammer should be required to make a finished article—in making plough-shares, for instance. Is the steel of good quality as to hardness, elasticity, &c.?

Mr. Selleck.—The steel plough-shares so made are sold nearly at the usual rate of common plough-shares. They possess the important quality that the soil does not stick to them. Their durability has not been fairly tested as yet, for the works were only commenced last spring. But, the strength of the shares has been tried by their resistance to fracture, and I have seen them, after being broken, drawn out into perfectly malleable steel, from which razors were made.

Mr. Fisher.—What should you say of making the crank-pin of a locomotive in that way, where strength is of the first consideration?

Mr. Selleck.—I should not recommend it, because I think there is a much better way to make them, namely, of Franklinite, in which I had a good deal of experience. There is a great deal of old cast iron, such as grate bars, which is considered good for nothing; but I find that mixing a little Franklinite with it, it will run just like water, and give a valuable product.

The Chairman.—What is the comparative value of the Franklinite as a residuum and of the Franklinite ore as taken from the mines?

Mr. Selleck.—If you use the ore without extracting the zinc, you cannot use more than five per cent. to any advantage; but using the residuum after the zinc is extracted, you may use 25 per cent., and will get a better result.

Col. Curtis.—I have known ten or fifteen per cent. of the ore to be used in the blast furnace. The trouble is that it is necessary to make some provision for driving the zinc out of the furnace. But it may be driven out, and may be collected again. Persons running blast furnaces sometimes object to paying the price asked for Franklinite, for the reason that the yield of iron is less than from the magnetic iron ore. Suppose an iron furnace consuming about ten thousand tons of magnetic iron ore, and that it is proposed to add two thousand tons of Franklinite, it is admitted that it will increase the value of the iron, and out of the two thousand tons of ore will be obtained about eight hundred tons of iron, worth the cost of the ore. But hitherto they have permitted the zinc to escape, and by saving that they have now a clear gain of thirty thousand dollars. My impression is, that when the Franklinite is more generally used, an apparatus will be erected, costing about two thousand dollars, to save the zinc, and that there will be a greater profit from the zinc hitherto thrown away than from the iron. At Williamsburg, they are using twelve and a half per cent. of Franklinite pig for bell metal, and it is found superior to brass. A mixture of Franklinite cures both redshort and coldshort iron. It extracts the sulphur from anthracite coal, which thus becomes a better material for making iron than charcoal. If applied to the making of rails, millions would be saved to the country annually, from their durability. It is excellent, also, for cannon. The best test for ordinary metal has been 32,000 lbs. tensile strength to the square inch; while Franklinite has stood a strain of 39,000 lbs. In my judgment, the use of the Franklinite is in its infancy. We have spent one hundred thousand dollars in our experiments, and I think the world will say that we have conquered the difficulties. Franklinite ore is well adapted not only to improve the character of our own iron, but that of foreign irons. It is remarkable that it is found, as yet, no where in the world except in New Jersey vein.

Mr. Johnson suggested that the distillation of the zinc from the Franklinite ore would of necessity carry off a large amount of fuel, which would be lost unless the zinc was made to pay for it.

Mr. Selleck.—In speaking of five per cent., I was speaking of ordinary furnaces. With improved furnaces they may use more. I have saved the zinc in working Franklinite ore, and there is no difficulty about it if the furnace is properly constructed.

The Chairman stated that the ore of the great zinc works in Europe had been used for ages in making the public roads before they became aware of its value. And so in Pennsylvania, within the past year, tens of thousands of tons had been thrown out, put upon roads, and used to fill up valleys, when an English gentleman found that it was a sulphuret of zinc, richer by more than twenty per cent. than the oxide which had been found in New Jersey.

Col. Curtis.—It has been suggested that the distillation of the zinc would carry off a large amount of heat. The practical fact is that the burning up of the zinc creates an intense heat, so that at least twenty per cent. less fuel is required to be used.

Mr. Churchill.—The burning of the zinc would give more heat than carbon.

Col. Curtis.—In my judgment the iron trade of this company, if properly developed, could be made equal to the whole cotton crop of the south. We now import about fifty millions of iron and steel, and are draining California of its gold to pay for it, while we ought to be able to export those metallic substances.

Mr. Fisher.—Will Bessemer's process operate favorably with the Franklinite ore?

Mr. Selleck.—It is utterly impossible to make iron from the Franklinite ore, unless you mix an oxide of iron with it. It is made into steel.

Mr. Tillman.—It is the Kelly process, and not the Bessemer process, for Mr. Kelly used it in this country long before Bessemer. The difficulty with that process is that it will not make an uniform article, and it is supposed by manufacturers that it will amount to nothing.

Prof. Seely—I will answer Mr. Fisher's question. Mr. Selloch calls it the residuum steel, Mr. Fisher calls it cast-iron. I think it is neither, but an alloy purely. Franklinite ore is ninety-five per cent. of iron, and the remainder zinc and manganese. Steel is ninety-five per cent. of iron, and the remainder carbon and nitrogen. It happens that the zinc and manganese give to the iron some of the properties of steel. Now if we attempt to apply the Bessemer process and introduce air, it will form an oxide of manganese and oxide of zinc, which would ruin the iron.

Mr. Selleck.—A little Franklinite sprinkled over iron and heated, will melt and run like quicksilver all over the surface, making the iron as hard as steel. If Franklinite iron is put upon the point of the caulks of horse-shoes, it will make them so much harder than the iron that the wear of the shoe will leave a cutting edge always sharp at the point of the caulk, and prevent slipping upon the Russ pavement.

Mr. Tillman.—The effect of the admixture of manganese seems to add greatly to the strength of iron. The atomic weight of iron is 28, and that of manganese is 26.50; and manganese is magnetic, like iron at very low temperatures.

Mr. Selleck.—Why does not sulphuric acid act upon Franklinite?

Mr. Tillman.—I have only seen it tried with nitric acid, which does not affect it. Iron has what is called a passive condition in which it is not affected with nitric acid, and may be put into that passive condition by adding a small quantity of manganese. The reason is that the atomic weight of nitrogen is 14, which is just one-half the atomic weight of iron. But this belongs to a department of chemistry not yet fully investigated. It comes under the head of catalysis.

Mr. Nash stated that the Franklinite ore in New Jersey is not properly a vein, but a diffusion of the Franklinite through the rock.

Col. Curtis.—Ores appear in deposits, pockets, or veins. If in deposits, you seldom go down one hundred feet before they are exhausted. Most of the zinc ores are in viens. In New Jersey we have gone down about four hundred feet, and the vien seems to widen as we go down. Geologists consider it a wedge vein, running at a pitch of about seventy-five degrees. If so, there is no such thing as exhausting the ore.

Mr. Nash argued that it was merely a stratum upheaved so as to lie at that angle.

The Chairman stated the geographical and geological position of the New Jersey Franklinite ore. It lies between walls of limestone, from which it cleaves as readily as if it were accidentally pressed in there, and the limestone wall is left clean.

Subjects for discussion.—The subjects of "Soluble Glass" and of "Explosive missiles of war," were selected for discussion at the next meeting.

Adjourned to Wednesday next.

American Institute, Polytechnic Association, }
December 4, 1861. }

Prof. Cyrus Mason in the chair.

SCREW STEAMERS.

Mr. Fisher contributed to the inventions of the Association according to the plan previously suggested by him, a drawing of a screw steamer with two advantages; first, the rudder is placed under the bow, and is balanced, so that it will be more effective and require less power to control it; second, the screw is lowered and made of larger diameter, so that the whole power of the engine may be applied to the screw, and no paddle wheels will be required.

FRANKLINITE AND OTHER ORES.

The Chairman exhibited in behalf of the inventor, Mr. Selleck, a piece of iron consisting of nine laminæ, alternately of Franklinite and malleable iron. In this shape it is flexible, but there is no drill that can penetrate it. Safes made from it will be burglar proof; hammers cannot break through, and drills cannot penetrate it. The same principle can be applied to the plating of ships, for any number of laminæ can be used.

Mr. Bull asked whether drills could not be made of Franklinite, which would penetrate it.

Mr. Godwin asked whether the blow-pipe could not be used by the burglar to soften it.

Mr. Butler stated that no portable blow-pipe could affect it, when in the side of a safe, and that a drill would have to be harder than the Franklinite in order to make any impression upon it. The extreme hardness of the Franklinite created a difficulty in working it with our present appliances. In punching or shearing it, there must be a layer of malleable iron next the tool to protect it. But no file can touch it. Edges must be finished with the grindstone.

Mr. Alanson Nash read a paper upon Franklinite, and other ores of iron and zinc.

AMERICAN GEOLOGY.

Dr. Stevens.—Reptiles date their first appearance from the close of the Carboniferous era. They begin to be found in the Permian group, which immediately followed the Carboniferous age, in great profusion. They increase constantly in numbers until the Cretaceous period, when they cease to be the predominant form of life, and higher orders succeed. In the reptile age, the Gulf of Mexico had three arms extending up into the country, and was very much larger than at present; extending, at the beginning of this period, even up into the British possessions, as is shown by recent surveys. New England was still separated from the main continent by a channel in which Sorel river, Lake Champlain, and the tide waters of the Hudson now lie. A depression of no more than 140 feet would be required now to make New England an island as it was then. The Pacific coast then came ta the western slope of the present Rocky mountains. At that time the Rocky mountains had not been thrown up as high as at present. The Alleghany mountains were elevated immediately after the coal era.

The Triassic period, when the red sandstone was deposited, followed the Permian. The triassic rocks are filled with saurian remains. In the red sandstone of the Connecticut river, are found tracks of birds, kangaroos, reptiles, and also probably of the opossum. The birds whose tracks have been found were of enormous size, their tracks showing a stride of seven or eight feet. In this age there were lizards in New Jersey as large as an elephant. The bones of an animal supposed to have been a sea serpent 140 feet long, have been found and exhibited in the United States; but it proved to be made up of several individual animals of a species allied to the whale. In the previous age, the fishes were ganoids, protected by thick plates. In this age there were three new orders; those like the shark, with prickly scales, those like the perch, with fine teeth like the teeth of a comb upon the scales, and those like the gray family. Sharks teeth, 3½ inches in length, have been found in New Jersey, so that there must have been mighty monsters in those waters. The seas in the interior of the continent, as high up as Hudson's Bay, must have been as warm as the waters of the tropics at the present day, for no cold water fish, like the cod, or salmon, were found there in this age of the world. A great many of the trees now adorning our forests were already in existence at the close of the reptitian era: the oak, the elm, the maple. Besides these, the cinnamon tree, which is not now known upon this continent, then flourished in great abundance in the western part of it. About forty trees familiar to us now, have been discovered as having flourished in the Cretaceous age of the world. From Natchez westward to the slopes of the Sierra Nevada, the continent has not since been changed; but the eastern portion of this continent has changed its level at least 2,500 feet during that time.

Prof. Seely.—These lectures are suggestive of many thoughts. Geology is only a descriptive history of the facts that have occurred, and not a philosophical history of the causes of things. When we know the causes of events, we may make prophecies. The day will come, probably, when we shall have the philosophical history of the world. All that we know of chemistry is consistent with the facts stated. For example, if the sixty-six elements were created and placed together, they would form a globe;

and immediately oxygen, seeking those substances for which it has most affinity, aluminum, silicon, potassium, sodium, &c., would form the centre of the earth. Only after these affinities have been satisfied, in the igneous epoch, could we have carbonic acid and the productions of the carboniferous period. Again, the water when first formed must have been in the form of vapor, and as it became condensed the lime and similar substances would be dissolved in it, giving us very little dry land. There was then little oxygen in the atmosphere, and therefore vegetable, rather than animal life, was luxuriant. The atmosphere is not a chemical mixture. Its composition is remarkably uniform now; but it has undoubtedly very much changed in the oclation of its constituents. I have no doubt that it will continue to change so as to be suited for higher organizations. Such considerations illustrate a method of viewing the subject which seems to me to open a vast field of exploration.

The Chairman remarked that although the science of chemistry has been improved so much since the time when four elements, fire, water, earth, and air, were all that were recognized, yet it remains pre-eminently the great field of investigation in natural science. What will be the result when it begins to investigate the development of the first forms of crystals and of vitalized matter, no one can foresee.

EXPLOSIVE PROJECTILES.

The subject of "Explosive Projectiles" was postponed until the next meeting. Adjourned.

American Institute, Polytechnic Association, *December* 12, 1861.

Mr. Tillman was called to the chair.

Mr. Butler exhibited specimens of the Franklinite and wrought iron in layers, and remarked that the layers of Franklinite were not as hard as the Franklinite before put it. It seemed as if the hardness had been in part merged into the wrought iron.

CAMP PAN AND BAKER.

Mr. C. Bush exhibited this cooking and baking utensil. which is of light weight, convenient, and of compact form. It is constructed with double sides and bottoms, with non-conducting material interposed between them; the pans being adapted to be used singly in the ordinary way, or attached together to form a baker—which, when filled with the article to be baked, is buried in hot ashes, or placed in an open fire, and the article cooked in an expeditious manner.

The Chairman had found the quality of the cooking good. A question now arose whether this pan would be liable to become warped in use, and also whether the non-conducting material might not be a serious inconvenience in using a fire of green wood.

Mr. Butler suggested that the former doubt might be removed by causing the two pans, with the fire-proof filling, to lap over somewhat; and expressed the opinion that there would be no difficulty from the latter cause. There would soon be a bed of coals and heat sufficient for cooking.

AMERICAN GEOLOGY.

Dr. Stevens resumed: The subject this evening is what is known as the mammalian era, or the age in which mammals first appeared in large numbers, and were the highest type of animals known upon the face of our continent. During this era, it appears that Lake Michigan, and all the waters of the north, had an outflow southwards; and were, also, connected with Lake Winnepeg and Hudson's Bay on the north. The communications between the lakes and the Ohio and Mississippi rivers left large islands in the northwestern States. Across the continent from the Connecticut river to Wisconsin, ancient sea beaches still remain, and are found sometimes in the mountains and sometimes in the valleys, at different elevations, some more than six hundred feet above the present level of the ocean, showing that there were several stages in the elevation of the American Continent, the continent remaining stationery at each epoch long enough for sea beaches to be formed. In Canada, and in some places in the United States, sea shells, and the teeth of whales, walruses, seals, and other marine animals have been found in these ancient sea beaches. At Poughkeepsie, in the valley of the North river, the teeth, bones, and horns of the great Northern deer, now never found in latitudes lower than Labrador, have been found buried in the sands of the tertiary or mammalian era. In Rhode

Island, the entire carcass of a whale has been exhumed. At Lubec, in Maine, the bones of another whale have been exhumed. In Michigan, the teeth of the walrus have been exhumed from one of the ancient sea beaches. Thousands of similar instances have been noted, not only in the Mississippi valley, but further east. The Atlantic coast was then further inland, say fifty miles, in Maine, and not far from its present position in this neighborhood. The line of coast southwards inclined further and further from that now existing to the west, until Eastern Virginia, Florida, and Southern Alabama lay under the ocean. The Mississippi river, from a width of nine miles at the junction of the Wisconsin, increasing in many places to fifteen miles, reached a width of twenty to fifty miles at the mouth of the Red river, and terminated with a width of one hundred and fifty miles, according to late geological surveys in Mississippi. In the interior of Nebraska, east of the Black Hills, and about one hundred and forty miles west of the Missouri river, upon the Niobrara river, was an island sea about one hundred and sixty miles in diameter, filled with fresh water, and stretching northward to the Red river of the North, through that to Lake Winnepeg, and so on, extending northwards as far as the Arctic Continent. The animals which lived in that sea, great whales, great lizards, fish and turtles, are preserved with remarkable perfection in the rocks. Between the Rocky mountains and this island sea, there was dry land, covered with trees very similar to those now found upon the Pacific slope. Those found on the Pacific coast partake somewhat of the tropical character, showing that the Pacific ocean had then the same warming influence upon the adjacent country that it now has. Those woods upon this continent were tenanted by five species of elephants, where none now exist; those of the present epoch being confined to the Indian and the African Continents. There were three species of the mastodon in that region, an animal, some of whose species are as much larger than the elephant, as the elephant is larger than the horse. There were seven species of the rhinoceros, one not much larger than a good-sized Berkshire hog; two species of the hippopotamus. There were, also, horses, the ox, the hog, and a variety of other animals allied to the camel, the horse, the hog, the rhinoceros, the bear, the leopard, the wolf, and still other varieties essentially different from any known at the present day. After the ruminating animals had lived and flourished through the Eocene period, the first part of the mammalian era, carnivorous animals seem to have been introduced, such as the panther, leopard, lion, wolf, and dog. It would seem as if this was done as a necessary part of the great idea of animal creation, to prevent the too great increase of animal existence.

It is a remarkable geological fact that during the whole of this period, there is no proof that a single new mineral, or new form of ore, of any particular value to the American people, was deposited in the formations. California, Oregon, and the whole country north and west of the Sierra Nevada, with the gold and silver they abound in, were brought up after the rocks of this period were formed. There seem to have been three great successive stages in this process of placer-forming elevation. The first is now high up on the mountains; the last, from which the gold has been washed into the auriferous sands, on the level of the great plains. The gold is found only in the placer earth, and where it has been washed out of the placer earth. In no single instance has the placer earth failed to pay the men who will work steadily at it through the week. This placer earth extends from the southern part of California northwards, to the extreme limit of the Russian possessions. From the best information I can obtain, there is gold enough west of the Rocky mountains to employ as many miners as wish to go there for thousands of years. They must dig over the one hundred and fiftieth part of the entire surface, west of the Rocky mountains, to exhaust it.

There is a system of gold veins running due north and south, which is as old as the primitive era, and which always yields the purest gold. The next system is of the age of the Rocky mountains and lies in the same direction with the mountains. The gold is a little softer, and begins to be contaminated with iron, lead, silver, osmium, and iridium. The third system, lying east and west, is of the tertiary age, and is always contaminated with other metals. It is from these veins that the gold was washed out by the action of the sea waves and carried into the placers, and thence into the valleys of the Sacramento and other rivers.

EXPLOSIVE PROJECTILES.

Mr. Stetson.—I will divide this subject into three questions: first, the proper form for explosive projectiles; secondly, their contents, and thirdly, the means for timing their explosion. The original form of bombs and shells, was spherical; and that form is still used in all smooth-bored pieces. They are made of different sizes, up to 15 or 20 inches in diameter, and filled with such materials as the peculiar exigencies of the service may suggest as most destructive or disagreeable to the enemy. For firing into open forts, they are generally filled with balls, or sharp pieces of iron, sometimes six-sided or cubical, with fragments of bottles, and similar missiles. But in firing into casemated fortifications, it is often far more disastrous to the enemy to stifle them out, by filling the shells with substances which will produce an intensely disagreeable smoke. And for firing into wooden structures, like a ship, or a fort with wooden buildings, portfire, a material which will burn very intensely even under water, is used with great advantage. The thickness of shells is made such as to avoid breaking with the concussion of firing, and at the same time to break up into a large number of pieces with the explosion of their contents. Shells for rifled cannon are made of the same general form with the solid shot. The Hotchkiss' shells are arranged in the same manner as the solid projectiles, which bear his name, and were described at a former meeting, namely, with a belt of lead to be expanded a certain amount by the impulse of the discharge so as to fill the grooves of the cannon. In firing spherical shells, there is always so much windage that enough gas passes the shell to fire the fuse, which is necessarily at or near the front of the shell; but with rifled cannon we have not this advantage. It was supposed, until within a few years, that the shell could only be fired from a mortar, which is so inaccurate in its aim as to be rarely serviceable except in firing into a city, or in similar cases. But it is now found that they can be fired from ordinary cannon with great accuracy of aim. They can therefore be used in firing at ships, and unless the ship is so near that they pass completely through, they are much more destructive than the solid ball. Although the gas cannot get by in the rifled cannon until after the shell leaves the mouth of the cannon, when the shell is moving at its highest velocity, yet the fuse will generally be fired. But for greater certainty, the Hotchkiss' shell has channels left in the side for the gas to pass through.

The instant of explosion may be regulated in two entirely different ways. We may either use a fuse which shall burn for a certain number of seconds, or we may cause the explosion by the striking of the shell. The fuse is generally made to burn about 20 seconds, and when the shell is to be fired, it is shortened to the required length. The percussion shell has ben publicly* known for six or eight years, but as usually constructed has several disadvantages. It has a percussion cap upon its front and is fired by the striking of the shell. One disadvantage attends this arrangement, namely, the danger of premature explosion, from dropping or careless usage. Of course it could not be safely rammed down. It has been attempted to construct the percussion cap of such a material that it would stand an ordinary blow. One form of the Hotchkiss' shell, is so constructed that the percussion cap is enclosed within the ball. For this purpose there is a little chamber within which is a sliding tube, and upon the front of this tube the percussion cap is placed. When the cannon is fired, the tube baving been brought back by its inertier, the moment the shell strikes any object, or even against the water, the tube flies forward and strikes the front end of its chamber with sufficient force to ignite it. Yet the cap is protected from any blow, and the mere dropping of the shell cannot ignite it. But this plan is attended with another difficulty. It has been found that the shells thus arranged, are liable to explode immediately upon emerging from the gun. If you can get them safely past that point they will fly until they strike. The explosion at this period of the flight has been ascribed to the resistance of the air; but I think I see another cause for it which is more likely to be the true one.

Mr. Sykes.—Is it not the elasticity of the metal? The tubes come back until they strike, and then rebound with such force as to stiike the front end, and the cap is fired.

Mr. Stetson.—That is exactly what I suppose to be the cause; and Mr. Hotchkiss has successfully guarded against that difficulty by putting a soft and inelastic material, such as lead or soft putty, at the back to prevent this rebound. It is worthy of remark that the percussion shell, although fired by the striking of the shell, yet penetrates the whole depth due to the force of its impact before the explosion takes place; so that in firing against ships the explosion does not take place until after it has passed through the first wall of the vessel.

* Experiments were made by Robert L. Stevens in August 1817, in the presence of President Monroe. The results were not made public.—J. R.

Mr. Roosevelt described a percussion shell invented by himself in 1854.

Mr. Babcock described several other explosive projectiles. Sawyer's projectiles must strike with sufficient force to compress a layer of lead before it can explode. The Shenkel shell has a pin to prevent any motion of the tube containing the cap; and must strike with sufficient force to cut that pin off, in order to produce an explosion.

A percussion projectile may pass through three feet of timber before it has time to explode. This is an advantage in most cases; but the percussion shell is of very little use against infantry, because it will bury itself in the earth before explosion.

Gov. Noble, of Wisconsin, stated that the rifled shell was invented by Capt. Norton, as early as 1833.

NEW METHOD OF RIFLING.

Gov. Noble stated that it had been found from 500 experiments that a rifled gun which would cause a penetration of eight inches of ordinary pine board, could be made to cause a penetration of $24\frac{1}{2}$ inches merely by making new grooves for a certain distance. The theory proposed for the explanation of this fact, but with which he was not satisfied, was: that there is a limit of expansion to powder, which may be determined by experiment. It is about thirty-two diameters from the breech of the gun. Beyond that distance the motion of the ball is from its momentum, and hence a vacuum is produced behind it, or the pressure of the atmosphere before it is made available. From this point therefore the extra rifling is introduced, which allows the atmosphere to get behind the ball. But if this theory were true, the gun should be still more effective if cut entirely off at that point. De Brame's experiments seem to involve the same principle; and it is desirable that some scientific explanation of the facts should be given.

Mr. Roosevelt said that experiments had been made to ascertain the most effective lengths for the barrel; and that the success of the accelerating gun also, was against the theory.

A gentleman suggested that the new arrangement might give greater effect to the elasticity of the atmosphere, and might also furnish oxygen for the more complete combustion of the powder.

Mr. Stetson said that instead of air passing into the gun, he had always found something coming out, following the ball; and sometimes unburned powder.

Mr. Babcock stated that the principle could not be applicable to ordnance, for they are already far less than 32 diameters in length. It is now the practice to make rifles shorter than formerly. They are made 27 inches long, instead of three feet or more.

Mr. Sykes suggested a form for a projectile, with spiral wings to cause it to revolve, and with a chamber in the rear for a rocket composition.

Mr. Babcock stated that the explosion of the gun had been found to destroy completely the rocket composition.

Mr. Johnson.—Another objection would be that the velocity of the ball itself would be a little greater than that of the issuing stream.

Subject for discussion.—The subjects selected for the next meeting, were "Dredging" and "Soluble Glass."

Adjourned.

American Institute, Polytechnic Association,
December 19, 1861.

Prof. Cyrus Mason in the chair.

COTTON—FLAX—SILK.

The Chairman proposed that the subject of "Textile Fibres" should be taken up on the second Thursday in January, at which time he would give the results of his microscopic examinations.

Mr. Churchill stated that upon a microscopic examination of twenty or thirty different specimens of flax prepared by a modification of Claussen's process he had found fibres of spiral structure, flat and twisted like cotton.

Mr. Tillman stated that the flax fibre, as prepared by Chevalier Claussen, is like a glass tube, and utterly worthless for manufacture. He had found another material however which showed the cotton fibre.

Mr. George H. Bowley exhibited a sample of tree silk from Nicaragua. The silk is the product of a nest of worms which cluster like snow upon the trees. It has not been reeled; but the natives make ropes of it, and it is very strong. The worms seem to prefer one kind of tree, and those trees are completely covered; probably 50,000 of them being on one tree.

Mr. Stetson suggested that many silk goods, where strength is unimportant, are made of waste silk; and even if this article could not be reeled, it might prove to be valuable.

Dr. Stevens was of opinion that if kept separate the worms would form cocoons.

NEW GUN.

Mr. Stephen Krom exhibited drawings of a new breech loading gun invented by him, which he explained.

AMERICAN GEOLOGY.

Mr. Bowley exhibited a specimen of gold quartz from Nicaraugua. There are no more than eight veins in the whole district from which this came. The mine has been worked for three hundred years successfully. The ore will yield 10 ounces to the ton, which is considered remunerating.

Dr. Stevens, in his lecture on the geology of this continent, gave the history of our mountain ranges. He said:

I thought it best this evening to introduce the history of our mountains because the close of their history has very much to do with the preparation of the American Continent for the abode of man.

As the earth began to cool so that solid rock could be formed, upon the supposition that the earth was once a mass of molten matter, the first crust formed would be thin; and a collapse of that crust, towards the centre, forming a large valley, would throw up contiguous to that valley a mountain ridge. The furrowing of the earth's crust is the necessary consequence of the subsidence of any portion of it.

The earliest system of mountains on the North American Continent has been called the Cabotian system, from the discoverer, Cabot. Commencing in Labrador they stretch across the primitive American Continent, one branch running southward of Lake Winnipeg and forming the mountains whence spring the head waters of the Mississippi. These mountains were low, scarcely ever elevated more than a thousand feet above the surface of the country, or 1,600 feet above the level of the sea. The next system of mountains runs at right angles with the first, or north and south, and lies in several different systems. They rise, in the White mountains to about 3,500 feet above the level of the surrounding plain. The third system is the Appalachian, beginning in Massachusetts, and terminating in Alabama. If this system of mountains had been pushed up in one grand chain, it would have been from three to five miles in height; but fortunately it was thrown up in three or four great folds with breaks in them. Between New York city and Albany, the Harlem R. R. cars cross the region included in the Appalachian system, and yet we do not pass through a mountain or over a mountain, but wind through the breaks. At the same time with the Appalachian mountains, the Colorado mountains in Texas running into Arkansas, were thrown up; and the peninsular of Yucatan has a system of mountains belonging to the same age.

The next system of mountains is the Rocky mountains. Formerly we were taught to believe that the Rocky mountains were the backbone of the American Continent; but they were not in existence as a high range unitl the continent to the north and east was dry land and well stocked with animal life. The Appalachian mountains were thrown up after the close of the carboniferous era; and the Rocky mountains, running in the opposite direction, were thrown up long after the Cretaceous age. West of the Rocky mountains is the Sierra Nevada, of a later age than them; and west of it another range including the Cascade mountains, still later in its origin. Between the Sierra Nevada and the Rocky mountains, are various systems, short, isolated, and the latest of all. These are generally of volcanic origin.

After the North American Continent had assumed nearly its present form, there was a submergence of the entire northeastern portion of it, burying the tops of the Catskill mountains a thousand feet beneath the bosom of the ocean. Wherever you go upon the rocks of this region, you find them worn smooth and grooved as if by the passage of something over them wearing these grooves in a certain direction. You also find immense boulders, evidently moved from their original positions, tumbled about promiscuously. It was the great deluge of the northern waters, carrying floating ice, anchor ice, and all the other phenomena of an Arctic climate, that blotted out all the past, destroyed the mastadon. the rhinoceros, the hippopotamus, and prepared the continent for a new creation of animals and plants better adapted to the use of man. Mount Washington, some of the highest peaks of the Green mountains, and the higher peaks of the Alleghany mountains, were lone islands in this vast Arctic ocean. The average thickness of the drift deposited at this time is about 100 feet; and you can imagine the mighty power which would grind up rocks and spread their huge fragments over the continent, and leave a deposit of such depth. One consequence has been that upon the south or southwest of every isolated mountain there is a gravel bed, and there the farmer finds his richest land; because there is the greatest accumulation of those materials, lime, sand, alumina, with which the drift period has enriched this portion of the American Continent.*

The Chairman stated that he had been informed by a man who had spent his life in trading in lands that he had formed the rule never to buy land upon the north side of hills or mountains; that all the best lands lay to the south of them. He had himself observed the same fact; and that the forests are generally left to grow upon the northern sides of the hills.

Mr. Stevens stated that since the discovery of a mammoth in Siberia clothed with fur four inches long, outside of which was coarse rank hair twelve or fourteen inches in length, geologists were modifying their views with reference to the temperature of the earth in former ages. Animals may be allied to our tropical animals, and yet may have been fitted to endure an Arctic climate.

The Chairman.—Is there any geological reason why there should be a greater abrasion upon eastern than upon western slopes?

Dr. Stevens.—Yes; the rocks were fractured upon the eastern slopes.

DREDGING.

Mr. John Johnson explained his new method of dredging, which he illustrated by numerous experiments. He gave a brief summary of the early machines used in dredging. In 1591, there was a machine used in Italy scooping up the materials which were desired to be removed for the benefit of navigation. In 1618, Savery took out a patent in England for the application of steam to dredging. In 1708, Hertel, and in 1734, Morton and Balme, of Holland, employed a barge, and a windlass to draw up the materials collected by a spoon and bag. In 1750, iron buckets and an endless chain arrangement, were used in France. In 1774 to 1780, Redelykhead and Eckhardt applied scoop wheels. John Golburn, of Chester, had already, in 1768, used a kind of scoop

* This may be true of an isolated mountain, but is contrary to the great fact that nearly all the richest lands of the United States lie north and west of the Appalachian group.—J. R.

dragged across the river Clyde. In 1769, Grimshaw used a four-spoon dredger, each spoon containing a ton of soil. Bolton and Watt, in 1796, applied steam to the dredger. In 1802, Mr. Rennie enlarged and improved the apparatus. In 1805, Mr. Shorter operated a spoon dredger by the tide. In 1807, Richard Trevethick, an engineer, made further improvement in the mode of dredging. In 1810, John Mills introduced machinery by which 50 per cent. of the applied power was shown in the results.

At later periods the steam dredger has been much improved, and has been constructed on a larger scale. The result has been that the cost per ton has been reduced within the last twenty years from thirteen pence to four pence. In September last an iron steam dredger 110 feet in length, was constructed upon the Clyde. This machine, which can operate in 30 feet of water, has filled a barge of a capacity of 33 cubic yards, or 45 tons, in 15 minutes, in 18 feet of water. This is an efficiency about four times greater than was possessed by the early machines.

Pumping was spoken of by Mr. Johnson as being under some conditions a species of dredging. In pumping, at the time of constructing the government dry dock at Brooklyn, there was a pound of fine sand in each gallon of water pumped out; and three thousand tons of sand were removed in that way, by the Worthington pump. In an attempt of Mr. Maillefert to recover quicksilver from the "Flying Dutchman," it was found that what little excavation they effected in one day was filled up the next. The sand in which the vessel lay was "so *lively* that the divers sank in it knee deep. "But by the aid of the centrifugal pump of W. D. Andrews, driven by an engine of 12-horse power, the mercury and other cargo were obtained.

Mr. Johnson then proceeded to show by experiments how readily sand may be removed by pumping, either air or water, and when raised by his form of pump, that it will be accompanied by a comparatively small amount of water. The weight of a cubic foot of dry sand is about 80 lbs. Wet to saturation it is about 100 lbs. A small additional quantity of water was shown to aid materially in the removal of sand by his pumping apparatus. Messrs. Eaton and Brother, of Charleston, S. C., with a propeller dredger 150 feet in length, having a centrifugal pump six feet in diameter, with a nineteen inch tube attached, raised 150 cubic yards of sand, shells, &c., from a depth of twelve feet, in twenty-seven minutes, and deposited the same a mile and a half distant in forty minutes. A thousand cubic yards have been removed by this dredger in a day; the average, however, being 350 cubic yards. Roots, bits of wreck, parts of piles, bricks, cannon balls, and a boat grapnel weighing 30 lbs., were pumped up with the sand. One hundred and ninety thousand cubic yards of sand, &c., have been removed by this machine, working in a sea-way, in two years, at a cost of 60 cents per cubic yard. But the centrifugal pump is too rapid for this work, pumping only 25 per cent. of sand, and therefore pumps up too large a proportion of water, for the amount of sand raised is only 25 per cent. To prevent a deposit of sand in running water, a velocity of 15 feet per second is necessary. Mr. Johnson then showed that from 85 to 90 per cent. of sand and other earthy matter might be raised by his apparatus.

The conditions under which bars are formed, are, 1st, the presence of sand, shingle, or other easily moved material; 2d, water of a depth so limited as to admit of the waves, during storms, acting upon the bottom; and 3d, such an exposure as shall allow of waves being generated of sufficient size to operate on the submerged materials.

The Chairman.—The Hudson River Railroad company would have saved $500,000, if they had known that by the course of the tide a sand bank would have been built up against their bridge; for they expended that amount in constructing a wall which has proved an unnecessary protection.

Mr. Johnson showed that sand could be carried through a syphon with a comparatively small proportion of water. There are in most cases few large bodies in the earth to be removed. It is chiefly composed of sand deposited by the tides, and such materials as may be easily pumped in this way.

Mr. Godwin described the successful application of a similar principle to the emptying of cesspools.

PATENTS.

Mr. Churchill inquired what the effect of the publication of an invention by bringing it before this society would be upon the right of the inventor to take out a patent therefor.

Mr. Stetson.—There is probably no better way to make an inventor's rights known, than such an explanation of an invention as is given here. His right to take out a patent is limited to two years after sale and use, but the right to obtain a patent for an invention made known to the public, never ceases.

Dr. Vanderweyde.—I have had occasion during the past year to prove by the printed reports of our proceedings here that my invention had been exhibited and explained, and that very publication proved my protection.

The Chairman called attention to the provision for depositing in the archives of the American Institute a sealed description of an invention, which it might be desirable not to make public at the time.

Mr. Roosevelt remarked that merely explaining an invention is not sufficient. Something must have been done, as well as something said, to protect the inventor.

New subject.—The subject of "Soluble Glass" was selected for consideration at the next meeting.

Adjourned.

American Institute, Polytechnic Association,
December 26, 1861.

Prof. Cyrus Mason in the chair.

AMERICAN GEOLOGY.

Dr. Stevens.—I propose to-night to speak of two phenomena which have operated in different ages of the world to modify the physical appearance of this continent, viz: Earthquakes and volcanos.

Three different and plausible theories have been broached by learned men to account for volcanos. It is one of the wonders of the world that there should be anywhere a chimney, constantly smoking, and giving vent to ashes, heated vapors, stones, and oftentimes melted rock flowing as freely as melted tar. When we come to analyze the lava from volcanos, we find it precisely similar in its chemical constituents to the hardest rocks, such as granite and trap. An hypothesis, for a time popular, was, that there is a chemical operation going on in the bowels of the earth; that somewhere in the interior of the globe, are immense deposits of sodium, potassium, and the metallic basis of the earths, and that through cracks in the earth's crust, water finds its way down to these metals. Sufficient heat, it was assumed, is thus evolved to melt the rocks in the immediate vicinity. This theory, although very ingenious, was abandoned by its author, and is now exploded. The theory of Laplace holds that the interior of the earth is composed entirely of molten matter;

that beneath a thin crust, of forty to one hundred miles in thickness, all is in a state of igneous fusion; that volcanos are but chimnies to this great furnace below; and that whenever there is a collapse of the earth upon the molten centre, these melted rocks are thrown up and overflow the surrounding country. It is probable that this theory is true, at least, in part. It may explain some of the large volcanos of the globe, such as Hecla, Vesuvius, Etna, Stromboli, and some in Central America. More recently there has been a purely chemical theory advanced, viz: That all sedimentary rocks, which are recently formed by the deposition of sand, gravel, and mud, at the bottom of the sea, contain a greater or less amount of animal and vegetable matter; that when these rocks begin to condense, to change from their soft, muddy consistency to a hard material, heat is evolved which is increased to such an intensity, by means of the organic matter in the deposit, that the soft, pulpy mass is molten in part, and begins to bubble up and overflow. In favor of this last theory, it is alleged that, in the neighborhood of all the active volcanos of the globe, the rocks are those of the latest formation, and are now undergoing that process of condensation, and all contain a very large per centage of organic matter. Further, as we go back in the history of the globe, every great geological formation, while it was undergoing the process of formation, had its volcanos and its earthquakes. They are to be traced through the cracks, radiating from a centre, precisely similar to those now found in Italy, Sicily, and Central America, immediately following earthquakes. On the plains of Illinois, where the country appears perfectly level, for instance, we are able, by accurate surveys, to trace a system of cracks of such a description. And it is almost certain that wherever a river flows, there is an ancient fissure in the rocks underneath it, which has determined its direction. This is true, not only of the Mississippi, the Susquehanna, the Alleghany, the Hudson, but even the little streams that come down from the mountains, and are dry in the summer season, all have their course determined by some fissure in the rocks beneath. In California, where volcanos now bubble up like lakes of molten mud, hot enough to roast an egg in a few minutes, all the rocks are of recent formation. The same is true of Oregon, Mexico, and all through South America, wherever there are active volcanoes.

I will now give you the history of the volcanos of N. America.

In the Cabotian mountains, among the oldest on the globe, and extending across the northern part of this continent, the traces of ancient volcanos are found throughout. They occur especially upon the northeastern coast of Lake Superior, and upon the Gulf of St. Lawrence. These mountains were formed in the azoic age of the world.

In the latter part of the azoic age, there was another system of ancient volcanos in the neighborhood of Boston, the outflow of which is still found in the shape of porphyry, green stone and certain forms of granite. Coming up a step further into the lower silurian formtions, when shell-fish began to abound, we have another system of volcanos in the north of New Hampshire, Vermont, Canada, and occasionally in the Blue mountains of Tennessee, and in the Blue Ridge of Virginia, leaving granite, porphyry, and green stone to mark their positions. There was, also, in the Silurian age, a very long system of eruptions on the shore of Lake Superior, occurring usually in the form of three parallel ridges, elevated six hundred feet above the immediate neighborhood. Ile Royale appears to have been elevated from the bottom of Lake Superior at this time, coming up with almost perpendicular sides. Still later, in the Carboniferous and Devonian age of the world, there were volcanos among the mountains of Nova Scotia and New Brunswick. In the Permian age, which immediately succeeds the Carboniferous, we begin to find the Triassic rocks, or red sandstones, of New Jersey and the Connecticut river, and of North Carolina and Virginia. When those rocks were deposited, and in the act of hardening, trap, and greenstone, and basalt, and other igneous rocks, were formed; we have the traces of igneous action, beginning beneath the bosom of the Atlantic, extending from the Vermont line across the States of Massachusetts and Connecticut, and terminating at New Haven, commencing again at the Palisades, and extending across the States of New Jersey, Pennsylvania, Maryland, Virginia, North Carolinia, South Carolina, and terminating in Georgia, usually in three great systems. We find igneous rocks also in Missouri, indicating volcanic action there in the same age. After this age there has been no volcanic action upon the eastern slope of the United States.

In the succeeding age, the Cretaceous, there were volcanos lying east of the Rocky mountains, four isolated mountains lying near the Canadian fork of the Arkansas river, others extending down into Mexico, and, according to Humboldt, even into Guatimala. These have all been extinct for many years. Scoria and pumice stone have been found floating down the Missouri river, supposed to have come from some volcano still in action.

Dr. Vanderweyde.—Pumice stone is found floating down the Rhine, supposed to have come from extinct volcanos.

Dr. Stevens.—The pumice upon the Missouri is of fresh appearance, as if recently from the fire.

While the tertiary rocks, lying between the Sierra Nevada and the coast range were consolidating, Mount Diabolo, and Mount Shasti were elevated. That system extended up into the Russian possessions. But for this ancient outflow of volcanic matter, we could now build, at a slight expense, a railroad running up through this valley, turning around the Sierra Nevada, passing the Humboldt mountains, going through the great gap in the Rocky mountains, and so on to St. Louis, across to Chicago, by Little Falls to New York; and, excepting at Little Falls, we should not encounter a mountain upon the whole route; gradually rising six thousand feet above the level of the sea, and then slowly descending to the Atlantic coast. Subsequent to this age volcanic mountains were thrown up in the valley of Utah; and there we have the only burning volcanoes in the United States. They exist there as large lakes, and are exceedingly interesting and curious to travellers.

Scientific men have devised two theories to explain the phenomena of earthquakes; one that they are caused by a collapse of the earth's crust upon the liquid mass beneath, and a consequent surging backwards and forwards of the great molten sea beneath us. I do not understand how that could produce such an instantaneous movement of the earth over such a great extent of country. The earthquake wave seems to travel with a speed almost equal to that of lightning. I consider the true cause of earthquakes as yet undeveloped by scientific research.

SUCTION DREDGING.

Mr. Fisher suggested that the apparatus for dredging by pumping, explained by Mr. Johnson, would be useful also for creating an artificial obstruction or bar for the purposes of blockade.

Dr. Stevens stated that there are no boulders south of this port; that on the Jersey shore the largest pebbles are no larger than a hen's egg, growing smaller as we proceed southward, the principal substance being sand.

DRAIN PIPE.

Prof. Seely exhibited a specimen of bituminized pipe. The process of manufacture consists in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness. The paper is so well protected by the asphaltum as not to be liable to decay.

Mr. Tillman.—The same has been used for roofs, and does not succeed.

Mr. Stetson stated that the extremes of temperature and of moisture and dryness to which a roof is subjected are very much more deleterious to such a substance than the uniform exposure of such a pipe used for water or gas.

TYPE-SETTING MACHINERY.

On motion of Mr. Stetson,

Resolved, That a committee of three from the Section on Mechanics be requested to examine and report to the Section on type-setting machines, to which their attention may be called with reference to the gold medal.

Messrs. Bogardus, Ward, and Mason were nominated and appointed as the committee, with power to fill vacancies.

SOLUBLE GLASS.

Prof. Seely stated that water-glass, or glass soluble in water although made by accident several centuries ago, had not been known until 1825, in its necessary conditions. To some extent any glass is soluble in water. Those glasses which contain the largest proportion of potash or soda, with but little lime or other alkaline earth, are most readily soluble. It has been proposed to use water glass as a covering for stone houses, to be applied in the liquid form, spirting it on with a rose and to harden on the wall. Applied in this way, it gives a very fine finish to plastered walls. In a short time the surface assumes a brilliant lustre, suggesting the idea of varnish. But after it is completely dry it cracks and parts with its polish. What is called stereochrome, is a process of covering walls after coloring them with this fluid, which fixes the colors and preserve their brightness indefinitely. If water-glass is applied to a surface which has no reaction, it is liable to be washed off. Applied to marble or to a plastered wall, the silica leaves the potash and forms an insoluble silicate of lime. It has been adopted in one of the preliminary operations in preparing cotton cloth for printing. It is suggested that it be used in manufacturing brick to make them hard.

Dr. Vanderweyde exhibited specimens of soluble glass, and suggested that it should be made soluble in boiling water, but insoluble in cold water, so that in its application there should be no danger of its being washed off. If mingled with clay, it would probably form a silicate of aluminum, and make an impenetrable brick. The soda would be washed away.

Subject for discussion.—The subject selected for the next meeting was, "Textile Fabrics."

Adjourned for two weeks.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
January 9, 1862.

Prof. Cyrus Mason in the chair.

NEW COAL OIL LAMP.

Mr. Dibben exhibited and explained a new coal oil lamp, invented by C. W. Smith, for burning coal oil without a chimney. This lamp burns two fluids in the same flame—alcohol and coal oil. The latter is always uppermost in consequence of its less specific gravity, and they are not so easily mixed as to influence the result. One wick reaches to the bottom of the lamp, taking up the alcohol, and the other is floated by a cork so as to take up the coal oil. Coal oils are so rich in carbon that they cannot be burned alone with an ordinary wick without an argand chimney. In this lamp, now before us, the flame of the alcohol furnishes the best requisite for the complete combustion of the carbon of the coal oil, and surrounds the flame from the coal oil, so as to prevent smoking. The lamp is convenient, portable, cheap and does not appear to be at all dangerons. The cost of chimneys, in most of the coal oil lamps, prevents the use of coal oil from being economical. This plan seems to be a good one to obviate the necessity for a chimney.

Mr. Bull.—What is the cost of the fluids used?

Mr. Dibben.—The alcohol is about thirty-five cents per gallon, and the coal oil about fifty cents. It makes no difference in what proportion they are put into the lamp. The relative proportion consumed will depend upon the manner of trimming. It has been found that about two parts of alcohol to one of coal oil produces a good flame. It is a cheaper light than burning fluid, and much less dangerous, if there is any danger at all. If the alcohol were entirely consumed, the only effect would be that the lamp would smoke. It is as readily lighted as a burning fluid lamp, and can be carried about without smoking.

Dr. Stevens suggested that a petticoat burner, placed over the coal oil tube, would increase the brilliancy of the flame by promoting a draft of atmospheric air, heated somewhat by the tube, and impinging upon the flame just at the point of its ignition. In order completely to consume the light, carburetted hydrogen gas, which is commonly burned in cities, three per cent. of atmospheric air is necessary. With the lighter coal oils, about five per cent. of atmospheric air is necessary to produce complete combustion, and therein consists the philosophy of the chimney. Some of the heavier oils require eight per cent. of atmospheric air, and if by any means they can obtain that, they do not require alcohol or any other fluid containing hydrogen.

Mr. C. W. Smith.—My object is to produce a cheap, convenient and portable light. The attempt at burning coal oil without chimneys have three objections: 1. The smell is disagreeable. 2. The moment you lift up one the lamps suddenly, as in going up stairs, the flame goes out. 3. The light is very deeply colored. In all three of these respects I think this lamp is superior. I regard the lamp as entirely safe. I have endeavored to produce an explosion, but have not succeeded yet. Glass is a poor conductor of heat, and I do not think enough heat could reach the alcohol in the bottom of the lamp, covered with coal oil, to evaporate it sufficiently to make it dangerous. It will burn any sort of kerosene, or mixture of kerosene and petroleum.

Referred, on motion of Mr. Johnson, to the Section on Chemistry.

AMERICAN GEOLOGY.

Dr. Stevens.—The importance of the mineral formations of any country can hardly be overrated. A nation without iron and coal within its borders, must be little more than an agricultural region. Steam is now the great motive power of the world, and coal is the great generator of steam. It was coal and the steam engine that enabled England successfully to compete, at one time, with the French empire and almost the whole of Europe. France, with a much larger and finer country, has never been able to compete successfully with England, for the reason that within her boundaries are no important deposits of coal or iron. Happily for us, within our own country we have all the various economic minerals that are to be found upon the face of the wide globe. I believe that there is no one which may not be found in sufficient quantities to pay the expenses of mining.

I will now point out the localities of the various mineral formations of the United States, beginning with the later discoveries upon the California coast and traveling eastward.

First comes the gold formation of the Pacific.

The deposits of auriferous sands, clays and gravels are distributed from the head of the Gulf of California, in a strip of country varying from fifteen to seventy-five miles in width, across California, Oregon, Washington, into the British possessions, and probably as far north as the Sierra Nevada or Cascade mountains extend. Upon the Sierra Nevada mountains the placer earth is found at various altitudes. How came the gold in this placer earth? The theory is that at one time the whole of the American Continent, west of the Rocky mountains, was depressed four or five thousand feet below the level of the sea. These plateaus must have been formed while the continent was being elevated, the water for a long time standing at a certain height. The debris from the mountains would be washed down the slopes of the valleys into these plateaus, in quantities proportioned to the periods of time during which the earth was coming up from the depth of the sea. Underneath the placer earth there is another source of gold, for it is found in the rocks, the granite, the slate, the serpentine and other rocks. The gold in these rocks is usually distributed through three different systems of veins, varying from a few inches to several feet in thickness. The gold is not always uniformly diffused through the entire vein, but there is a certain association of minerals that is never wanting. Almost all minerals are related to each other in a certain way, certain minerals being generally found together. The original form of gold is sulphide of gold, and associated with it we always find more or less sulphide of iron. All metals are universally distributed, but in certain places they are gathered together in richer profusion, and it is to these that I refer. Iron, lead, silver, molybdenum, tellurium, osmium, manganese and copper are usually found associated.

Coming down to the Santa Clara mountains, we find the richest mines of quicksilver on the globe. In that neighborhood tin is also found. We have the famous Washoe silver mines in Utah. In Illinois and Kentucky is the subcarboniferous limestone, producing some silver and lead; and it makes its appearance again in the Organ mountains of New Mexico, where we come immediately into silver and lead bearing ores again, the silver having become richer as we go westward. Probably this is the same with the great silver formation of Chihuahua in Mexico, extending into Central America and into South America. By the upheaval of the Rocky mountains, both the Carboniferous limestone and the Cretaceous series were broken in two, and they appear again upon the eastern slope of the Sierra Nevada. But the rocks of California belong to an entirely different age, so that geologically it is in vain to look for silver, west of the Sierra Nevada, in the same richness and profusion which it displays in the Washoe mines. Now, to come to the Pike's Peak region; wherever the primitive formation have been upheaved and brought to the surface, they have brought gold with them; and I have no doubt that gold will be found along this entire range of mountains. But it is not found in placer deposits, as in California, and consequently it will not pay the miner as well. It is usually found in this region in the primitive quartz. The gold of North Carolina, extending from Virginia into Georgia, that in Vermont, that upon the Chaudiere river in Canada, and that in Nova Scotia, are all of the same formation.

At Lake Superior we begin with the copper, which is found in connection with calcareous spar, and is sometimes found in immense masses. A new theory has arisen within a few years, viz.: That all minerals were at one time pretty uniformly distributed through the mass of the rock, while it was in a soft pulpy condition; and that the metal was gathered from the entire mass, probably by electrogalvanic action, and brought into a vien. Lime was also in solution in the same mass, and by the same agencies was brought into the same vein. This would explain why we find the copper distributed as it is between these crystals of calcareous spar which show no effect of heat upon them. The celebrated Mr. Crosse filled a box with clay, silex, and lime, uniformly mixed. He then formed an artificial vein, and subjected the whole to the action of electricity. After some months the silex had collected in this artificial vein, forming a true quartz vein. I have explained, on a former evening, that upon the Welsh coast copper is even now in the process of formation. In the British possessions copper is found in the primitive formation, an entirely different formation from that of the Lake Superior region. We have the same formation as on Lake Superior in South Carolina, Georgia, and Tennessee, in New York, and in the lead region of Missouri.

COOKING CANTEEN.

Mr. Herbert exhibited a canteen which could be used for cooking potatos, rice, beans, &c.

Referred to the Section on Mechanics.

TEXTILE FABRICS.

The Chairman stated that he had as yet seen no evidence of any progress, since this subject was last under consideration, in adapting the flax fibre to the machinery now used for spinning wool and cotton, or removing any of the difficulties attending it. So with the tree cottons. He had come to the conclusion that they are all unsuited for cotton machinery in consequence of the unequal length of the fibres. Upon a careful microscopic examination of seven samples of cotton, and estimating their value from the length of the fibre, its fineness, and the degree to which it is twisted into the corkscrew form, he had found that the actual market value in Wall street corresponded with his estimates, showing that these characteristics actually regulate the market value of any description of cotton.

Mr. Bull.—Would there be any more difficulty in constructing machinery for working the flax fibre than for working cotton?

The Chairman stated that cotton was peculiarly adapted to being worked by machinery, whereas there seemed to be no such adaptation in the flax fibre. Napoleon offered a prize of thirty thousand dollars for a machine for spinning flax into a thread; but the machine never appeared. No machine has ever been invented specially for working flax at a rate as cheap as cotton is spun; but the proposition is not merely to spin flax, but to spin it upon cotton and woolen machinery. The great difficulty has been to cause the flax fibre to form a fine thread.

Mr. Fisher suggested that the flax fibre prepared by the steam gun might be available for an extra quality of linen paper. He considered cotton paper as hardly fit to be used for the best kinds of printing and writing. This flax fibre might be found superior to worn linen rags.

The Chairman.—It has never yet been offered low enough.

Mr. Gale said that linen is extensively consumed in this country, for collars, wristbands, shirtbosoms, handkerchiefs, and linen coats and pantaloons, besides many other uses. It costs us from fifty to seventy-five cents per yard, and is chiefly imported. On the other hand, we have a surplus of female labor in this country which might be advantageously employed in its production. Linen is, in my opinion, a better protection against cold than cotton or woolen; for if we lay a covering of linen upon a pile of potatos, and a covering of woolen upon another pile, equally exposed, the latter may be frozen while the former will be uninjured. Apples may be hung up in a linen bag, and will be secure from frost. The United States ought to produce its own cotton, and linen and silk.

Mr. Churchill suggested that the porous nature of the woolen covering, and the impermeability of the linen covering might explain the difference between the two in resisting the frost. Mr. Churchill also remarked that specimens of prepared fibres examined by him, and especially of flax, prepared by a modification of Claussen's process, exhibited the various twisted forms of cotton fibres through short lengths; this might interfere with the identification of short fibres as in paper.

The Chairman said that his observations corresponded with this.

New subject.—The subject selected for the next meeting is "Saltpetre and substitutes therefor."

Adjourned.

American Institute, Polytechnic Association,
January 16, 1862.

Mr. R. L. Pell in the chair.

RAILROAD JOINT.

Mr. Johnson, in behalf of P. Bartens, the inventor, exhibited an improved railroad joint, consisting of a chair, so constructed as to "make the road, as it were, of one continuous solid rail, preventing any rail from getting displaced, and at the same time allowing space between the ends of the rails for expansion." When a rail is to be taken up, the bolts confining it to the sleeper and the key are removed. The chair will then slide along the rail far enough to release the end.

ARMY CANDLESTICK.

Mr. Benjamin W. Hopper, of Astoria, N. Y., exhibited two kinds of improved candlesticks; one of which, in a small tin box, with a looking glass in the lid, three inches in diameter, comprises two candlesticks, to hang up or set down. It has, also, compartments for matches, spare candle, inkstand, pens and penholder.

Referred to the Section of Mechanics.

DRESSING FLAX AND OTHER FIBROUS PLANTS.

Mr. James E. Mallory read the following paper on flax and other fibrous plants, and the proper mode of preparing them for use:

The subject of vegetable fibres has received much attention in this country as well as in Europe during the last few years.

The desire to procure a cheap substitute for rags in the manufacturing of paper has led to many experiments, having for their object the production of a proper material from the fibres of various kinds of wood. Having been interested in a series of experiments of this character, I became satisfied, after a thorough examination of the subject, that the difficulties in the way of procuring a cheap paper, making fibre from wood, were almost if not quite insuperable.

Turning my attention to the tropics, I found an inexhaustible supply of fibrous plants, promising, in my judgment, the very best material not only for paper, but for nearly all the fabrics now in use. It was at first a matter of surprise to me, that from sources of such unparalleled supply, the amount of fibre annually yielded for the various wants of community were comparatively so small. Upon further investigation, I found that it was to be attributed entirely to the defective modes adopted in all tropical countries of dressing and preparing the fibre for market—no simple and well-constructed machine for that purpose is in use. The natives produce the fibre by beating the fibrous leaf with a piece of wood upon a stone, afterwards washing it in water; in this manner one person may produce about six pounds of a coarse, badly prepared fibre per day. It is true that machines for the purpose of separating and dressing the fibre have been invented, both in this country and in England, but all of them have been so expensive and cumbrous, and at the same time so ill-adapted to the object in view, that they have necessarily failed.

About this time I called the attention of Mr. Gelston Sanford to the subject, explaining fully my own experience based upon previous experiments, and submitting various specimens of tropical plants which I had obtained from St. Domingo. After an extended course of experiments, Mr. Sanford has succeeded in producing a machine wonderful for its simplicity and effectiveness. This machine will readily produce an amount of thoroughly dressed fibre varying, according to the kind of plant used, of from three hundred to six hundred pounds per day, and requires only one person to work it. It will soon be put to practical use in the countries in which fibrous plants grow in great profusion, by a company of gentlemen of this city.

"The following extract, from a work entitled "Tropical fibres, their production and economic extraction," published during the past year, by Mr. E. G. Squier, will sufficiently show the importance of the subject as well as the value of this invention:

In the year 1857, (January 14,) Chief Justice Temple, of Belize or British Honduras, read a paper before the Royal Society of Arts of London, on the resources of that country, which, as is well known, forms part of Central America. Amongst other objects of interest, he exhibited a quantity of the fibre of the plant under notice, *pine-apple*, as well as of the *Agave Sisilana*. Of the former, or *Bromelia Sylvestris*, he said: "The plant called *Bromelia pita istle* by the Mexicans, and *silk grass* by the Creoles of British Honduras, grows spontaneously in the greatest abundance. The leaves are of a soft, dark green, from five to thirteen feet long, and from an inch and a half to four inches wide. Along the edge of the leaf, about six inches apart, are short, sharp, curved thorns. When the plant is cultivated these gradually disappear. The fibre which the leaf contains is unquestionably of a superior description, and I have no doubt could be used in every species of textile fabric. I have been informed by leading manufacturers that this fibre is equal to the best China grass, superior to the New Zealand flax, and capable of being manufactured into the finest fabrics."—[Journal of the Royal Society of Arts, vol. 5, p. 125.] In the discussion which took place among the leading members of the society, on the paper of Judge Temple, Mr. P. L. Simmonds, editor of the Mark Lane Express, said: "I have, to-day, seen some of the indigenous specimens of the

Penguin or *Bromelia* from Honduras, which have been operated upon by a new patented process of Messrs. Pye Bros., of Ipswich, and am astonished at the remarkable improvement and high commercial value which have been given to the article. *The main difficulty that has stood in the way of rendering many of these fibres useful of making them cheap, and of universal use, has been the want of cheap and efficient machinery for preparing them, and getting rid of the gummy and other matters without injury to the fibres. Such machinery is a desideratum of the age.*"

Mr. Pye remarked that "on the authority of practical men he could confidently assert that the fibre of the *Pita Bromelia*, from its strength and quality, might be rendered fit, by the hackling process, for the finest fabrics."

Mr. J. B. Sharp said that "he could confirm all that had been said by those who preceded him. He had that morning submitted some of the fibres to a close microscopical examination, and had ascertained that each fibre contained from five to twelve or more fine filaments, held together by gummy matter, capable of being dissolved by proper processes. Some of the specimens before them had been passed over the comb or hackles of a flax-mill, and had been pronounced by the most experienced flax spinners of the country (England) to be greatly superior to Russian flax, and approaching the best description of Belgian, in capability of application to the finest textile fabrics. * * A material point to be considered was: What machinery shall be employed in obtaining these fabrics? On this head he would observe that the plantain, one of the most luxuriant plants in growth, could be easily prepared with one machine, while the silk grass or *penguin*, etc., required a machine essentially different in construction. * * The leaf of the silk grass consisted of two different structures; the upper side being of a soft or pulpy character, easy of removal; and the under side of a harder or more ligneous character, and more difficult to separate—these two external bodies holding the fibre between them. The preparation of the fibre, however, was a question of mere mechanical arrangement. * * He had no hesitation in saying that the three British colonies of Jamaica, Honduras and Guiana were capable of furnishing fibres from the plants in question to the value of $15,000,000 per annum."

Any one desirous of further information upon the subject of tropical fibres, can be satisfied by reference to the book from which I quote.

After Mr. Sanford's machine had been brought to perfection, the question arose whether the machine or the principle upon which it was constructed, might not be applied to the dressing of flax. We tried it, and the experiment was so far satisfactory that we immediately set to work to modify the machine, and at the same time commenced an earnest study of the nature of flax, as well as of the various processes and modes of dressing through which flax straw has to pass on being prepared for textile fabrics.

We have examined all of the machines and processes now in use, as well as many of the most promising inventions which have proved failures; our object being to learn the real difficulties to be overcome, as well as the cause of the failure of so many inventions. We finally discovered not only the difficulties to be surmounted, but also the reason why others have failed in their efforts; and that I may be perfectly understood, I propose to commence with the *hand bench break* and *hand scutcher*, stating the objection to that mode of dressing flax, and then to notice briefly the flax dressing machines now in use in this and other countries; stating the objections to the present mode of dressing flax, its wastefulness and danger, and also the reason why not only the present machines and modes of dressing flax should be abandoned, but the reason why flax dressing should be taken altogether from the mill owner and left to the farmer by whom the flax is grown. Flax straw, after it has been rotted, still contains sufficient gum to cement the fibres quite firmly to the woody stalk, and in order to remove the boon or shoove without injury to the fibre, it is necessary first to separate the fibre from the woody part longitudinally, and secondly, to break the boon of a length not to exceed one-fourth of an inch; and as the edge of the woody particles, when broken, are sharp, and act like knives upon the fibre, it is necessary in order to remove them without injury to the fibre, that the material should be acted upon in such a manner as to open the fibres, allowing the shooves to drop through them.

The construction of the old hand break is such as to break the boon too long, leaving a great portion of it still adhering to the fibres. In using this machine, the operator, after breaking the straw, takes a handful of the material thus prepared and beats it with a knife or swingle for the purpose of removing the pieces of boon still adhering. The objection to this mode of flax dressing is this: The mass of the material in the hands of the operator, subjected to the knife or swingle operation, is so large that a perfect removal of the woody particles becomes impossible without a very considerable waste of valuable fibre; the fibre being drawn out from the mass with the woody particles, and in addition to this loss, the fibres remaining in the hand of the operator are materially injured by becoming entangled as well as bruised or partially broken. The condition of the fibre, after undergoing this treatment, is such that, in subsequently reducing it to a degree of fineness, fit for fine fabrics, a further loss of from forty to fifty per cent is sustained.

A great many experiments have been made, from time to time, to discover some new mode of preparing flax straw for the action of machinery, such as water rotting, steeping in hot water, in alkali with and without heat, steaming with and without pressure, and the like; but all have been abandoned for the old process of dew-rotting, which is now universal.

The business of flax dressing is now and for a long time has been controlled by the owners of mills or factories, erected at considerable expense expressly for that purpose. The machines used by them are constructed upon the same principle as the hand process above described, and require, to operate them, skilled and high priced labor.

Flax dressing by the hand process is so tedious, and the daily yield so small, as to render it unprofitable to the farmer, and, as few farmers have sufficient capital to enable them to erect suitable buildings, and to purchase the expensive machinery now in use for flax dressing, they are compelled, if they raise flax at all, to sell the straw to the mill owner.

Farmers living at a distance from the mill cannot afford to cart the straw, hence the amount of flax dressed must be limited and the price high.

Could every farmer have a machine, which could be driven by horse power, and attended by boys or girls, without risk to the operative, it would not be long before a linen fabric could be purchased for a price less even than that of cotton. Great efforts have been made in this country, as well as in Europe, to devise such a machine, but hitherto without success. It is belived that the machine invented by Mr. Sanford, which I will presently explain, will fully answer that important end.

There are within fifty miles of Troy, N. Y., fifty-six mills, which cost from five to eight hundred dollars each, exclusive of buildings and power, and which severally dress from one to two hundred tons of flax straw per year. The power required to drive these mills may be stated to be from six to fifteen horse power.

All of these mills are constructed upon the principle of the old hand process, with the single exception of the break. Instead of the bench break, they substitute fluted rollers, through which the flax has to be passed six or seven times. The operative is required to exercise considerable skill and caution in working the fluted rollers, as there is always danger that his arm may be drawn between them. As many as ten cases of this kind have occurred within a few years, in a single county, in each of which the operative lost an arm.

After passing through the rollers, the flax is passed to a man who does what is termed rough scutching, and from him to another man who does the fine scutching and finishing. The scutching knives are precisely like the old hand scutchers, six of which (being each about two feet in length) are placed in the periphery of a common pulley, about two feet in diameter, and three of these pulleys, armed with scutching knives, are placed on one shaft, at suitable distances apart, to enable three men to stand between them in a right line. Considerable care must be exercised in using this machine also, as the fingers of the operative are not unfrequently cut off by the revolving knives. The straw to be dressed passes through the hands of several operatives, as follows: One passes it to the man attending the break, the breakman passes it through the fluted rollers six or seven times, as above stated, and the man who first handles the straw then passes it to be dressed by the revolving knives to the scutchers, two of whom rough dress it, as it is called, then a third takes the product of the two rough dressers, and gives it the fine or finishing scutch, as it is termed. It is then tied up and pronounced ready for market. The man who first handles the straw, not being fully employed in that duty, assists generally about the mill. Under the present mode of dressing flax, a number of men are employed in rotting and preparing the flax for the mill, all of whom are under the control of the mill owner. Much of the flax is brought from a distance to the vicinity of the mill, and there rotted and prepared. In consequence of this, much valuable straw is wasted by being handled so many times. After the straw is at the mill, so imperfect is the present mode of dressing flax, that nearly one-half of the fibre passes into a refuse called tow. The tow is of two qualities: the course worth at this time only fifty cents per hundred pounds, and the fine worth two and a half cents per pound. All of this tow, if in long *line*, would be worth, at this time, twelve cents per pound.

After flax is dressed, as above, the fibre must pass through a subsequent hackling process, before it is reduced to a degree of fineness suitable for spinning, and in this process loses, as I have before remarked, from 40 to 50 per cent, which passes into tow. This is owing to the defective principle upon which the flax is dressed, it being impossible, by any mode now in use, to remove the woody particles of the flax stalk without breaking or marring many of the fibres, and entangling very badly those which remain.

The true principle upon which flax-straw should be relieved of its boon is to break and free it simultaneously. The only principle, or machine, now in existance, which will thus dress flax, preserving the fibres perfectly parallel and unbroken, is the Sanford machine.

The principle upon which this machine works is this: The flax-straw, in a thin stratum, is passed through a pair of feed rollers, one of which is elastic—the rollers allowing the straw to pass through them at the rate of one hundred and sixty feet per minute. As it passes through the feed rollers it comes in contact with a cylinder and belt which are running (the one driving the other) at the rate of eight hundred feet per minute, the belt and cylinder being armed with teeth and scrapers, and arranged so that the straw must pass between them—the bars or scrapers and the teeth taking hold of the flax-straw upon both sides of the straw, the set of bars on the belt striking the straw on one side about an eighth of an inch in advance of the bar on the cylinder, breaking the woody part of the straw very short, while the teeth, on both cylinders and belt, keep the fibres perfectly straight, so that most of the woody particles drop through the bars or scrapers on the belt (the belt being open for that purpose). The remaining shooves are scraped off, and carried out out of the fibre, at the end of the machine, through channels which the teeth keep constantly open. The construction of the machine is such that the flax-straw, upon being fed in, is first bent one way, and then the other. The first effect of this bending motion is to relieve the fibre from the boon longitudinally. The next effect is to break it, but never till after the bars have first loosened it. This action avoids the possibility of injury to the fibre, by the teeth and scrapers, in removing the boon or shoove.

To operate this machine, one person (a boy or girl may do it) places the flax-straw in a clamp, about two and one-half feet long, and about one inch wide, by one half inch thick, the inner surface being lined with rubber, so as to yield to the unevenness of the straw as it is laid in it. The clamp is jointed at one end, like the newspaper-holder, and is very like it in appearance. Each clamp, filled with the straw, is laid upon a table near the machine, and is then taken by another person (boy or girl), who presents it to the feed rollers, holding one end of the clamp until the rollers have drawn the straw in. After the straw has been drawn in a little more than half its length, the operator then steps upon a treddle, which reverses the motion of the feed rollers, (the feed rollers being so arranged that they feed the flax out five times as fast as it is fed in). The operator then presents the other end of the straw held in the clamp, which is fed in as before.

The product, after undergoing this operation, is in a fit state to spin into all goods of a coarse character, such as twine, toweling, etc., etc., but for fine goods, like flax fibre, dressed by all other modes, it has to pass through a subsequent hackling process, but with this remarkable difference—the fibre's cleaned by this machine being all unbroken and uninjured, and each fibre being perfectly parallel with every other fibre, and being entirely free from boon. The hackling process is attended with very little loss.

The inventor of this machine has spent much time and, in connection with other parties, much money under the conviction that it was possible so to construct a machine that it would operate not only with a great saving of fibre, and without danger to the operative, but that it might be made so simple and cheap that every farmer, however poor, could afford to have one; he, also, believed that could such a machine be placed in the hands of the farmer, so great an impetus would be given to the growing of flax for textile fabrics, that within a few years it would become an important branch of industry in all the free States, remunerative to the farmer and beneficial to the community.

Many scientific men, and men of experience in flax dressing, have examined the Sanford machine, have tested its practical operation, and the character of the product yielded by it. They are, without exception, convinced that the following facts are established:

First.—A machine capable of producing seventy pounds of fibre in ten hours, can be sold at a price not exceeding one hundred and thirty dollars, at the factory ready for shipment.

Second.—The yield of flax fibre, by the use of this machine, in proportion to the weight of flax-straw dressed, exceeds by at least one-third that obtained by any other machine or process.

Third.—The fibre dressed by this machine is much more valuable than that dressed in any other way.

Fourth.—This machine is so simple in its construction and operation that the liability to derangement is very slight, and the facility for keeping in order very great.

Fifth.—This machine does not require in its use any peculiar skill. It can be operated by boys or girls, and does not involve any risk to the hands or arms of operatives, while the ordinary scutching machines require the use of skilled labor, and, as experience has proved, is always attended with risk to the operatives.

Sixth.—This machine can be driven by any of the horse powers in use, and as it can be operated by ordinary farm labor, it enables the farmer to dress and prepare for market at a little expense the flax raised by himself, thus opening to him a new and profitable field of labor.

Seventh.—The machine is small, occupying three feet square, and weighing about four hundred and fifty pounds.

The amount of flax fibre produced in the United States in the year 1850 was 7,806,809 pounds. Had the straw from which this amount of fibre was taken been dressed by the Sanford machine, the yield would have been not less than 10,409,078 pounds. The increased product at present prices, would be worth $312,271.86.

When it is remembered that in many of the western States an immense quantity of flax is raised for the seed alone, the straw being destroyed or wasted as of no value, it will readily be seen that the introduction among farmers of a cheap and effective machine, capable of converting what would otherwise go to waste, into an article of great value, cannot fail to produce the most important results.

It is well known that flax can be successfully cultivated in all the northern States. If, in addition to the value of the seed—

sufficient of itself to pay the entire cost of cultivation—the straw can readily be made a source of large profit—a wide field of successful industry will be opened.

Mr. Sanford, the inventor of the machine described, then explained the model, and exhibited its mode of operation.

The Chairman inquired about the practical success of the steam gun for making flax cotton.

Mr. Mallory stated that he had been connected with the first experiments with the steam gun. He had tried it upon various materials, and had even blown liguum vitæ with it. The objections to it for flax are that the cotton made by it must afterwards be passed through a picking machine, and that the heat makes the flax more difficult to bleach. Sanford's machine does at one operation what requires four or five with the steam gun. And if flax cotton is desired, it can best be made from flax that has passed through this machine.

Referred to the Section of Mechanics.

AMERICAN GEOLOGY.

Dr. Stevens.—I have, in a former lecture, said that certain ores are always found associated together. Gold, when in place, is usually accompanied by sulphuret of iron, and sulphuret of iron generally contains gold. Whenever lead is found in the United States, the sulphuret or some other ore of zinc is associated with it. One of the most prominent localities for lead in the United States is the neighborhood of Galena. There are immense quantities of zinc in the west, but unfortunately it is associated with the sulphuret of iron, and on this account it has not proven valuable. The great zinc formations of the United States are found in the Blue Ridge. At Franklin, in New Jersey, it is found in the form of oxide, and iron, manganese are combined with it in one mineral. Zinc is one of our most important mineral productions. Its oxide is of great value as a paint, from the fact that it is not injurious to health, and that it is not darkened by sulphuretted hydrogen.

The next great mineral formation of the United States is iron. Practically, iron ores are divided into two great classes; those in which the iron is in the state of an oxide, and those in which it is in the form of a carbonate. The latter are frequently found associated with limestone, in the coal formations; while the oxides are found in all formations. The ores of iron earliest in geological date, are the magnetic oxides which are found in the azoic rocks. Such ores are found in masses called "Iron mountains" in Wisconsin and Michigan, Lake Superior. I suppose that the iron was originally distributed throughout the soft muds and sands which form the slates of that region; but by some chemical or chemico-electric agency the iron was gathered together in masses. The denuding agencies which have since swept over the country, have worn away the slates, leaving the iron ore in a mountain shape perhaps two or three hundred feet above the level of the plain. Oxides of iron are found in other formations. Where the carbonates of iron have cropped out on the sides of hills, they have given off their carbon and taken up oxygen, and have thus been converted into hematites, which are rich ores of this metal.

Blackband is a carbonate of iron, mingled with bituminous shale. The amount of carbon and bitumen is so great that the whole can be set on fire, and the burning of the carbon will roast the ore. But this ore is only used for mingling with other ores.

Experience has satisfied iron masters that the best iron is obtained from mixtures of different kinds of iron ores. For instancs, from Pittsburgh they will send to the Adirondack mountains for the magnetic oxide, and to Tennessee for the dyestone ore, which they mingle with the nodular ore of their own neighborhood. These nodules are found in the coal measures in a shale which is otherwise free from iron. I account for their presence thus: After the coal was formed, there was an irruption into the coal basin of waters from the surrounding neighborhood which carried the neighboring forests and all the floating material into the coal basin. They then became water-logged and sank down upon the coal. Around this vegetable and animal matter, the iron was collected.

SALTPETRE AND SUBSTITUTES THEREFOR.

Dr. Stevens.—Saltpetre, or the nitrate of potash, is scarcely ever found as a mineral by itself; but everywhere the elements for its formation exist in the soil, in organic matter, and in the atmosphere. All that is requisite is to protect a sufficient portion of the earth from rains and heavy dews. Hence saltpetre or some other nitrate is constantly forming in caves and under barns, wood houses and sheds where organic matter is present, and potassa or some other base is in the soil. During the last war, the great caves of Kentucky and Tennessee were the chief source from which we obtained our saltpetre. England, at present, holds almost a monopoly of the saltpetre of the globe, in consequence of the low price at which she obtains it from her Eastern possessions. Saltpetre may be artificially made by taking plaster from old houses, carrying it into fields, covering it with sheds, and continuously sprinkling it with nitrogenous fluids, until the nitrate of lime is formed. It is next mixed with wood ashes, thus converting the nitrate of lime into the nitrate of potash. Nearly all the saltpetre used in Germany is made from this source.

Dr. Vanderweyde.—Dissolving phosphorus in bisulphide of carbon, produces a liquid. Dipping a piece of paper in this, the moment it becomes dry, it will ignite. (This was illustrated by experiment.) An Englishman has proposed to fill shells with this compound. The plan has not been adopted in practice.

New subject.—Prof. Seely suggested for the next meeting, the subject of "The application of Chemistry to the Military Art," which was agreed to.

Adjourned.

American Institute, Polytechnic Association,
January 23, 1862.

Mr. Fisher in the chair.

OFFERS FOR PREMIUMS.

Messrs. Baker & Smith offered their "Low Pressure, Steam Warming and Ventilating Apparatus."

B. I. Burnett offered the "Eureka Refrigerator," and also the "Eureka Ice-chamber," arranged for cooling and purifying air in rooms of the sick, &c.

Referred to the Section of Mechanics.

AMERICAN GEOLOGY.

Dr. Stevens.—To-night I shall call your attention to the American coals.

It may be well to state in the first place how they came into notice as generators of heat and gas. It is said that John Schneider,* former Governor of Pennsylvania, had upon his

* The discovery of the value of Anthracite coal was claimed for John Cist, Esq , Wilkes-barre. He had explored and completed a map of the Wyoming coal formation as early as 1811.—J. R.

estate, in the Lehigh region, what he called stone coal, upon which for twenty years he experimented at various times. He could occasionally make it burn, but it would hardly be got to burning, by the aid of more inflammable fuel, before it would go out. He was laughed at by his neighbors all this time; but he had the true German perseverance. One day a Yankee clock pedlar, seeing it, discovered the secret of the failure to burn. With a good fire of hickory wood, it would burn and make the kitchen too hot too live in; but as soon as the wood was burned up, the coal would fall down and go out. So the Yankee went into a blacksmith's shop and constructed a grate, and in that the stove coal would burn. Just as it was in the tide of successful experiment, a messenger arrived at the gate to inform the Governor that a criminal was about to be executed, and making application for a pardon. "Let him hang," said the Governor to the messenger, "you come into the kitchen and see my stone coal burn." An attempt was next made to burn it in the furnaces of steam engines, but at first without success. At last an engineer having got up a pretty good fire went home, and upon returning to his furnace found it all in a glow, with a good Lehigh fire; and thus he discovered that the way to burn it is to get it a burning and then let it alone. If the draft is too great, clinker will be formad, and the way to prevent it is to diminish the draft. From that time the burning of anthracite in the United States became a fixed fact, and it is now used all over the world. It has in many places banished all other coal, and is the purest and richest source of carbon that the world knows of.

After it was ascertained that anthracite would burn, the iron manufacturers tried it, and found, after many and long trials, that, with the hot blast and pure anthracite, iron could be made cheaper than in any other way. The anthracite pig has become so cheap in the market that, in the United States, charcoal pig is manufactured only for specific purposes. Thus, at Salisbury, Conn., iron is made from a pure hemitite, with charcoal, for purposes requiring a tough iron, such as the axles of cars, tires, muskets, swords, etc.

The coals in the United States are divided into:

Anthracite,
Semi-Anthracite,
Bituminous,
Cannel, and
Bituminous Shale,

According to the amount of carbon which they contain. Different specimens from the same vein of coal, differ materially in the relative proportion of their constituent elements; but the following table exhibits an approximation:

	CARBON, per cent.	GAS, per cent.	WATER, per cent.	ASH, per cent.
Anthracite	85	7.3	.9	6.8
Semi-Anthracite .	73	15.8	1.2	9.9
Bituminous	63	31.5	1.5	2.0
Cannel..........	27	63	1.5	8.4
Bituminous Shale.	17.7	34.7	1.7	45.9

The carbon is the element which gives to coal much of its value for generating heat. Coals, other than anthracite, contain the gases, oxygen and hydrogen, which form the flame of coal. When the coal contains sulphur, the hydrogen combines with it, forming sulphuretted hydrogen. For this reason, when coal gas is burnt in cities, paint, whose basis is white lead, grows dark more rapidly than it used to do before gas light was introduced, and it is more difficult to keep silver ware bright. It is impossible to dry coal thoroughly without artificial heat, and there is left, as the analysis just quoted shows, one or two per cent. of water. The ashes contain silica, alumina, iron, lime, soda, potash, sulphuric acid, chlorine, phosphoric acid and magnesia, singly or combined.

Dr. S. then exhibited drawings of the coal formations of the Monongahela, showing the different depths at which the important veins lie beneath the surface.

The Nova Scotia coal lies north of the Bay of Funday, and was formerly abundant in our market, under the name of the "Picton coal." There is also a narrow trough, commencing in Rhode Island, and running up to Worcester, Mass., about thirty-five miles in length, containing an anthracite coal so hard that it is said that to burn a ton of it, we must burn two tons of Pennsylvania coal. These two coal formations belong to the same era in the world's history, and had no connection with the appalachian system.

It is coal which has brought about that great increase of the wealth of England, within the last century, which enabled her, throughout the continental wars, to supply the armies of Europe with her gold, and the world with her manufactures. It has made England the mother of colonies. She still possesses the only great accessible coal deposit in Europe. But we have far greater resources of this description than she has, thus: We have, in Pennsylvania, more coal than England ever had. We have, also, more coal in each of the States of Virginia, Ohio, Kentucky, Tennessee, Illinois and Missouri, and probably in Kansas, than is known to exist in all the rest of the world put together. Were our population to become as dense as that of China or Japan, we should have for each person a ton of coal every year for at least ten thousand years to come. I say then that we are destined to become the great manufacturing and commercial nation of the globe, if, happily, we can only keep together.

IMPROVED JOURNALS FOR RAILROAD CARS.

Mr. Atkinson exhibited Hopkins' patent brass journal for railroad cars, which had been in use upon the Central Railroad, of N. Jersey, for six months, and had run 63,000 miles. It weighed two pounds fourteen ounces, when new, and now weighs seventeen and a half ounces. It ran three months with one oiling. The box is made tight, so as to keep the dirt out.

APPLICATION OF CHEMISTRY TO THE MILITARY ART.

Prof. Seely.—I presume it was not the intention, in selecting this subject, to include the application of chemistry to provide for the ordinary wants of the soldier, but merely its application to the pyrotechnic or destructive art. There is an exaggeration in the public mind with regard to what chemistry is capable of doing, and as to what it has done in warfare. The far-famed Greek fire, which was said to destroy everything in its way, and which water would not extinguish, was not near as efficient as ordinary camphine or alcohol. It seems that it was substantially composed of our petroleum oil.

Some modes of applying chemistry are objected to because of their barbarism, such as firing poisoned balls, or poisoning the provisions of the enemy. It is not the object of modern warfare to make men sick for life, or to destroy the lives of men, women and children, indiscriminately, but to defeat soldiers in the field, until the war can be ended.

The military is now the most perfect of all the arts, for no other art has been so much encouraged by governments.

I think that a shell six inches in diameter, filled with melted cast iron, will have more effect than a hogshead of any inflammable fluid that could be fired. Sulphuric acid, sprinkled over an enemy, may do them some harm; but a shot will do more harm than a drop of sulphuric acid. The great feature in the application of chemistry to the military art is gunpowder, and I think we shall never find anything superior to it. A new cartridge has been invented, of which the paper is itself explosive, and water proof. This may be a convenience, but it will not send a ball any farther than the ordinary cartridge.

Dr. Vanderweyde.—It has been proposed to use the chlorate of potassa instead of saltpetre in the manufacture of gunpowder, but it will not answer because the compound will ignite by mere friction.

We may obtain from the chemical equivalents of the substances which form gunpowder the proper proportions to be used in its manufacture. They are as follows:

$$\left.\begin{array}{r} S \\ 3\,C \\ KO \\ NO^5 \end{array}\right\} \begin{array}{c}\text{which becomes} \\ \text{by combustion}\end{array} \left\{\begin{array}{l} KO, SO_3 \\ KO, CO_2 \\ CO_2 \\ N \text{ etc.}\end{array}\right.$$

The best gunpowder agrees very closely with this. Gunpowder was invented by accident, and chemistry has not found any substance which will supersede it.

Mr. Stetson suggested that chemistry might, perhaps, give us a substitute for gunpowder which would have a less injurious effect in fouling the gun, or at least supply us with purer materials, so that the powder may burn up clear.

Dr. Vanderweyde.—What injures the gun is the sulphuret of potassium, SK. If the powder is not made with care, there may be an excess of it, which will enable the sulphur to attack the iron.

Mr. Charles W. Smith said that chemistry had brought the percussion cap into use. In the revolutionary war, and in that of 1812, our armies used the old flint lock musket. Among the things remaining for chemistry yet to do, are these: To invent a fuse, which shall be reliable for its rate of combustion; and, secondly, to invent a destructive fluid which will inflame spontaneously. Filling hollow balls with melted iron has proved unsuccessful; and the old method of red hot shot is practically far superior to it.

Mr. Sedgwick spoke of the advantages which chemistry might afford in the hygienic department, in improving the sanitary condition of the soldier, in providing him with good food and good water, etc.

Dr. Vanderweyde incidentally remarked that aluminum, while it will withstand the action of nitric acid, will not resist alkalies, and will not withstand soap; so that it is not suited for cooking utensils.

Dr. Stevens alluded to the victories of Napoleon, won with the *smooth-bore gun*, round balls, and flint-lock muskets. At the siege of Toulon, he drove away the British ships, while his nearest batteries were three, and some of them five, miles off. What have we gained upon that? The success of an army depends more upon the feeding of its soldiers than upon the length of their guns.

The same subject was continued for another week.

Adjourned.

American Institute, Polytechnic Association,
January 30, 1862.

Mr. R. L. Pell in the chair.

OFFERS FOR PREMIUMS.

Messrs. Bartlett & Lesley offered for competition: The Polar Refrigerator; the New Gothic Furnace; the Water, Wine and Butter Cooler.

Mr. J. W. Moore offered for competition: Elliot's Pocket Revolver; Elliot's Hand Printing Press; Elliot's Spring Bed.

Referred to the Section of Mechanics.

PIKE'S PEAK.

Mr. Walker, upon invitation, gave a description of the settlements in the neighborhood of Pike's Peak, in the Rocky mountains.

The greatest disadvantage under which the settlers in that region labor, is the want of a reliable method of separating gold from quartz. At present a large proportion of the gold is undoubtedly thrown away, for frequently analysis shows that $300 worth of gold ought to be found in a ton of quartz; and yet although it, the ore, is probably uniform in its character, $20 worth is all that can be obtained. Amalgamation with mercury, in the ordinary way, does not answer the purpose, for the gold dust may be stirred into the quicksilver, and they will not unite. But if the quicksilver be first amalgamated with a copper or brass plate, the gold will then unite with it to some extent. I have examined every amalgamator I could find, and I have seen nothing that I think will answer the purpose. Whoever invents a reliable amalgamator will revolutionize the whole system of obtaining gold. The quartz there is universally crushed by stamps, after having been blasted out. This quartz is not a white crystallized substance, but is more like a porous brick. It occurs in parallel vertical veins, from two to ten feet thick, and besides the gold there is a good deal of silver in it. The atmosphere of this region is so dry that a piece of meat which is hung up in the air will dry up, but will not become tainted.

APPLICATION OF CHEMISTRY TO THE MILITARY ART.

Mr. Fisher suggested that among other applications of chemistry various articles had been put into a concentrated form, in which they could be more useful to the army. Extracts of tea and coffee had been made for this purpose.

Mr. Johnson stated that potatos are made into a flour in this city. They are boiled with the skins on, and while hot the skins are scraped off. They are then passed through a sieve, dried, ground into a coarse flour and barreled.

Prof. Seely.—As I stated at the last meeting, chemistry is doing for the soldier as it has done for other men, administering to his comfort by improving his food and clothing. The invention of gunpowder I consider the great tribute of chemistry to the military art. Mechanical inventions always precede or follow chemical inventions, and are intimately connected with them. It was a mechanic who conceived and perfected the application of gunpowder to the military art. The composition had been known in China centuries before the Christian era, and was in common use for pyrotechnic displays, in celebrating jubilees and for peaceful purposes alone. But it was some centuries after the Christian era before there was a gun, and before the composition could have been called gunpowder. I do not know that we have gained anything in the art of destruction of life by gunpowder or other improvements in war. I fancy that we do not kill any more men in proportion to numbers in battle, now-a-days, than was done formerly. The only effect of our improvements is to increase the distance between the combatants, who get just so much further off to be as safe as they were before. After gunpowder there are ten thousand little things that the chemist may introduce as improvements in the manufacture of the materials, the iron, steel, copper, brass; and in the modification of the composition of gunpowder itself, in its fineness or in providing substitutes for it for particular cases, as in the charging of shells. Among these, one of the most important was the invention of the percussion powder and percussion cap. Gun cotton will not take the place of gunpowder, not only because it burns too quickly, but because it will not burn without the presence of air. Gunpowder contains within itself oxygen enough to burn its other constituents; but gun cotton does not. If it is necessary to have a composition to explode more quickly than gunpowder in charging shells, I do not know anything better than gun cotton saturated with chlorate of potassa.

Mr. Fisher.—While the improvements in warfare may not cause any greater destruction, or give civilized nations any advantage over one another, yet they are valuable in rendering it impracticable for barbarians to overrun civilized nations. The more knowledge is required, and the more skill and capital are invested in these improvements, the safer we are from attacks by barbarous nations.

A visitor suggested that the more destructive the weapons of war the greater must be the distance of the contending parties, and hence the less the actual loss of life. It is, therefore, a humane act to make such improvements.

Prof. Joy, of Columbia College, stated that within the last few years Prof. R. Bunsen had made some interesting chemical analyses of gunpowder, the result of which varied much from our previous information upon the subject. The composition of the gunpowder was:

Saltpetre	78.99
Sulphur	9.84
Carbon	7.69
Hydrogen	.41
Oxygen	3.07
	100.00

After explosion, the residue was found to consist chiefly of sulphate and carbonate of potassa, the analysis being:

Sulphate of potassa	56.62
Carbonate of potassa	27.02
Hypo-sulphite of potassa	7.57
Sulphide of potassium	1.06
Potassa	1.26
Sulpho-cyanide of potassium	.86
Saltpetre	5.19
Carbon	.97
	100.52

The composition of the condensed smoke was almost identically the same, being:

Sulphate of potassa	65.29
Carbonate of potassa	23.48
Hypo-sulphite of potassa	4.90
Potassa	1.33
Sulpho-cyanide of potassium	.55
Saltpetre	2.48
Carbon	1.86
Carbonate of ammonia	.11
	100.00

The composition of the gas is altogether different from what we formerly supposed it to be. Carbonic acid and nitrogen form nearly the whole. It was found to be:

Carbonic acid	52.67
Nitrogen	41.12
Carbonic oxide	3.88
Hydrogen	1.21
Sulphuretted hydrogen	.60
Oxygen	.52
	100.00

The pressure of the gasses is 4,374 atmospheres, of which 1,000 is due to expansion by heat. The solid products of the combustion of 100 lbs. of powder amounted to 67.70 per cent., and the gaseous products to 31.24 per cent., the results being:

Sulphate of potassa	42.20
Carbonate of potassa	12.60
Hypo-sulphite of potassa	3.20
Sulphide of potassium	2.10
Sulpho-cyanide of potassium	.30
Nitrate of potassa	3.70
Charcoal	.70
Sulphur	.10
Carbonate of Ammonia	2.80
Nitrogen	9.90
Carbonic acid	20.10
Carbonic oxide	.90
Hydrogen	.02
Sulphuretted hydrogen	.18
Oxygen	.14
	98.94

This analysis was made in 1857, and is one of the most skillfully executed analysis we have.

The objections to gun cotton, urged by Prof. Seely, I think unanswerable. It has been found in blasting to blow out a small hole instead of large masses of rock. Gunpowder is the most obvious contribution of chemistry to the military art; but it would be difficult to say what it has not contributed, for without chemistry we could not clothe our army, or feed them, or furnish them with arms.

Prof. Seely.—Was the gunpowder, in these analyses, burned under pressure as in a gun?

Prof. Joy.—It was put into a fuse on the end of a whip-stalk, and so arranged as to shake down one grain at a time into a funnel, so that but one grain should be exploded at a time. There was an aspirator at the other end of the apparatus to draw off the gases, which were immediately sealed up in tubes, and set aside to be analysed. The residuum in the little bulb was analysed, and the smoke was also analysed.

Prof. Seely.—I conceive that this explanation very well accounts for the discrepancy between the results of this analyses and of our former analyses. The products of the combustion of gunpowder, or anything else, will vary very much with the temperature and the pressure at which combustion takes place. The higher the temperature the fewer the products and the simpler the constituents. In these analyses the temperature was evidently low, being only sufficient to procure ignition. Certainly we should not find from a gun such an unstable product as carbonate of ammonia. This fact of varying products from varying temperature may account for some of the evils in the use of gunpowder.

Prof. Joy stated that if our supply of saltpetre were cut off, we could manufacture it. By boiling together the chloride of potassium and nitrate of soda, they would decompose each other, and form common salt and nitre.

Dr. Rowell.—The office of sulphur in gunpowder is to take fire at a very low temperature; and it is the office of the charcoal to keep up the red heat necessary to decompose the nitrate of potash. The temperature at which an ordinary friction match takes fire is so low that it may be lighted and extinguished in alcohol; but if we wait until the brimstone takes fire, it will set the alcohol on fire. It takes a temperature of 600° to set oil on fire, and sulphur burns at a lower temperature, so that we must wait for the wood of the match to be ignited before we can light an oil lamp. If we could instantly convert a particle of ice into steam, it would be as useful as gunpowder. But whatever we undertake to substitute for gunpowder must be readily inflamed, and, at the same time, become sufficiently heated.

Prof. Seely.—The amount of heat produced by combustion depends upon the amount of oxygen consumed. There is no substance which produces so much heat in combustion as hydrogen. We find they combine:

Hydrogen........	1	Oxygen........	8	Seg.... ..	1:8
Carbon...	1	do	$3\frac{1}{2}$	......	1:3.5
Sulphur.....	16	do	32	......	1:2
Phosphorus.... ..	32	do	40	......	1:1.25

And this is the order in which they produce heat. There is another property of sulphur, also very important: its volatility, and the readiness with which it communicates a flame from one particle to another. This causes a large volume of powder, in small grains, to be ignited very rapidly, there being a large surface which the flame covers.

Mr. Roosevelt suggested that as it takes more than a man's weight in lead to kill a man, gunpowder is only a humbug after all, and the bayonet the proper weapon for an effective army.

Mr. Johnson suggested a new mode of making large iron tubes for guns, hydraulic presses, and other articles requiring great tenacity.

At present it is the practice in most cases to bore the cavity out of a solid mass of metal, whether obtained by casting or forging. Mr. Johnson would propose, instead, to form the tube upon a mandril, beginning by rolling upon it a red hot sheet of wrought iron. Upon this he would sprinkle, while hot, the Franklinite iron, with borax, covering the layer with a second sheet of red hot wrought iron, and continuing thus to apply successive layers of sheet iron and Franklinite until the thickness necessary for strength is reached. The mandril being withdrawn, the tube heated to the welding point, is next to be passed through rollers, by which action, as the Franklinite is liquid at that temperature, the excess of that material will be pressed out, and the whole mass firmly united.

To avoid clogging the mandril, the first cylinder of iron applied to it had better be a steam or gas pipe.

New Subject.—On motion of Mr. Fisher, the subject of "Modes of Blockade," was suggested for the ensuing meeting.

Adjourned.

American Institute, Polytechnic Association,
February 5, 1862.

Prof. Seely in the chair.

FRANKLINITE PLATES.

Mr. Selleck exhibited a specimen of five plates of wrought iron. cemented together with Franklinite.

Mr. Dibben.—Were the plates cleaned beforehand?

Mr. Selleck.—There was no preparation of the plates whatever. The scale was all on. I think it might be better to scale it. It was thrown into water after it was rolled, when a little more than cherry red. It would not be so hard if it was left without being thrown into water. The Franklinite hardens like steel. It can be as easily shaped and worked as iron. I do not think it is so liable to rust as ordinary iron or steel. This mass was rolled while the Franklinite was in the fluid state, and the combined mass can be rolled as rapidly as ordinary iron. There is no extra work upon the plates. This article is applicable to burglar-proof safes, mould-boards for plows, hoes, shovels, &c.,—to any wearing surfaces.

Mr. Dibben.—Suppose you wanted to weld a shank to that specimen?

Mr. Selleck.—The combination can be welded as well as any other form of iron. I have taken a nail rod, melted Franklinite upon it, doubled it over, drawn it out, and had a razor made out of it. Cold chisels have been made in the same way. The Franklinite steel becomes harder when tempered, than any other steel I have ever seen. A quantity of it was sent on to Mr. Alger, in Boston, and he used it for tools in boring out cannon. He had the temper drawn six times, and the tool then stood six or eight times longer than the best English steel he had ever tried. There is some mystery yet about the hardening of Franklinite steel. I think it hardens better in a current of air than in water. I have had a good deal of trouble in getting it soft enough to work.

Mr. Dibben.—How long are your sheets of iron and Franklinite subjected to heat in this process?

Mr. Selleck.—The Franklinite melts almost instantly.

Mr. Dibben.—If you expose wrought iron to melted Franklinite, does it not make a steel of the wrought iron?

Mr. Selleck.—It forms a covering upon the wrought iron the same as galvanizing. It does not penetrate over one-thirty-second of an inch.

Mr. Dibben.—That is contrary to my experience. I have had a piece of three-sixteenths iron entirely permeated by it without melting. It had all the characteristics of steel; but it was submitted to heat for a long time.

The Chairman.—The amount of the penetration would depend very much upon the length of time it was kept heated.

Mr. Dibben.—Can this be worked when it is cold?

Mr. Selleck.—Oh, yes; and wherever stiffness is required, as in plates for vessels, in shutters, doors, &c., requiring lightness also, I think this would answer better than wrought iron.

Mr. Stetson.—What percentage of these plates is Franklinite?

Mr. Selleck.—I think that in this bar about one-third of the weight is Franklinite. The Franklinite costs no more than the iron. I do not think it would be practicable to make the plates so much as one-half Franklinite. The Franklinite is very limpid, compared with other iron.

Mr. Dibben.—That depends upon what you flux it with. You can add superphosphate of lime to white iron, and make pins with it.

Referred to the Chemical Section.

OFFERS FOR PREMIUMS.

Mr. Selleck also exhibited a new traction powder for locomotives, consisting of fine Franklinite. Sifted upon the track, ahead of the driving wheels, it will so penetrate the iron as to prevent the wheels from slipping, and will be more permanent in its effects than sand.

Referred to the Chemical Section.

Mr. J. W. Moore exhibited Elliot's revolving pistol, heretofore offered for a premium. The hammer is entirely within the handle, so that it is impossible to fire it by accident.

Referred to the Mechanical Section.

Brown's self-regulating hot-water furnace, for warming and ventilating dwellings, &c., was referred to the Mechanical Section.

Mr. Churchill presented coal oil lamps, invented by Dietz, and by Miller, which were referred to the Chemical Section.

Mr. C. W. Smith offered friction matches, in which paraphine takes the place of sulphur.

Referred to the Chemical Section.

On motion of Mr. Stetson, all the members of the Polytechnic Association were invited to meet with the Mechanical Section to consult with regard to articles offered for premiums.

The Chairman extended to members a similar invitation, on behalf of the Chemical Section.

Mr. Roosevelt effered a new theory of chemistry, which was referred to the Chemical Section.

Dr. Vanderweyde also offered the following:

NEW CHEMICAL COMPOUND.

Dr. Vanderweyde.—I have discovered a new compound of phosphorous and carbon, which I neglected to speak of at the last meeting. The books mention a compound of phosphorous and carbon, obtained as a residue. Carbon and phosphorous being united, and while in a soft state, the phosphorous being pressed out, a residue is obtained very similar to phosphorous in its properties, inflaming and melting at the same temperature with phosphorous. I suppose that is not properly a compound of phosphorous and carbon, but a mixture of phosphorous and carbon in a finely divided state. In every instance of chemical compounds, we find the characteristics of the compound very different from those of the constituents. Thus vermilion is a compound of sulphur and mercury. Sulphur is a yellow solid; mercury is a white liquid metal, and the result is a red paint. So with the sulphide of carbon, of which so much has been said recently. Sulphur and carbon are solids, but the sulphide of carbon is a very volatile liquid. I should supppose, therefore, that the phosphide of carbon would have a different nature from phosphorous or carbon.

I undertook to make the combination in the same way that the bisulphide of carbon is produced. I arranged a tube in the mode employed in that process, in which the tube being filledwith carbon and heated, pieces of sulphur are dropped in at one end, the liquid product comes out at the other end. In the place of sulphur I used phosphorous; but although the tube. was kept red hot, nothing came out at the other end, neither gas nor liquid. So I concluded that the result of the combination was a solid, which proved to be the fact. Upon opening the tube the compound took fire, but I plunged it in water and extinguished the flame. I found the pieces of charcoal covered with a white substance, so inflammable that every piece that was taken out and left to dry, took fire as soon as it became dry. I suppose that this combination contains two parts of phosphorous to one of carbon, or that it is a biphosphide of carbon. I communicate this to the Association as a new and interesting substance, and I leave to others the application of it. The inside of the tube was covered with a red substance, similar to amorphous phosphorous, which also took fire as soon as it was dry.

At the suggestion of the Chairman,

Dr. Vanderweyde promised to repeat his experiment and prepare an essay upon the new compound, to be offered for a premium.

Referred to the Chemical Section.

NEW ELECTRIC MACHINE.

Dr. Vanderweyde also offered a new electric machine made entirely from India rubber.

The common electric machines, said he, collects electricity at the most unfavorable place, namely, at the ends of the conductors. This is like attempting to fill a reservoir by pressing the water up from below. We ought to collect the electricity at the centre of the conductor. Instead of the long conductor of the usual shape, I made a slit in the conductor through which I passed a long piece of vulcanized India rubber, and thus obtained a much longer spark. I obtained a still longer spark by conducting rings, to the center of which I attached the vulcanized rubber. With my present machine I have four rings, and obtain positive and negative electricity at the same operation. The rings are isolated by pieces of rubber, and are hollow and filled with water, so that no electricity can flow out. I draw the spark from a little brass knob, and I have obtained a spark ten or twelve inches long. The India rubber produces resinous electricity. If the friction is produced by some other substance we may have a positive electricity. So that with two different coverings, where the friction is produced, we may have either positive or negative electricity.

The Chairman.—Any known electric, except sulphur, may be electrified either positively or negatively.

Referred to the Chemical Section.

MODES OF BLOCKADING.

On motion of Mr. Dibben, the subject of blockading was postponed until the next meeting, and extended, so as to include "Modes of Obstructing the Navigation of Rivers and Harbors."

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
February 13, 1862.

Mr. S. D. Tillman in the chair.

Mr. Abraham Brower, No. 4 Reade street, stated that he had patented a water proof composition for leather articles, but declined to state what its ingredients are.

It was referred to the Chemical Section.

MODES OF BLOCKADING.

Mr. Fisher read a paper upon "modes of obstructing the navigation of rivers and harbors."

After giving a history of the recorded instances of the obstruction of harbors and the interruption of navigation by artificial barriers, and discussing the principles of international law applicable to the subject, he described the method adopted at the entrance of Charleston harbor, and then proceeded as follows:

On engineering principles, I object to this method of blockading. Its first cost is greater than that of a more efficient method, which has recently been exhibited to this club, by Mr. Johnson, and the removal of stones and hulks will be far more costly than the removal of the bars formed by the means Mr. Johnson proposes.

As I understood the plan, Mr. Johnson proposes to lift sand or mud, through a tube, into a large chamber or vessel, by means of an air pump, or water pump, operating to form a partial vacuum in that chamber. When the chamber is filled with sand, the vessel is to go to the place where it is to be dumped, to dump it, and then to return for another cargo, and so on.

While he was raising the sand, in the apparatus he exhibited, it occurred to me that a centrifugal pump, driven at the speed he stated it to be necessary, might raise the sand in a constant stream, and force it through hose, for a sufficient distance to form embankments under water. He stated that, in some practice in dredging by pumps, about three-fourths water and one-fourth sand had been pumped; but this excess of water was due to too much speed of the pump. At a slower speed, the sand came up with little more water than it contained as it lay on the bottom. It therefore occurred to me that the speed of pumping, the size of pipe and hose, and other proportions, could be so adjusted as to get the right mixture of sand and water, which would neither clog the hose, nor fail to sink where it is wanted. In answer to questions from me, Mr. Johnson gave information which confirmed this view, and I have subsequently conversed with two distinguished engineers, who have had experience in pumping sand and gravel, who assure me that they have no doubt that sand and silt may be moved in this way, at much less cost than by any other known.

It will be recollected that Dr. Stevens, in answer to a question on this subject, stated that, south of New Jersey, there are no boulders larger than eggs,—nothing that will not go through a centrifugal pump. Oysters would be the greatest obstruction; but conch shells can go through the pumps required for this work.

If, as I should have supposed, before witnessing Mr. Johnson's experiment, a mere suction pipe will not raise all kinds of sand and mud, there is a dredging machine, invented by Mr. Montgomery, ten years ago, which consists of an archimedian pump, drawing mud up through a cylinder, and discharging it into a scow. Mr. Montgomery told me, some years ago, that this machine worked well, and would have come into use had it not been for disagreement among those concerned with it. It was built and stationed in a ship on the North river. The owners met to witness its trial. Mr. Montgomery said it must be removed for trial, because it would stop up the ship, if tried as it lay. They laughed at him, and *would* see it tried, and were willing to pay all damages, "if *he were not afraid to try it.*" He was indignant and took them at their word, and set the engine to work; and, in a short time, it made a pile of mud that reached above the water, so that the dredging vessel could not back out. And, as she could not turn round to bring her pumps to bear upon the banks, she was blockaded. A quarrel ensued, and the whole invention was abandoned.

This appears to me to be a promising experiment in hydraulic blockading. The archimedean, or wren-pump, has the power to slice the mud or sand, if the centrifugal pump requires that help.

If neither can work perfectly alone, together they can do all that is required for such bottom as that in the Southern ports; but I think that either of them will work well alone.

If in this way embankments can be made under water, to fill up channels, they can certainly be removed in the same way, and the concerns of our English cousins, on behalf of mankind, in future ages, may be calmed.

Whether there is the least chance of a trial of this plan I do not know. Chance or no chance, I deem it our duty to say what we think of it. It is not for us to say that the powers that be are not wise enough to try it, and therefare we may spare ourselves the trouble to speak of it, except for our amusement. I am so visionary in these matters, I have no faith in politicians, or even small associations of men; but my want of faith is not my rule of action. If I think a measure good, I recommend it, and do my part to promote it.

The chief object I had in proposing the subject of blockading was to broach the foregoing views. But I deem it proper to speak of the ships lately built for blockading. They are all unfit for the purpose—all too slow to catch common merchant steamers. Their machinery is inefficient, costly, and exposed to shot. Several locomotive builders tried to get contracts to put locomotive engines into those vessels, but could not get permission to deviate from the plan of the department, even on stipulation that their engines should work as well as those on the prescribed plan, and twenty-three vessels were built in one experiment, and all are one failure.

It is now proposed to build an experimental batch of iron-clad steamships of war, of twenty or more, while the experimental ship built by the Stevens' is left untried. We, who are not politicians, may remonstrate against this jobbing, with as little influence as the charms of a Greek tragedy exercised over the calamities it predicted; but it is our duty to declare that such folly will prevent our success in this civil war, unless folly equally gross on the other side shall balance it.

If we are to have the best iron vessels they must have the best machinery, which is that developed by locomotive builders. The marine engineers are thirty years behind them. They neither originate improvements, nor appreciate the great improvements originated by the locomotive engineers.

Wm. Fairbairn, in an address lately delivered, said that 200 lbs. pressure is now used with more economy and convenience than a lower pressure, and he believes that before many years, 500 lbs. of pressure will be used and found advantageous. Angier Perkins states that 1,500 lbs. of pressure has been practically used, and with advantage and safety. And I am credibly informed that 200 lbs. is sometimes used on our railways, and that the engines work better than with a lower pressure. With such facts, and such authority, we should not blindly follow the blind lead of our marine engineers, and fill up ships with huge low-pressure boilers that reach above the water line.

Since the foregoing was written, we have received accounts of a disaster which illustrates the policy of boilers of this class. The gun-boat Essex, during the attack on Fort Henry, received a shot through her boiler, which caused the scalding to death of thirty-two men, and the injury of others; and this will be repeated whenever these boilers come within range of the best guns, served by expert gunners. The boilers of the twenty-three gun-boats which have already been built on one untried plan, are eleven feet high. Locomotive boilers of the patterns built by Baldwin & Co., or by Allan, or Mulholland, would not be half as high, and boilers of equal power may be made of less than four feet height, and that without departure from plans that have long been in successful use. Other plans, which have not come into use, promise still better, and ought to be tried—but not twenty trials at a time of each plan.

Here is the last page of this paper. I devote it to a suggestion. New York is the chief city of the Union; the American Institute is the free rendezvous of the promoters of practical science; this Club is the scientific branch of the Institute; all engineers and inventors are invited to attend it, and speak in it as members. If in any place on the continent it is proper to propose the organization of a patriotic association to improve the means of warfare, it is proper to propose it here. But such an association must not be made up entirely of inventors, who wish to experiment at the cost of the public; nor entirely of engineers, who neither invent, nor advance new inventions; nor entirely of patriotic citizens, who neither invent, nor select wisely from old inventions. It should include all of these. There must be progressive talent, and conservative talent; there must be capital;

and there must be managers and secretaries. If we organize aright, talent and capital will come in.

Dr. Stevens drew a diagram of the *teredo navalis* or ship-worm. There extends through it a double tube, through one branch of which it draws in a current of water, and sends it out through the other. When the animal is born it is almost microscopical, but when full grown has the size of a man's thumb. It is very prolific, bringing forth several millions, and it is exceedingly voracious. They will penetrate several feet into sand, wherever there is water. That little animal is capable of eating up, in a few weeks, all the vessels we have sunk in Charleston harbor.

Mr. Johnson exhibited the operation of pumping sand under water, repeating the experiments made by him at a former meeting. He proposed to do all the work under water, thus saving the power required in other machines to lift the sand above the water. He proposed merely to lift the difference between the weight of the sand and the water, while other machines lifted the whole weight of the sand, saturated with water. A vessel being built with an air-tight deck, and furnished with suitable apparatus for taking in the sand below the water line, may be worked in dredging out docks, by a steam engine on shore. The air is exhausted from below the deck by this pump, and its place is supplied by sand and water raised from the bottom. The sand is then prevented from escaping, and the vessel is towed to the point for discharging its load, where, upon opening a trap door in the bottom, the sand, being heavier than water, will fall out, and its place will be supplied with water. Returning to the dock this water is removed by pumping, and its place supplied by sand and water, as before. It is found that in most cases the sand will be taken up with a small proportion of water. Care must be taken that the sand should not become dry in the tube; and, to avoid this, it is only necessary, before taking it from the water, to draw enough of water through it to wash it out. The laws regulating the deposit of solids held in mechanical suspension by flowing water, show at what velocity it is necessary that the water should flow to prevent a deposit. If that speed is attained there will be no tendency of the sand to subside and clog the tube. To remove a vessel, the tube can be placed below it so as to draw out the sand, and cause the hull to keel over.

Mr. Enos Stevens suggested that the same principle might be applied to removing sand without the intervention of a floating vessel, by drawing the sand through a tube sunk to the bottom of the water, in which case the sand need not be raised at all.

Mr. Johnson.—It was suggested a few years ago to make an island of five acres, for hospital purposes. There were six feet of water, and it was estimated that 167,000 cubic yards of sand would be required. I made a rough estimate at the time that it would take about thirty days to do that with a moderate amount of power, moving the sand for one-third of a mile.

Mr. Fisher.—There is a current over most bars. If the sand were mixed with water would not most of it go off to sea?

Mr. Johnson.—It would not go very far. Mud would remain longer in suspension than sand.

BLOCKADING.

Mr. C. W. Smith.—We all know what uncomfortable things snags are. I see no reason why we should not drive piles ten or twenty feet apart; perhaps at such an angle as to present their points outward to catch into any vessel which might seek to come up. It seems to me that there is no other way for obstructing a harbor, so cheap and feasible as that. No vessel, unless iron-clad, could force its way through.

Mr. Dibben.—I would respectfully submit that we have something else for our navy to do besides watching these entrances, and I consider the obstructing of some of these inlets, so as to allow one vessel to do the work of two or three, a credit to him that devised it. But this bugbear story of spoiling harbors is all a humbug. Charleston harbor can be restored to its former condition for $10,000. You may do all you can for six months to spoil Charleston harbor, and I will guaranty to make it better than it was before for $50,000. Sand can be moved very easily, and stones still more easily. Bring up a lighter alongside, hook on to a stone and hoist it up with a little engine, and hook on to another one, and as soon as the stones are out the old hulk will float. And the entrance will be better after the obstructions are removed than it was before, because it can be made of a systematic width.

Mr. Fisher.—The plan of obstructing harbors, by driving piles, strikes me very favorably.

Mr. Selleck.—I have seen piles driven 200 feet deep, placing one upon the top of another. They can be driven in water of any depth.

Mr. Johnson suggested, in removing rocks, to pump the sand from below them, and let them sink out of the way. There is a tendency of sunken vessels to sink in the sand, if it is not very dense, so that after a sufficient time they would of themselves go down out of sight.

Mr. Dibben was of opinion that this would not be the case. There is the wreck of a vessel in our harbor now, that I have seen there ten or fifteen years. Sometimes the sand will be washed away, and sometimes will gather around it.

Dr. Stevens.—I never had any fears that the Southern harbors would be permanently obstructed by the sunken vessels. The accumulation of water by the spring floods would be sufficient to form new channels, so that we shall have to sink new vessels if the war continues. It is for this reason that I am in favor of a living blockade.

New Subject.—The subject of "Coal Oils and Petroleum" was selected for consideration at the next meeting.

Adjourned.

American Institute, Polytechnic Association,
February 20, 1862.

Mr. S. D. Tillman was called to the chair.

The Sections not being fully prepared to report upon premiums, were allowed another week.

LARGE CANNON.

Dr. Rowell stated that it had been found, in casting large cannon, that it is useless to exceed a certain thickness, on account of the honeycomb structure which would result. To avoid this, it had been proposed to cast the gun of a thickness which would ensure tenacity, and to provide for the additional strength; first, by surrounding it with longitudinal stays of wrought iron, to prevent bursting the end off, and next by shrinking on rings of wrought iron to resist the lateral pressure. The gun is cast with projecting rings, between which sections of rings upon the inside of the longitudinal stays would be placed, holding the stays firmly in their position. He would propose, instead of casting the gun with the projecting rings, to cast it large enough to form the rings by turning out grooves between them.

Mr. C. W. Smith said that Captain Dahlgreen's experiments had demonstrated that the angles upon the surface of a cast iron cannon, whether originally cast upon the gun or afterwards turned, will invariably, after the gun has been fired a few hundred times, present centres of crystallization; and that in this respect turning these angles has no advantage. It seems that a change is going on in the forms of the crystals of the iron, during the vibrations, resulting from the explosion of the gunpowder within the gun, and especially at the angles, so that these angles are invariably the points at which fracture takes place. It is for this reason that in the army we have now cast aside all the old ornaments, and resorted to the smooth plain gun. Capt. Dahlgreen, finding that casting trunnions upon the gun weakened them, went so far as to cast a gun large enough to take in the trunnions, and then turn it down; but he found that it had no effect upon the crystallization. He, therefore, now casts his trunnions on a separate piece, with a band to pass around the end of the gun to receive the recoil. According to these experiments, therefore, nothing would be gained by turning the grooves in the gun as suggested.

Mr. Dibben said that the same law had been known before Capt. Dahlgreen's experiments, although not so fully demonstrated. But it is not merely after use, but at the time of casting; if there is unequal thickness there will be unequal crystallization. The Parrott gun is the best now in use, and that is made by shrinking wrought iron over the breach of a cast iron gun.

Dr. Stevens suggested that thus far most of the large guns had exploded before they had hurt anybody.

COAL OILS AND PETROLEUM.

Mr. C. W. Smith said that the coal oils are made up of substances very different in their characters.

The first product of their distillation is naptha. This has been used as a substitute for turpentine. An anæsthetic has also been extracted from it. Coal oils are now extensively used for illumination, and are going into extensive use for lubrication, being found for that purpose superior to the best sperm oil. An oil has been prepared from petroleum, suitable for use upon leather, as a tanner's oil, and various other uses have been found for these oils. They may be found serviceable for fuel for steamships.

Dr. Stevens.—It is true that coal oil, understanding by that term not only the hydrocarbons derived from the distillation of coal and shale, but those produced naturally and derived from wells and springs, have lately come into a great variety of uses. They were certainly used as a medicine by the aborigines of our country. The petroleum obtained from the springs at Cuba, in this State, was so valuable in the eyes of the old Six Nations, that in selling the western part of the State of New York, they reserved those springs. At a very early day this oil was in use among them for strains and for rheumatism, and it was known in the druggist shops as lunar oil.

By distilling it, and thus uniting the hydrogen and carbon in various proportions, various medicines have been derived; one of them, similar in effect to quinine, is used extensively in England as a cure for intermittent diseases. Quinine and morphine are both hydrocarbons. Why one should be a tonic and the other a narcotic, we do not know. An anæsthetic preparation from coal oil has been used with some success, but not with so great success as sulphuric ether or chloroform. Any hydrocarbon is a valuable remedy for rheumatism. I venture to say that no person ever suffered much from rheumatism whose skin was always in a well oiled condition. Oil of turpentine, petroleum, paraphine or any oil will be useful as à cure. Petroleum comes from the earth, in the United States, in a great variety of forms; sometimes so hard that it is like pitch; sometimes so loaded down with paraphine as to be useful immediately for lubricating the machinery of locomotives; sometimes it is of a light amber color, and is nearly all light oil or kerosene, burning in common lamps without any purification, or losing only five per cent. if purified; and there are coal oils of almost every grade between these extremes. Of the hundreds of springs now in operation in the United States, no two produce oil of exactly the same kind, and the oil also changes in the same spring after a few months. It has also been found impossible to make an equable coal oil. It can be obtained by distillation from coal for five cents per gallon; but some of it will lose twenty-five per cent. in the rectification, and some of it will yield no light oil at all. At present we seem to be supplying the world from our wells, but the springs may be exhausted, as those of Burmah have been. Many are now sealing up their springs, and may hereafter reap the benefit of so doing. But there is no certainty, if you have a well, that a man on the next five acre lot may not tap it and run you dry.

Petroleum is not confined to the carboniferous formation, but is found in all, being most abundant in those strata which contain the largest amount of organic matter stored up. The bitumen with which these strata are charged, becomes transformed, by some chemical change in the bowels of the earth, into petroleum. As to the use of coal oil for generating steam, it has been found by experiment, before the British Admiralty Board, and also by the experiments of Prof. Johnson, that with the present fireplaces and boilers, the bitumen in coal adds very little to its effectiveness, so that the best coal for the purpose is that which contains the largest amount of carbon and the least bitumen.

The Chairman.—Oil, in my opinion, at five cents per pound, will cost ten times as much as coal. Its expensiveness will almost equal that of electricity, in the consumption of zinc. It is also very dangerous, unless it has been purified.

Prof. Seely.—I had occasion some time ago to examine the question of the desirability of using coal oil as a fuel for the air engine, using the products of combustion, and I came to the conclusion, upon theoretical grounds as well as from a little practice, that coal oil at ten cents per gallon, when burned in that most economical way, would furnish power as cheap as coal at six dollars per ton, burned under a steam boiler. A pound of hydrogen will give out three times as much heat as a pound of carbon. It is to be regretted that we do not yet know what coal oils are chemically. I am satisfied that they differ from the oils extracted from coal tar. These have long since been thoroughly investigated, and the different substances they contain carefully separated and examined. Many of these have proved of great value. In purifying coal oils, it is considered desirable to deodorize them; but as soon as we deodorize such an oil we shall make another thing of it, and it may not be what we want. The odor belongs to the substance. There have been various processes for modifying the odor, among which is stirring chloride of lime into the oil. This has the effect, but it generates hydrochloric acid, which is objectionable for several reasons, therefore chloride of lime should not be used.

Mr. C. W. Smith.—Many substances are dangerous if improperly used, and indeed almost any substance may be so used as to be dangerous. I am convinced that coal oil can be economically used for generating steam for marine engines, not only from its comparative cheapness, but because it occupies so much less room than coal, requiring no more than one-fourth the space. Of course the boiler and fireplace must be adapted to it. The main point is to supply sufficient oxygen to burn up the carbon that is so freely liberated.

Dr. Stevens.—I do not see why the use of coal oil may not be successful. Wherever there is a large amount of heat stored up, I think it is within the range of possibilities for the human mind to discover some method of using it. We know that it took twenty-five years to learn how to burn anthracite coal. There is no danger from carrying the oil to sea in barrels. It is as safe as gunpowder, and safer than soft Cumberland coal, or any coal containing a sufficient amount of sulphur for spontaneous combustion. Petroleum has no liability to spontaneous combustion. It is about as dangerous as gunpowder if your vessel takes fire, but it will not take fire of itself.

The Chairman said there was danger of its coming in contact with fire on board the vessel.

Mr. Reed stated that he had been trying a method of desulphurizing coal, which would remove the objection of its spontaneous combustion. The process is very simple and inexpensive, and had proved very successful.

Prof. Seely referred to a former discussion, in which he had stated the details of his computation of the relative value of coal and of coal oil for producing heat.

New subject.—The subject of "Organic Chemistry" was selected for consideration at the next meeting.

Adjourned.

American Institute, Polytechnic Association,
February 27, 1862.

Mr. R. L. Pell in the chair.

PREMIUMS.

Mr. Tillman, Secretary of the Mechanical Section, presented a report recommending the award of certain medals and diplomas.

The report was accepted.

Prof. Seely, Secretary of the Chemical Section, presented a report recommending the award of certain medals and diplomas, accompanied by a special report upon coal oil lamps.

On motion of Mr. Dibben, the report was adopted by the Polytechnic Association, and ordered to be reported to the Board of Managers of the American Institute.

VALVE GEARING.

Mr. Edward N. Dickerson invited the Association to appoint a committee to take a trial trip upon next Saturday morning upon the steamer Kiang Tsi, which has two different valve gears for working steam expansively, so arranged that either can be made to operate independently of the other, one being exchanged for the other instantaneously, by moving a handle, without any other change of conditions, thus affording peculiar advantages for the comparison. One of them is Winter's cut-off, and the other is an improvement upon the Sickles' cut-off.

On motion of Mr. Dibben, the invitation was accepted. The following gentlemen were appointed as the committee: Messrs. Dibben, Johnson, Bartlett, Rowell and Fisher.

ORGANIC CHEMISTRY.

Prof. Seely.—This subject is so broad that I feel a little doubtful what direction I shall give it. Fifteen or twenty years ago there was no science of organic chemistry, and we should hardly suppose from the school books upon chemistry that such a science was now known as organic chemistry. There are only detached and unsystematized statements to be found in them. Inorganic chemistry, on the contrary, is very systematically taught; and I know of no physical science more perfect in its details. Now, I believe that organic chemistry, so far as our knowledge of it extends, is just as perfect, and even more beautiful as a science. In inorganic chemistry we learn that there are sixty-six elements, which combine, according to certain laws, and names are given to the compounds corresponding with the combinations. It is all very systematic, and all very simple. So in organic chemistry, we can make a catalogue of *quasi* elements. They are all compounds, but they combine and produce compounds in a similar way to the combination of the elements of inorganic chemistry. In the only treatises which we have *in extenso* upon organic chemistry—not in English, but in German—there are catalogues of these radicals, as they are termed, showing how they will unite with each other, and what compounds will result. One interesting fact is this, that in these classes you will find grouped together the most various compounds in organic nature. Butter, for example, which we might suppose only came from the cow, or from an animal giving milk, we can produce in all sorts of ways, from compounds that no animals have had anything to do with. For instance, the acid matter of sour-krout is lactic acid—the same that is found in sour milk.

Another interesting fact is that the organic compounds can be so readily arranged in well defined classes. For example, there are a dozen of the petroleum or coal oils so similar to each other that any child can see that they ought to be classed together. One differs from another principally in being more or less volatile. And so with any organic substance, it may be classed with hundreds, perhaps, of others, resembling it, or connected with it.

Mr. C. W. Smith.—One of the first things that will be observed by the student of organic chemistry, is the tendency to form series. Taking a certain compound, we find that adding a definite quantity of perhaps two elements, we produce another compound, and so we can go on and build up a series, proceeding step by step, to the extent, in some cases, of forty or fifty different compounds, varying from each other by precisely the same differential. This is something entirely different from anything we meet with in inorganic chemistry. The tendency of discovery is to increase the number and extent of these series. We commence with a substance highly volatile, and by adding $C_2 H_2$, or whatever the increment may be, we build up a series of substances less and less volatile, until perhaps at last we reach a solid, or at least a substance nearly solid.

Prof. Joy, being called upon, said that the series of homologous substances, commencing with $C_2 H_2 O_4$, $C_4 H_4 O_4$, $C_6 H_6 O_4$, up to $C_{36} H_{36} O_4$, was now nearly complete. Such series have led to the idea that iodine, bromine, etc., may be compounds differing by some homologue which we have not yet discovered. The old idea of transmuting all metals into gold is founded upon a similar notion, for if we could find a common difference between the metals, we should merely have to add or to subtract this common difference in order to convert one into another.

The growth of plants, by the formation of little globules or cells, building up one upon another, is like the building of a house with bricks. The plants begin with very small cells, which have the power, not understood as yet, of taking up carbon, hydrogen, oxygen and nitrogen, in the necessary proportions; and as each cell is formed another is built upon it, and so on. The chemist can furnish the nourishment, but the vital power is the great mystery. It is something we cannot imitate; and it is that which is unquestionably of divine origin. But after the animal ceases to live, then it forms a practical subject for investigation at the hands of the chemist. Then the chemist can tell you what occasions the decay of the animal, and he can prevent this decay, in a great measure. If it be a plant, if it be wood, he knows that by the use of corrosive sublimate he can coägulate the albumen in it, and prevent decay.

Let us trace, for a few minutes, the chemical history of a dead cow. I will not dwell upon the properties of the meat sold by the butcher, nor upon other parts of obvious value, but will take up those things which would seem to be mere offal. These are all picked up, and nearly all of them can be converted into glue. The bones are boiled to convert the fat into neatsfoot oil and stearine. Of the latter, some is converted into candles, and some, I am sorry to say, is used to adulterate butter. The small pieces of skin are boiled down to make glue, a portion of which is exposed to a certain degree of cold, and purified by chemical means, rendered opaque and spongy, in which state it is called gelatine; for gelatine is merely frozen glue, prepared with special care. At the bottom of the kettles, there will be a great deal of hair and other sediment. That is not thrown away by any means. The hair is used in the manufacture of brushes, or burnt and mixed with other animal matter and sold as a manure. A portion of the hoof is used for combs and similar articles. The parings of the hoof are made into Prussian blue. The bones are used for the handles of knives and forks, for buttons, etc. The fragments of the bones are burnt into bone-black, which is used in the sugar refinery; and after it has been exhausted there, phosphorus is manufactured from it. Other portions of the bones are treated with sulphuric acid, and converted into a super-phosphate of lime, for manure. A portion of the hoof is burnt into a form of carbon, used in the manufacture of steel for taking impressions for bank notes. So that a cow is, perhaps, even more useful after she is dead than when she was living.

Mr. Fisher inquired whether the refuse of bone or horn, used to temper steel, should be thoroughly or partially carbonized.

Mr. C. W. Smith.—The usefulness of sal ammoniac in case-hardening, and of refuse bone in tempering steel, depends upon the ammonia; and hence we ought not to expel the ammonia before using it.

Mr. Bartlett.—A patent has lately been taken out in Belgium for an improvement in making steel, which consists essentially in passing ammonia over the iron to purify it and make a way for the carbon and nitrogen to enter in. The iron is purified, as they say, by the decomposition of the ammonia which forms a sulphide of hydrogen, by separating sulphur from the iron.

Mr. Enos Stevens.—Vegetables derive their nourishment both from inorganic and from disorganized substances. Animals, on the contrary, make all of their growth from what has been elaborated either in vegetables or in other animals. When disorganization has commenced, an article is destroyed for animal food. Burned hay, for instance, is so spoiled as not to be digestible. The system can get rid of food which has been injured by fermentation or burning, or by the addition of an alkali, but such food does not nourish the system. If a cow is fed upon city garbage, nature may use it temporarily, but unless something better is soon given to take its place, it will be burned out by fever, diarrhœa, diabetes, &c. And we may expect similar results from the use of improper food by man. A proper system of cooking would make digestion what it should be, a mechanical rather than a chemical process. We should never use a temperature higher than 200 deg. or 210 deg. If we use a higher temperature than 200 deg., to save time in cooking, we shall lose some of the more volatile elements, and especially the ammonia, and our food will be less nutritive. The proper way is to put one kettle within another, as in the farina boiler, or to let steam play around and upon the articles to be cooked, according to the manner in which you wish the article to be cooked.

Mr. Fisher.—How would it answer to cook at a higher temperature, taking precautions to prevent the escape of the ammonia, as in Papin's Digester?

Mr. Stevens.—That would not do, because there would be so much of the material disorganized. The idea is to retain every particle, in the state of organization in which it was in the animal or vegetable in which it grew.

The Chairman.—How would you boil potatoes, &c., for stock?

Mr. Stevens.—By putting them in a large vat and introducing steam. Practically, it will seldom go above 200 deg.

Mr. Bliss.—In cooking eggs it is better, instead of boiling them, to bring them as near the boiling point as you can, and then take them off and keep them in the water a little longer. This makes them more digestible. I think about one-third of our food is lost by our method of cooking.

Mr. Stevens.—I have found potatoes good when boiled upon the mountains, where water boils at 200 deg.

Mr. Dibben.—When it was discovered that steel contains nitrogen as well as carbon, it became very plain that in using horn, &c., it should be the raw material.

Prof. Seely.—This question of cookery seems to me to be simply a matter of taste. If a man finds his food to be more palatable when cooked at 200 deg., I have no objection. There is one reason why the temperature should be pretty high in cooking, to convert the starch into dextrine, which is soluble in water. But it is so generally the case that what a man likes agrees with him, that I consider the matter of taste the most important criterion.

Prof. S. proceeded to explain the series of organic substances. If we can combine any substance with one of a series we can with them all, and the results will form a new series. Thus there is a series of ethers, a series of alcohols, a series of acids, &c., each of which varies in volatility in the same regular gradation. We can, therefore, select a substance of the desired volatility or density for any required purpose.

Any seed will grow in water if you give it ammonia and carbonic acid; but it is a remarkable fact that in that case the plant will yield no seed. The inorganic elements, as they are called, seem necessary to give plants the power of reproduction. A quantity of inorganic matter, phosphate of lime especially, although insignificant in amount, is absolutely necessary. Where there is no phosphate of lime in the soil, you cannot have wheat.

There is a difference in one respect between the growth of vegetables and of animals. Vegetables seem to grow as a house is built. One organic cell is erected above another, they dry up and stay in their first position, and the life seems to be destroyed. It stays protected probably by the continual passage of the sap: but when in animal growth a cell is deposited, it soon burns up. The vegetable all grows and stays; the animal all grows and dies. In five or six years the human body may be entirely changed. The brain of an active man is especially liable to change, so that I think it quite doubtful whether James T. Brady, for instance, has a particle of the same matter in his brain to-day that was there a month ago. Using up is burning up. At each inspiration we take in fresh air, and at each expiration throw out the products of combustion. This combustion is more perfect than it is in the arts. The carbonic oxide is all burned to carbonic acid before it escapes. All the movements of animals are simply results of chemical action, and a little calculation will show that an animal is the most economical machine we know of. It is immensely ahead of the steam engine. In a year we take in only about a ton and a half of material, two-thirds of which we throw away because it is not fine enough to burn. We use only 800 pounds of oxygen; yet for 365 days we move about our 150 pounds constantly. Only about five ounces of combustible material are required to move us about all day; while a steam engine, to carry us about in that way, would consume perhaps a ton of coal.

Mr. C. W. Smith.—Without endorsing 210 deg. as the highest amount of heat to which vegetable or animal food can be raised without injury, I am convinced that there is a point somewhere, peculiar, perhaps, to each substance. In the preparation of food the great point is to prepare it mechanically, and not to change it chemically. It has been claimed that broiled meat is more healthy than boiled meat. The explanation of that may be that in broiling we get rid of the grease, which runs away and gets burned up. Frying is especially unwholesome, because the grease is retained and subjected to a high temperature.

The subject of "Organic Chemistry" was continued, and the subject of the "Preparation of Food" was also adopted for the next meeting, March 13.

Adjourned.

American Institute, Polytechnic Association,
March 13, 1862.

Mr. Tillman introduced to the Association Professor Charles A. Joy, of Columbia College, the new Chairman, who had been appointed by the Board of Science and Art of the Institute.

On taking the chair, Prof. Joy thanked the Board of Science and Art for the honor conferred in selecting him to preside over the deliberations of the Association. He was not familiar with the former proceedings of the Association, and might need the indulgence and aid of members. There would be some advantage in his want of familiarity, as he could not be suspected of undue partiality in cases he might decide upon.

In the absence of the new Secretary, Mr. Thomas D. Stetson, Mr. J. K. Fisher was appointed Secretary *pro tem.*

Mr. John M. Reed stated a new method of desulphurizing coal, which had been tried at the Architectural Iron Works in this city with very favorable results on anthracite coal used in melting iron in the ordinary cupola furnace. The effect however is greater in bituminous than in anthracite coal, owing to the fact of there being more sulphur in the former than in the latter. The process is simple and cheap, and one of the greatest improvements in fuel; the clinker is less, there is less labor in cleaning, and the metal is improved. These results are so striking as to be worthy of investigation. I invite persons interested in the manufacture of iron to visit our works.

Mr. Stevens.—I think the gentleman states the saving as too large. I should think one and a half per cent. very liberal for the absence of sulphur. As it is diffused in minute crystals, it does but little damage, and is very difficult to get out. In desulphurizing coke, in England and in Pittsburgh, by steam, some good was done, but it injured the veins, and the process was abandoned. He hoped that an effective process might be discovered, but we must not expect too much.

Mr. Reed.—In forging with the prepared fuel, much more could be done than with common coal. Both sulphur and phosphorus are in a great measure expelled; red shortness and cold shortness were neutralized, and these qualities would be destroyed by the proposed coal.

The subject of the evening, "Preparation of Food," was called up.

Mr. Enos Stevens was called upon to open the subject.

Mr. Stevens.*—It was admitted at our previous discussion that vegetables organize their materials from both inorganic and disorganized substances, and build up and ever retain their particles, cells, or fibres, in modes much like those of masons in constructing houses, by cementing one brick upon another. It was also conceded that animals are wholly made up of the particles, cells, or fibres that have previously been organized in vegetable life. The use, for food, of gelatine extracted from flesh, was favorably mentioned by Prof. Joy; and pemican, or flesh stewed, concentrated and dried, by Prof. Seely; and dried vegetables, by Mr. Dibben.

These gentlemen seemed to entertain the usual theory of the

* Although this very ingenious paper has been admitted into the Transactions, it is not to be assumed that the theory of Mr. Stevens has received the sanction of the American Institute.—J. R.

books, that the better food is dissolved before it is eaten, the easier it dissolves or digests in the stomach, and the more readily it is assimilated into animal organization. Among those who make the most intelligent efforts to apply the principles of modern organic chemistry to the arts of selecting, preserving and cooking food for mankind, I usually find the following theories and details pursued, viz: They presume that the fermentation of bread prepares it to dissolve more readily in the stomach. They are also of opinion that it changes a part of the flour into starch, and thence into alcohol; and another part into butyric acid. And because the very intense heat of the baking drives off both the alcohol and the foetæ butyric acid, they, therefore, recommend the consumers of such bread to regain the alcohol from brandy, wine or beer, and the butyric acid from butter, to be eaten on the bread. Again, they believe that beef, and all other flesh, not corned down, should be stored until incipient putrefaction takes place, so that it may be more tender to dissolve in the stomach; and when flesh is so intensely roasted or baked as to expel the fat, they require that this extracted fat should be used as gravies, suet puddings or shortening to pastries or biscuits. Instead of eating ripe grapes, they tell us to ferment their juices into wine, and take the grape sugar in toddy, and the tartaric acid in cream of tartar soda biscuits. Moreover, in my opinion, they actually attempt to enrich beef and hams of pork, while salting them, by using saltpetre, which is nitrate of potash. Others put sugar into bread, to replace that which is transformed into alcohol by the bakers' fermentation. By various other modifications of their theory of chemically preserved and improved organic materials of food, we find many extracting and drying the various substances of vegetables and meats, as starch, sugar, preserves, vinegar or salt pickles, condensed milk, concentrated soups, and various jellies and syrups. For analogous reasons, others feed to cattle, hogs, or poultry, distillery slop, grain or meal damaged by water, in storage or transportation, mow-burned hay and unthreshed grain, frozen and rotten potatoes and cabbages, and mouldy bread, crackers and maccaroni, and thus produce a very tender and cheap beef, veal, poultry, and very peculiar tasting butter, eggs and milk.

I admit that animals derive all their constituents of growth and repairs from the particles, fibres, or cells previously built up in vegetable organization, like the bricks in a house; but it appears very evident to me that healthy and successful animal growth and repairs would use only the "perfect bricks" of the previous vegetable organisms; and reject every particle or fibre that was not perfectly in the state of organization that it possessed in the healthy vegetable or animal in which it previously grew. The organizations of animals are characterized by the good or bad conditions of the organization of the vegetable or animal substances from which they were derived as food. When there is only a very little disorganized matter in food, then the vital principle rejects it quite, or nearly all. But when there is a scarcity of normal food, and a great abundance of garbage or partially disorganized food, or otherwise improper nourishment, then the animal vitality makes temporary repairs or growth, as well as store of fat or fuel, even from mud, disorganized food, such as is most abundantly in the hog, and least so in sheep and cattle. Yet their natural vitality evidently designs to replace the bad materials with good, whenever normal food can be attained.

For example, of the general proposition that animal organizations are characterized, to some extent, by the peculiarities of their food, I recall to your memories how, when cows eat onions, garlic, or rotten turnips and potatoes, or mow-burnt hay, or sprouted grain, that their milk and butter, as well as beef and veal, taste or smell of onions, or of the several abnormal substances that they ate. For the same reasons, distillery-fed pork not only tastes peculiarly unpleasant, but is so soft that any person can thrust his finger through any part of it, even if three inches thick; and oxen and horses fed on hay, meal, or grain, damaged by water in transportation in vessels, form their flesh so soft and tender that they cannot endure the yoke or harness without galling or festering, nor without their hoofs soon becoming too brittle to hold their shoes well, and then even their hides make poor leather.

But if such feed is continued to the same animal more than six or eight weeks, and sometimes only a few days, then the vitality will fail to retain it under animal control, and then it must be thrown off either by diarrhœa, fever, scrofulous exhalations, diabetes, or all of them. Indeed, fevers seem to burn out malconstituted flesh, by the heat of the lamp of life, as a caulker or painter burns out the tar or other substances that encumber their kettles. Yet if beasts are butchered when fleshy or fat, from feeding on garbage and disorganized food, then any person who eats of them, or of their butter, milk or eggs, is the same way affected as if he had eaten the disorganized food or garbage, such as was eaten by the malorganized butchered beast, or of the milk, butter, veal or eggs derived from such feed.

On the contrary, if beasts to be butchered are fed on such food as is most agreeable to man, such as the cereals, corn and wheat, then their flesh, milk, butter or eggs not only taste most pleasantly to mankind, but both the beasts and such persons as feed on them are most healthy, happy and prolific. Yet cattle and hogs, equally fleshy on acorns, shady grass, or pungent twigs and roots, afford unsavory flesh; but when cattle, hogs or poultry have been mostly raised on unsavory food or disorganized garbage, they may be rendered of excellent quality by feeding them a few months, just before they are butchered, with the cereals or very pleasant vegetables. Moreover, by the same reasoning that a cow that eats distillery slops, putrid cabbages, and mouldy grain, is declared to produce unhealthy milk and injurious veal and cheese; by that same rule we must conclude that the children whose wet nurses eat charred roast beef, extracted lard, fermented or alkaline bread, or thoroughly extracted soups, are swill milk fed of the worst kind, &c., and in a fair way to try the whole catalogue of diseases.

But the particular practical circumstances to which I wish to direct attention, is that it matters not by what kind of disorganization food has been affected, whether by fermentation, putrifaction, evaporation, dissolution or combustion. In other words, I mean to say that in my opinion food is equally spoiled and rendered injurious to all that eat it, by either or any of the analytical processes of mow-burning by fermentation; or putrifaction into carrion or muck; or evaporation into soot or ether; or dissolution in the strong acids or alkalies or hot liquids; or of charring by combustion.

The conclusions derived from my observations and experiments on these subjects, indicate that we ought to select, preserve and cook our food in such a manner as always to keep every particle of it in the same state of organization that it had in the healthy vegetable or animal in which it grew. Hence all cooking should be so accomplished as merely to render the food more easily digested, but never so as to disorganize any of it by any analyzing process whatever.

Food, in my opinion, should either be taken raw or ripe, as supplied by nature; or else only pulverized by machinery and soaked in very warm or hot water, to assist the mechanical mastication and soaking in the mouth and stomach, so as to render the particles or fibres of food easily separated from each other, and always without any chemical changes in the atomic organization of the several original vegetable particles. According to these indications, extensive and practical acquaintance with the details of practical chemistry is required in cooking only in detecting, preventing and rejecting every chemical change in the food, while storing or cooking it, as well as in the condiment while eating. In pursuance of the requirement of our nature to have our food taste the most pleasantly possible, and at the same time never in any measure disorganized, I have succeeded, by inquiries and experiments, in making up a very much improved system of cooking all kinds of food, or serving it merely ripe; and in selecting most advantageously the various good articles of food for every different age, climate, occupation and exposure of mankind, so that man may live well wherever any other animal at all can exist.

The main peculiarities of this system of cooking are, first: that everything is, while cooking, kept below 212 deg. of Fa., and that the bread is exploded by the combination of the elements of common salt, previously mixed into the flour and water for the dough. But the most important part of this system of securing well organized materials for men and animals, is that which describes the most expedient modes of selecting and preserving food for both men now to be fed, as well as for the good of the health and soundness of the vegetables and brutes to be hereafter harvested or butchered for mankind.

Mr. Seely said he had listened with interest to this theory. Each one might indulge his theory, but he would instance birds that would eat nothing but carrion.

He did not agree that decomposition was objectionable, because it always takes place in the system before assimilation. In regard to the modern preparation of food for its preservation, the greatest improvement is in drying.

Dr. Stevens.—The great use of cooking is to make the food pleasant to the first sentinel, the nose; the second sentinel, the palate, is next to be pleased; the third is to make it easy of deglutition in the mouth; next in the stomach where it meets the gastric juice, &c. The subsequent operations by which the system is built up, are not chemical and not to be explained on chemical principles. No rule can be of general application. Cooking is best when it meets the individual tastes; it is useful as it pleases. Kentuckians live on fried bread; Digger Indians live on grasshoppers. In Southern Europe and in South America they fry vegetables in olive oil, but many Spaniards eschew oil not rancid, and Esquimaux eat train oil. These examples show that whether food is cooked or not, or how it is prepared matters little, provided it agrees with us. Thirty years ago one Graham rode a hobby day and night; it was bran bread. Many rode the same hobby, and would cure all diseases by it, but there was always something te help it.* Bran bread was a spur to the nervous membrane, and as such sometimes did good. Where the food is too liquid the rectum is contracted, and bran or sawdust is useful to distend it. So when the contrary takes place, there will be dyspepsia, perhaps scrofula; in that case the bran bread is injurious, and sometimes produces constipation of the bowels. He adduced these instances to show that theories are good when rightly applied. The cob-mill mania years ago killed many horses, notwithstanding the great authorities who approved it. Yet for all this, good cooking is essential to health, but each is the best judge of the cooking that suits him. Starch, sugar, alcohol are brakes in the human locomotive. We live too fast, faster than the usual quantity of food can supply the waste, hence we must have something that will restore the consumption of the tissues until nutriment can be supplied. The negative effect of these articles is seemingly equivalent to the positive effect of nutritive food.

I do not mean that the bran should be very coarse; it should be pleasant to the taste. He had eaten sawdust, but did not find it really useful; it tended to cultivate a torpid, not a vigorous life. Sugar, tobacco and other articles of the kind are good for unemployed men, to make them contented.

Oysters were in certain circumstances highly nutritious, yet were little more than jelly. Some shell fish are tough, and the toughest were really the best; but at times the stomach cannot

* The husk of the wheat, which is separated by the bolt from superfine flour, contains the greater part of the phosphates and sulphates, to which the superiority of wheat over other grains, as a food for man, is in a measure due.—J. R

digest an oyster, and if it makes any one sick, he afterwards eschews oysters. So with lobsters. He related a case where a patient was poisoned by a lobster. Thirty years before he had been poisoned by a lobster, and the stomach remembered the fact and could not digest that sort of food, as was proved by an emetic.

The Chairman said that the rejection of food was an important part. Oysters, lobsters, snails, &c., concentrate poisonous salts, as he had proved by analysis, and then may be poisonous. In regard to the temperature, it was possible to make food tough by too much heat. It is not necessary to exceed 155 deg. to cook food; 130 deg. will cook some kinds of food.

The subject named for the next meeting was "Salting the Streets."

Dr. Stevens proposed, for the meeting of March 27, "The Manufacture of Glass."

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, }
March 20, 1862. }

A communication was received from the Board of Managers of the American Institute, and referred to an appropriate committee.

Mr. J. Johnson, from a committee on the question of changing the day of meeting reported progress, and the committee was continued.

A report from the committee on reporting and advertising was presented.

ON DESULPHURIZING COAL.

Dr. Stevens remarked that steam was sometimes used for the purpose of desulphurizing coal, and sometimes lime, the latter with the expectation of forming the sulphuret of lime. He did not think that much could be gained from the latter method. Coal has rarely more than two per cent. of sulphur, but that of Cumberland may have as high as four per cent.

Mr. Tillman objected to this discussion, because the process was not made known, such being a rule of the Association.

Prof. Seely did not believe it profitable to desulphurize coal, as the sulphur is usually in the shape of sulphuret of iron. The usual process of desulphurizing is to add some matter having a greater affinity for sulphur than iron.

SALTING STREETS.

Prof. Seely thought that the authorities would be compelled to reverse their action with regard to the salting of streets. Some years ago there was much snow, and the streets were impassable. The next year the streets were salted, and then there was no trouble. He used to think it was a beautiful application of science. Now, all ills are laid to salt—diptheria, etc. Doctors railed at it. The question was brought before the City Council, and they passed a stringent act against the practice of salting the streets. There was no objection to salt in itself. Salt was necessary to the human system. Each of us needs about twenty pounds per year. Salt water upon the feet is not bad in itself; salt water bathing and salt atmosphere are both conducive to health. All action of salt in the streets other than the lowering of temperature is certainly beneficial.

There has been more diptheria this year than when salt was freely used. The surface salted is too small to have much effect upon the general health.

Salt slush is complained of as very disagreeable, both from its filth, as compared with the dry snow, and from its great coldness. Wetting the feet does tend, under certain conditions, to induce colds, but as the snow is certain ultimately to melt and present the same wet and filth, it is only a question of time. The increased cold of the salted snow-water is the only difference. This coldness is overrated. Salt and snow may, when guarded from access of heat, be made to assume a very low temperature, but in the streets, in practice, it rarely goes more than three degrees below the ordinary freezing point.

It is averred by some that salted snow-water rots the leather. There appears no ground but imagination for this supposition. Leather does, perhaps, remain wet a little longer for the salt, but, except for this reason, the salt is probably beneficial to the leather.

The most serious objection to salt is the injury supposed to be done to the horses. It is a general belief that salting streets injures the horses. It probably does in fact injure some whose feet are wounded, or in some other manner susceptible to cold, but the general benefits to man are so great as to render the injury to horses a small evil.. Salt has sometimes been used in excess, and it is better to use but little. Its use should be under the supervision of the law. Probably the best way would be to apply it at twelve o'clock at night, under the control of the police.

The streets may be cleared very effectively and cheaply by its use.

Mr. Fisher called out Mr. Ebbitt, of the Sixth Avenue Railroad, who said he was one of the first to use salt. He thought 1856 was the first year in which it was used in this city. He was the first. It was continued until 1861, when the Common Council stopped it. If the salt produced diptheria by any effect on the air, it should affect the drivers and conductors. There are 300 men in the employ of the Sixth Avenue Railroad Company, and the conductors generally are not naturally robust men. The situations are sought by men of feeble health as a good business to preserve and restore health. Only 130 or 140 bushels of salt were used for each snow, on the entire length—five miles of double track. There are, in an average winter, about sixteen snows requiring saltings. The speaker had, himself, been in all the snows, night and day, and had had no colds.

There are some medical men who think the salt saturates the earth and produces evils after the snow has gone. This is probably an error. It all goes into the sewers, and each additional snow requires additional salt. None of the effects of the salt, in removing the snow, are experienced three days after a salting.

Mr. Ebbitt presented the following schedule of the quantities used on his road each year:

Year.	Bushels.
In 1856	525
1857	1,945
1858	1,900
1859	2,970
1860	3,960

The following table gives the number of times snow fell in New York city, from 1853 to 1862, from memorandums kept in the office of the Sixth Avenue Railroad Company:

Year.	Snows.
In 1853	5
1854	11
1855	12
1856	18
1857	19
1858	16
1859	16
1860	11
1861	13
1862	19

Mr. Ebbitt explained some of the diseases of the feet of horses, averring a belief, based on a long and constant familiarity with the matter, that the use of salt does not injure them. He said that thrush was a foot disease of horses, for which salt was the most approved remedy. Salt, he thought, tended to make the nails hold the shoes more firmly to the feet, and was in that point a slight benefit.

Salt was the readiest and quickest agent to put the track in condition for use. Without salt they were obliged to double the horses per car, and reduce the number of cars running. A large enough number of horses to keep double teams of four horses for each car, with suitable relays, so as to keep the whole number of cars running, cannot be kept with economy.

The economy to the company in the use, and also of the *proper* use of salt, as distinguished from excessive use, is a better guide or control over its use than any police regulation.

Salt is from eighteen to twenty-five cents per bushel. It is more efficient when applied during the fall of the snow than when applied after its fall.

Mr. Fisher inquired the relative cost of removing the snow by salt and by shovels.

Mr. Ebbitt said the regulation would not allow the companies to dump snow in the docks. If the track lies unsalted, even if the most of the snow be removed, the horses are not able to stand, unless freshly shod. This is the main evil. Shoes last generally about sixteen days. To fresh shoe five hundred horses in a single night is practically impossible. The actual cost of removing the snow by shoveling to the sides of the streets is probably not more than that of salting.

Mr. J. H. Churchill asked if there were frosted feet on the horses at other times than the 8th of February, 1861, which had been spoken of, when sixty horses on Mr. Ebbitt's line had frosted feet.

Mr. Ebbitt said no. On that occasion no salt had been used for eight days before, and then no more than thirty bushels. The salt and snow had entirely disappeared. There was a sudden and very severe lowering of temperature, after a foggy morning, nearly to zero. That was the cause of the evil.

Mr. Dickinson, of the Second Avenue Railroad, agreed with Mr. Ebbitt. On the 8th of February, 1861, his road had 550 horses, and over 100 were injured, dating from that day. The appearance was like a frosted part. He had seen the same in Canada, but never here before. We had not used salt for ten days before. The morning was foggy, the noon warm, and the afternoon became very cold. Almost every horse out that afternoon was injured. But other horses, in stage lines, and some at Astoria and Harlem, which did not come near the railroad track, were affected the same way. Some of them, similarly affected, were brought to his stables, from distances in the country, to be cured. Mr. D. thought salt cost a little more than clearing the streets by hand, but not much. On the slightly traveled portion, at the upper end of his road, near Harlem, it is almost impossible, even with crowbar and pickaxe, to keep the grooves of the rails clear, and salt is almost indispensable. The snows, in the latter part of this winter, since the salt had been interdicted, had been light. If there had been heavy snows, we should have been blocked, as we were four years ago, and could not have run through the entire line. We then did not run to Peck Slip, and the Third Avenue line did not run below Pearl street for some two weeks.

Prof. Read thought the railroads were a great accommodation. They add ten cents a day by the time saved to the laboring people. The doubling of the teams and reduction of the number of cars is a serious evil to them. He found the water running off the railroad, in Brooklyn, when salted, contained only three per cent. of salt, and that is too small to be of much effect in this regard. He found but a quarter of one per cent. remaining on the track after the snow was gone, and but one and a quarter while the salt lay on the track.

Mr. Ebbitt wished to learn from Prof. Read if the salt really could injure paints, brussels carpets, and silk dresses, as was complained by some.

Prof. Read thought that there was ammonia in salt which might affect the paint, etc., a little, but the quantity was too small to be of any perceptible effect.

Prof. Joy said it was a common, but incorrect, opinion that an acid was formed by the salting, which was an injury.

A gentleman remarked that salt might affect dyes badly. He had a black silk hat which was injured by a short exposure on the sea-coast.

Prof. Read thought that salt might decompose iron in the dyes, if the dyes were not good.

Mr. Dibben remarked on the known effect of salt on snow and ice, whether with or without water. As the water is added to the mixture by the thawing of the snow, the temperature at which it will remain fluid is higher. Salt and snow alone will sink to 8 deg. F., or 8 deg. below zero. As the snow melts and the brine freshens, it ceases to melt more snow at 28 deg. or 29 deg. The occurrence on the 8th February, 1861, Mr. D. thought was due in part to the salt remaining on the track, which increased the evil of the sudden cold weather and slight fall of snow. Mr. D. thought the increased cold due to the salting of the railroad was very sensible to the human feet; he could distinguish it readily himself, and he thought its effect was evil.

It was an universal opinion, and he thought a correct one, that distempers in the feet of horses, other than railroad horses, occurred in an increased degree after each salted snow.

Mr. Ebbitt thought Mr. Dibben more sensitive to the temperature than most people, and that most persons with their feet ordinarily clothed would not experience any sensation whatever in crossing a salted and briny track. He had *never had any* frosted feet among his horses, although salting for several years, except that period in February, 1861.

Mr. Robert Walker thought the horses were of less account than human beings. The water produced by salting the track was muddy and slimy, and would always wet the boots of the gentleman crossing, and worse, the morocco of the ladies' balmorals. It penetrates both, and the common council had a view to the health of the foot travelers mainly. The fact that salt was good in the food, and was in the blood, etc., did not show that salt in water did not prevent wet feet from injuring health. Working girls had to work all day with the feet wet, occasioned by crossing the salted railroads. The salt was a great injury to such persons, and to all others who have to walk through it, or even upon the sidewalks near the crossings.

Samuel Hotaling said he was the first to call the attention of the authorities to the use of salt to thaw out hydrants and the like. He was a dealer in salt, and had been familiar with the provision business since boyhood. He had walked through salt slush every winter and through brine in summer. It was not injurious; it was a healthy business. During the yellow fever in this city, when the people left the lower part of the city, they flocked to a packing-house yard to avoid contagion.

He had inquired among stage owners, and a Broadway stage proprietor had assured him that the salt did no injury to the horses. Salt had been the means of enabling the people to use the railroads. Without salt the roads would be practically blocked with snow, and the people compelled to avoid the upper part of the city, and live in Brooklyn and Jersey city instead. Salt, by thawing away the snow, quickly promotes rather than injures the health of the people. It makes the track dry in a short time.

He had found little but theory on the subject as regards the effect on the lungs by exhalations. But the Sanitary Committee of Philadelphia had actually recommended salt for the streets.

Mr. J. H. Churchill said that he had obtained statistics from one of the city railroads, which led to a different conclusion from that presented by Mr. Ebbitt. It is well known to horsemen that the grease and similar effects mentioned by him are produced by chill from wet and deficient circulation, will remain a standing complaint, and in this condition horses will be particularly subject to inflammation of the extremities from exposure, even weeks after the removal of the first cause. Salt, it is true, dries up grease again, and in fact the feet of horses in this city are injuriously hardened.

It would seem idle to discuss the question whether wet feet are injurious to men, women or children, and equally so whether cold and wet feet are an aggravated evil.

On the other hand the removal of the snow is a paramount necessity, as shown to-night and the last season, for travel; and if the common council or those in authority would insist upon the railways doing what they allege now that they can do, viz: remove at once the slush and water by opening channels to the sewers, all the objections would be reduced to practicable limits. The idea of malaria must be left to the doctors, who will possibly differ; but it is a fact that the salt is not carried up in any water evaporated from the slush. But there is a question of much interest which is at the bottom of this matter: The boiling point of a mixture of salt and snow is raised; does such a mixture evaporate more slowly at low temperatures than snow or water? At any rate the evaporation is slow and practically during a long continuance of snow; we have for all this time wet crossings, and when the snow breaks up we have none the less all the usual inconveniences of a thaw. In fact, our misfortunes are doubled. The task is to shorten it. Remove the water as produced by the salt, and the railway companies would confer a great boon on the city; but it must be removed instantly, as soon as thawed.

One word on the scientific part of the question. The process adopted of snowing and salting simultaneously, is exactly the one most suited to produce the greatest degree of cold, for the time. The more expeditious the thawing the greater the cold. This is necessarily done at all hours, even when the streets are fullest. We cannot avoid the nuisance. It is no answer to say that after so many hours the usual temperature is very nearly re-established. Again, it is not the same thing whether a foot that is subjected to a given mixture of snow and salt is at, say the temperature of this room, or has been previously made as cold as it can bear to be.

Dr. Vanderweyde read a letter from the Herald, by a contractor for hauling the Hudson R. R. R. cars from Chambers street to Thirty-first street, against the use of salt. He said he lost eighty horses by frosted feet, which he attributed to this cause.

Subject for next week, "Glass." Subject for week after, "Salting Streets," continued.

Adjourned.

American Institute, Polytechnic Association,
March 27, 1862.

Prof. Chas. A. Joy in the chair.

The regular subject of the evening was taken up.

GLASS.

The Chairman—I invited a gentleman to give us the history of the art of making glass; but, a short time before the meeting, I received a note from him, saying that it would be impossible for him to attend; so, if you will allow me, I will give you a brief sketch of this history myself. The art of making glass dates from immemorial antiquity. The first mention made of it in writing is probably in the Book of Job—in the xxviii. chapter, and the 17th verse. In the 12th verse, the question is asked, "But where shall wisdom be found? and where is the place of understanding?" and, in connection with the question, the remark is made, in the 17th verse, "The gold and the crystal cannot equal it; and the exchange of it shall not be for jewels of fine gold." Here glass is compared in value with gold and with wisdom.

Though glass was known in ancient times, it was exceedingly rare and costly, and, even among the Greeks and Romans, it was a luxury.

The manufacture of glass was introduced into Europe by the Crusaders; and, for a long time, Venice had the monopoly of this industry. In the latter part of the seventeenth century, in France, the manufacture was monopolized by the nobility, all other persons being excluded from it by law. Though the art of making glass is so old, its chemistry was first understood by a chemist who died in 1847. It is claimed for Berzelius that he first showed the relations of the composition of glass to chemistry. He ascertained that silica is an acid—silicic acid—and combines with bases to form salts—glass is a double or triple silicate of soda, or potassa, of some familiar oxide of metal. By the combination of silicic acid with different bases—either one or more in the same compound—a great variety of glasses may be made, but there are only eight of these varieties that are of any considerable importance. The simplest of these is soluble glass, which is a single silicate of potassa or soda. This article is attracting much attention at the present time, and there is a practical maker of it in the room, who, I hope, will give us an account of the process of its manufacture. Bohemian or crown glass is a silicate of potassa and lime. This variety is used for the convex portion of achromatic lenses. Window glass is a silicate of soda and lime. Bottle glass is made of very coarse materials; it is a silicate of soda, lime, iron and alumina. In this phial are specimens of the materials used in making this bottle, just as as they are mixed at the manufactory. Crystal glass is a silicate of potassa and lead. Flint glass is the same, with a larger proportion of lead. This is the glass used for the concave portion of achromatic lenses. Enamel is a silicate and stannate of soda and lead; or the soda may be replaced by potassa. The presence of iron in glass gives it a green or red color. This color may be removed by the binoxide of manganese, but in this case it is liable to return in the course of time by the reoxidation of the iron. In Bond street, in this city, there are old windows in which the glass has a reddish hue, obtained in this way. Will Dr. Stevens give us the geology of this subject?

Dr. Stevens.—The silex used in making glass is obtained usually in the form of sand. Formerly all the sand used in this country in glass making was collected on the sea shore. The purity of the sand is of so much importance that the small proportion of impurities in sea sand has caused glass works to be removed a considerable distance, from one locality to another. The Lenox glass works were removed from the eastern part of Massachusetts, in order to be near the pure sand found in Lenox. All the sand now used in the glass works of the United States is derived from the older rocks. The Lenox sand belongs to the Taconic system, the very oldest of the fossiliferous rocks. The Oneida county works, the works in Wayne county, and those in Oswego, all use the Oneida county sand, which is derived from the Silurian rocks—the rocks lying next above the Taconic. The Pittsburgh works use the magnesian sand stone of the lower silurian, obtained from Missouri, a little below St. Louis.

The Chairman.—Will Prof. Seely give us the chemistry of glass?

Prof. Seely.—As it is getting late, and as there are strangers here, prepared to speak, I should like to be excused.

The Chairman.—Prof. Dwight, of the Law School of Columbia College, has kindly consented to give us the law in relation to the use of light, which, he says, under the decisions at present in force, is a dark subject.

Prof. Dwight.—It may be of some interest to know what are our legal rights in relation to the use of light; and though, as the Chairman says, the subject on the whole is a very dark one, there are some points which are settled. The only case in which questions could arise in our community is in that of proprietors of adjoining lands. There is one way unquestionably in which a man may acquire a right to have a window look out over his neigbor's land: that is, by express grant. And the law is settled that such grant, to be valid, must be made by deed—an instrument with a seal. All grants of similar rights in land must be made by a sealed instrument. In case of such grant, the right of the owner of the land must yield to that of the grantee; so if a person has granted to an adjoining proprietor the right to have a window look out upon his land, he cannot so occupy it by building, or otherwise, as to obstruct the enjoyment of this right. Thus far the law is clear; no doubt can be thrown upon these points. In England, it is settled that the right to light coming over the land of an adjoining proprietor may be acquired in two other ways. If a man sells a building with a window looking out on a vacant lot, he cannot afterward build upon the lot in a way to darken the window. This is called a right by implied grant, the other is by right of ancient possession. If a man's window has opened upon his neighbor's land twenty years, his neighbor cannot then close it. These questions have been raised in this country, and in some of the lower courts there have been decisions adverse to the adoption of the English law. It is thought that it would be peculiarly unsuited to our growing cities and villages. You know that when the common law of England was adopted for this country, it was adopted with the proviso that only such portions should be in force as are in accordance with our institutions. Though the questions in regard to the right to light either by implied grant or by pre-prescription, are not yet fully settled. I have little doubt that the English law on the subject will finally be rejected by our courts.

The Chairman.—Will Mr. Kraft give us a description of the mode of making soluble glass? He has a manufactory in Brooklyn.

Mr. Kraft arose and whispered to the Chairman, who remarked, "Mr. Kraft is not familiar with the English language, and if the Society will accept my version, I will translate for him." Mr. Kraft then spoke in German, Prof. Joy translating as follows: Quartz, soda and a little charcoal are pulverized and melted together in a crucible, six fusions being necessary to make a perfect mixture. This is the appearance of the soluble glass. It will dissolve in one-fifth of its weight of water. In this vial is a sample of the solution.

Mr. Dibben.—Will the gentleman please state a single use to which the soluble glass has been practically applied?

Mr. Kraft.—It is used in some of the calico-print works, near Boston, as a mordant. It is also an admirable article for paint. To prepare it for this purpose, it is pulverized and added, little by little, to water kept in a state of ebullition. With the solution thus obtained, the pigment is ground, as is usual with linseed oil. To fit the ground paint for use, it is diluted with water. If the solution is not less costly than linseed oil, the prepared paint is relatively cheap, because the white basis need not be a costly metallic oxide, and carbonate of lime, whiting, or other cheap substances, become a substitute for the white lead used in oil painting. The white thus prepared does not change by exposure to the air.

Soluble glass applied to plaster gives it a very strong hardness, by converting carbonate into silicate of lime. Applied to calcerious stones, liable to decomposition by exposure to the air, it will enable them to resist disintegration.

Applied as a paint to wood, in several coats, of which the first is *thin*, it will prevent it from taking fire and burning with flame. A building, of which the floors and wood work are thus painted, is practically incombustible.

Mr. Bartlett.—I understand the soluble or water glass is used as a wash, but not as a mordant.

The President.—I can state that it has been successfully used in Germany for fresco painting. I can also state a use for which it has been found not to answer; that is for cleaning clothes. In a large establishment, near Berlin, where there are several hundred children, it was thoroughly tried, but was found to dissolve the linen.

Mr. Dibben.—Will Mr. Kraft state the price at which it was sold?

Mr. Kraft.—The solid at $12 per hundred pounds, the liquid at $10.

Prof. Seely.—There is one point that I should like to make here, in relation to the chemistry of glass. Any one acquainted with the laws of chemical combination, and with the composition of glass, would have anticipated that the silicic acid might be replaced by boracic acid; silicon and boron being so similar in their properties. It is well known that this is found to be the case; the borates, formed by the combination of boracic acid with the alkalies or metallic oxides, are glasses similar in their properties to the silicate glasses, but somewhat different; for instance, they are more fusible. One metallic oxide may also replace another in the combination. Faraday was the first to suggest that the oxide of zinc might be used in the place of oxide of lead, and a glass is thus produced, superior, I believe, for certain optical purposes, to the lead glass. Now, the point that I wish to make is, that this law indicates a wide field which has not been explored. For instance, the metal cadmium is analogous to zinc, and it is probable that a glass in which the oxide of cadmium should replace the oxide of zinc would have properties similar to those of the zinc glass, but still not precisely the same. Let us try it. Rubidia and cæsia too, the newly-discovered alkalies, would, doubtless, make glass with peculiar properties; and it is conceivable that these properties might be of sufficient value to justify the use of even so rare and costly substances as the oxides of rubidium and cæsium. For instance, if the lustre of the glass imitated more closely than any other the lustre of the diamond and other precious stones, the cost of the materials would be of trifling importance.

The Chairman announced that the subject of the next meeting is "Salting the Streets," continued from a previous meeting.

The Association then selected for discussion, a fortnight hence, "Naval Warfare," and adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
April 2, 1862.

Prof. Chas. A. Joy in the chair.

The regular subject of the evening was called up, viz.:

SALTING THE STREETS.

Mr. J. K. Fisher.—At the first discussion of this question—the utility of salt as a means of clearing snow from the streets—it was claimed that salt is cheaper than the other means allowed and used for the purpose; and it was also claimed that no injury to persons or horses results from it.

On the other side, it was claimed that the mixture of snow and salt sensibly chilled the feet of men, and probably injured the feet of horses.

As to cost, it was said that the salt cost somewhat more than the shoveling of snow from the railway to the sides of the street. It was also said that the companies were prohibited from throwing snow into the docks. This prohibition would increase the cost of removing snow by cartage.

I do not intend to say much on the comparative merit of these two ways of getting rid of snow. It is obvious that if snow is melted, and runs away immediately, it is better for the public than when it is thrown to the sides of the street, and left to melt in the sunshine, and to keep the streets wet for a long time, provided there be not in the salted water something more injurious than in an equal quantity of fresh water. It is also cheaper than the means used to clear Broadway during the past season. The snow was frozen; then broken up by picks; frozen again; then broken up again, and the remains carted off. Had it been shoveled and carted while soft, it would have cost much less. The cheapest way is to remove it before it is packed. The next cheapest way is to remove it before it is frozen.

But the cost of removal is not the only cost to be considered. The cost of drawing loads over it, or through it; the cost of shoes, for horses and men.

The damage to carriages and pavements from jolting, the doctors' bills, and the cost of sleighs, all these and other items incident to the presence of snow, are to be estimated. But all these are trifling when compared to the discomforts and insalubrity of our streets in the snow season, compared with the streets of European cities that have little or no snow in them.

Comparing the style and expense of private buildings with the style and expense of the pavements and sidewalks, and the keeping of them in repair and cleanliness, we see a contrast which proves that the public authorities do not keep up with the wealth and liberality of the people. The people desire luxury, and are willing to pay for it. Mere comfort does not satisfy them, much less are they satisfied with what mere health requires; still less are they satisfied with a condition that is neither luxurious nor comfortable, nor healthy, and has not the apology of being economical, even to the public treasury.

In view of all the probable expenses, and of the wants of the people, I conclude that the first policy is to remove the snow as soon as it has fallen, while it is soft; to sweep it from the streets as thoroughly as dust should be swept.

If this be done, if the streets be kept dry, I believe the public health will be promoted; the comfort of the people will be greatly increased; the cost of shoes and clothing will be less; the wear and tear of carriages and pavements, caused by the falling of wheels into holes in frozen snow, and pounding the pavements into holes, and breaking the wheels, will be saved; and what is scarcely less desired, the love of order and beauty will be satisfied. We shall no longer feel ashamed of our public affairs, our rulers and our city, even of our country. Wealthy citizens will no longer be constrained to live in the country for the health and comfort of their families, but will prefer the city if this and corresponding improvements be carried out, as such improvements may be with economy, where wealth is concentrated.

Here I might conclude my remarks if I were in a merely popular assembly, that ignores all improvement but that which its own eyes have seen; but in a meeting of scientific men, who can see with their brains, I may be allowed to consider whether genius, taste and liberality may not, at a cost not exceeding the good of it, develop another means of removing snow, and of otherwise increasing the facility and comfort of locomotion in streets.

There is a new means already in some measure introduced. The dummies or noiseless locomotives, which for the last ten years have at times worked on the Hudson River railway, have proved that steam is in all respects better than horses for moving cars in streets. I am well informed as to what has been done in steam rail cars, steam carriages and locomotive engines, and I have no doubt that all classes of railroad vehicles can be worked by steam more cheaply and safely than by horses; and even on common pavements and common roads, carriages of all kinds can be worked at less cost than horses, and will injure pavements and roads less than horses will injure them. As evidence of this I refer to the published statements of cost, from which it appears that a train of seven cars is drawn at thirty miles per hour by a locomotive, at a cost ranging from twelve to twenty-two cents per mile, according to the price of fuel and the quality of the engines; and the cost of drawing a single car at six miles per hour by four horses, is more that twenty-four cents per mile.

I compute that a street rail car will require four pounds of coke per mile. On the best railways the consumption of coke is about a third of a pound per ton per mile. If we could attain equal economy in street cars, less than two pounds per mile would suffice; but the wheels of street cars are smaller than those of steam rail cars; the rails are clogged with dirt; there are frequent stops and other causes of waste, all of which indicate that four pounds per mile is a moderate computation. This fuel will melt about four hundred pounds of snow, if it be effectively applied. We may, therefore, expect that each steam car will melt four hundred pounds per mile run; and as a car is started from each station every second minute, on a fully worked street railway, we have sixty cars per hour traversing each mile of double track, and twenty-four thousand pounds of snow may be melted per hour on each mile.

The weight of snow, as it falls, is about eight pounds per cubic foot. The width of track, which the companies have to clean, is fifteen feet; hence if the snow is a foot deep, there is 120 pounds on each linear foot of railway, or 634,000 pounds on each mile. Hence in 27 hours the cars will melt a foot in depth of snow from the whole surface of the way; but as the steam may be thrown upon the rails alone, until they are cleared, and then thrown upon the parts between them, there is little reason to doubt that the cars will be able to melt the snow as fast as it falls on the rails, and to clear the whole track in a day or two. And all this may be done without the danger to public health which is alleged to attend the melting of salt.

The same means, to greater extent, may be used when omnibuses, wagons and other vehicles are run by steam, because more steam will be required. On stone pavements the steam and gases of the carriages in a street like Broadway, would in a day or two, or less, melt the snow that ordinarily falls in one storm.

Not only would there be little snow left to be carted from the thoroughfares, but there would be a use for snow which would partly pay the cost of carting it from private streets. Snow would be better than water to make steam for carriages, because it is pure, and because less of it is required. The steam, in melting the snow and heating it to 212 deg., would be about one-third condensed and returned to the boiler, thus saving a third of the weight of water.

We do not yet know whether steam cars and carriages will condense their steam. Thus far the dummies have condensed it; but steam carriages have exhausted it into the air, keeping it invisible by excess of heat in the chimney. If condensers be used, snow and ice will be more important than when there is no condensation. In this case snow will be accumulated during the winter, to be used in warm weather; and to supply this the private streets will be disencumbered of snow, paying but a part of the cost of removing it.

Mr. C. W. Smith.—I was not here, Mr. Chairman, at the first discussion of this subject, and, if I attempt to make any remarks, I may occupy ground that has already been gone over. I happen to be one of those persons who, as the gentleman says, "enjoy poor health;" and I find very little enjoyment in it. Many years since, I contracted a disease of the lungs, and I am very sensitive to changes in the atmosphere. You may take me blindfold through the city, and I can tell every street that is salted, as soon as I enter it, from the chilliness in the air, and its effects upon my system. Melting snow by mixing salt with it, doe sensibly and considerably reduce the temperature of the lowest stratum of the air. As in the case of all other substances, snow cannot be reduced from the solid to the liquid state, without absorbing heat, and when it is melted by means of salt, the heat is absorbed from the atmosphere. The air is not only made colder, but it is rendered more moist. Warm air will contain more water than cold air, and when the temperature of the air is reduced, the invisible vapor which it contained is condensed, and is perceived in the form of moisture. Thus we have a cold, damp air—the very worst air for the health. I never walk through or even cross a salted street, without having my cough increased, and I have no doubt that every such exposure must tend to shorten my days.

Dr. Gardiner.—The first question to be decided in relation to this matter is, whether it is desirable to have the snow removed from the streets. In Paris and other cities in France, when the snow falls to the depth of a few inches, a large number of workmen are employed with carts, and in a short time the snow is all carted away. There is so little snow in that country that it is not used for sleighing, and when it does fall it is simply a nuisance, to be got rid of as soon as possible. But the case is different with us. The country around New York is frequently so covered with snow, that the roads are impassable with wheeled vehicles, and if people visit the city at all, they must use sleighs or sleds. If the snow is all removed from the streets, they cannot be traversed with runners, and the country people find it impossible to get about with their sleds. Now, it is a question worthy of consideration, whether the streets of the city should not be adapted to the same vehicles as the roads in the vicinity. Cut off the city from the country, and the city perishes.

The Chairman.—I invited Dr. Sayre to be present at this discussion, and to give us his views. He is the city physician, and in his official capacity caused the practice to be discontinued. He has devoted a great deal of attention to the subject, and can doubtless give us some pertinent facts in relation to it.

Dr. Sayre.—Mr. Chairman, I thank you for the invitation to be present at this discussion. Dr. Gardiner, Mr. Smith and Mr. Dibben have so fully stated the chemistry and science of the matter, that it is not necessary to go into that branch of the subject. Every old woman knows that if she mixes snow and salt together, and sets her vessel of prepared milk and eggs into the mixture, the milk will be frozen into ice cream. Snow and salt form a freezing mixture, which extracts caloric from any substances with which it comes in contact. I will state the circumstances which first called my attention to the effects of salting the streets. Sometime after my appointment as city physician, by Mayor Wood, as I was walking one day up Broadway, I saw near Canal street, a team of four fine horses belonging to Mr. Herring. The wheel horse was standing on the snowbank near the curbstone, and was resting comfortably on his four feet; but the other three horses were standing in the water which filled the middle of the street, and I was surprised to see that each of them was standing on only two of his feet. Stopping to observe them, I soon saw them change their position, putting down the feet which they had been holding up, and raising the others out of the water. Seeing that the horses were fancy animals, I asked the driver if this was some trick that he had been teaching them. He replied that it was not, and remarked that he supposed the horses raised their feet to get them out of the cold water. I then put my finger into the water, and discovered that it was extremely cold. This led me to investigate the subject, and I soon became satisfied of the very deleterious effects of the practice of salting the streets. Never, in the history of the world, was such an event known as the freezing of a horse's hoof. Every blacksmith knows, and every person who has ever seen a horse shod knows, that you may burn the hoof with a red-hot iron, or you may stick nails into it, without producing any sensation. It is an inert mass. So long as a horse stands upon the surface of the snow, he would not have his foot frozen, if he should stand there forever. But when he puts his foot into a freezing mixture that is in a liquid state, so that the liquid comes in contact with the corona of the foot above the hoof, where the parts are alive and sensitive, full of blood vessels, then the foot may be injured. I have at my office, specimens of horses' hoofs that have sloughed off in consequence of injuries received to the feet by the animals standing in the salt slush in the streets. As Dr. Gardiner has well remarked, this question is simply a matter of dollars and cents to the railroad companies. When a manager shows the stockholders that he has cleared a track with $60 worth of salt, when it would have cost $460 to clear it with shovels, they conclude that he is an excellent manager. They do not think of the horses which will be dying a fortnight hence, or perhaps next summer. On the Tenth Avenue railroad, the contractor for drawing the cars owns the horses, and he has discovered that the loss in horses more than counterbalances the economy resulting from the use of salt; and after thorough trial, he has adopted the plan of clearing the track by having the snow shoveled off at his own expense. [The speaker then read an affidavit of this man, stating that when he used salt on the road, he lost quite a number of horses, and had others become lame, and that since he abandoned the practice, none of the horses' feet were injured by the cold.] If salt slush is thus injurious to the feet of horses, why should it not be to your or my more sensitive feet? It is. I had one case in my own practice, that is worth all the theories in the world. A man whose name is known to a large portion of the inhabitants of this city—Captain Reed, of the privateer *Armstrong*, an old gentleman—in stepping from one car to another, wet both of his feet, in the salt slush, above his ankles. He rode some distance up town to his house, and when he got there both of his feet were frozen. He died from the effects.

On motion of Prof. Seely, the same subject was continued for discussion a fortnight hence.

Naval warfare was made the subject for the next meeting.

Adjourned.

American Institute, Polytechnic Association,
April 10, 1862.

Prof. Chas. A. Joy in the chair.

MANUFACTURE OF PUDDLED WROUGHT IRON DIRECT FROM THE ORE.

Dr. Stevens exhibited a model of the apparatus invented by Mr. Isaac Rogers, of Newark, N. J., and explained its operation.

It consists in first roasting granulated iron ore mixed with coal, for several hours in a close revolving cylinder to deoxidize it, then conveying it directly to a puddling furnace, in which it is converted in a short period of time into balls of wrought iron. In Mr. Rogers' works two roasting cylinders and two puddling furnaces are in operation, and the manufacture of wrought iron blooms direct from the ore goes on continuously. One cylinder is sixteen feet long, the other twenty, and both six feet in diameter. A description of one will suffice for both. The huge cylinder is hung horizontally in the loft above the puddling furnace. This cylinder is really a large oven, and evolves on a hollow shaft. It is placed in a covered brick arch, and is heated by the waste heat arising through flues from the puddling furnace. New Jersey magnetic ore is that which is operated on. It is first ground with about 25 per cent. of Cumberland coal, and in this condition it is fed in at regular intervals to the cylinder through an opening in the hollow shaft. During every revolution of the cylinder, 25 pounds of ground ore and coal are dumped eight times into the hopper placed over the shaft at one end, and the ore is then carried slowly to the back end of the cylinder by a screw. A signal bell, operated by the engine, warns the attendant when to dump his bucketful of ore into the hopper. It takes from five to eight hours for the ore to pass through the cylinder to the back end. During this period it is turned over frequently, and exposed in thin layers to the heated surfaces of the cylinder. The object of this roasting operation is the deoxidation of the ore out of contact with the atmosphere. Although the ore is thus treated for several hours, as much roasted ore, at a low red heat, is discharged into the puddling furnace at every revolution of the cylinder as makes a common bloom of wrought iron weighing from 110 to 130 pounds. During every 22½ minutes, 200 pounds of mixed roasted ore pass from the revolving cylinder above to the puddling furnace below, and in the same space of time a ball of puddled wrought iron is taken out from the latter, placed under the trip hammer and converted into a bloom. The impurities in the ore melt in the puddling furnace, are separated from the iron and flow down into the *spue* hole in the form of slag.

Prof. Seely.—I would ask if there is any evidence that the iron is reduced in the cylinder?

Mr. Rogers.—We have the apparatus in operation at Newark, and should be pleased to show it to the gentleman. It has been examined by the most scientific men we have, and it is making good iron. We claim three advantages for it—that the apparatus can be erected at very low cost, that we make wrought iron at a saving of $10 per ton, and that the iron is of a good quality.

Prof. Seely.—Have you ever tried the experiment of dispensing with the cylinder—putting your ore and coal directly into the furnace without passing them first through the cylinder? It is contrary to all the facts with which I am acquainted, to suppose that the iron can be reduced from its ore in that cylinder. Iron is decomposed by hydrogen at a low red heat, but not by carbon.

If the experiment has not been tried of putting the ore and coal directly into the furnace, I suggest that it be tried.

Mr. Dibben.—The advantage of this arrangement is that the ore and coal are partly heated for the puddling furnace by the waste heat of the furnace. But the great difficulty in all these direct processes of making iron, where no flux is used, is to get rid of the silica and other foreign substances contained in the ore.

Prof. Renwick.—I would ask if any other ore has been tried than the Dickinson ore? The Dickinson ore is very easily reduced. It can be done in a common blacksmith's forge. There is no difficulty in making a horse shoe from this ore at any blacksmith's fire. This plan of making wrought iron direct from the ore, is the oldest of all processes, and is the one now in use among barbarians. It requires, however, a very rich ore, and has never yet been economical.

Mr. Cooper.—Ten years ago there was in operation at the Trenton Iron works, an apparatus precisely similar to this. It made good iron, but there was a practical difficulty in the cylinder warping, and it was laid aside. The iron would be reduced in the cylinder in this way: A little atmospheric air would get in with the coal and ore, and the oxygen of this air would combine with the coal at red heat to form carbonic oxide; then, as oxygen has a stronger affinity for carbonic oxide than it has for iron, it would leave the iron and combine with the carbonic oxide, producing carbonic acid, and leaving the iron in the metallic state. The silex would be got rid of as silicate of iron, thus reducing the yield of the ore.

Mr. Bartlett.—Very careful provision is made for excluding all air, except that which fills the interstices between the particles of ore and coal. As it takes thirty-three pounds of oxygen to burn twenty-five pounds of coal into carbonic oxide, and as oxygen forms only about twenty-three per cent. of the atmosphere, it would require 150 pounds of air for each charge of ore and coal. This would be equal to about 2,000 cubic feet of air—enough to fill a room ten feet wide, ten feet high and twenty feet long. This could not be contained in the interstices of 100 pounds of ore and coal.

The Chairman.—The time has arrived for the discussion of the regular subject selected a fortnight since. It is

NAVAL WARFARE.

Mr. Dibben opened the discussion in a sketch of the history of iron-plated ships.

Prof. Renwick.—There are some facts in the history of this art which were not stated in the highly satisfactory address to which we have listened. Iron-plated ships were first suggested by John Stevens, the father of Robert and Edwin. In regard to columbiads, known in Europe by the plagiary name of *Paixhans*, the first were made at the instance of Col. Williams, U. S. Engineers, for the armament of the castle known by his name, on Governor's Island, in this harbor. The drawings for the gun are said to have been made by Col. Brunford, U. S. Ordnance. The calibre of these guns was of 100 pounds. Elongated projectiles were invented by Robert L. Stevens before the close of the war of 1812. I was present at a trial of them in 1817, and that trial was not successful; the shells did not explode. In the same year there was another trial, at which I was not present, but I was informed that it was successful. A number of shells were made, placed in boxes and deposited in Castle William to be ready for use.

Mr. Babcock.—A number of steel shot have been recently prepared for the government and placed on board the *Naugatuck*, Stevens' little boat, to be used in a 100-pounder Parrott gun against the *Merrimac* if she again ventures out. They are of solid cast steel of the acorn form, with the point terminating in a cylinder three inches in diameter and about three inches long, with a perfectly square end, the corners being nicely finished to a cold-chisel edge. It is thought that if they do not penetrate the side of the *Merrimac*, they will at least catch into the plates with sufficient hold to tear them from their places. I am told that the *Merrimac* has precisely similar shot, weighing 360 lbs. each, with which to attack the *Monitor*.

Prof. Joy.—It is remarkable that 81 years ago they were discussing the very subject which is engaging our attention at this time, and in reference to the same locality. I hold in my hand an order from Washington in relation to boats at Yorktown to protect the French fleet from fire-ships. Washington wished Count de Grasse to sail up York river with his fleet, and thus make the capture of the British army certain, but the Count declined to do this unless Washington would furnish boats to prevent his vessels from being burned. This order was accordingly issued. It is dated October 15, 1781. Hostilities ceased on the 17th, and the surrender was made on the 19th; so this is among the last of the military orders issued by Washington. [Prof. Joy then read the order. It directs the officer to take the boats out of James river and place them on wheels and send them over to the head-quarters of the army before Yorktown. The order directs that the boats shall be covered with boughs to prevent them from being seen by the enemy.]

Prof. Renwick.—Had I been aware of the subject of discussion for this evening, I should have brought with me a model, and descriptions of an armor-clad vessel. Had I done so, however, I must either have postponed the exhibition of them, or have trenched upon the time that has been so profitably and instructively occupied. May I request that the subject be continued for future discussion?

The same subject was chosen for discussion a fortnight hence, and the meeting adjurned.

American Institute, Polytechnic Association, *April* 17, 1862.

Prof. Chas. A. Joy in the chair.

ORIGINAL EXPERIMENTS WITH SUPERHEATED STEAM.

Mr. Warren Rowell made some experiments, impugning certain conclusions made in 1850, in relation to Mr. James Frost's *stame* or superheated steam.

These conclusions were, that steam at a temperature of 212° under the pressure of the atmosphere, when heated apart from water, had its volume doubled by the addition of 4° of heat, and that 12° more of heat gave an increase of an additional volume.

Mr. Frost's experiments were made with a siphon tube, the short leg of which was three inches in length, and closed at the end, while the end of the long leg was left open. He introduced a minute quantity of water into the short leg, and then filled this leg with mercury. The tube was held with the legs extending vertically upward, and the water in the short leg was, of course, raised by the mercury to the upper and closed end of the leg. The tube was now placed in a bath of salt water—a saturated solution, the temperature of which is 228°. The water in the tube was converted into steam, which forced the mercury up the long leg of the siphon, and, as long as the steam continued to be generated in quantity more than sufficient to fill the short leg, the excess was forced around the bend of the siphon and escaped through the column of mercury in the long leg.

It was supposed by Mr. Frost and the committee of the Institute that all of the water in the tube was necessarily converted into steam, as it was subjected to a temperature of 228°, while the pressure was only three inches of mercury in addition to that of the atmosphere.

He now placed the tube in a bath of pure water, boiling, when the three inches of steam was reduced to one inch, and with this inch of steam, thus prepared, his experiments were conducted. By placing the tube in a bath of salt water of such strength that it would boil at a temperature of 216°, the one inch was increased to two inches, and by inserting it in the saturated solution at 228°, it was expanded to three inches.

From this experiment Mr. Frost drew the apparently manifest conclusion that steam of 212°, heated apart from water, had its volume doubled by the addition of 4° of heat, and trebled by the addition of 16° of heat. From this law he pointed out the enormous value of superheated steam.

Mr. Frost's experiments having been recently repeated before Mr. Isherwood, Mr. Rowell and others, the suspicion was excited that there was water in the tube, together with the prepared inch of steam, and Mr. Rowell devised a modification of the experiment, to test this point.

His first plan was to introduce just enough water to make an inch of steam in the tube at the atmospheric pressure. By exceedingly careful measuring and weighing he obtained the proper quantity of water in a delicate glass bulb, which he pushed down through the mercury into the short leg of the siphon. It was here evaporated at 212°, and then the tube was placed in the bath of 216°. But this steam was not doubled by the addition of the 4° of heat. It was expanded only to the extent corresponding to Guy Lussac's law. The same result followed its immersion in the saturated solution of 228°.

Subsequently a different plan was adopted for obtaining just an inch of steam in the tube to experiment with. The tube was placed in the saturated solution in nearly a horizontal position—the open leg being slightly inclined upward—and the boiling was continued until a very little more than an inch of steam remained.

On placing the tube now in the bath of pure water, the steam filled just one inch, and on heating this steam to 216° and to 228°, its volume was not doubled and trebled, as in Mr. Frost's experiments, but was simply expanded in accordance with the well-known law of the expansion of gases, by which their volume at 32° is doubled by the addition of 480° of heat.

From these experiments, Mr. Rowell comes to the conclusion that Mr. Frost had too much water in his tube, and that the great increase of volume which took place in his steam resulted from the evaporation of this water.

Mr. Godwin.—I was well acquainted with Mr. Frost, and examined his experiments with a great deal of interest. I ask permission to read, from the *Scientific American*, an extract from the *London Engineer*, taken from the annual report of Mr. Fletcher, Chief Engineer of the Manchester Association for the Prevention of Steam Boiler Explosions. He directs the attention of those who use condensing engines to the fact that these motors generally do not execute work in proportion to the quantity of steam delivered from the boilers. The loss, as measured frequently, is about thirty-three per cent. This is due to the alternating connection of the cylinder at each stroke of the engine, with the boiler at a high temperature, and the condenser at a low one—about 100° Fah. In such engines there is an alternate action of condensation and re-evaporation in the internal surfaces of the cylinder, and it is thus a considerable per centage of steam passes from the boiler to the condenser, through the engine, without doing useful work. This action is so silent and subtle that it has escaped detection for many years. Such a loss is of much consequence in steamships, which have to carry their own fuel. It amounts to about three hundred tons of coal in one of the larger class of steamers in a voyage across the Atlantic ocean. "The remedy for this loss" is to adopt the steam jacket for the cylinder, or superheat the steam. There is nothing new, or untried, or dangerous, in either of these. Some have held up superheated steam as a bugbear, and have asserted that it destroyed the interior surface of the cylinders, cut the faces of the valves, corroded the metal, and prevented proper lubrication. Actual experience has proved these objections to be visionary. Mr. Fletcher says, on this head, "I find that where superheated steam has been fully tested no difficulty is experienced in its use, and no alteration is required for old engines, to which it may be applied, beyond the introduction of a slightly better description of packing for the glands. The Peninsular and Oriental Steam Navigation Co. have, in many of their engines, realized an economy of upwards of 30 per cent. by the introduction of superheated steam;" and a steamer lately built of 2,600 tons burthen, with engines of 400 horse power, in which steam jackets, surface condensers, and superheated steam are applied, has realized, we are told, a saving of fifty per cent. in fuel, compared with a steamer of like tonnage and power without such appliances. These statements claim the attention of all steam engineers and steamship companies. It has been found most advantageous to superheat the steam to about 100° above that in the boiler, when no difficulty is experienced in lubricating valves, pistons and glands. Every new economical application of steam deserves to be generally known and carried into practice.

The regular subject was then taken up.

SALTING STREETS.

Prof. Seely.—There was one point made by Dr. Gardiner at the last meeting, which, perhaps, ought to have been considered at our first discussion of this subject—that is, whether we want snow in New York city. In regard to that, I would say that for those who have the means to purchase fine horses and sleighs, and the leisure to indulge in the recreation, sleigh-riding is a very agreeable luxury. I like it very well myself. But I cannot afford to indulge in it, and I have no doubt that in this city there are a thousand persons like myself in this respect to one who can enjoy sleigh-riding; and I think that the few should be willing to give way to the many. Even for those who have sleighs the streets are not very good places to ride in, and most of those who indulge in the recreation go into the suburbs or out of town. This subject has recently been thoroughly investigated in Philadelphia. It being proposed to prohibit the use of salt on the railroads, a committee was appointed by the city government to take testimony, and fully investigate the matter. The College of Physicians and the Board of Health were both called upon for their opinions, and all citizens interested were invited by public notice to present their views. The testimony was very contradictory, but it seems to me that the preponderance is decidedly in favor of the practice. The strongest opinions are in opposition to it, but these are generally given by those least competent to judge. The College of Physicians made a series of observations for the guidance of their judgment. Dr. Rogers tested the temperature of the salt slush in many places, and he walked through the streets with a thermometer in his hand, carrying it about three feet above the ground. He found the slush but very few degrees colder than the snow—three, four, five, and, in one case, eight degrees colder; and the temperature of the lowest stratum of the air was, in no case, any lower than that at the height of five or six feet. Both boards gave their opinion in favor of allowing salt to be used, and no physician objected to it.

Since the last meeting I have very fortunately had an opportunity of making some experiments myself. We had a slight fall of snow, and I prepared some mixtures of it with salt, in different proportions, and observed the temperatures and the rate of melting. I placed in my laboratory four tin cans, all of the same size—six inches in diameter and eight inches in height. In each of these I placed twenty ounces of snow, carefully weighed. In one of the cans, which I call number one, I mixed with the snow ten ounces of salt, in number two I mixed one ounce, in number three one-fifth of an ounce, and in number four I left the snow pure, without any mixture of salt. It will be seen that in number one the proportion of salt was fifty per cent. of the weight of snow; in number two, five per cent.; and, in number three, one per cent., the last being about the proportion in which it is used in the streets. I tried the temperatures of the mixtures with a thermometer at several periods during the day, with the following results:

	A. M.				P. M.				
	9:15	9:45	10:45	11:45	12:45	1:45	4:00	Salt.	Snow.
Temp. of air.	47°	50°	52°	55°	58°	56°	60°		
Can No. 1, temp.	—4°	—3°	—1°	18°	*30°	39°	48°	10 oz.	20 oz.
Can No. 2, temp.	0°	5°	7°	18°	21°	27°	43°	1 oz.	20 oz.
Can No. 3, temp.	4°	19°	22°	28°	28°	30°	*31°	½ oz.	20 oz.
Can No. 4, temp.	32°	32°	32°	32°	32°	32°	†32°	0 oz.	20 oz.

The four deg. belew zero, entered in the memorandum as having been observed at fifteen minutes past nine, A. M., is a mean from observations in different parts of the vessel. In some parts it was six deg., which was the lowest temperature noted. The snow was unfortunately damp, and it was impossible to mix the salt with it as thoroughly as would have been desirable. It will be seen from the table that No. 1 was all melted at 12:45 P.

* No snow. † Much snow still unmelted.

M., and Nos. 2 and 3 at four o'clock P. M. When I left at six o'clock a considerable portion of the snow in No. 4 remained unmelted. The temperature was in this case reduced much more than it would be if the salt was sprinkled upon the surface of snow lying upon the ground. Here the salt was all through the mass, and could obtain heat only at the outside, while if it was sprinkled upon the surface it would form a thin sheet which could readily obtain heat from the air above and from the ground below. This would also cause the snow to melt more slowly in my experiment than it does upon the ground. I have no doubt that one per cent. of salt, if judiciously used, will carry off the snow in one-fourth of the time in which it would usually be removed by our winter weather. I am still of the opinion, Mr. President, that the use of salt, under intelligent direction, for the removal of snow, will tend to promote the comfort and health of our citizens.

Capt. Bartlett.—Mr. President, this is simply a question of dryness. If you wet your boots with salt water they will remain moist a long time, but if you wet them with fresh water they will soon dry. He also cited many facts drawn from his experience in the navy to show that the wearing of wet clothes is exceedingly injurious to health.

Prof. Seely.—It is true that clothes wet with sea water will remain moist longer than if wet with fresh water; but this is not the case with salt and water. There are salts in the sea which absorb and retain moisture, but chloride of sodium is not hygrometric.

Mr. J. K. Fisher.—During the discussion, on the second evening of the subject of salting the streets, certain positions which I had assumed were admitted, but turned against the general view I advocated. It was admitted that the people desire comforts and even luxuries, and are willing to pay for them; and on this ground it was claimed that snow ought to remain for the sake of sleighing. If this luxury could not be enjoyed without allowing snow to remain, we should have to choose beetween the comfort, or luxury, if it be so, of dry and clean streets, and the luxury of sleighing; and, in my judgment, we should estimate the former luxury the greatest, and not consent to sacrifice it for the latter. But the disposition claimed by me, and conceded by those who dissent on certain points, the disposition of the people to pay liberally for luxuries, private and public, has already brought into existence a place for the enjoyment of sleighing. The Central Park has good roads, men to keep them in order, rollers to level and pack the snow, and all means to perfect this luxury. Here it is enhanced by the beauties of scenery—beautiful even in winter—and by the splendor and gayety of equipages and parties; the meetings of friends, and other attractions not met in streets, In the system I propose, you may ride with comfort to the park for five cents, and there you may ride in an omnibus sleigh for as little as you pay for it in the streets; or you may have a better sleigh for a fair price; your luxury may be rated to your means and taste. To the man of leisure, or the man of industry in his leisure hour, one ride in the park, with the multitude around him, would be more luxury than ten rides in the street, such as we have been accustomed to; and, besides the park, there are suburban roads for fast horsemen. These provisions are enough to satisfy all but the few who keep horses and sleighs. Others who keep horses, and wish to drive them on the snow, would find it more convenient to hire sleighs in the suburbs. Hence I conclude that the majority of people, and of each class of people, are not willing to accept the alternative of one or the other of these luxuries, but desire them both, and are willing to pay for them.

The system I recommended for the streets was, to shovel and sweep them, and cast away the snow immediately after it falls. It was stated that this is the practice in French cities. I have read that it is the practice in French camps; the ground in them is never wet by snow that falls, while the temperature is below freezing. These habits of a people who are clever in uniting comfort with economy, confirm the view I advocate.

Even if no improvement in locomotion is possible, but horses, rough pavements and dirt are to be perpetual in streets, then perfect removal of snow while it is dry is desirable, and would be willingly paid for if it cost much more than aggregate expenses of the present practice; but, from the evidence of all who spoke here, it appears likely to cost much less.

Having gone thus far on ground that is established by practice, I made a separate estimate of the expense of cleaning streets, based on the idea that improvements have not come to an end; that knowledge may still be increased; that possibly the power that draws six cars at thirty miles per hour, at less than the cost of driving one car at six miles per hour, by horses, may be refined so that it will be admissable in streets. This separate view, I think, should have received some assent or dissent in a body of scientific men. It is a view which for thirty years has been entertained by many of the most celebrated engineers in the world. The question it involves is, not whether a particular plan will perfectly succeed, but whether there exists in the world sufficient engineering talent to develop a plan that can compete with horses, in comfort, luxury and liberal economy.

Mr. Ebbitt.—Mr. Chairman, I appear here on the part of the railroads, or at least one of them—the Sixth Avenue. I have had a great deal of experience in using salt, and in attempting to clear the track without it. The railroads do not desire to use salt for their own profit, but simply for the convenience of the public. When the tracks are obstructed with snow, we are obliged to double our teams and run half the number of cars, thus cutting off nearly half of our receipts while our expenses remain the same. This crowds the cars and forces a great many people to walk when the walking is the most disagreeable. I have been up three nights in succession, working day and night, to get the tracks clear so that we can make our regular trips. Nothing creates so much dissatisfaction as a failure to make our trips in time.

The great number of horses that were injured in February, last year, were not injured by salt. The last time that salt was used was on the first of February, and the horses were injured on the eighth. I remember the day very well. In the morning there was a dense fog, so dense that it was impossible to see across the street. At noon the sun came out for a little while, and then it grew suddenly very cold. At night it was some six or seven degrees above zero. Our horses that worked in the forenoon were uninjured, but of those that worked in the afternoon, sixty-one were found the next morning to be lame, some in one foot and some in another. The injured feet were white and presented the appearance of having been frozen.

There are men on our road who have worked many years, always standing in the water when salt is used to melt the snow, and none of them have been injured. I brought along one of our starters, Mr. More, a man of delicate health, who will give his experience.

Mr. More.—I have worked on the railroad, and for the last six years we have used salt for melting snow. I stand at the station twelve hours in the day, from six o'clock in the morning till six at night. I used to be much subject to colds, but for a few years have been quite free from them. I think that standing in this salt water is a good thing for the health.

The subject of "Surface Condensers" was selected for a fortnight hence, and the subject of "Glass" for the next meeting.

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, *April* 24, 1862.

Prof. Chas. A. Joy in the chair.

REDUCTION OF IRON.

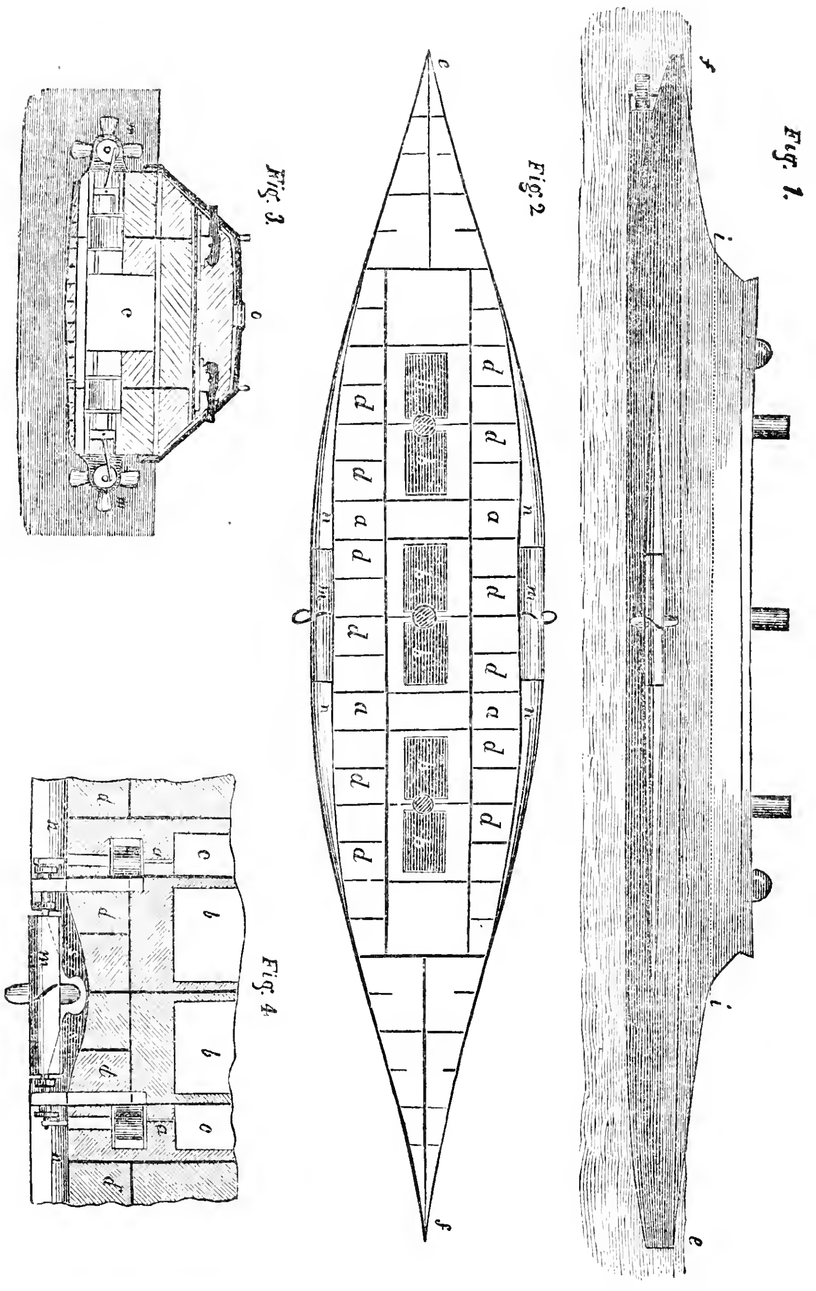
Mr. Churchill.—I was not present at the meeting on the 10th inst., but I see by the records that Prof. Seely stated that the iron in the cylinder of Mr. Rogers' apparatus could not be reduced from the ore by the carbon. This would not be necessary. I have here on the blackboard the formulæ of the reactions applicable to Mr. Cooper's furnace. I will take the protoxide of iron, as that will illustrate the changes just as well, though this is not the oxide operated on. A little atmospheric air would get into the cylinder, and this, with the carbon and the oxide of iron, will give us C, Fe O, and $O+N_2$. The carbon would combine with the oxygen of the air to form carbonic oxide yielding CO and Fe O, (throwing out the nitrogen as producing no effect.) Then the iron would be reduced by the carbonic oxide, which would be converted into carbonic acid yielding CO_2 and Fe. The carbonic acid being in a nascent state, would be immediately reduced, by the free carbon present, to carbonic oxide. This reaction takes place several hundred degrees F. lower than the reduction of free CO_2, and yields 2CO. This would reduce two more atoms of iron, and thus the process would go on.

NAVAL WARFARE.

On the call for the regular subject, a desultory discussion arose, and continued for some time, having regard chiefly to the struggle between the *Merrimac* and the *Monitor*.

Professor Renwick then stated that, in conformity with the notice he had given, he had brought to the meeting a model of an iron-plated vessel. He then went on to say, that his reading of the late battle in Hampton Roads is, that there is an end to all the modern rules of naval tactics; that artillery will hereafter play a very secondary part in naval warfare; that hence-

(THE RENWICK STEAM BATTERING RAM.)



forth the vessel which, with sufficient weight, has the greatest speed, and can change her course most speedily, must infallibly defeat her opponent by crushing in her sides. The plan which he exhibited, unless his judgment was warped by his partiality for the inventor, combines these requisites in the highest degree. It is driven by two propellers, one on each side of the vessel, and may therefore, by the application of sufficient power, receive a much higher speed than can be given by a sigle propeller. Placed amidships, these propellers can give the vessel a motion around an axis in her midship section, while by two propellers at the stern, the axis of motion is in the stern-post. The act of *wearing* will, therefore, be performed, all other circumstances being equal, in half the time. The model I exhibit has been laid before the Navy Department, and has received a favorable report. The inventor is Edward S. Renwick, of this city, and the description of the vessel is as follows:

Length of vessel	400	feet.
Breadth of beam	60	"
Depth of hold	37	"
Draught of water	22½	"

Speed per hour at least 18 miles.

The form and arrangement of this vessel are shown in the accompanying sketches: Fig. 1 representing a side view of the vessel; Fig. 2, a plan of it at the lower edge of the armor plates, four feet below the water line; Fig. 3 being a transverse section at the engines, and Fig. 4 a plan of a fragment of the vessel at the engines. The objects of the projector were, to obtain great speed, a heavy armament, protection of the guns against shot, and a capacity to turn the vessel as if upon a pivot; also to form the vessel in such manner that she could be used as a *ram*. In order to attain these objects, the length, *e f*, below water, was made sufficient to obtain fine lines at the bow and stern, as shown in Fig. 2, and the bow and stern above water were cut back, as shown at Fig. 1, to reduce the weight of the armor plates to the smallest possible quantity compatible with the protection of the battery. The bow and stern above water thus present the form of a half cone with the butt at the central battery. This plan relieves the bow and stern of strain of heavy weights, where the displacement, from the fineness of the water lines, is unequal to the load placed over them, and at the same time furnishes a long *beak* which projects under water.

In order to propel the vessel with speed, and at the same time turn her rapidly, two screw propellers are located at the opposite sides of the vessel, upon a plan lately patented to the projector. The propeller blades are mounted upon a hollow shaft, fitted at its ends with gudgeons which enter into sponsons, *n n*, secured upon the vessel's sides. The cranks of the engines are secured to these gudgeons, and turn into the sponsons; and the connecting rods extend directly from the steam cylinders, through openings in the sides of the vessel, into the sponsons. The entrance of the gudgeons into the sponsons is packed in the usual manner, to prevent leakage. By this arrangement, each propeller is driven by two steam engines, as shown in Fig. 4, in the same manner as the driving axle of a locomotive; and as the pair of engines of each propeller are entirely independent of those of the other, one propeller may be turned forward and the other backward, to turn the vessel upon her centre so as to present her beak always toward an adversary. The engines are extremely simple, being plain horizontal engines, each having its air pump driven by a piston rod extending out of the butt of the cylinder. The condensers, *c c*, and air pumps thus lie at the centre of the vessel, between the butts of the adjacent two steam cylinders.

In order to make the vessel sufficiently strong, her bottom is made cellular, and the interior of the vessel below the gun-deck is divided by longitudinal and cross bulkheads into numerous water-tight compartments, as shown at Fig. 2. The boilers, *b b b b*, are six in number, and each is placed in a separate compartment. The coal is stowed in the compartments *d*, outside of the boilers, so that it is within reach of the firemen. These coal bunkers are of sufficient capacity to contain 1,400 tons. The engines require only 24 feet of the length of the vessel, and each two are placed between water-tight bulkheads at *a a*.

The armament is to consist of twenty-four guns of eleven inches bore, placed on the gun-deck at the dotted line *i i* of Fig. 1, eight feet above water, and sheltered by the sloping sides of the vessel. With the draught of twenty-two and a half feet, the vessel can also carry two twelve-inch rifled guns for solid shot, placed in revolving towers on her spar-deck, upon the plan which was adopted in the *Monitor*. The armor plates are to be of solid rolled iron, four and a half inches thick; this thickness, when placed on a slope, having been found by experiment sufficient. The dimensions of the propelling machinery are as follows: four cylinders of seventy-eight inches diameter, and three feet nine inches stroke; six boilers, each having six furnaces on a side, giving a collective grate furnace of twelve hundred and twenty-four square feet; two propellers, each seventeen feet in diameter and thirty-two feet pitch.

This vessel has about one-half more power than the Stevens battery, while from the simplicity and compactness of the engines, the machinery occupies much less space. The propellers are situated at the strongest part of the vessel, instead of overhanging at the stern, where they would exert a tremendous strain upon the narrow part of the vessel. In order to permit the propeller blades to turn freely, a slight indentation is formed in the side of the vessel; and in order to direct the water in this indentation around the tubular propeller shaft, horizontal wedge-formed chambers, *s s*, are placed in between the propeller shaft and the vessel. When the vessel is in port, the propellers are protected from injury by contact with the dock, by hanging a removable skeleton guard upon each side of the vessel, similar to the guard beams which protect a paddle wheel. The vessel has a complete berth-deck under her gun-deck, for the crew, and ample space for stores in the compartments, which are in advance of and behind her boilers. The ventilation of the vessel is effected by fan-blowers, driven by separate donkey engines, and the foul air and smoke from the guns escape through a longitudinal shot-proof grating in the spar deck at *o*, Fig. 3. The spar deck is plated with iron like the sides, and is surrounded by a wooden bulwark, to keep off the sea. The projector does not pretend to be the first who conceived the idea of side propellers, but he claims to be the first who has succeeded in arranging submerged side propellers, and applying power to them in a practically useful manner; and that he obtains all the advantages that accrue from the position of paddle wheels near the longitudinal centre of the vessel, with the advantages that result from the use of submerged propellers, without the defects of either system.

If 15-inch guns can be procured, the vessel is to be armed with them, a smaller number being used; and if it be deemed expedient to protect all the guns by revolving towers, the sloping sides of the vessel above the gun deck may be removed, and six revolving towers put in their place. But as a vessel with towers cannot fire more than two guns in line with the keel, and as this vessel can do the same, with the capacity to turn rapidly to fire a broadside, the expediency of such a change is questionable. It would be easy to construct a smaller vessel on the same plan, with less proportionate speed, if the projector's present plan be deemed too large; but the proposed vessel, although of greater power, is only of about the same size as those now building by the English government; and if the United States build a vessel, it should be at least able to cope upon the open sea, as well as in the harbor, with any built by any foreign government.

Mr. Dibben.—They are far more industrious in the investigation of this subject in England than we are in this country. Within a few years a commission of competent engineers has been appointed by government, to examine all inventions designed to aid the public service, and whenever anything is presented which promises to be valuable, the inventor receives facilities for testing his plans. Sometimes he receives a salary while he is making his experiments, and in other cases he is allowed the use of the public dock yards. Sir William Armstrong was thus aided in the beginning of his career.

Mr. Stevens.—Some years ago I made some experiments in firing bullets through plates of different materials. I found that a bullet moving with a velocity of 1,000 feet per second, would cut out a hole in a pane of glass without breaking the glass; but to cut out a smooth hole in a steel shovel blade, required a velocity of 3,000 feet per second.

Mr. Dibben.—I think there must have been some defect in the pendulum with which the velocity was measured, as 1,800 feet per second is the highest velocity ever imparted to a shot.

Mr. Rowell.—Did you try firing candles through a board?

Mr. Stevens.—Yes, and they came out in good merchantable condition.

Mr. Babcock.—I have tried firing candles through a board, and I have found the wicks, but I never could find the candles. Now I am up, I will remark that I learn from Mr. Parrott that he has been making some experiments with wrought iron shot, and he finds that they have no more power of penetration than those made of cast iron. They flatten against the plate.

Captain W. A. Bartlett.—I saw at Washington, last week, a gun of novel construction, which has proved very effective indeed, in some of our skirmishes. It is a light rifle, mounted on wheels, throwing a 1-inch bullet, and can be fired 200 times in a minute. Several of the Governors of States have ordered it to be furnished to their regiments, one or two guns to a regiment. On one occasion one of these guns was brought to bear on a squadron of cavalry at 800 yards, and it cut them to pieces terribly, quickly forcing them to fly. The charges are placed in steel cases, which are placed in a hopper, and they are fired one at a time. The arrangements are such that there is no danger of the whole exploding at once.

The subject selected for discussion a fortnight hence, was "Soap."

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