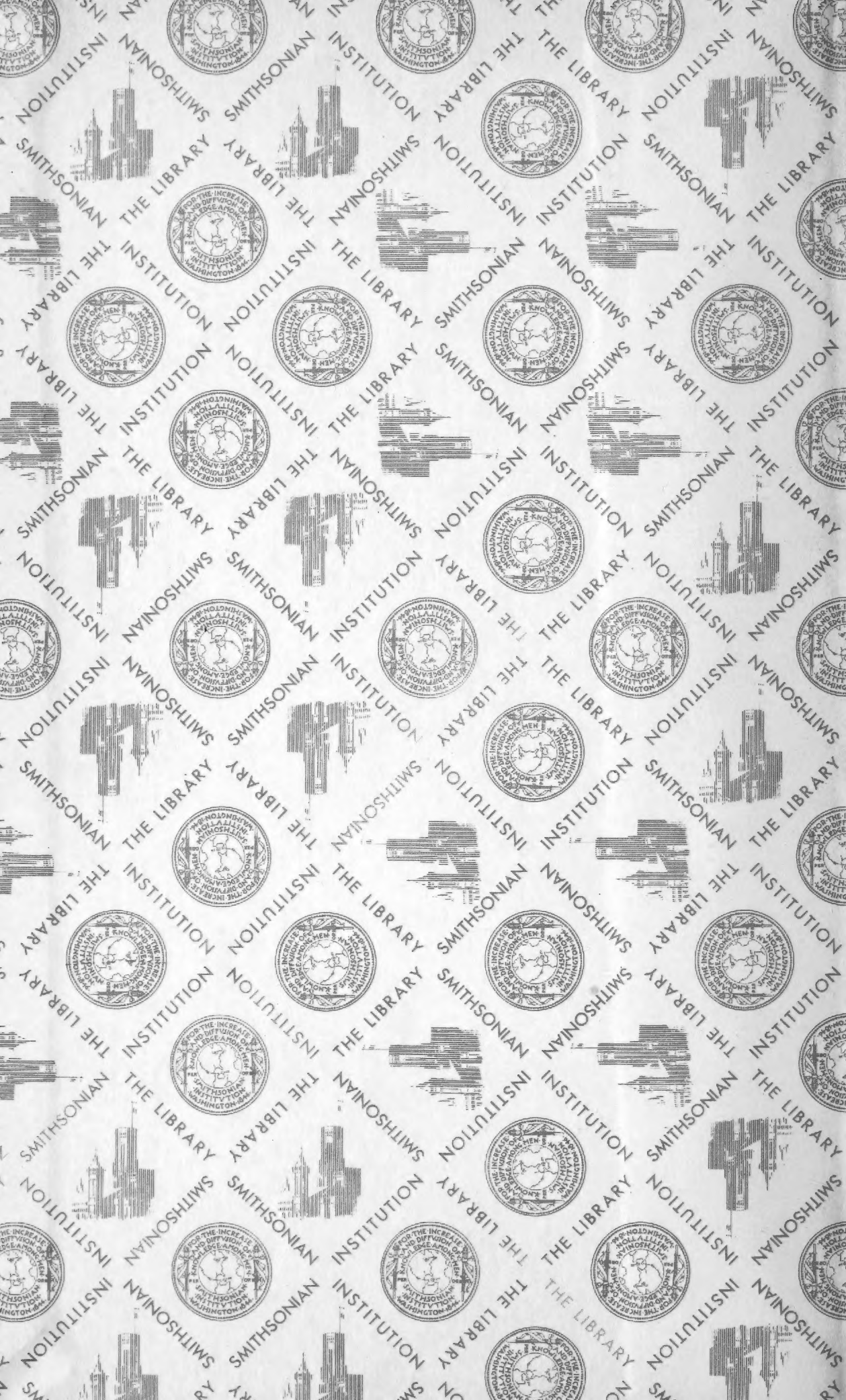
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FORTIETH ANNUAL REPORT

OF THE

NEW YORK STATE MUSEUM
OF
NATURAL HISTORY,

For the Year 1886.

TRANSMITTED TO THE LEGISLATURE JANUARY 14, 1887.

ALBANY:
THE ARGUS COMPANY, PRINTERS,
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STATE OF NEW YORK.

No. 115.

IN ASSEMBLY,

JANUARY 14, 1887.

FORTIETH ANNUAL REPORT

OF THE

NEW YORK STATE MUSEUM OF NATURAL HISTORY FOR THE YEAR 1886.

To the Legislature of the State of New York:

I have the honor to transmit herewith the Fortieth Annual Report of the Regents of the University, as Trustees of the New York State Museum of Natural History, as required by law.

GEORGE WILLIAM CURTIS,
Vice-Chancellor.

REPORT.

To the Legislature of the State of New York:

The Regents of the University submit to you, as required by law, their fortieth annual report as trustees of the State Museum of Natural History.

In the last annual report the trustees of the museum called your attention to the work of preparing the State Hall for its occupancy for a museum, which was intrusted to them by a law passed in 1883. The full use of the building was only to come into the hands of the museum when the State officers were provided with proper accommodations in the Capitol. This has not yet been accomplished, and the Comptroller, the Treasurer and the Engineer and Surveyor still occupy parts of the building. Since the last report, however, the clerk of the Court of Appeals has vacated two rooms which he had occupied on the south-west corner of the second story. These rooms are now used by the museum, one of them being the quarters for the State Botanist and the large collection of plants composing the State herbarium, which are under his care. The other room is used by Professor Hall and Mr. Beecher as an office.

Progress has been made in removing the material from Professor Hall's buildings to the rooms alloted to them in the State Hall. The portion of material which has been removed is that which had been used by Professor Hall in his publication of the Palæontology of the State. Rooms in the basement, on the north-east corner, have been fitted up for the machinery used in making sections of rock and sections of palæontological specimens. These sections go far towards revealing the proper inward construction of the ancient inhabitants of the earth. They are now being studied with great profit by those who are making palæontology their specialty. As rapidly as the State officers can be provided with accommodations the rooms of the State Hall will be utilized for the State Museum.

The building itself will, in the end, require some material modifications. The roof is in such a condition that it will probably require to be replaced in order to make it a fit cover for so important a collection. No general method of heating this building has ever been provided. The State officers who were in it in the past, and those who are still occupying it, make use of stoves as the method of heating. This, of course, entails a great amount of unnecessary labor, and is not economical nor satisfactory. Some system of heating the building by steam ought to be adopted. There seems to be no insuperable objection to the carrying of steam from the present steam-house, which has been built for the purpose of conveying heat to the Capitol. The distance is not much greater to the State Hall than it is to the Capitol. There would be no objection to creating as much more steam in the steam-house as would be needed to properly warm the State Hall.

Another volume on palæontology has been published since the last report, in accordance with the law passed in 1883. The subject is Lamellibranchiate, and is a continuation and completion of the subject of the preceding volume published in 1884. A volume on Bryozoans is in preparation, and will be issued shortly. The immense task of preparing these successive volumes weighs heavily upon Professor Hall, and the trustees have found it necessary to give him as much respite from other duties and as much assistance as they have found it possible to do. With these modifications in the original plan of work, it is believed by the trustees that this great publication, which is so honorable and creditable to the State, will be finished nearly, if not entirely, in accordance with the provisions of the law of 1883.

Very important explorations have been carried on by the museum staff during the past year. Professor Smock has continued his exploration of the crystalline rocks in the south-eastern portion of the State. He has also done something towards collecting facts and *data* concerning the building stone of the State. This latter subject he proposes, when he has collected a sufficient amount of *data*, to publish together as a bulletin of the museum. Mr. Beecher has made use of a portion of his time in examining a locality in the Adirondack region where crystals of tourmaline has been found. He has, under the direction of the local committee of the museum,

completed an arrangement by which the museum will be supplied with a large collection of these crystals.

Mr. James W. Hall, one of the assistants in the museum, has also visited, under the direction of Professor Hall, a locality where dictyospongidæ have been found. He not only found the specimens in this locality, but also in another, which had not before been suspected. These localities are notable within the bounds of this State, and even of the United States, where specimens of this kind have been found.

The trustees desire, in connection with the additions made to the museum, to report to you the large and important collection of minerals which were purchased from Mr. George F. Kunz. Mr. Kunz is a mineralogist in the employ of Tiffany & Co. in New York, and in the regular pursuit of his occupation he had made a very unusual collection of minerals and gems. This collection the trustees of the museum, after a very careful inspection by Professor Smock and Mr. Beecher, decided to purchase for $4,000. This has been accomplished and the collection has been delivered, and is now being prepared for a proper display in the rooms of the museum.

The trustees also desire to report to you a collection of mollusca which has been presented to the museum by Mr. Beecher. They consist of about 15,000 specimens of land and fresh water shells and are of great interest and value. They occupy seventy-five drawers of twenty by twenty-four inches. The additions to the museum should also include a collection of Eurypterus purchased by Professor Hall from Ward & Howell of Rochester. They comprise about 100 specimens and cost $125; also a collection of corals purchased from Mr. Woodman of New York containing about 177 specimens and costing $1,000.

The work that has been conducted in the museum will be found very fully described in the reports which are herewith appended. The report of Director Hall, of the State Botanist and the State Entomologist Lintner and the other reports, will be found full of interest.

The trustees report the following as constituting the museum staff at the present time: James Hall, LL. D., Director and State Geologist; J. A. Lintner, Ph. D., State Entomologist; Charles H. Peck, State Botanist; Professor John C. Smock, assistant in

charge of the museum; Charles E. Beecher, assistant in charge of the Palæontological collections; James W. Hall, assistant in charge of the zoological collections; John Gebhard, special assistant and guide.

Mr. Beecher, in addition to his duties as an assistant in the museum, gives a portion of his time to assisting in preparing the volumes on palæontology. In this same work Mr. George Simpson is also engaged as a draftsman, and Mr. J. M. Clarke is also employed in preparation of material for the Palæontology.

Respectfully submitted.

GEORGE WILLIAM CURTIS,
Vice-Chancellor.

David Murray,
Secretary.

STATE MUSEUM OF NATURAL HISTORY.

REPORT OF THE DIRECTOR.

ALBANY, N. Y., *December* 14, 1886.

To the Honorable, the Board of Regents of the University of the State of New York:

GENTLEMEN. — I have the honor to communicate herewith, the Annual Report (being the fortieth in consecutive order), upon the State Museum of Natural History, and the condition of its collections in the several departments, so far as the same have come under my knowledge or direction.

The accompanying appendix will present a list of the additions to the museum collections, which have been made by collection, purchase and donation, during the past year.

The report of last year is not yet out of the printer's hands, and, therefore, I cannot refer you to the published document, which contains an account of the work accomplished during the year 1885.

In that report I have also transmitted a copy of an illustrated paper on the annelidæ chætopoda of the New Jersey coast, by Professor H. E. Webster, which was communicated by him to the thirty-second report of the State Museum, and formed a part of that report, as transmitted to the Legislature. Of this paper the text only appeared in the published document, of which no extra copies were printed for the use of the Regents. Through accident or otherwise the plates had been lost, and were only discovered in the office of the State printer last year (1885). These plates with the accompanying text, as it appeared in the thirty-second report, will appear in due time.

Since my report of last year was communicated to the Board of Regents, they have ordered an edition of the thirty-second report to be reprinted, but this is still without the plates referred to. In order that the Regents' edition of this report may be more complete and fill the place in the series, as originally intended, I would sug-

gest that a sufficient number of the plates be printed to correspond with the number of copies of that edition.

There is likewise, in the same report, a paper on the distribution of iron ores in Essex county, N. Y. This was originally accompanied by a map, which is necessary for the proper understanding of that text. I would, therefore, suggest that a sufficient number of copies of this map be procured to correspond with and accompany the Regents' edition of the thirty-second report.

No farther progress has been made in the preparation of the bulletins upon the lamellibranch shells, or upon the dictyospongidæ. Last year the committee on the State Museum, decided to postpone the work of lithographing for these bulletins for the present. I would now beg leave to suggest that this work be commenced as soon as practicable. The illustrations of the dictyospongidae will occupy at least twenty-five double octavo plates, and it seems very desirable to have them done by the experienced artist, Mr. Ast, who has done so much good work for the palæontology of New York.

The proper lithographing of these plates would occupy one artist for about a year, therefore, as the coming year may bring a diminution of lithographic work for the Palæontology, I would recommend that any interval occurring should be occupied in forwarding this work for the Bulletin of the State Museum of Natural History, and that no time be lost before beginning. The necessity of doing this work in a quiet and unremitting manner is very well understood by every author, while the letter-press printing may be pushed more rapidly.

It need scarcely be said that it is very important that the lithography be essentially completed, before the descriptive text shall be put to press.

The museum report of this year will be comparatively barren of scientific papers communicated by the staff, beyond the State Botanist and State Entomologist.

In the first place it became necessary to make a distribution of the extensive collections of lamellibranchiata, which had formed the basis of the two volumes of the palæontology of the State, and which, by the law of 1883, had been transferred to the State Museum. These collections have all been labeled according to the nomenclature adopted in the volumes referred to, and a large

proportion of them have been selected and made up into a series of collections for distribution to the colleges, normal schools and academies of the State. A list of the institutions receiving these collections is herewith appended.

Early in the spring of 1886 it was determined by the trustees that the large collections accumulated since 1855 by the State Geologist, for use in the preparation of the palæontology, should all be removed from his private buildings to the State Hall, in conformity to the law of 1883, which authorized the occupancy of these rooms as fast as they should be vacated by the State officers. This work, begun in April, has occupied the greater part of the spring and summer months, and is not yet completed.

Owing to some necessary field work during the autumn months, the work has progressed but little since the beginning of September.

I have appended a statement showing approximately the nature and total amount of collections which have been transferred from my own premises to the State Hall, and the amount yet to be so transferred.

Besides removing the collections to the State Hall, the offices and working rooms of the museum staff and assistants in palæontology have been established there, and, by the time of the annual meeting of the board, will be fully occupied with the work of the museum and the palæontology. This organization, when fully accomplished, will give to our palæontological collections, and to the State Geologist and his assistants, the occupancy of a public building for the first time in more than forty years.

The current work of the museum has been carried on, as usual, in the museum building and in the State Hall. The zoological collections have all received proper attention, and the stuffed skins and skeletons have been removed from their cases and thoroughly cleaned, and returned to their proper places. These collections are in good condition, and essentially free from the depredations of insects. The whale skeleton remains still unprovided with a proper place of exhibition, or a place where it can be properly mounted. A small space has been alloted on the second floor of the museum, the entire length of which is scarcely more than one-fourth the length of the skeleton. The vertebral column is exhibited in the three sections, there not being sufficient room for

attaching the ribs. These, with the mandibles, lie upon the platform, while the skull and upper jaw are stored in another part of the building.

I would earnestly recommend that some place be appropriated for this fine specimen, which, if properly mounted, would be very instructive to the student and interesting to the general public. The ground in the rear of the State Hall would afford abundant space for a pavilion devoted to this object. It would not occupy sufficient space to interfere with the present purposes of the ground, and such a feature would add to the public interest of the place.

The exterior and interior of the Museum Building on State street has been thoroughly renovated and repainted, the entire economical collections of ores, blocks of marble, and other building and ornamental stones, have been cleaned and rearranged, and the name and locality painted upon each one, thus obviating the necessity of replacing the written or printed paper labels, which, no matter how carefully and apparently securely pasted upon the blocks were sure to be picked off piece-meal by the too curious visitor or undisciplined child.

The collections of crystalline and metamorphic rocks have received special attention in their arrangement, and an effort has been made to restore in full, as had been partially done before, the typical collections as arranged by the State Geologist in 1843, and more especially in the specimens arranged by Dr. Emmons under the Taconic system. The specimens which were thus originally catalogued in the report of the State cabinet had been relegated to the basement by a former curator, and were only identified by their labels and restored to their proper place in the serial arrangement by the present director in 1866. This original catalogue, with the labeled and numbered specimens, will be of use in studying the character of the works which constituted the Taconic system of Emmons as defined by him in 1843, 1845. This collection is worthy of the study of those geologists who are interested in the discussion of this question. The reports of the State Botanist and State Entomologist will make known to you the work accomplished in these departments.

In the division of the museum work Prof. J. C. Smock has superintended the renovation of the interior of the Museum Building, the rearrangement of some portions of the collections, and the

relabeling of the marbles, building stones, ores and other similar material. He has arranged in a new case, at the head of the stairs upon the first floor, a series of specimens illustrating certain economic products of the State which formed a part of the New Orleans exhibit, making an instructive addition to that part of the collection; and also the rearrangement of some portions of the crystalline and metamorphic rocks. These museum duties occupied his time for the early part of the year, and later he has been giving in the field special attention to the quarry industries of the State. The purchase of the Kunz collection of minerals and the necessity of arranging the same will occupy a large part of his time during the coming year.

Mr. C. E. Beecher, assistant in charge of the palæontological collections has been occupied during the first months of the year upon the collections of fossil lamellibranchiata, and with the assistance of Mr. J. M. Clark, the entire collection has been labeled, and a selection of thirty-five collections has been made from the duplicates of this class of fossils.*

Subsequently both of these gentlemen have been occupied in arranging in the State Hall the collections transferred from the rooms occupied in Mr. Hall's buildings.

Mr. Beecher has likewise superintended the fitting up of the new office in the State Hall, and later has been working in the preparation of material for the volume on the fossil brachiopoda.

Dr. J. W. Hall in charge of the zoological collections and of the laboratory for cutting rocks and fossils, has looked carefully after the preservation of the zoological specimens and they have been thoroughly overhauled, cleaned and rearranged. In the laboratory he has superintended and prepared many hundred sections of rocks and fossils preparatory for study under the microscope. Specimens for the museum collections too fragile for breaking by the hammer have been cut and shaped by machinery especially adapted for this purpose. Improvements have been made in the machinery used, and we are now better prepared than ever before to accomplish this kind of work. Among the conveniences added to the museum he has devised a lock for locking or unlocking a series of drawers with a single turn of one key. This invention is already in use in

* I shall have further occasion to mention Mr. Clarke's work in the report of the State Geologist.

two cases of 144 drawers each and in several series of table drawers. In each instance a single key locks or unlocks all the drawers simultaneously.

During the month of October, Dr. Hall, with the assistance of C. Van Deloo and Martin Sheehy, explored the Chemung rocks of Steuben county, especially for fossil dictyospongidæ, and there have been brought in from the towns of Bath, Avoca and Wallace, several hundred nearly perfect specimens, and altogether the most extensive collection ever made of these heretofore comparatively rare fossils.

Mr. Geo. B. Simpson, who is partially occupied upon museum work, has been engaged upon the corals and bryozoa, separating, cleaning and describing the species from the large collections which have been brought into the museum from field collections and other sources.

These collections, when finally arranged, will form an interesting and important feature of the museum collections.

Mr. John Gebhard, special assistant and guide to the museum has been regularly in attendance upon his duties, and his exposition of the museum collections and his instructive explanations are very acceptable to inquiring visitors.

During the year 1886, collections of rocks and fossils were distributed to the Potsdam Normal School and to the Brockport Normal School. These collections included those made up in 1875–76, as well as the lamellibranchiata of the distribution of 1886.

To the following institutions I have sent collections of the fossil lamellibranchiata of the distribution of 1886, as supplementary to the general collections of 1875 and 1876 sent to the same institutions:

Rensselaer Polytechnic Institute, Troy, N. Y.
Cornell University, Ithaca, N. Y.
Long Island Historical Society, Brooklyn, N. Y.
Syracuse University, Syracuse, N. Y.
Alfred University, Alfred, N. Y.
State Normal and Training School, Oswego, N. Y.
State Normal and Training School, Buffalo, N. Y.
State Normal and Training School, Geneseo, N. Y.
State Normal and Training School, Fredonia, N. Y.
State Normal and Training School, Cortland, N. Y.
The Albion Academy and High School, Albion, N. Y.

Westfield Academy, Westfield, N. Y.
Norwich Academy, Norwich, N. Y.

The following institutions have received a general collection of fossils from the State Museum:

Canisius College, Buffalo, N. Y.
Normal School, Potsdam, N. Y.
Normal School, Brockport, N. Y.

The purchase of the Kunz collections of minerals will supply a long-felt want in the museum, and will give a means of a popular exhibition in this department not before possessed. The original collection of minerals of the State of New York was made during the years 1836–1841, and under circumstances not favorable to the accumulation of the better specimens from our State localities. Good mineral specimens had, even at that period, a special money valuation which has greatly increased in later years. In procuring specimens for the original collection of New York minerals no money was expended by the State and, consequently, the collection acquired was an inferior one, and it has so remained to the present time. The authorities of that period believed that the possessors of fine specimens would willingly contribute them to the State, but experience proved quite the contrary; and when it was understood that the State wished to procure specimens a higher price was asked. By reference to some communications accompanying the annual report you will obtain a more distinct idea regarding this matter. The minerals constituting the *general collection* consist largely of donations which have been recorded and acknowledged in previous reports.

During the earlier years of the museum administration a considerable part of this general collection thus acquired had been incorporated with the old State collection, as arranged by Dr. Beck, thus destroying the original intention of the State Mineralogist, who had arranged the minerals of the State of New York as a strictly local collection. In 1866, when the present director entered upon his duties as curator of the State Museum, it became one of his first objects to restore this State collection to its original arrangement, and to arrange a general collection of minerals from the materials in the State collection cases and from the material stored in the basement of the building.

Unfortunately we have never had the means of keeping up the State collection as it should have been, with the progress of new discoveries, and, therefore, it has fallen into desuetude. I would now most emphatically recommend that in the arrangement of the recently purchased collection all the good or crystallized specimens of the general collection be incorporated with it, constituting one general collection without the designation of State or national limitation; and, further, that the New York State collection be arranged in the cases now occupied by the general collection, and that a systematic effort be made to complete it so that it may present a creditable appearance as an exhibition of the mineral proceeds of the State of New York.

I believe that the trustees of the museum owe this duty to the State, as a part of the historic record of the geological survey, and to the memory of the State Mineralogist, Dr. Lewis C. Beck.

The purchase of a large collection of recent corals will add an important feature to the zoological collections of the State Museum. We have been in need of such a collection more than of any other in zoology. This will give an equilibrium to our exhibited collection, leaving still desirable additions in the annelidæ and crustacea, in which departments our collections are still very inferior.

A collection of land and fresh water shells has been presented to the museum by Mr. C. E. Beecher. This collection occupies seventy-five drawers of two feet square, and will be an important addition to the molluscan collections of the museum.

The museum collection of stuffed skins and of skeletons is fairly representative of the vertebrate fauna of New York; and so long as we have no specialist working in these classes, we need not be anxious to enlarge its scope. Our collection in recent shells is a very creditable one, and, like that of the vertebrates, needs only to be labeled according to the more recent literature on the subject to be a very creditable collection. We may, therefore, wait a special opportunity before making efforts to add to these collections. We shall be able to find room on the upper floor of the museum for this collection of corals, by rearranging some portions of the collection there exhibited and removing other portions not strictly connected with zoology to the floor below.

With these departments now so well provided for, I would earnestly recommend increased attention in the palæontological

collections of the State. Notwithstanding the very large collections in this department, it should not be forgotten that the law of 1885 and the following contracts provided only for obtaining material for the completion of the work on the palæontology as then contemplated. These conditions restricted the State Geologist in the limits of the field to be worked, and he had no authority for making collections in the lower rocks. While, therefore, the State collections are very rich in material of the Upper Helderberg, Hamilton, Portage and Chemung groups, we are extremely poor in the Niagara of the State, and all the formation below that horizon, and have very few representations of the primordial zone. With these very extensive collections of the higher rocks, our duplicate and working collection presents a very one-sided or unequal aspect, and this condition affects the arranged collections of the museum, which, in the lower formation, scarcely presents a creditable exhibition.

In conclusion I beg leave to repeat my recommendation of last year, that the director be authorized to employ some competent person to devote himself to the selection and distribution into series of the duplicate fossils of the State Museum collections, and especially of the very extensive collection of fossil corals. The accumulation of collections is now so great, including those to be brought in by the State Geologist (the work now in progress), that we shall soon require the use of the drawers and cases now occupied by these corals, and shall be compelled to pack them in boxes or distribute them into school collections.

The report which, as State Geologist, I am required to make, will give some further information on several points referred to in this communication.

I am, very respectfully, your obedient servant,

JAMES HALL,
Director.

APPENDIX.

APPENDIX A.

Additions to the collections of the State Museum during the year 1886:

I. BOTANICAL.

From H. F. Haxton, Buskirk's Bridge, Washington county:

Section of an apple tree, three feet four inches in diameter.

II. ZOOLOGICAL.

By Purchase.

From H. T. Woodman, of New York city:

177 Corals.
136 Marine shells.
2 Opercula of Turbo.
7 Groups of eggs of gastropods.
2 Spider crabs.
5 Limulus polyphemus, showing special features.
18 Echinodermata.
19 Sponges.
14 Gorgonias.

By Donation.

From Joaquin Molar:

Vertebræ, natural preparation, Matanzas, Cuba.

From W. H. Keeler, of Albany, N. Y.:

Oysters and star fishes growing on a wooden stake, used to mark the proprietary line of oyster beds.

A brick covered on one side with young oysters.

III. MINERALOGICAL AND GEOLOGICAL.

By Donation.

From George F. Kunz, of Hoboken, N. J.:

One collection of typical rocks from New Hampshire, containing 250 specimens, collected and named by Prof. Charles H. Hitchcock, State Geologist.

From Carl Cocker, of Greigsville, Livingston county, N. Y.:

Rock salt, two large cabinet specimens, from shaft sunk at Piffard, Livingston county.

Cores from boring for salt at Piffard, at depths of 900 to 1,090 feet.

From A. J. Morrill, of Danville:

Chrysotile and Serpentine, one box, with sixty specimens, from Danville, Richmond county, Province of Quebec, Canada.

From D. Lynch, of Olmsteadville, Essex county:

Garnet, from Minerva, Essex county.

From John D. Nutting:

Garnet, from Warren county.

From C. C. Stevens, of Keeseville:

Graphite, Colophonite and White Quartz, from Willsborough, Essex county.

Granite, dressed block, from near Essex county.

From Dr. J. N. Tilden, Peekskill, N. Y.:

Stilbite, Peekskill, Westchester county.

Sillimanite, three specimens of, from Yorktown, Westchester county.

Pyrrhotite and Chalcopyrite, four specimens of, from mine on Anthony's Nose, northwest of Peekskill.

From R. McMichael, of Philadelphia:

Serpentine, "American Verde-Antique," from Green Serpentine Marble Quarry, Hartford county, Md.

From Daniel T. Smith, of Grand View:

Sandstone, one block of, from Nyack, N. Y.

From George Crawford, of Kingston:

Bluestone, one block of, from Kingston, Ulster county.

Bluestone, one block of, from Fox Hollow, Ulster county.

Flagging-stone, from Roxbury, Delaware county.

Flagging-stone, from Oxford, Chenango county.

From A. L. Pritchard, president of the Snowflake Marble Company, 157 Broadway, New York city:

"Snowflake marble," one large dressed block of, from Pleasantville, Westchester county.

From Hon. James Shanahan, State Superintendent of Public Works:

Limestone, *Onondaga*, large block of, from Union Springs quarry, Cayuga county.

From —— Haskell, of New York city:

Specimens of rock drillings (eighteen), representing material passed through at twenty-foot intervals, from 660 to 1,000 feet in depth, at well sunk in Amsdell's brewery yard, Albany, N. Y., 1886.

From Edward I. Devlin, of Regent's office:

Mud from depth of 4,529 fathoms, 150 miles north of St. Thomas, West Indies, from soundings by U. S. Steamer "Enterprise," March 6, 1886.

From J. N. Atwood, secretary of the Ausable Granite Company:

A block of granite, dressed and polished on two faces, $16 \times 7\frac{1}{2} \times 4\frac{1}{2}$ inches, from the quarries of the Ausable Granite Company, at Keeseville.

From Daniel T. Smith, of Nyack:

A block of red sandstone, from quarry at Nyack.

From George F. Kunz, Hoboken, N. J.:

Chrysocolla and Malachite from Arizona.

Rhodocrosite from Arizona.

From M —— Foshay, Brewsters, Putnam county.

Apophyllite from the Tilly Foster iron mine, near Brewsters.

From Robert Whitaker, Weavertown, Warren county.

Specimens of garnet and white quartz from near Weavertown.

By Purchase.

From L. Stadtmüller, of New Haven:

One collection, consisting of seventy specimens, illustrating typical rocks described in Dana's text book of geology.

From Mr. Charles E. Hall of the second geological survey of Pennsylvania:

One collection of Pennsylvania rocks, consisting of 576 specimens from the crystalline-rock district of the south-eastern part of the State and the adjacent, sedimentary formations, in Philadelphia, Bucks and Chester counties.

Many of these specimens are types which are represented by descriptions and analyses in the reports of the Second Geological Survey of Pennsylvania. They bear the number of the reports and are, therefore, catalogued in reports O. & $O._2$ of the Pennsylvania Survey.

From Mr. Charles E. Hall, of the Pennsylvania Geological Survey:

A collection of 230 representative ores and minerals, occurring in the crystalline-rock formations in the south-eastern part of the State. Collected during the progress of the Second Geological Survey of Pennsylvania.

From Silas C. Young of Edenville:

A collection of minerals, consisting of twenty-four specimens, of warwickite, yttrocerite, houghite, leucopyrite, xanttrite and jeffersonite, occurring in the vicinity of Edenville, Orange county.

From S. C. H. Bailey, Cortlandt-on-Hudson:

Meteoric iron, Scriba, Oswego county.

IV. PALÆONTOLOGICAL.

By Donation.

From L. J. Bennett, president Buffalo Cement Company, Buffalo, N. Y.:

Eurypterus *lacustris*, two large specimens in slabs.

From Jacob T. Hazen, West Park, Ulster county, N. Y.:

Slab of Hudson river slate, with graptolites, from West Shore railroad cut at West Park.

From D. D. Luther:

A specimen of Lepidodendron from the Portage shales, near Naples. (The specimen consists of a portion of the trunk, about fifteen feet long and thirteen to four and one-half inches wide.

From Charles E. Beecher:

Type specimen of *Spirodomus insignis*, Beecher, Waverly group, Warren, Pa.

Limestone, with *Cœlospira concava*, lower Helderberg group, Hudson, N. Y.

Favosites, encrinal limestone, Hamilton group, Eighteen-mile creek, N. Y.

From I. P. Bishop:

Specimens of Trenton fossils, Chatham, N. Y.

By Purchase.

From F. A. Randall, Warren, Pa.:

One Phacops rana, Hamilton group, Eighteen-mile creek, N. Y.

Six specimens of Phyllocarida, Chemung group, Warren, Pa.

One specimen of scales of fish, Chemung group, Warren, Pa.

Nine specimens of lamellibranchiata, Chemung group, Warren, Pa.

One specimen of Dictyophyton prismaticum, Chemung group, Warren, Pa.

One specimen of Spiraxis Randalli, Chemung group, Warren, Pa.

From Ward & Howell:

Seventy-five specimens of Euryptus and other Crustacea, and two specimens of Algæ, from the Waterline group, Buffalo, N. Y.

From H. T. Woodman, of New York:

Two fossil corals (Favosites), from the Devonian of Iowa.

From Myron G. Cotton, of Farmington, Ontario county.

Some bones and part of one horn of an elk (*Elaphus canadensis*). (These remains were found in a muck swamp in a part of the State in which the animal has not heretofore been known to have existed.)

From D. D. Luther:

Collections of fossils from the Portage and Chemung group, in the vicinity of Naples, and southward in Steuben county and adjacent parts of Livingston county.

By Collections Made by the Museum Staff.

Mr. J. M. Clark has made collections of the fossil crustacea from the upper Helderberg group, at Waterville, Oneida county at Manlius, Onondaga county; at Canandaigua, East Bloomfield, Phelps and Clifton Springs, Ontario county; at Limerock, near

LeRoy and Stafford, Genesee county, and at Clarence, in Erie county. He has also made similar collections from the Hamilton group at Pratt's Falls, Onondaga county, and at Tichenor's Point, on Canandaigua lake.

Mr. C. Van Deloo and Martin Sheehy have made a collection of Bryozoa from the Shales of the Hamilton group, in Ontario county.

Dr. J. W. Hall, with the aid of Mr. Van Deloo and Martin Sheehy, has made a large collection of Dictyophyton from the Chemung group, near Bath, and in the towns of Wallace and Avoca.

V. HISTORICAL AND ANTIQUARIAN COLLECTION.

BY DONATION.

From David G. Spencer, of Schenevus, Otsego county, N. Y.:
A clock with wooden works, eighty years old.

VI. TO THE LIBRARY.

BY DONATION.

From Smithsonian Institution:
Report for 1884, part I.
Bureau of Ethnology, third annual report, by J. W. Powell.

From United States Geological Survey:
Fifth Annual Report, 1883, 1884.
Bulletins Nos. 15, 16, 17, 18, 19, 20, 21, 22, 23, 27, 28, 29.
Mineral resources of the United States, 1883, 1884. Williams.
Monograph IX, Brachiopoda and Lamellibranchiata of the Raritan Clays and Greensand Marls of New Jersey. Whitfield.

From War Department, Chief Signal Officer:
Monthly Weather Review, November, December, 1885, January, February, March, April, May, June, July, August and September, 1886.

From Department of Agriculture:
Annual Reports for 1877, 1881, 1882.
Report of Forestry, vol. IV.

From United States Commissioner of Fish and Fisheries:
The Fishery Industry of the United States, with volume of plates.

Bulletin, vol. V for 1885.
Report of Commissioner for 1883.

From United States Patent Office:
Official Gazette, vols. 34, 35, 36 and 37, Nos. 1–9.
Annual Report of Commissioner of Patents for 1885.

From United States Bureau of Education:
Circulars of information, Nos. 3, 4, 5, 1885.
Report of Commissioner for 1883, 1884.
Special Report Ed. exhibits at New Orleans, part I.
Mineral Resources of the United States, 1883, 1884. Williams.

From United States Civil Service Commissioner:
Third Annual Report.

From Forest Commission of New York:
First Annual Report.

From J. A. Lintner, Albany, N. Y.:
Second Annual Report of the State Entomologist of New York.

From Chancellor H. R. Pierson:
University of the State of New York, Report of, for 1885.

From Regents of the University:
Palæontology of New York, vol. III, part I (two copies); part II (two copies); vol. IV (two copies); vol. V, part I, Lam. I and II (three copies); part II, plates and text (three copies).

From Geological Survey of New Jersey. Cook and Whitfield:
Palæontology of the cretaceous and tertiary of New Jersey.

From Mr. S. A. Miller:
Catalogue of American palæzoic fossils.

From R. E. Call:
Fresh-water Mollusca, recent and quarternary.
On Pyrgulopsis.

From S. H. Scudder:
Syst. Uebersicht d. fossilien Insecten.

From Geo. F. Kunz:
Precious Stones in the United States.

From James H. Dodge:

Report of City Auditor, Boston, 1885, 1886.

By Purchase.

Geology of the United States, Maclure.

Catalogue of minerals, Chester.

Mineraloque Micrographique a Planches, Fouquit et Levy.

Synoptical Flora of North America, vol. I, part II, vol. II, part I, Gray.

Beschi neuer verstemerungen a. d. Thale Salgir. Russland, Kutorga.

Beiträge z. Geognosie u Pal. Dorpats.

Beiträge Palæontologi Russlands.

Nene Arten von d. Toantharia rug. a. Oberkurzendorf, Dybowski.

Abhandhungen über fossilien korallen.

Un Spongiare nouv. d. Syst. Eifelien, De Walque.

Trilobiten d. Prenss. Geschieber, Steinhardt.

Carboniferous Polyzoa, Vine.

On the Family Diosporidæ.

On the Annelida Fulicola.

Polyzoa of the Wenlock Shales.

Ieones selectæ Hymenomycetun, Fasc. II, Fries.

Encyclopedia Brittannica, vols. XX, XXI.

Wall map of New York State, French.

Map of New York city and vicinity.

Orange county Atlas.

Rockland county Atlas.

Map of Cattaraugus county.

Map of Chautauqua county.

Map of Columbia county.

American Journal of Science, vols. 31, 32.

American Naturalist, vol. 20.

Nature, vols. 33, 34, 35, Nos. 1, 2, 3.

Political Science Quarterly, vol. I, 1, 2, 3, 4.

Science, vols. 7, 8.

Neues Jahrbuch für Mineralogie, Geologie u. Palæontologie, 1886, I. Bd. Hefte 1, 2, 3; II. Bd. Hefte 1; IV. Beilage Band, 1, 2, u. 3 Hefte.

By Exchange.

New York State Museum of Natural History:
9th, 10th (2 copies), 11th (3 copies), 14th, 15th, 16th (2 copies), 22d and 31st Ann. Reps.

Natural History of New York:
Geology 4th Dist.: Palæontology, vol. I.
Geology of 1st Dist., 2d Dist., 3d Dist. and 4th Dist., or pts. I–IV (2 copies).
Geology of 2d and 3d Dists.

List of palæozoic fossil insects of United States and Canada.

Geological Survey of Illinois, 7 vols.

Geological Survey of Illinois, vol. III.

New York Academy of Sciences: Annals III, No. 9, December, 1885.

New York Academy of Sciences: Trans., v. Nos. 1, 2, 3, 4 and 5, January and February, 1886.

American Museum of Natural History: Bull., vol. I, No. 7.

American Museum of Natural History: Ann. Rep. of Trustees for 1885.

American Geographical Society: Bull., No. 2, 1885.

American Geographical Society: 1882, No. 6; 1883, No. 7; 1884, No. 5.

New York Microscopical Society: Jour., vol. I, Nos. 8, 9; vol II, Nos. 2, 3, 4, 5, 6, 7.

Torrey Botanical Club: Bull., Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.

Vassar Brothers Institute: Trans., vol. III, pt. 1.

Johns Hopkins University: Studies from Biological Laboratory, vol. III, Nos. 6, 8.

Cincinnati Society Natural History: Jour., vol. VIII, No. 4; vol. IX, Nos. 1, 2, 3.

Brookville Society of Natural History: Bull., No. 2.

Washburn College Laboratory: Bull., vol. I, Nos. 5, 6.

Davenport Academy of Sciences: Proc., vol. IV.

Peabody Academy of Science: Methods of Arrow-Release, Morse.

Canadian Institute: Proc., 3d series, vol. III; Fasc., 4, vol. IV, No. 1.

Canadian Record of Science; vol. II, Nos. 3, 4.

Royal Society of Canada: Proc. and Trans., vol. III.

Rio de Janeiro: Archivios de Museo Nacional, vol. VI.

Rio de Janeiro: Lettre to Ernest Renan, Netto.
Liverpool Public Library and Art Gallery: 33d Ann. Rep. of Com.
Soc. Geologique de Belgique: Annales, Tome 12, 1884–85.
Soc. Geol. de France: Extrait du Bulletin from l'annee 1886.
Soc. Zool. de France: Extrait du Bull, 1885.
Musée Teyler Haarlem: Archives, Serie 2, vol. 2, 3, Partie.
Musée Teyler Haarlem: Cat. de la Bibliotheque, 1, 2.
"Isis" in Dresden: Sitzung Berichte u. Abhandlungen, 1885, Jan.–June, 1886.
Mojsisovics u. Neumayer: Beiträge z. Palæontologie Oesterreichs — Ungarns, B'd V. Heft 3.
Moscou Soc. Im. des Naturalistes: Bull. 1885, Nos. 2, 3, 4.
Wien Annalen des K. K. Naturhistorischen Hof Museums, Band I., Nos. 1, 2, 3, 4.
Stockholm, Ofversigt af Kongl. Vetenskaps Akademiens Förhandlingar, 42 Arg., Nos. 6, 7, 8, 9 and 10, 43 Arg., Nos. 1, 2, 3, 4, 5, 6, 8.
Florence, Arch. d. Scuload 'Anatomia Patologica, vol. I., Pellizari.
Florence, Sulle Convulsioni Epileptche, Rovighie, G. Sanhari.

Memoranda, Furnished by Prof. John C. Smock.

During the past summer (1886), the State has expended an appropriation of $5,000 in repairs to the Geological Hall building. A new roof and new gutters and leaders make the building safe against damages from leakage, besides improving the external appearance.

In the museum exhibition stories, the walls and ceilings have been repaired and kalsomined, and the exterior of all the wall cases and railings have been painted white. The rooms are lighter and the collections much better presented for this much needed improvement. Some of the table cases also received a coating of paint.

The collections of marbles and building stones in the hall-way of the museum building has been cleaned, rearranged and the labels painted upon the blocks, thus avoiding the annoyance from the removing or mutilation of paper labels by curious visitors or children. It attracts increased attention and is much admired by the visitors. The collection embraces about 200 dressed blocks and

slabs mainly from quarries in New York State, with others from the Vermont quarries, Maine granites and Ohio sand-stone, with other stone from Massachusetts, Connecticut and Maryland, and representative specimens of the red and brown sand-stones of Lake Superior.

In the first story of the Geological Hall, the following changes have been made, viz.:

1. The "New Orleans" collection of building-stones, slates, marbles, iron ores, etc., has been placed in a new wall case at the head of the stairs entering the room.

2. The so-called *Quebec Group* case originally arranged to conform to the nomenclature of the Canada Geological Survey, has been removed back one section in the west side wall cases, and placed next to the Huronian. The material in it has been sorted and rearranged so that the specimens of lime-stone, slate and quartzite from typical "Taconic" localities (of Emmons) with some others, previously in drawers, and not on exhibition, now form a separate section, between the Huronian and Potsdam–Calciferous cases, under the designation of *Metamorphic* (Taconic of Emmons). The case as now arranged is a historic one, representing the type specimens of Emmons' Taconic System, so far as these remain in possession of the museum, holding the place in the arrangement originally given to it by the author of the term "Taconic System in Geological nomenclature."

In the second story of the museum exhibition rooms a few minerals have been added to the general collection, but the arrangement has not been altered or disturbed. The collection of typical rocks for students use has been on exhibition most of the year in a case constructed for it.

There have been two new table cases put in this room to accommodate archæological material not before on exhibition. These cases now stand against the enclosure containing the casts of Megatherium and Dinotherin remains.

In the tertiary collections slight changes in the arrangement of the cases have been made, a more natural sequence in the order of their position.

Three additional table cases have been placed in this room for the arrangement of specimens illustrative of dynamic geology.

At the present time they are partly filled with an incomplete and miscellaneous collection.

3. A new case for the "Pompey stone" has been placed in one of the south window recesses on this floor, where it can be seen to best advantage.

4. The large fossil corals, formerly in the hall-way of the museum have been placed on a low bench built against the east side wall cases.

5. The blocks of iron ore on the west side of the room have been rearranged and the labels thereto, painted in plain letters on the white base-blocks, where they can be easily read by the visitors.

6. All of the large blocks on platforms in this story have been relabeled.

REPORT OF FIELD WORK FOR 1886.

By Prof. JOHN C. SMOCK.

In accordance with the general scheme of museum work, and in what may be termed the division of "Economic Geology," the survey and examination of the building stone quarries of the State was begun in the autumn. A circular letter, with appended list of questions, relative to ownership, name of lessees, amount of capital and value of plant, number of laborers, value of product, distance from public lines of transportation, markets, and date of opening, was prepared and addressed to some of the quarry owners, chiefly in the districts visited. The greater number have come back with data furnished, in answer to these inquiries. The field work was begun in the south-eastern part of the State, and was continued, with some interruptions, to the close of the season. The quarries in Westchester, Putnam, Dutchess, Columbia, Orange and Rockland counties were nearly all visited. A few in Ulster county also were examined. Statistics of the blue-stone quarries of the State were obtained, with notes of the business and localities worked, and other data of that branch of the quarry industry of the State. The plan for this survey of the quarries included the whole State, and the results of this survey were to form a bulletin to be issued during the winter. On account of the lateness of the season when the work was begun, and the want of time to get over the whole territory occupied by the quarry industry, the preparation of the report thereon is necessarily postponed until after another season of field work. It will be possible to complete the observations in the field next summer and autumn, and to present the report in a museum bulletin during the coming winter. In the meantime, the work in the office of sending out circulars, and the study of the specimens, can be started, as also the comparative examination of material from quarries outside of the State, but which come to our markets and compete with New York stone.

The importance of the subject is apparent to all who give even the least thought to the great quantity of stone now employed in

public structures and in private building, and the urgent necessity laid upon architects and builders to select such materials as will most effectually resist decay and decomposition, and be most permanent and unchangeable in appearance and structure. The unsightly aspect in case of many of our public buildings, and the inferior quality of much of the stone now in use, show the great need of more care in the selection of stone; and to this end there is the necessity for the education of the people, in the general facts about stone, and the localities where quarries now are worked, as also, the information of a more particular nature as to occurence, constitution, structure, and chemical changes, incident to certain varieties and peculiar to localities. It is this specialized matter which is sought after, and which is to be given to the people in the forthcoming survey report on the building stone of the State.

The collections made during the autumn past are representative of localities visited, and, when arranged, they will form an interesting exhibit in the department of economic geology. They number about two hundred carefully selected cabinet specimens.

REPORT OF THE BOTANIST.

REPORT.

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN: — I have the honor to communicate to you the following report:

In prosecuting the work of completing and arranging the State herbarium the past year, specimens of the plants of the State have been collected in the counties of Albany, Genesee, Essex, Hamilton, Livingston, Montgomery, Rensselaer, Saratoga, Schoharie, Washington, Wayne and Wyoming.

Specimens of 184 species have been added to the herbarium, of which twelve were contributed by correspondents, and 172 were collected by the Botanist. Of these 106 are new to the herbarium, and with two exceptions are new to our flora. Forty-seven of them are regarded as previously unpublished species. Among the added species are seven flowering plants, one moss and one lichen. The remainder are fungi. A list of the additions accompanies this report and is marked "A."

The number of contributors is twenty-three. Among their contributions are specimens of many extra limital species, not included in the preceding enumeration. These are kept distinct from the herbarium proper, which represents the State flora. A list of the contributors and of their respective contributions is marked "B."

A paper containing notices of species not before reported, together with a record of their respective localities and descriptions of new species, is marked "C."

Notes and observations concerning those not new to our flora will be found in a paper marked "D."

Wishing to obtain good flowering specimens of certain plants which grow upon the summit of Mt. Marcy, that locality was visited early in June. Although the snow had not yet entirely disappeared from that high elevation, several of the desired plants were in full bloom. Fine specimens were obtained of the alpine

rosebay, *Rhododendron Lapponicum*, the Lapland diapensia, *Diapensia Lapponica*, the hairy fly honeysuckle, *Lonicera cærulea*, and the dwarf birch, *Betula glandulosa*. The hairy fly honeysuckle and the small cranberry had not before been observed by me on the open summit of the mountain and should be added to the list of plants already published as belonging to that elevated station. July is given in the Manual and also in the State Flora as the time of flowering of the alpine or Lapland rosebay, but here it was flowering finely on the tenth day of June. Several new and interesting species of fungi rewarded my search in that bleak locality. Near the base of the mountain, the few fruited June berry, *Amelanchier Canadensis*, var. *oligocarpa*, enlivened the dark evergreen forest with its few pure white flowers. These are much scattered on the branches, there being only one, two or three in a place. The petals are broadly oval or almost orbicular, and the branches are wide-spreading, straggling and irregular. These features are so unlike the corresponding ones in other varieties of the species, that for the instant they almost compel us to believe that the plant is a distinct species rather than a mere variety. Yet, in less elevated and more open places connecting forms appear. Along Marcy brook, the rare mountain bush cranberry or few flowered viburnum, *Viburnum pauciflorum*, was observed, but it was not yet in flower. At Ausable ponds the large leaved avens, *Geum macrophyllum*, was discovered. This is a notable addition to our flora. It is an inhabitant of the White mountain region of New Hampshire and of the Lake Superior region, whence it extends westward to the Sierra Nevada mountains, and northward to Sitka. This New York station is intermediate between the eastern one and the nearest western one. An interesting form of the northern Clintonia was also discovered at this time. In it, one or two lateral umbels project from the scape at short distances below the terminal umbel of flowers. I find no mention of this form in our botanies. It is apparently due to a very thrifty and vigorous condition of the plant. The number of flowers in an umbel often much exceeds the number ascribed in the descriptions of the botanies.

From time to time reports have reached me that a red-flowered form of the white water-lily, *Nymphæa odorata*, existed in some of the waters of the Adirondack region. As I had never been

able to find such a plant myself, these reports were somewhat tantalizing. Knowing that such a lily had been found in Massachusetts, and learning of a definite locality where it was reported to have been seen in the Adirondacks, I determined to test the accuracy of this report, and to add, if possible, a specimen of such a rarity to the herbarium. Mud pond, in which it was said to grow, is a small, boggy water-hole, between Long lake and Tupper's lake. Upon visiting it I found an abundance of the white water-lily. There were a few flowers scattered about, in which the external petals were considerably tinged with red. When these flowers were but partly open, and viewed at a short distance, they had a decided pink-red appearance, and might easily be mistaken for the variety in question. But a closer examination invariably revealed white interior petals, though in some instances these were slightly stained with red or pink on the exterior surface near the base. Thus far the occurrence of the real red water-lily in the Adirondack region has not been verified by me; but this half-way approach to it indicates the possibility of its existence there, and raises the hope that it may yet be added to our flora. In this bog hole the bayonet rush, *Juncus militaris*, was found growing plentifully. It is an interesting addition to the idigenous plants of the State. On this trip, groves of larches or tamaracks, *Larix Americana*, in three widely separated localities, were noticed, in which many of the trees were almost defoliated by the ravages of some insect. Among them were many trees already dead, evidently having yielded to the thorough manner in which they had been deprived of their foliage. It appears that the loss of a large percentage of the larch trees of these noble forests must yet be added to the loss of many of the spruces through the agency of pestilent insects.

Wishing to observe what influence had been exerted on the flora by the operation of the salt works at Warsaw and its neighboring localities, that place was visited. It is well known that certain so-called seaside and salt marsh plants occur at Onondaga lake, about the salt works at Salina, and in other places where there are saline influences. It is evident that at Warsaw no saline influences have been present until quite recently. No salt springs come to the surface. The salt water is manufactured, so to speak, and pumped up from great depths. No salt marsh plants existed there when

the salt wells were first opened. Had any been introduced and established there since that time, was a question, the answer to which I wished to put on record. Not a single plant of this character was found. The nearest approach to it is the common orache, *Atriplex patula*, which grows freely along the sea coast; but this plant is also capable of living and thriving in places remote from salt water or saline influences. It has followed the tracks of our railroads till now it is a common plant along these thoroughfares in many places in the interior of the State. At Warsaw it is abundant, and occurs in several well-marked forms, thus showing well its disposition to vary. Its fondness for salt water, however, is shown by the fact that it is especially vigorous along the ditches by which the waste brine is carried away, and it follows these for considerable distances. Some of the trees in the immediate vicinity of several factories were seen to be dead or dying. Their death was apparently due to the gaseous products of the combustion of coal which is used in running the works. They were not in reach of the brine.

Two opinions are entertained concerning the liability of plants to the attacks of parasitic fungi. Some claim that, no matter how vigorous and healthy a plant may be, if the spores of its parasite lodge upon it the result will be the development in it of the disease which that parasite generates in that particular host plant. Others claim that there is a difference in the susceptibility of plants of the same species to the attacks of the same parasite; that a plant in a weak, starved or feeble condition is more likely to yield to and suffer from the attacks of its parasites than is one of the same species which is strong, well fed and vigorous. In other words, it is claimed that the vigorous plants, though exposed to the action of the spores of the parasite, have the power to resist the development of the disease and to remain healthy and unaffected; while the more feeble ones, exposed to the action of the spores of the same parasite, yield to the disease and suffer therefrom. This last claim is one of great practical importance, and if it can be shown to be well founded, a knowledge of it may be useful. Two instances illustrative of it fell under my observation the past season.

At Warsaw a small patch of knotgrass, *Polygonum aviculare*, was noticed. The plants were very small and starved in appear-

ance, and seemed to be struggling for existence. A close inspection showed that many of them were affected by a parasitic fungus, *Uromyces Polygoni*. On one side of this patch, and continuous with it, was one composed of taller, more healthy looking plants. These were entirely free from the fungus, thus indicating that the weakness of the plants in one patch had favored the development of the disease, while the strength of the plants in the other had resisted it. It might be said by the supporters of the other claim that the dwarfed and weak condition of the affected plants was due to the presence of the fungus and not the predisposing cause of its presence. To one accustomed to observe this fungus, such an assertion would carry but little weight. But if we should admit the truth of this assertion, how should we explain the presence of the dwarf but unattacked plants in this patch?

In low ground near the lake shore at Port Henry, were numerous seedling plants, apparently of the discoid tickseed, *Coreopsis discoidea*. This ground had been overflowed in time of high water, and when the water receded it left numerous heaps of small sticks, bits of bark and other floodwood. Many of the seedling tickseeds were growing on these heaps of rubbish where there was little or no soil to afford nutriment to their roots. Others were growing on the ground about them, having their roots imbedded in and nourished by the soil. The plants growing on the floodwood were in many instances infested by a parasitic fungus, *Peronospora Halstedii;* but not a single affected plant could be found among those whose roots were in the soil. In this case the better nourished plants had escaped infection, although as much exposed to it as their less favored companions. Possibly there may be cases in which plants are liable to the attacks of parasitic fungi, no matter how strong and vigorous they may be, but it is clear that this cannot be a rule without exceptions. Instances are not wanting to show a greater susceptibility to attack in weak than in strong and well fed plants. Those who are accustomed to collect specimens of parasitic fungi soon learn, almost unconsciously, to look for them, either among feeble and starved plants or among those of unusually rank and luxuriant growth.

Very respectfully submitted,

CHAS. H. PECK,

ALBANY, *December* 15, 1886.

(A.)

PLANTS ADDED TO THE HERBARIUM.

NEW TO THE HERBARIUM.

Geum macrophyllum *Willd.*
Aster sagittifolius *Willd.*
Lactuca Scariola *L.*
Mimulus moschatus *Dougl.*
Amianthium muscætoxicum *Gr.*
Juncus militaris *Bigel.*
Alopecurus pratensis *L.*
Distichium capillaceum *B. & S.*
Calicium eusporum *Nyl.*
Collybia fuliginella *Pk.*
Clitopilus subvilis *Pk.*
Hebeloma glutinosum *Lind.*
Polyporus dryophilus *Berk.*
P. sinuosus *Fr.*
P. radiculosus *Pk.*
Hydnum velatum *B. & C.*
H. subfuscum *Pk.*
H. carbonarium *Pk.*
Irpex ambiguus *Pk.*
Porothelium papillatum *Pk.*
Thelephora dendritica *Berk.*
Stereum abietinum *Pers.*
Hymenochæte tenuis *Pk.*
Clavaria Kromholzii *Fr.*
Phyllosticta Caryæ *Pk.*
P. phaseolina *Sacc.*
P. Lycopersici *Pk.*
P. phomiformis *Sacc.*
P. tumoricola *Pk.*
P. populina *Sacc.*
P. spermoides *Pk.*
P. faginea *Pk.*
P. vagans *Pk.*
P. fatiscens *Pk.*
P. Symphoricarpi *West.*
Phoma magnifructa *Pk.*
P. leguminum *West.*
P. eupyrena *Sacc.*
P. Populi *Pk.*
P. herbarum *West.*
P. Castanea *Pk.*
P. Dipsaci *Sacc.*
Aposphæria conica *Sacc.*
Cytospora grandis *Pk.*
Haplosporella Pini *Pk.*
Diplodia paupercula *B. & C.*
D. Asparagi *Pk.*
Stagonospora Chenopodii *Pk.*
Septoria Stachydis *R. & D.*
S. fusca *Pk.*
S. Stellariæ *R. & D.*
S. Sibiriei *Thum.*
S. solidaginicola *Pk.*
S. brevis *Pk.*
S. populicola *Pk.*
S. Smilacinæ *E. & M.*
Pilidium graminicola *Pk.*
Glœosporium Robergei *Desm.*
G. septorioides *Sacc.*
G. Lindemuthianum *Sacc.*
Melanconium betulinum *Schm.*
M. dimorphum *Pk.*
Marsonia Populi *Sacc.*
Coryneum tumoricola *Pk.*
Scolecosporium Fagi *Lib.*
Pestalozzia Jefferisii *Ellis.*
Monilia Martini *S. & E.*
M. cinerea *Bon.*
Ramularia Barbareæ *Pk.*
Coniosporium punctoideum *Karst.*
Cladosporium Aphidis *Thum.*
C. Asparagi *Fr.*
C. brevipes *Pk.*

C. letiferum *Pk.*
Cercospora Acetosellæ *Ellis.*
Macrosporium tomato *Cke.*
Pilacre orientalis *B. & Br.*
Graphium Sorbi *Pk.*
Isariopsis alborosella *Sacc.*
Fusarium Lycopersici *Sacc.*
Peziza truncicomes *Ger.*
P. alboviolascens *A. & S.*
Helotium episphæricum *Pk.*
Ascomyces letifer *Pk.*
A. rubrobrunneus *Pk.*
Erysiphe horridula *Lev.*
Calosphæria ciliatula *Karst.*
Valsa Thujæ *Pk.*
V. exudans *Pk.*
Valsella adhærens *Fckl.*
V. Laschii *Sacc.*
Diatrypella quercina *Nits.*
Melanconiella Decorahensis *Ellis.*
Sphærella Pinsapo *Thum.*
S. minutissima *Pk.*
S. alnicola *Pk.*
S. Pontederiæ *Pk.*
Diaporthe farinosa *Pk.*
D. sulphurea *Fckl.*
Valsaria Niesslii *Sacc.*
Leptosphaeria Asparagi *Pk.*
Massaria Pyrii *Otth.*
Pleospora Shepherdiæ *Pk.*
Dothidella Alni *Pk.*
Lophiotrema vestita *Pk.*
L. parasitica *Pk.*

Not New to the Herbarium.

Thalictrum purpurascens *L.*
Nelumbium luteum *Willd.*
Nymphæa odorata *Ait.*
Nuphar advena *Ait.*
Nasturtium lacustre *Gr.*
Arabis Drummondii *Gr.*
Cardamine hirsuta *L.*
Lepidium Virginicum *L.*
Lechea major *Mx.*
Polygala paucifolia *Willd.*
Lathyrus palustris *L.*
Lespedeza violacea *Pers.*
Geum rivale *L.*
Pyrus sambucifolia *C. & S.*
Amelanchier Canadensis *T. & G.*
Ribes Cynosbati *L.*
R. lacustre *Poir.*
R. prostratum *L'Her.*
Cornus paniculata *L'Her.*
Lonicera cærulea *L.*
Symphoricarpus racemosus *Mx.*
Aster acuminatus *Mx.*
A. Radula *Ait.*
Solidago uliginosa *Nutt.*
Hieracium pilosella *L.*
Rhododendron Lapponicum *Wahl.*
Hyssopus officinalis *L.*
Polygonum tenue *Mx.*
Diapensia Lapponica *L.*
Carya alba *Nutt.*
Quercus palustris *Du Roi.*
Betula glandulosa *Mx.*
Salix Cutleri *Tuckm.*
Abies alba *Mx.*
Orchis spectabilis *L.*
Clintonia borealis *Raf.*
Streptopus roseus *Mx.*
S. amplexifolius *D. C.*
Polygonatum biflorum *Ell.*
Luzulu parviflora *Desv.*
Juncus articulatus *L.*
Scirpus Eriophorum *Mx.*
Scleria verticillata *Muhl.*
Carex alopecoidea *Tuckm.*
C. flava *L.*
C. longirostris *Torr.*
Agrostis vulgaris *With.*
Avena striata *Mx.*
Panicum capillare *L.*
P. Crus-galli *L.*
Setaria glauca *Bv.*
Triticum caninum *L.*
Aspidium Goldianum *Hook.*
Omphalia umbellifera *L.*
Pleurotus subareolatus *Pk.*

Crepidotus hærens *Pk.*
Boletus subaureus *Pk.*
Polyporus pubescens *Fr.*
P. cyphellæformis *B. & C.*
Trametes mollis *Fr.*
Phlebia radiata *Fr.*
Odontia fimbriata *Fr.*
Peniophora neglecta *Pk.*
Clavaria pinea *Pk.*
Glœosporium Martini *S. & E.*
Marsonia Juglandis *Sacc.*
Ramularia Plantaginis *E. & M.*
Cystopus Bliti *Lev.*
Peronospora Halstedii *Farl.*
P. gangliformis *De By.*
Trichothecium roseum *Lk.*
Pezicula acericola *Pk.*
Uncinula adunca *Lev.*
Hypoxylon atropunctatum *Schw.*
Diaporthe acerina *Sacc.*

(B.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Mrs. M. M. Patton, Berne, N. Y.

Cynoglossum grande *Dougl.*
Brodiæa capitata *Benth.*

Mrs. I. B. Sampson, Albany, N. Y.

Sarracenia variolaris *Mx.*
Polygala nana *DC.*
Ruellia oblongifolia *Mx.*
Eriocaulon gnaphalodes *Mx.*

Hon. David Murray, Albany, N. Y.

Viola lutea *Sm.*
Arenaria verna *L.*
Silene inflata *Sm.*
Parnassia palustris *L.*
Saxifraga aizoon *Jacq.*
S. azoides *L.*
S. bryoides *L.*
Sedum acre *L.*
S. saxatile *L.*
Linnea borealis *Gron.*
Gnaphalium leontopodium *Willd.*
Hieracium pilosella *L.*
Loiseleuria procumbens *Desv.*

Prof. James Hall, Albany, N. Y.

Agaricus subareolatus *Pk.*

Charles E. Beecher, Albany, N. Y.

Lenzites sepiaria *Fr.*
Polyporus brumalis *Fr.*
P. sanguineus *L.*
Trametes hydnoides *Fr.*
Dædalea glaberrima *B. & C.*
Stereum versicolor *Fr.*
Hypochnus rubrocinctus *Ehr.*
Geaster minimus *Schw.*

Geo. A. Rex, M. D., Philadelphia, Penn.

Hemiarcyria stipata *R.*
Arcyria dictyonema *R.*
A. Œrstedii *R.*
Trichia Jackii *R.*
Tilmadoche gyrocephalum *Mont.*
Physarum pulcherrimum *B.&C.*
P. Petersii *B. & C.*

Rev. A. B. Langlois, Pointe a la Hache, La.

Cytospora pallida, *Ellis.*
Fusarium sarcochroum *Desm.*
Ailographum cæspitosum *E. & E.*
Dinemasporium Langloisii *Ellis.*
Botryodiplodia diplocarpa *E. & E.*
Meliola sanguinea *Ellis.*
Valsa hylodes *Ellis.*

E. C. Howe, M. D., Lansingburgh, N. Y.

Carex Buxbaumii *Wahl.*
Alopecurus geniculatus *L.*
Triticum caninum *L.*

H. L. Griffis, Binghamton, N. Y.

Polygala paucifolia *Willd.*

C. E. Smith, Philadelphia, Penn.

Baptisia tinctoria *R. Br.*
Polygala lutea *L.*
Linaria vulgaris *Mill.*

P. H. Dudley, New York, N. Y.

Trametes Pini *Fr.*
Polyporus versicolor *Fr.*

Prof. B. T. Galloway, Columbia, Mo.

Cercospora condensata *E. & K.*
C. Gymnocladi *E. & K.*
C. rhuina *C. & E.*
C. Plantaginis *Sacc.*
C. Caulophylli *Pk.*
Cercospora Sanguinariæ *Pk.*
Puccinia Seymeriæ *Burrill.*
Septoria bacciligera *Wint.*
Gloeosporium Aceris *Cke.*
Marsonia Quercus *Pk.*

Prof. L. M. Underwood, Syracuse, N. Y.

Puccinia curtipes *Howe.*
Uromyces Trifolii *Fckl.*

Prof. T. H. McBride, Iowa City, Iowa.

Boletus sphærosporus *Pk.*

Julius A. Bisky, Flushing, N. Y.

Aster Radula *Ait.*
A. acuminatus *Mx.*
Mimulus moschatus *Dougl.*
Amianthium muscætoxicum *Gr.*

Prof. F. Lamson Scribner, Washington, D. C.

Arundo Donax *L.*

A. P. Morgan, Preston, O.

Polyporus endocrocinus *Berk.*

Prof. Wm. Trelease, St. Louis. Mo.

Lycoperdon delicatum *B. & C.*
L. rimulatum *Pk.*
Dothidea viridispora *Cke.*

Prof. W. A. Kellerman, Manhattan, Kansas.

Lenzites abietina *Fr.*
Panus stipticus *Fr.*
Polyporus adustus *Fr.*
P. brumalis *Fr,*
P. sulphureus *Fr.*
P. applanatus *Fr.*
P. picipes *Fr.*
P. fraxinophilus *Pk.*
Trametes sepium *Berk.*
Craterellus cornucopioides *Fr.*
Stereum frustulosum *Fr.*
Merulius tremellosus *Schrad.*
Hydnum pallidum *C. & E.*
Tremella foliacea *Fr.*
Glœosporium stenosporum *E. & K.*
Vermicularia Dematium *Fr.*
Darluca filum *Cast.*
Leptostroma vulgare *Fr.*
L. Actææ *Schw.*
Septoria Verbenæ *R. & D.*
S. gaurina *E. & K.*
S. Nolitangeris *Ger.*
S. Kalmicola *B. & C.*
S. Helianthi *E. & K.*
S. Verbascicola *B. & C.*
S. Polygonorum *Desm.*
S. Mimuli *E. & K.*
S. Pruni *Ellis.*
S. Cerastii *R. & D.*
S. Gei *Desm.*
S. sphærelloides *E. & K.*
S. xanthifolia *E. & K.*
S. Sisymbrii *Ellis.*
S. Specularіæ *B. & C.*
S. Erigerontis *Pk.*
S. lactucicola *E & M.*
S. Cacaliæ *E. & K.*
Phyllosticta Asiminæ *E. & E.*
P. acericola *B. & C.*
P. smilacina *E. & M.*
P. Phaseoli *Sacc.*
P. Chenopodii *West.*
P. Ampelopsidis *E. & M.*
P. Labruscæ *Thum.*
P. Podophylli *Wint.*
P. Lycii *E. & K.*
Discosia maculæcola *Ger.*
Phoma glandicola *Desm.*
Stilbospora ovata *Pers.*
Coniothyrium herbarum *C. & E.*
Sphæronema Persicæ *Schw.*
Cæoma mercurialis *Lk.*
ColeosporiumCampanulacearum *Fr.*
C. Sonchi *Tul.*
C. Senecionis *Fr.*
C. Agrimoniæ *Bon.*
Uredo Smilacis *Schw.*
Trichobasis Crotonis *Cke.*
Chrysomyxa pyrolatum *Koenig.*
Synchytrium Anemones *Woron.*
S. mercurialis *Fckl.*
S. Taraxaci *DeBy.*
Rœstelia penicillati *Fr.*
R. lacerata *Tul.*
Melampsora salicina *Lev.*
Æcidium impatientatum *Schw.*
Æ. Allii-ursini *Pers.*
Æ. Tragopogonis *Pers.*
Æ. Prenanthis *Pers*
Æ. Euphorbiæ *Pers.*
Æ. leucospermum *DC.*
Æ. rubellum *Pers.*
Æ. Epilobii *DC.*
Æ. Œnotheræ *Pk.*
Æ. Caladii *Schw.*
Æ. Dicentræ *Trel.*
Æ. Ficariæ *Pers.*
Æ. Violæ *Schum.*
Æ. Callirrhoes *E. & K.*
Æ. amphigenum *E. & K.*
Æ. Sambuci *Schw.*
Æ. Verbenicola *E. & K.*
Æ. Ceanothi *E. & K.*
Uromyces appendiculatus *Lev.*
U. Zygadeni *Pk.*
U. Euphorbiæ *C. & P.*
U. Lespedezæ *Schw.*
U. Alchemillæ *Pers.*
U. Peltandræ *Howe.*
U. Hyperici *Schw.*
Ustilago Carbo *Tul.*

U. Syntherismæ *Schw.*
Phragmidium obtusum *Lk.*
Gymnosporangium macropus *Schw.*
Puccinia Sorghi *Schw.*
P. Helianthi *Schw.*
P. Mariæ Wilsoni *Clint.*
P. Amorphæ *Curt.*
P. aculeata *Lk.*
P. Artemisiarum *Duby.*
P. Myrrhis *Schw.*
P. Xanthii *Schw.*
P. Malvastri *Pk.*
P. nigrescens *Pk.*
P. Polygonorum *Lk.*
P. solida *Schw.*
P. Chærophylli *Purt.*
P. Menthæ *Pers.*
P. Silphii *Schw.*
Epicoccum sphærococcum *Berk.*
Sporocybe byssoides *Fr.*
Fusicladium fasciculatum *C. & E.*
Helminthosporium gracile *Wallr.*
H. interseminatum *B. & R.*
Macrosporium Maydis *C. & E.*
M. Solani *E. & M.*
M. Catalpæ *E. & M.*
Polythrincium Trifolii *Kze.*
Stachybotrys lobulata *Berk.*
Botrytis vulgaris *Fr.*
Pyricularia grisea *Sacc.*
Cylindrosporium Fraxini *E. & K.*
Microstroma leucospora *Niessl.*
Ramularia Desmodii *Cke.*
R. Astragali *E. & H.*
R. Grindeliæ *E. & K.*
R. rufomaculans *Pk.*
R. Tulasnei *Sacc.*
Entyloma Ranunculi *Bon.*
E. Physalidis *Wint.*
Cystopus cubicus *Lev.*
C. Bliti *De By.*
Peronospora sordida *Berk.*
P. parasitica *Tul.*
P. gangliformis *De By.*
P. alta *Fckl.*
P. Halstedii *Farl.*
P. Oxybaphi *E. & K.*
P. Arthurii *Farl.*
Cercospora Acalyphæ *Pk.*
C. Ampelopsidis *Pk.*
C. Chenopodii *Fres.*
C. Plantaginis *Sacc.*
C. effusa *Ellis.*
C. Desmodii *E. & K.*
C. condensata *E. & K.*
Cercospora Gymnocladi *E. & K.*
C. chionea *E. & K.*
C. Isanthi *E. & K.*
C. rhuina *C. & E.*
C. microsora *Sacc.*
C. Teucrii *E. & K.*
Peziza capitata *Pk.*
P. floccosa *Schw.*
P. nivea *Fr.*
Ascobolus pilosus *Fr.*
Phacidium Pini *Schw.*
P. Medicaginis *Schw.*
Cenangium triangulare *Schw.*
Exoascus deformans *Berk.*
Chætomium chartarum *Cd.*
Chætomella perforata *E. & E.*
Podosphæria Kunzei *Lev.*
Phyllactinia suffulta *Reb.*
Erysiphe lamprocarpa *Lev.*
Uncinula adunca *Lev.*
U. Ampelopsidis *Pk.*
U. macrospora *Pk.*
Microsphæria Euphorbiæ *B. & C.*
M. Platani *Howe.*
Diatrype disciformis *Fr.*
D. bullata *Fr.*
D. hypophlæa *B. & C.*
Xylaria Hypoxylon *Fr.*
Hypoxylon sassafras *Schw.*
H. atropunctatum *Schw.*
Rosellinia millegrana *Sacc.*
Dothidea perisporioides *B. & C.*
Stigmatea Robertiani *Fr.*
Diaporthe spiculosa *Fr.*
Phyllachora Ulmi *Fckl.*
Heliosphæria patella *Grev.*
Linospora capreæ *Fckl.*

Venturia orbicula *C. & P.*
Kellermania yuccagena *E. & E.*
Leptosphæria doliolum *Pers.*
Pleonectria denigrata *Wint.*
Ophiobolus porphyrogonus *Sacc.*
Melanomma pulvispyrius *Fckl.*
Gnomonia setacea *Pers.*
Melanconis dasycarpa *E. & R.*
Sphæria Caryæ *C. & E.*
S. Arthuriana *Sacc.*
S. anguillida *C. & E.*
S. fulgida *C. & P.*
Sphærella decidua *E. & K.*
S. maculæformis *Pers.*
S. sparsa *Awd.*
S. polystigma *Ellis.*
S. Campanulæ *E. & K.*

E. J. Forster, M. D., Boston, Mass.

Hydnum auriscalpium *L.*
Scleroderma vulgare *Fr.*
Phyllosticta Sambuci *Desm.*
Sporidesmium lepraria *B. & Br.*
Phragmidium bulbosum *Schl.*
P. mucronatum *Lk.*
P. gracile *Grev.*
Triphragmium Ulmariæ *Lk.*
Puccinia graminis *Pers.*
P. clandestina *Carm.*
P. Umbilici *Guep.*
Ustilago Carbo *Tul.*
Urocystis pompholygodes *Schl.*
Podisoma Sabinæ *Fr.*
Roestelia lacerata *Tul.*
Sepedonium chrysospermum *Lk.*
Chætomium elatum *Kze.*
Hypomyces aurantius *Tul.*
H. lateritius *Tul.*
H. rosellus *Tul.*
Sphærotheca Castagnei *Lev.*
Sphæria fimbriata *Pers.*
Sphærella Buxi *DC.*
Stigmatea Robertiani *Fr.*

H. C. Gordinier, M. D., Troy, N. Y.

Ranunculus alismæfolius *Geyer.*
Lepidium campestre *L.*
Cerastium nutans *Raf.*
Arenaria lateriflora *L.*
Geranium Carolinianum *L.*
Trifolium hybridum *L.*
Mitella nuda *L.*
Chrysopsis graminifolia *Nutt.*
Polygonum tenue *Mx.*
Rumex Brittanica *L.*
Blitum capitatum *L.*
Populus balsamifera *L.*
Salix candida *Willd.*
Thuja occidentalis *L.*
Orchis spectabilis *L.*
Cypripedium spectabile *Swartz.*
Carex Buxbaumii *Wahl.*
C. Muhlenbergii *Schk.*
C. alopecoidea *Tuck.*
C. aurea *Nutt.*
Alopecurus geniculatus *L.*
Glyceria acutiflora *Torr.*
Pardanthus Chinensis *Ker.*

J. Dunn, Albany, N. Y.

A piece of wood of silver maple, showing the scar of an inscribed cross, both in the wood and the bark.

W. S. Hayward, Sodus, N. Y.

A splinter of wood and fragments of stone broken by lightning.

(C.)

PLANTS NOT BEFORE REPORTED.

GEUM MACROPHYLLUM, Willd.

Adirondack mountains, near the inlet of Lower Ausable pond. In the Manual this species is accredited to the base of the White mountains, Northern Michigan, Illinois and north-westward. Our newly discovered station is intermediate between the eastern and western localities recorded in the Manual. Flowering specimens were collected in June.

LACTUCA SCARIOLA, L.

Introduced, but apparently well established, in Clyde, Wayne county. September.

MIMULUS MOSCHATUS, Dougl.

Introduced. "Well established in a bog near Locust Valley," Long Island. *Julius A. Bisky.* August.

AMIANTHIUM MUSCÆTOXICUM, Gr.

Valley Stream, Long Island. July. *J. A. Bisky.* This is probably one of its most northern stations.

JUNCUS MILITARIS, Bigel.

Adirondack mountains. In Mud pond and Clear pond near Long lake. July. The bayonet rush grows in shallow water in these localities. Its panicle is not very conspicuous, and a superficial observer might easily mistake the plant for the great bulrush, *Scirpus validus*, which grows in similar situations. It spreads by creeping rootstocks which give origin to new plants, sometimes at less than an inch from the parent plant. The capillary submersed leaves noticed by Dr. Robbins in flowing water were not seen in these stations, in which the plants grow in quiet water. The whitish membranous scales that subtend the reddish-brown or chestnut colored heads of flowers are noticeable by reason of the contrast in colors.

DISTICHIUM CAPILLACEUM, B & S.

Wet rocks and precipices. Adirondack mountains, Cascadeville. June. The distichous arrangement of the leaves, characteristic of the genus, is not very conspicuous in this moss, which at first sight somewhat resembles *Dicranella heteromalla.*

CALICIUM EUSPORUM, Nyl.

Bark of dead balsam, *Abies balsamea.* Chapel pond, Adirondack mountains. June. This rare lichen has but recently been detected in this country. Mr. Willey informs me that he first found it about a year ago in the White mountain region.

COLLYBIA FULIGINELLA, N. sp.

Pileus convex or nearly plane, sometimes irregular or undulate on the margin, glabrous, even, fuliginous-brown, flesh white; lamellæ, rather narrow, close, rounded behind, adnexed or nearly free, white; stem equal or slightly tapering upward, subfibrillose, stuffed or hollow, colored like the pileus or a little paler, white tomentose at the base; spores subelliptical, .0003 to .00035 inch long, .0002 to .00025 broad, usually containing a single large nucleus.

Pileus 1.5 to 2.5 inches broad, stem 1.5 to 2 inches long, 2 to 3 lines thick.

Under or near arbor-vitæ, *Thuja occidentalis.* Elizabethtown, Essex county. September.

In size and shape this species resembles *Collybia dryophila*, but its color, which closely resembles that of *Lactarius lignyotus*, is far different.

CLITOPILUS SUBVILIS, N. sp.

Pileus thin, centrally depressed or umbilicate, with the margin decurved, hygrophanous, dark-brown and striatulate when moist, grayish-brown and silky-shining when dry; lamellæ subdistant, adnate or slightly decurrent, whitish when young, then flesh-colored; stem slender, brittle, rather long, stuffed or hollow, glabrous, colored like the pileus or a little paler; spores irregular, angular, .0003 to .0004 inches long; odor weak or none, taste farinaceous.

Pileus 8 to 15 lines broad, stem 1.5 to 3 inches long, 1 to 2 lines thick.

Damp soil in thin woods. Karner, Albany county. October.

The species seems to be closely related to *Clitopilus vilis*, from

which I have separated it because of its smooth and shining (not flocculose and opaque), pileus and its farinaceous taste. It was discovered in 1884, growing, in company with *Entoloma rhodopolium* in such a way that it was taken to be a variety of it, and it was referred to that species under the name var. *umbilicatum*. This year it was found plentifully in the same locality, but entirely unaccompanied by *E. rhodopolium*. A more careful study of it leads me to the conclusion that it is a distinct species.

HEBELOMA GLUTINOSUM, Lind.

Among fallen leaves and on half buried decaying wood, in thin woods. Conklingville. September.

In wet weather the gluten is sufficiently copious to drip from the pileus.

CORTINARIUS SUBFERRUGINEUS, Fr.

Thin woods. Conklingville. September.

POLYPORUS DRYOPHILUS, Berk.

At the base of oak trees. Conklingville. July.

POLYPORUS SINUOSUS, Fr.

Decaying wood of maple, *Acer saccharinum*. Forestburgh, Sullivan county. September. The species is remarkable for and easily known by its sweet and agreeable fragrance, which has been likened to that of licorice.

POLYPORUS RADICULOSUS, N. sp.

Resupinate, effused, thin, soft, tender, orange-yellow, the mycelum creeping in and over the wood, silky-tomentose, at first white, then yellow, forming numerous yellow branching root-like strings or ribs which are more or less connected by a soft, silky tomentum; pores rather large, angular, at first shallow, sunk in the mycelium, the dissepiments becoming more elevated, thin and fragile; spores elliptical, .0002 to .00025 inch long, .00012 to .00016 broad.

Half buried chips of poplar. *Populus tremuloides*. Gansevoort. September.

The species is allied to *P. Vaillantii*, in its peculiar rhizomorphoid strings of mycelium, but from this it differs decidedly in its color and texture. In these respects it approaches *P. bombycinus*, of which it may possibly be a peculiar variety. It is very

destructive to the wood on which it grows, causing it to become soft, brittle and even friable.

HYDNUM VELATUM, B. & C.

Decaying wood of poplar, *Populus tremuloides*. Gansevoort. September.

HYDNUM SUBFUSCUM, N. sp.

Resupinate, thin, soft, the margin and subiculum beneath white, tomentose, sometimes extended into branching strings of mycelium, the upper surface of the subiculum pale yellowish-brown or dingy-isabelline, when magnified, appearing as if sprinkled with minute shining particles; aculei slender, subulate, very acute, white when young, then with white tips or wholly colored like the subiculum.

Decaying wood of deciduous trees. Conklingville. September. In *H. himantia*, which, in some respects, this species resembles the teeth are described as obtuse and pulverulent.

HYDNUM CARBONARIUM, N. sp.

Resupinate, very thin, at first floccose-pruinose and white, then smoky-brown, sometimes retaining a white margin; aculei at first short, then longer, subulate or cylindrical, minutely ciliate at the apex, whitish when young, then smoky-brown.

Charred wood. Elizabethtown. September. The species is easily recognized by its peculiar color and by the ciliate or setulose tips of the teeth. It appears as if it had been smoked or scorched.

IRPEX AMBIGUUS, N. sp.

Resupinate, adnate; subiculum very thin, flocculose-pruinose, white, becoming pallid with age; aculei oblique, somewhat united at the base, minute, very variable, subulate and entire, or compressed, acute, truncate, branched, incised or subserrate, white when young, becoming pallid with age.

Decaying beech wood and bark. Adirondack mountains. September.

It forms small irregular or interrupted patches. To the naked eye it resembles *Hydnum pallidum*, but the teeth are more or less united at the base, thus requiring it to be placed in the genus Irpex. Scarcely any two of them are exactly alike.

POROTHELIUM PAPILLATUM, N. sp.

Effused, very thin, flocculose-pruinose, white when young, soon pallid or isabelline, subwaxy and often rimose, the margin subin-

determinate: verrucae minute, subdistant, at first a limpid globule resting on the subiculum, then slightly prominent, papilliform, colored like the subiculum and crowned with a limpid globule which varies in color from hyaline to amber.

Decorticated wood of poplar, *Populus tremuloides*. Elizabethtown. September. It forms patches several inches in extent. It is apparently related to *P. Friesii*, but it is not membranous, the warts are colored like the subiculum and are not immersed in it.

THELEPHORA DENDRITICA, Berk.

Overspreading the hymenium of effete *Polyporas applanatus*. Adirondack mountains. September.

STEREUM ABIETINUM, Pers.

Prostrate trunk of spruce, *Abies nigra*. Cascadeville, Adirondack mountains. June.

Our specimens agree with the description of the species to which we have referred them, but they present some interesting characters not mentioned in that description. It often happens that great perplexity arises because of the incomplete descriptions of some of the older authors. A careful examination of our specimens shows the presence of both setæ and metuloids, the latter much more numerous than the former. Thus this species does for Stereum, Hymenochæte and Peniophora what *Dædalea confragosa* does for Dædalea, Trametes and Lenzites, as was shown in the thirtieth report. It sets at naught the characters used in distinguishing these genera, and bids defiance to the generic limits assigned in the botanies. To the naked eye, the hymenium in our specimens has a somewhat "velvety pruinose" appearance, but when examined by the microscope it is found to be abundantly furnished with projecting setiform bodies, some of which are smooth and colored, as in Hymenochæte; others are colorless and rough or minutely warted, as in Peniophora. Sometimes a single one is colorless and warted in the upper part, colored and smooth in the lower. And as if this was not enough of confusion to our former notions, the hymenium, though dry, becomes rimose as in many species of Corticium. The fungus sometimes forms patches several inches in extent by the confluence of individuals. It is nearly or quite one line thick, the intermediate stratum being

composed of erect fibres. Though dry, it is not very tough. The spores are oblong or subfusiform .0005 to .0007 inch long, .0002 broad.

HYMENOCHÆTE TENUIS, N. sp.

Resupinate, very thin, even, forming elongated, more or less confluent, dark ferruginous patches, concolorous on the determinate margin, inseparable, rimose; setæ acute, .0012 to .0025 inch long.

Decorticated wood of arbor-vitæ, *Thuja occidentalis.* Cascadeville. June.

CLAVARIA KROMHOLZII, Fr.

Open woods. Brewerton and Adirondack mountains. September.

PHYLLOSTICTA LYCOPERSICI, N. sp.

Spots large, suborbicular, cinereous; perithecia minute, brown or blackish, opening by a single or sometimes by two pores; spores abundant, oblong or elliptical, .00025 to .0003 inch long, .0001 to .00012 broad.

Fruit of tomato, *Lycopersicum esculentum.* Menands, Albany county. July.

PHYLLOSTICTA PHASEOLINA, Sacc.

Leaves of cultivated bean, *Phaseolus vulgaris.* Menands. September.

PHYLLOSTICTA CARYÆ, N. sp

Spots large, irregular, often confluent, at first yellowish, then brown, sometimes becoming grayish in the center; perithecia minute, .004 inch broad, punctate, epiphyllous; spores irregularly elliptical, .0002 inch long, .00008 broad.

Living leaves of hickory, *Carya alba.* Piffard. August.

PHYLLOSTICTA PHOMIFORMIS, Sacc.

Living leaves of white oak, *Quercus alba.* Sandlake, Rensselaer county. September.

PHYLLOSTICTA TUMORICOLA, N. sp.

Spots suborbicular, arid, pallid with a reddish or reddish-brown margin, apparently caused by insects; perithecia amphigenous or epiphyllous minute, .005 to .007 inch broad, depressed, brownish; spores oblong or narrowly elliptical, colorless, .0004 to .0005 inch long, .0002 to .00025 broad.

Living gall-spotted leaves of white oak, *Quercus alba.* Karner. October. In *P. phomiformis* the spores are much larger than in

this species. The spots are centrally punctured and appear to have been produced by the stings of insects.

PHYLLOSTICTA POPULINA, Sacc. v. PARVA n. var.

Living or languishing leaves of necklace poplar, *Populus monilifera.* Menands. October.

Spots very small, orbicular, white, with a brown border; perithecia one to four on a spot.

PHYLLOSTICTA SPERMOIDES, N. sp.

Spots suborbicular, brown or cinereous with a brown border, sometimes confluent; perithecia minute, .0014 to .0025 inch broad, numerous, hypophyllous, blackish; spores minute cylindrical, .0002 inch long.

Living leaves of wild grape vine, *Vitis riparia.* Gansevoort. September.

PHYLLOSTICTA FAGINEA, N. sp.

Spots suborbicular, small, often seriate or subconfluent, and arranged in rows parallel to the veins of the leaf, cinereous or reddish-gray, with a reddish-brown border or wholly reddish-brown, subferruginous beneath; perithecia few, epiphyllous, minute, .003 inch broad, black; spores ovate or elliptical, .0003 to .0004 inch long, .0002 to .00025 broad.

Living leaves of beech, *Fagus ferruginea.* Argusville and Elizabethtown. September.

PHYLLOSTICTA VAGANS, N. sp.

Spots none; perithecia minute, .003 to .0035 inch broad, amphigenous, numerous, occupying the whole leaf, black; spores very minute, spermatoid, .00012 inch long, .00004 broad, sometimes oozing out and forming a white globule.

Dead leaves of *Smilacina racemosa.* Conklingville. September.

This is a very anomalous species. But for the very short minute spores, it would accord better with Septoria than Phyllosticta.

PHYLLOSTICTA FATISCENS, N. sp.

Spots rather large, suborbicular, pallid, generally marked by one or more elevated concentric lines, at length cracking around the margin and separating, wholly or in part, from the uninjured tissues of the leaf; perithecia minute, .004 inch broad, epiphyllous,

at first pale, then brownish; spores oblong, straight or slightly curved, .00025 to .0004 inch long, .00012 to .00016 broad.

Living leaves of yellow pond lily, *Nuphar advena*. Argusville, Schoharie county. July.

PHYLLOSTICTA SYMPHORICARPI, West.

Living leaves of snowberry, *Symphoricarpus racemosus*. Canajoharie, Montgomery county. July.

PHOMA MAGNIFRUCTA, N. sp.

Perithecia small, .005 to .007 inch broad, scattered, subglobose, erumpent, black; spores oblong-fusiform, .0009 to .0012 inch long, .0003 to .0004 broad; sporophores short.

Cone scales of arbor vitæ, *Thuja occidentalis*. Keene, Essex county. June.

This species is readily distinguished from others inhabiting cone scales by its large spores.

PHOMA LEGUMINUM, West.

Legumes of locust, *Robinia pseudacacia*. Piffard. August.

PHOMA OLERACEA, Sacc v. DIPSACI Sacc.

Dead stems of teasel, *Dipsacus sylvestris*. Wallington, Wayne county. September.

PHOMA EUPYRENA, Sacc.

Dead potato stems. Menands. October.

PHOMA POPULI, N. sp.

Perithecia minute, .003 to .004 inch broad, epiphyllous, gregarious, black, opening by a large pore; spores cylindrical, straight or slightly curved, .0006 to .0008 inch long, .00012 broad.

Dead leaves of poplar, *Populus tremuloides*. Elizabethtown. September.

PHOMA HERBARUM, West.

Dead stems of wormwood, *Artemisia vulgaris*. Port Henry. June.

PHOMA CASTANEA, N. sp.

Perithecia numerous, surrounding the branch, .011 to .014 inch broad, erumpent, black; spores minute, oblong or cylindrical, .00025 to .0003 inch long, .00006 to .00008 broad; sporophores short.

Dead branches of chestnut, *Castanea vesca*. Sandlake. May.

APOSPHÆRIA CONICA, Sacc.

Decaying oak wood. Piffard. August.

CYTOSPORA GRANDIS, N. sp.

Pustules large, two to three lines broad, ellipsoid or suborbicular, scar-like, ferruginous from the ruptured bark; loculi numerous; spores minute, curved, .0002 inch long.

Dead bark of sumach, *Rhus typhina*. Gansevoort. September.

HAPLOSPORELLA PINI, N. sp.

Perithecia valsoid, cæspitose, three to five in a cluster, sunk in the inner bark, erumpent; spores globose or subelliptical, colored, .0005 to .0006 inch long.

Dead bark of white pine, *Pinus Strobus*. Elizabethtown. June.

DIPLODIA PAUPERCULA, B. & Br.

Dead branches of elder, *Sambucus Canadensis*. Adirondack mountains. June.

DIPLODIA ASPARAGI, N. sp.

Perithecia gregarious, subglobose, minute, opening by a papillate pore, black; spores elliptical, colored, .0008 to .001 inch long, .0005 broad.

Dead stems of asparagus. Menands. October.

STAGONOSPORA CHENOPODII, N. sp.

Spots few, large, brown or yellowish-brown; perithecia minute, .004 to .005 inch broad, black; spores oblong, obtuse, biseptate or triseptate, constricted at the septa, colorless, .0008 to .001 inch long, .0003 to .0004 broad.

Living leaves of goose-foot, *Chenopodium album*. Menands. August.

SEPTORIA STACHYDIS, R. & D.

Living leaves of hedge nettle, *Stachys aspera*. Port Kent. June.

SEPTORIA FUSCA, N. sp.

Spots blackish-brown, indefinite, occupying the lobes of the leaves or their margins; perithecia epiphyllous, black; spores filiform, straight, slightly curved or flexuous, .0016 to .002 inch long.

Living or languishing leaves of wormwood, *Artemisia vulgaris*. Port Henry. June.

It differs from *S. Artemisiæ* in its indefinite spots and longer spores.

SEPTORIA STELLARIÆ, R. & D.

Living or languishing leaves of chickweed, *Stellaria media.* Aden Lair, Adirondack mountains. June.

SEPTORIA SIBIRICI, Thum.

Living leaves of fetid currant, *Ribes prostratum.* Adirondack mountains. September.

SEPTORIA SOLIDAGINICOLA, N. sp.

Spots small, angular, white or whitish on the upper surface, darker beneath, surrounded by a brown or reddish brown border; perithecia few, usually one or two on a spot, epiphyllous, subglobose, blackish; spores linear, straight, subacute, simple, .001 to .0016 inches long, .00016 broad.

Living leaves of goldenrod, *Solidago arguta.* Cobble hill, near Elizabethtown. September.

Distinguished from *S. Solidaginis* by its longer continuous spores, which are neither septate nor nucleate.

SEPTORIA BREVIS, N. sp.

Spots none; perithecia scattered, epiphyllous, minute, .003 to .004 inch broad, opening widely, black; spores short, .0004 to .0005 inch long, .00006 broad, straight or slightly curved.

Dead leaves of *Solidago Virgaurea* v. *alpina.* Mt. Marcy. June.

Distinct from other species inhabiting solidago, by its very short spores, which resemble somewhat the allantoid spores of species of Valsa.

SEPTORIA POPULICOLA, N. sp.

Spots suborbicular, reddish or brownish red with a narrow blackish border on the upper surface, grayish on the lower; perithecia hypophyllous, few, pale, opening widely; spores filiform, curved, two to four-septate, .0025 to .003 inch long .00012 to .00016 broad.

Living leaves of balm of Gilead, *Populus balsamifera.* Keene. June.

Distinguished from other species found on poplar by its long pluriseptate spores. The perithecia are but slightly developed.

SEPTORIA SMILACINÆ, E. & M.

Languishing leaves of *Smilacina racemosa.* Sandlake. September.

PILIDIUM GRAMINICOLA, N. sp.

Perithecia minute, .008 to .014 inch broad, depressed, erumpent, orbicular or hysteriform, membranous, opening widely, black, the disk whitish, the mouth laciniate-dentate; spores oblong or subfusiform, colorless, triseptate, .0012 to .0016 inch long, .0004 to .00045 broad; sporophores short, colorless.

Dead leaves of blue joint, *Calamagrostis Canadensis.* Mount Marcy. June.

GLŒOSPORIUM LINDEMUTHIANUM, Sacc.

Living bean pods, especially of the butter or wax bean. Menands. August.

An injurious fungus that produces brown spots on the pods, thus spoiling their appearance and diminishing their value.

GLŒOSPORIUM SEPTORIOIDES, Sacc.

Living leaves of white oak. *Quercus alba.* Gansevoort. September.

GLŒOSPORIUM ROBERGEI, Desm.

Living leaves of water beech, *Carpinus Americana.* Gansevoort. September.

MELANCONIUM BETULINUM, Schm.

Dead bark of white birch, *Betula populifolia.* Menands. September.

Distinguished from *M. bicolor* by its longer spores.

MELANCONIUM DIMORPHUM, N. sp.

Pustules small, subcutaneous, slightly prominent, subconical, black, containing a small white stroma; spores of two forms, one narrow, cylindrical, straight or curved, .0003 to .0004 inch long, .00008 broad, the other oblong, elliptical or subfusiform, colored, .0004 to .0005 inch long, .0002 to .00025 broad, oozing out in a black mass or in tendrils.

Dead branches of alder, *Alnus viridis.* Adirondack mountains. June.

Remarkable for the two kinds of spores. In some pustules the broader spores are more numerous, in others the narrower ones, but both kinds were found in all the pustules examined. Can the narrow ones be broken or effete sporophores?

MARSONIA POPULI, Sacc.

Living leaves of *Populus monilifera.* Menands. July.

CORYNEUM TUMORICOLA, N. sp.

Spots scattered, suborbicular, pallid with a reddish-brown border, apparently produced by insects; heaps epiphyllous, minute, dot-like, unequal, black; spores oblong, triseptate, colored, .0004 to .0005 inch long, 00016 broad, at length breaking from the sporophores.

Living leaves of elm, *Ulmus Americana.* Adirondack mountains. July. The spots in this instance, as in that of *Phyllosticta tumoricola*, appear to be due to the stings of insects. A central aperture or puncture is visible in the spots and the fungus occurs on only a part of them.

SCOLECOSPORIUM FAGI, Lib.

Dead branches of alder, *Alnus incana.* Elizabethtown. September.

The typical form occurs on beech, but I find no essential differences in the form on alder. *Massaria macrosperma*, the ascigerous form has not yet been observed with us.

PESTALOZZIA JEFFERISII, Ellis.

Leaves of wild grape, *Vitis riparia.* Gansevoort. September.

The fungus occurs on spots which are apparently produced by a sterile Rhytisma.

MONILIA MARTINI, E. & S.

Old corn cobs. Menands. September.

MONILIA CINEREA, Bon.

On plums. Sandlake. Closely related to *Monilia fructigena*, with which the species has been united by some authors.

RAMULARIA BARBAREÆ, N. sp.

Spots suborbicular, arid, white, generally bordered by a slightly thickened brown line; flocci amphigenous, either short and branched or longer and simple; spores oblong or cylindrical, often catenulate, rarely uniseptate, .0004 to .0009 inch long, .00012 to .00016 broad.

Living leaves of winter cress, *Barbarea vulgaris.* Highland Mills and Port Henry. June.

This species is closely related to *R. Armoraciæ*, from which it may be distinguished by the whiter mostly margined spots, the shorter hyphæ and the catenulate spores.

CONIOSPORIUM PUNCTOIDEUM, Karst.

Decorticated wood of arbor vitæ, *Thuja occidentalis*. Adirondack mountains. June.

CLADOSPORIUM APHIDES, Thum.

Dead aphides of *Phragmites communis*. Bergen Swamp. June.

CLADOSPORIUM ASPARAGI, Fr.

Dead stems of asparagus. Menands. October.

CLADOSPORIUM BREVIPES, N. sp.

Spots suborbicular, cinereous; flocci densely cæspitose, short, .001 to .0015 inch long, dark olivaceous, almost black in the mass, amphigenous, septate; spores terminal, elliptical, .0005 to .0006 inch long, .0003 to .0004 broad.

Living leaves of white oak, *Quercus alba*. Menands. July. This species forms minute compact tufts, so distinct and well defined that they might easily be mistaken for perithecia.

CLADOSPORIUM LETIFERUM, N. sp.

Spots dark brown, irregular, large, often involving the whole leaf; tufts epiphyllous, subeffused, olive green, the hyphæ very short, almost obsolete; spores oblong-pyriform, uniseptate or biseptate, slightly constricted at the septa, .0008 to .0012 inch long, .0003 broad.

Living leaves of poplar, *Populus tremuloides*. Keene. June.

This fungus often kills the leaves it attacks. When the spores have a single septum the two cells are unequal; when they have two septa the middle cell is generally larger than the terminal ones. The species differs from *C. Asteroma* in the shape and character of the spores and in its more effused habit.

CERCOSPORA ACETOSELLÆ, Ellis.

Living leaves of yellow dock, *Rumex crispus*. Elizabethtown. September.

Our specimens differ slightly from the type and may be designated variety *maculosa*. Spots numerous, small, suborbicular, grayish,

surrounded by an elevated margin and a brownish-red border; spores at length with one or two septa.

MACROSPORIUM TOMATO, Cke.

Decaying fruit of tomato. Menands. October.

PILACRE ORIENTALIS, B. & Br.

Dead bark of alders, *Alnus incana*. Elizabethtown. September.

In our specimens the sporiferous branches are sometimes elongated and flexuous and the young plant wholly white, in which respects they differ from the typical form of the species. But the stem soon becomes cinereous and finally the whole plant is umber-brown. Young plants sometimes grow from the base of old ones, sometimes from the head.

GRAPHIUM SORBI, N. sp.

Spots generally small, one to two lines broad, orbicular, definite, reddish-brown; stems hypophyllous, rather stout, equal or slightly tapering upward, the component flocci diverging and colorless at the apex; spores oblong, hyaline, .0008 to .001 inch long, .00025 to .0008 broad, sometimes with two to four minute nuclei.

Living leaves of mountain ash, *Pyrus Americana*. Adirondack mountains. July.

ISARIOPSIS ALBOROSELLA, Sacc.

Living or languishing leaves of chickweed, *Cerastium vulgatum*. Keene. July.

I find only uniseptate spores in our specimens.

FUSARIUM LYCOPERSICI, Sacc.

Fruit of the tomato. Menands. August.

A malady affects the fruit of the tomato. In the vicinity of Albany, the past season, the first ripening tomatoes were found almost invariably to be soft and decaying. A brown or discolored spot, usually located at the flowering end of the fruit, appears to be the origin and center of the disease. This spot often makes its appearance while the fruit is yet green. This Fusarium soon develops on this spot, appearing in the form of minute pallid dots, or in more effused patches which are of a pinkish or an orange hue. With advancing age it assumes a more or less brownish hue. If the affected tomato be cut open its inner flesh often exhibits a

peculiar purplish tint. In a short time the white flocculent threads of the fungus appear on the cut surface, soon to be followed by the more waxy and colored patches of spores, thus showing that the mycelium has permeated the diseased flesh of the tomato. The affected tomatoes become very watery and any surface on which a diseased tomato lies, soon becomes wet from the exuding juices. From the constancy with which this fungus appears in connection with the disease, it would appear that it might be regarded as the cause of the decay, but there are circumstances that point to some more subtle agent of the mischief. Further investigation is necessary to determine satisfactorily the source of the disease.

PEZIZA TRUNCICOMES, Ger.

Decaying prostrate trunks of deciduous trees. Knowersville, Albany county. May.

PEZIZA ALBOVIOLASCENS, A. & S.

Old chestnut rails. Conklingville. September.

HELOTIUM EPISPHÆRICUM, N. sp.

Receptacle minute, .012 to .02 inch broad, gregarious, subsessile, at first subhyaline, then reddish-yellow, the disk nearly plane, asci subcylindrical; spores oblong or lanceolate, .0002 to .00025 inch long, .0001 to .00012 broad.

On old *Hypoxylon Morsei*. Elizabethtown. September.

It resembles *H. citrinum* in habit, but is very much smaller.

ASCOMYCES LETIFER, N. sp.

Indefinite, hypophyllous, often occupying the whole lower surface of the leaf and suffusing it with a glaucous bloom; asci cylindrical, obtuse or subtruncate, .0016 to .002 inch long, .0006 to .0008 broad; spores minute, varying from narrowly elliptical to subglobose, .00016 to .0002 inch long, .00008 to .00012 broad.

Living leaves of mountain maple bush, *Acer spicatum*. Elizabethtown. June.

The species is very distinct from *A. polysporus*, which forms definite spots. The attacked leaves soon turn black, wither and die. Sometimes all the leaves on a branch are affected and the fungus then causes a veritable blight.

ASCOMYCES RUBROBRUNNEUS, N. sp.

Spots definite, variable, small and suborbicular or large and irregular, sometimes confluent, usually concave above, convex below, dull reddish-brown above, paler below; asci oblong, truncate at the apex, .002 to .003 inch long, .0006 to .0009 broad; spores minute, subelliptical, .00012 to .00016 inch long, .0006 to .0008 broad.

Living leaves of red oak, *Quercus rubra.* Sandlake. September.

In some respects this approaches *A. alutarius*, from which the color of the spots, larger asci and different shape of the spores will distinguish it.

ERYSIPHE HORRIDULA, Lev.

Abundant on corn gromwell, *Lithospermum arvense.* Port Henry. June.

Our specimens were too young when collected to show the spore characters, and are to this extent doubtful.

CALOSPHÆRIA CILIATULA, Karst.

Dead trunks and branches of white birch, *Betula populifolia.* Menands. September.

VALSA THUJÆ, N. sp.

Pustules scattered, slightly prominent, closely covered by the epidermis; perithecia nestling in the inner bark, subcircinate, five to ten in a pustule; asci oblong-clavate, .0014 to .0016 inch long; spores allantoid, .0004 to .0005 inch long, .00008 to .0001 broad.

Dead branches of arbor vitæ, *Thuja occidentalis.* Elizabethtown. September.

VALSA EXUDANS, N. sp.

Perithecia collected in a cortical stroma, thin, crowded, angular, closely covered by the pustulately elevated, irregularly ruptured epidermis, ostiola obscure or concealed beneath the defiled epidermis; asci very slender, cylindrical, .0016 inch long, .00016 broad; spores minute, oblong, straight, colored, .0002 inch long, oozing out and staining the surface of the matrix.

Dead bark of alders, *Alnus incana.* Elizabethtown. September.

This is an anomalous species and does not agree well with the generic characters. The straight, colored and oozing spores are unusual and peculiar features.

VALSELLA ADHERENS, Fckl.

Corticated trunk and branches of white birch, *Betula populifolia*. Sandlake. September.

In our plant the disk is often whitish or grayish from the adhering remains of the epidermis; the perithecia are five to twelve in a pustule and the spores are colored in the mass. It is apparently a variety of the species and may be called var. *Americana*.

VALSELLA LASCHII, Sacc.

Dead whitened twigs of *Acer spicatum*. Port Henry. June.

In our specimens the black stroma is apparent through the translucid epidermis, and the white disk, though small, is plainly seen by contrast. The asci are very broad, .0016 to .002 inch long, .0005 to .0006 broad. This form may be designated var. *acerina*.

DIATRYPELLA QUERCINA, Nits.

Dead branches of thorn, *Cratægus tomentosa*. Elizabethtown. September.

Although occurring on thorn branches, there does not appear to be any good characters for separating this fungus from the species to which I have referred it.

SPHÆRELLA MINUTISSIMA, N. sp.

Perithecia very numerous, occupying the whole lower surface of the leaf, very minute, .002 to .0025 inch broad, veiled by the epidermis, black; asci oblong or slightly narrowed toward the apex, .0016 to .002 inch long, .0003 to .0004 broad; spores crowded, oblong, straight, obscurely septate in the middle, .0006 to .0007 inch long, .00016 broad.

Dead leaves of alder, *Alnus incana*. Adirondack mountains. June.

The perithecia are scarcely visible to the naked eye. The affected leaves remain on the branches through the winter. They had not yet fallen in June.

SPHÆRELLA ANLICOLA, N. sp.

Perithecia small, .0035 to .0045 inch broad, hypophyllous, clustered or scattered, naked, black; asci oblong or subclavate, .002 to .0025 inch long, .0005 to .0006 broad; spores crowded, lanceolate,

uniseptate, often slightly curved, .0009 to .0011 inch long, .00016 broad.

Dead leaves of alder, *Alnus viridis*. Mt. Marcy. June. The The spores are narrowed toward one end and septate in the middle. The species is evidently distinct from *S. Alni viridis* in its larger exposed perithecia, in the shape of its spores and in wanting a dematiaceous stroma. Apparently the same species was found near Elizabethtown, but without fruit.

SPHÆRELLA PONTEDERIÆ, N. sp.

Spots rather large, six to ten lines long, oblong or elliptical, sometimes confluent, brown above, blackish brown or grayish brown below; perithecia minute, .003 inch broad, hypophyllous, black; asci oblong or subfusiform, .002 to .0025 inch long, .0005 broad; spores crowded or biseriate, oblong-clavate, uniseptate, sometimes quadrinucleate, .0006 to .0008 inch long, .0002 to .00025 broad.

Languishing leaves of pickerel weed, *Pontederia cordata*. Whitehall, Washington county. September.

Apparently related to *S. Caladii*, but with longer spores and different spots.

SPHÆRELLA PINSAPO, Thum.

Fallen leaves of arbor-vitæ. Port Henry. June.

DIAPORTHE SULPHUREA, Fckl.

Dead stems and branches of hazelnut, *Corylus rostrata*. Ganse-voort. September.

This species is easily recognized by the beautiful yellow spurious stroma that extends everywhere under the epidermis of the affected branches.

DIAPORTHE (CHOROSTATE) FARINOSA, N. sp.

Stroma somewhat pulverulent or mealy, dull buff color, formed of the slightly changed inner bark, erumpent in a minute slightly exserted disk; perithecia valsoid, irregularly circinating, generally four to ten in a circle, the clusters subconfluent, ostiola black, dotting the prominent pulverulent buff colored or at length brownish disk; asci subcylindrical, .0024 to .003 inch long, .00035 to .0004 broad; spores crowded or biseriate, oblong or subfusiform, uniseptate, generally quadrinucleate, .0006 to .0008 inch long, .00016 to .0002 broad.

Dead branches of basswood, *Tilia Americana.* Argusville. July.

This species approaches *D. furfuracea* in its pulverulent stroma, but it differs in its prominent disk, which renders the affected branches rough to the touch, and in its smaller quadrinucleate crowded or biseriate spores. From *D. velata* it is easily separated by the entire absence of any black circumscribing line or blackened surface. It evidently belongs to the subgenus Chorostate, but the clusters of perithecia are so numerous and so closely and almost confluently placed that they form an almost continuous stratum which surrounds the branch and extends long distances under the epidermis.

MELANCONIELLA DECORAHENSIS, Ellis.

Dead bark of white birch, *Betula populifolia.* Gansevoort. September.

In the typical form the disk is described as "sordid gray." In our specimens, both it and the stroma are yellowish green and pulverulent. On the smaller branches the disk is smaller and the ostiola are less prominent than on the larger ones. When the epidermis is torn away the perithecia adhere to it. The young spores are colorless and subacute at each end. The mature ones are colorled; obtuse and constricted at the septum.

The conidia ooze out and form orbicular black patches one to two lines broad. These are very conspicuous by reason of the contrast between their color and the white color of the matrix.

VALSARIA NIESSLII, Sacc.

Dead bark of white birch, *Betula populifolia.* Menands. September.

LEPTOSPHÆRIA ASPARAGI, N. sp.

Perithecia broadly conical, .01 to .014 inch broad, at first covered by the pierced epidermis, then naked, black; asci clavate or cylindrical, short pedicellate, .003 to .004 inch long, .00045 to .0006 broad; spores oblong or subfusiform, crowded, .0008 to .0012 inch long, .0003 broad, at first colorless and triseptate, then slightly colored and five-septate, constricted at the septa.

Dead stems of asparagus. Menands. October.

MASSARIA PYRI, Otth.

Bark of pear and apple trees. Albany. May.

PLEOSPORA SHEPHERDIÆ, N. sp.

Perithecia scattered, small, .014 to .018 inch broad, covered by the epidermis, erumpent, black; asci cylindrical, .006 to .008 inch long, .0006 broad; spores uniseriate, oblong, generally triseptate, rarely five-septate, with one or two longitudinal septa, constricted in the middle, colored, .0008 to .001 inch long, .0003 to .0004 broad.

Dead branches of *Shepherdia Canadensis*. Port Henry. June.

DOTHIDELLA ALNI, N. sp.

Stroma orbicular, one to three lines broad, thin, convex and black above, concave, brown or grayish-black and papillosely rugulose below; asci cylindrical; spores ovate-elliptical, obscurely uniseptate near one end, colorless, .0006 to 0008 inch long, .0003 to .00035 broad.

Dead leaves of *Alnus viridis*. Mt Marcy. June.

The spores are very unequally divided, the smaller cell appearing like an umbo.

LOPHIOTREMA VESTITA, N. sp.

Perithecia closely gregarious, small, .014 to .02 inch broad, sunk in the wood, erumpent, conical, clothed with a slight tawny-ferruginous pulverulent tomentum, ostiola naked, black, subterete or compressed; asci clavate, .006 to .007 inch long, .0006 to .0007 broad; spores crowded, subfusiform, at first biconic and uniseptate, then triseptate or quadrinucleate, constricted in the middle, colorless, .0012 to .0016 inch long, .0003 to .0004 broad.

Decorticated wood of poplar, *Populus tremuloides*. Gansevoort. September.

Readily distinguished by the tawny, pulverulent tomentum of the perithecia.

LOPHIOTREMA PARASITICA, N. sp.

Perithecia crowded, subsuperficial, .014 to .02 inch broad, clothed with a minute subcervine pulverulent tomentum, becoming blackish-brown with age, the ostiola prominent, subterete or compressed, clothed like the perithecia; asci subclavate, .005 to .006 inch long, .0006 to .0007 broad; spores crowded, at first biconic, then triseptate, constricted in the middle, colorless, .0012 to .0016 inch long, .0003 broad.

On old *Hypoxylon Morsei*. Elizabethtown. September.

This and the preceding species appear to be peculiar by reason of the pulverulent tomentum of the perithecia. They would seem to constitute a distinct section of the genus.

(D.)

NOTES AND OBSERVATIONS.

THALICTRUM PURPURASCENS, L.

A singular Thalictrum was found on the shore of Lake Champlain, near Port Henry. Its leaves were thin and delicate, quite small, and five to seven-lobed, resembling those of *Thalictrum dioicum*. Some had a general petiole, others had none. The flowers were almost diœcious, the anthers resembling those of *Thalictrum purpurascens*, though perhaps they were a little more slender and more strongly mucronate. The plants had the general aspect of *T. purpurascens*, except the leaves, which resembled more those of *T. dioicum*. *T. dioicum* in the same locality was past flowering, it being now the middle of June, and had developed its fruit to full size. Whether this plant is a hybrid between *T. dioicum* and *T. purpurascens*, or a variety of the latter, or a distinct species, is the question to be solved. Similar forms have been regarded by Prof. Trelease as hybrids.

NASTURTIUM LACUSTRE, Gr.

Black creek, near Bergen.

ARABIS DRUMMONDII, Gr.

Port Henry. A form with spreading pods.

GEUM RIVALE, L.

A form with pale yellow or cream-colored flowers was collected in the Adirondack mountains. It is not rare in that locality.

RIBES CYNOSBATI, L.

A very lax form of this plant occurs at Cascadeville, in the Adirondack mountains. The branches are long and slender, and the flowers are much scattered and very long pedicelled. It is associated in this locality with *Ribes rotundifolium*, *R. lacustre* and *R. prostratum*. All were in flower at the same time. The last species occurs abundantly at Lower Ausable pond, where

nearly all the young fruit of a large patch was found infested by *Sphærotheca Mors-uvæ* Schw., which fungus is probably a mere variety of *Sphærotheca pannosa* Lev.

ASTER SAGITTIFOLIUS, Willd.

This fine aster has not hitherto been represented in the herbarium. It is recorded in the New York State Flora as a rare plant in New York. Fine specimens were found near Piffard, Livingston county, and it occurs in great abundance along the railroad between that place and Rochester.

ASTER ACUMINATUS, Mx.

Glen Cove, Long Island. *J. A. Bisky.* A very noticeable station for this mountain-loving plant.

SOLIDAGO ULIGINOSA, Nutt.

Bergen swamp. A very slender form, with unusually narrow and entire leaves, and a rather short panicle, sometimes slightly recurved.

SYMPHORICARPUS RACEMOSUS, Mx.

Near Canajoharie. The variety *pauciflorus* in rocky places, near Port Henry.

POLYGONUM TENUE, Mx.

Summit of Cobble hill, near Elizabethtown.

SALIX CANDIDA, Willd.

Occurs sparingly near Guilderland Station. *H. C. Gordinier.*

ABIES ALBA, Mx.

Newcomb, Essex county. It also occurs in North Elba, but in all the localities observed by me the trees were growing in cleared land, and had evidently sprung up since the forests were cut.

ORCHIS SPECTABILIS, L.

A form with white flowers. Schaghticoke. *H. C. Gordinier.* Mr. H. L. Griffis also sends a white-flowered form of the flowering wintergreen, *Polygala paucifolia*, from Binghamton.

CLINTONIA BOREALIS, Raf.

This plant grows almost everywhere in the Adirondack mountains, and in some places it is exceedingly thrifty and vigorous.

It is not uncommon to find plants with one or even two lateral umbels in addition to the terminal one. The number of flowers in the lateral umbels is generally less than the number in the terminal umbel of the same plant, and when there are three umbels the lowest one has the smallest number of flowers. They vary usually from three to six in the lateral umbels. In one specimen there were six flowers in the lateral and twelve in the terminal umbel. One plant had five large leaves.

SCLERIA VERTICILLATA, Muhl.

A small form with but three clusters of flowers is common in Bergen swamp.

CAREX ALOPECOIDEA, Tuckm.

This species is rare in the eastern part of the State. It occurs near Lansingburgh. *E. C. Howe* and *H. C. Gordiner.*

CAREX FLAVA, L.

An extremely variable species, even in the same locality and apparently surrounded by the same circumstances and influences. At Hewitt's pond in the Adirondack mountains, specimens were collected which were but four or five inches high and which bore but a single small fertile spike each. Near these, others were found which were fifteen or sixteen inches high and bore five fertile spikes each. Another form, intermediate in size, had three fertile spikes, two approximate and a lower distinct one.

CAREX LONGIROSTRIS, Torr.

Rocky places. Keene. A rare species with us.

ALOPECURUS GENICULATUS, L.

Green Island. *H. C. Gordinier.* Lansingburgh. *E. C. Howe.*

These specimens are nearly erect, not geniculate at the base. On the other hand specimens of *Alopecurus pratensis*, a species described as erect, were collected by myself near Albany, in which the stems were decidedly geniculate at the base, thus exactly reversing this character as given in the descriptions.

AGROSTIS VULGARIS, With.

A form with very many of the flowers developed into leafy buds. Hewitts pond.

PANICUM CRUS-GALLI, L.

The form with dense panicles of awnless flowers is common in wet places about Warsaw, Wyoming county.

BOTRYCHIUM LANCEOLATUM, Angst.

Cascadeville, Adirondack mountains. June.

OMPHALIA UMBELLIFERA, L.

Not rare in the Adirondack mountains. Variety *abiegnus* grows on soft decayed wood of coniferous trees, and has a pale yellow pileus. Variety *alpinus* grows among mosses and on muck soil composed of decomposed vegetable matter. It usually occurs at high altitudes. It was plentiful in June on the summit of Mt. Marcy. In it the pileus and lamellæ are bright yellow.

PHOLIOTA MYCENOIDES, Fr.

In thin woods at Conklingville a form was found having the pileus rugose.

LENZITES SEPIARIA, Fr.

A resupinate form, var. *dentifera*, occurs on spruce in the Adirondack mountains, in which form the lamellæ anastomose, and are more or less toothed or lacerated, resembling an Irpex more than a Lenzites.

POLYPORUS VOLVATUS, Pk.

This singular species developes in May and June in the Adirondack mountains. When young it is slightly viscid. It is especially subject to the attacks of insects. In July most of the specimens will be found to be infested by them.

CREPIDOTUS HÆRENS, Pk.

Fine specimens of this rare species were found on ash and butternut near Sprakers. The pileus is sometimes slightly floccose-squamulose. The tough viscid pellicle is separable, and in drying the moisture disappears from the disk first, from the thin margin last.

HYDNUM GRAVEOLENS, Delast.

A singular Hydnum was found at Elizabethtown, in which the pileus was very uneven and everywhere coated with a whitish villosity or tomentum. It has the peculiar odor of *H. graveolens*, to which species we have referred it as variety *inæquale*.

PHLEBIA RADIATA, Fr.

Dead bark of wild bird cherry, *Prunus Pennsylvanica*. Conklingville. September. A thin cream-colored form corresponding nearly to variety *pallida Fr*. It sometimes forms extensive patches by the confluence of many individuals.

ODONTIA FIMBRIATA, Pers.

Decaying wood of poplar. Conklingville. September. A form with the subiculum thicker than usual and finely rimose. Variety *rimosa*.

PENIOPHORA NEGLECTA, Pk.

A wholly resupinate form occurs on red maple, *Acer rubrum*. Bergen.

CORTICIUM MARTIANUM, B. & C.

When well developed this is a highly colored and very showy species. At first a small orbicular tuft of strigose radiating hairs appears. The center of the tuft soon assume a reddish tint, which again changes to bright-red or scarlet and becomes waxy. The hymenium is now covered with irregular rugæ or folds giving the plant the appearance of some species of Phlebia. With advancing age the hymenium loses its brilliancy and becomes tinged with brownish, grayish or olivaceous tints, but the margin retains for a longer time its bright-red color, which fades to gray on the extreme fimbriate edge. The mycelium is yellowish. Metuloids have been seen in some specimens, but they are rare.

SPHÆROPSIS MALORUM, Pk.

This has occurred on leaves of apple trees, but in this case with perithecia rather smaller than in the type.

MARSONIA JUGLANDIS, Sacc.

The species is quite variable, being both hypophyllous and epiphyllous, and occurring on small or large spots and with few or many nuclei.

SEPTOCYLINDRIUM RANUNCULI, Pk.

This has occurred on radical leaves of *Ranunculus abortivus*. Helderberg mountains. May.

RAMULARIA PLANTAGINIS, E. & M.

Variety *nigromaculans* Pk. Spots with a small grayish center and a broad blackish or blackish-brown margin. The fungus occurs on this blackish margin. Menands. October.

PERONOSPORA GANGLIFORMIS, De By.

Living leaves of *Souchus asper*. Warsaw.

PEZICULA ACERICOLA, Pk.

Variety *gregaria* Pk. Receptacles small, gregarious. Bark of red maple, *Acer rubrum*. Karner. September.

RHYTISMA SALICINUM, Fr.

Fallen leaves of Salix Cutleri. Mt. Marcy. June. Fertile specimens.

REPORT

OF THE

STATE ENTOMOLOGIST

TO THE

REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK,

For the Year 1886.

CONTENTS.

REPORT.

OFFICE OF THE STATE ENTOMOLOGIST,
ALBANY, *December* 15, 1886.

To the Honorable Board of Regents of the University of the State of New York:

GENTLEMEN.—I beg leave to present herewith a report of some of the operations of my department and results of some of my studies during the current year, 1886.

The report is necessarily brief, owing to the discovery during the present month of a provision in a statute of the last legislature which is construed as a requirement that the reports of the State officers shall be placed in the hands of the State printer by the fifteenth of December of each year. I may, therefore, desire later to present a special report, and to ask its publication at your hands, or your consent for its transmissal directly to the Legislature to be issued as the third of the series of legislative reports.

The present year has been signalized by a remarkable abundance of aphides, or, as more commonly termed, plant-lice. About the twentieth of April, the first report of the appearance of the newly-hatched apple-tree aphis, *Aphis mali*, clustering upon and covering the terminal buds, was received. Other reports from various localities in the State of New York and in the New England States, followed. The operations of the aphis upon the young leaves as they developed greatly alarmed the orchardists, as the loss of the apple crop was threatened. To the requests made for the best method of destroying the insects, washes were recommended for use in the event of the attack not being speedily arrested by a heavy rainfall such as we often have during the early spring. Fortunately, the desired rain followed, destroying myriads of the aphides, and preventing any serious injuries from them later in the season. But the apple crop had already been greatly reduced by the early demonstration of the insects.

"Black and white aphides" on plum and cherry trees were very destructive in western New York. The new shoots were attacked by myriads, distorting and destroying the foliage and the fruit. Scarcely a tree in the vicinity of Rochester had escaped injury. (*Country Gentleman* for July 8, 1886, page 525.)

In the month of July, a far more serious aphis attack than that upon apple trees was made by the hop aphis, *Phorodon humuli*. Hops throughout the State suddenly became infested by the aphis to an extent far exceeding any demonstration of the kind for many years. The leaves and buds dried and fell off; the vines assumed a woody appearance and their roots upon examination showed a pulpy condition. Entire yards were destroyed. Others hardly paid for the gathering, As a result, the hop crop throughout the State of New York the present year has proved almost an entire failure. It is estimated that only about eight per cent of an average crop has been secured — 12,000 bales in lieu of 150,000.

During the same month, a severe attack of an aphis upon potato plants was reported to me from localities in Pennsylvania and Massachusetts. The examples received were in too poor condition to admit of comparison with our known species, and it therefore remains at the present unidentified.

Plant-lice were also reported as injuring carrots and parsnips in Massachusetts — in some instances completely destroying entire beds and fields. No injury to these crops by aphides had been recorded in the United States, and it will be of interest to determine the species now for the first time infesting them.

During the autumn the grain aphis, *Siphonophora avenæ*, made its appearance under circumstances that gave ground for the fear that its ravages upon some of our grain crops experienced in former years would be repeated the coming year.

Large numbers of the spring canker-worm, *Anisopteryx vernata*, appeared in several localities in New York, inflicting considerable injury, and indicating a steady increase of the pest among us. Mr. C. M. Hooker reports it as steadily gaining ground in Monroe county, and very destructive last year, but that Paris green and water would free an orchard from it very cheaply and easily. Mr. E. C. Pierson reports that it had occurred in many orchards in the northern part of Seneca county, but a timely and liberal spray-

ing of the trees, with London purple, had the desired effect and prevented much damage.

In Milbrook, Dutchess county, the presence of canker-worms was reported May seventeenth, but they were not proving very destructive.

At Easton, Washington county, at the same date, fruit trees were suffering from the ravages of the apple-tree tent caterpillar, *Clisiocampa Americana* Harris. A month later, the currant worm, *Nematus ventricosus* Klug, had invaded every garden and was rapidly consuming the foliage of the currant bushes.

A letter from Middletown, Orange county, of June twenty-ninth, to the New York Times, asserts a loss, the present year, of one-third of an average crop of 400,000 bushels of onions, as caused by the onion-fly, *Phorbia ceparum* Meigen (for an account of which see my First Report, pp. 171–181). The same letter states that "the fly had also attacked the leaf of the beet, depositing its egg beneath the epidermis, where the grub feeds upon the green matter until it reaches maturity and seeks a hiding place in the ground." This latter attack was not by the onion-fly, but by one of the beet-leaf miners, probably *Chortophila-betarum* or *Pegomyia vicina*, described, and habits given by me, *loc. cit.* pp. 203–211.

The "grapevine beetle," probably the small chrysomelid, which often proves a great trial to grape growers, *Graptodera chalybea* Illiger, was reported, in May, as injuring some vineyards on Lake Keuka by eating the buds before the leaves expanded. The beetles, which had hibernated in their perfect stage, after feeding as above, deposited their orange-colored eggs in clusters upon the under side of the young leaves, from which larvæ shortly hatched, to continue the attack by riddling or entirely devouring the foliage.

In Kingston, Dutchess county, the curculio, *Conotrachelus nenuphar* Herbst, was more injurious than usual to plums.

As an illustration of the concealment under which the early stages of the lives of some of our insects are passed, some observations made by me upon the preparatory stages of a fly, whose existence in this country was previously unknown, were of peculiar interest to me.

Catkins of the white birch, *Betula alba*, were sent to me with the inquiry, what insect deposits its eggs in the seeds? The first examination disclosed no insect presence, but close observation

showed that, in several instances, a seed had been transformed from its normal alate shape into a globose gall, and displayed on its side a round spot where the shell had inwardly been eaten to a thin pellicle to admit of the escape of the contained insect. The insect within was found to be a mature larva, apparently nearly ready for its pupation. It was evidently a Cecidomyian. In May, examples of the perfect insect emerged from the galls, and were referred to the genus *Cecidomyia.* No United States species corresponding to it was known. It was given a manuscript name of *C. betulæ*, but before publication it would be proper to compare it with the European forms. It was accordingly sent to Baron Osten-Sacken, of Heidelberg, Prussia, our authority in North American Diptera. Answer was returned by him, that careful comparison showed it to be absolutely identical with the *Cecidomyia betulæ*, of Europe, as described by Winnertz.

My principal collections of the year were made during a two-week's sojourn at Keene Valley, in the Adirondack mountains, in the month of August. The locality proved quite unfavorable to large collections. The Lepidoptera and Coleoptera were but few in number. The Hymenoptera and the Hemiptera, constituting the bulk of the collection, were almost entirely confined to the golden-rods, for the spiræas which in the previous year I had found so attractive to these forms, were not in bloom at "Beede's," at the upper end of the valley, although it was met with in full flower on my return at three hundred feet lower of elevation. As there has not yet been the opportunity for studying the insects obtained at the time, I am unable at the present to offer any special report upon them. It is believed, however, that many interesting forms have been secured, a few of which may prove new to science.

The additions to the Department by contribution will be given in the concluding pages of this report.

With the above general remarks, the following notices of several insects and insect attacks, which it is hoped will be of interest and value to our agriculturists and others, are

Respectfully submitted,

J. A. LINTNER.

A New Attack on Wheat by a Saw-fly Larva.

An insect, with habits hitherto unrecorded, made its appearance in wheat fields in New Jersey and Pennsylvania in the early part of June, which, from the character and extent of its injuries, caused considerable anxiety. A gentleman from Salem, New York, sent this note of inquiry:

I enclose a green worm, with brown head, taken to-day from my wheat field. These worms do not eat the blade or the head; they crawl up the stalk, strip off the head, and feed on the headless stalk. The ground is strewn with the heads — I suppose a loss of ten per cent of the crop. The worms do not travel, are found singly, and always eating the headless stalk. You have to look pretty close to see them, as they are usually the color of the wheat. Will you say what its name is? How long does it stay in one locality? (We have had it two years.) Can any remedy be suggested? Several of my neighbors have them.

From another correspondent from Slab, York county, Pennsylvania, the following note, with examples of the larva, was received:

I enclose a worm that has appeared in this vicinity this spring for the first time. The full-grown worm is about an inch long, of greenish color, with brownish head; body tapering from head back; no tail; ten pairs of feet. It is found on the wheat, cutting it off about one inch below the head, and then eating the soft green straw. Some fields here are strewn with wheat heads cut off by this worm. It may be an old enemy to wheat in some States or other countries, but it is new to us. Can you give us any light as to name, habits, and whether and where it has proved very destructive to wheat or any other crop?

A correspondent of the *Philadelphia Weekly Press* of June 30, 1886, wrote as follows:

A worm which is a new enemy to the growing wheat has appeared in many fields in portions of the county. It is armed with a pair of strong nippers at its head, is reddish-gray in color when first seen and about half an inch in length, but afterwards becomes green; when of full size, an inch in length, and of the thickness of a wheat straw. It attacks the upper portion of the stalk of wheat, just below the head, and by sucking the sap therefrom, around the stalk at the same level, gradually cuts it off as if done with a sharp blade. In this respect it resembles the "army worm" by which the eastern counties of the State were visited several years ago, but it does not congregate and move in bodies as that insect was described as doing. In fact, but few can be seen at the same time, one worm doing its damage over a considerable area. Early in the season occasionally a headless stalk could be

seen. Now the ground is thickly scattered with cut-off heads, and at the same rate of progress by the time the grain is ripe a considerable reduction in the yield per acre must be the result. Many farmers seem to know nothing of its presence. Its damaging work will escape the notice of any who do not enter their fields for a close inspection. Last year its damage in reported cases was very slight. This year, in some fields, a loss of one bushel in yield per acre to date would be a fair estimate.

Editorial mention is also made in the "Weekly Press," that the insect is reported in the "Wilmington Every Evening" as ravaging the wheat fields of Delaware.

The above inquiries and notice refer to the same insect. I think that I am safe in designating it as a new insect attack, for nothing of the kind has before been brought to my observation. I find no reference to it in any of our entomological writings; nor is it noticed in such European works as I have been able to consult.

The chief interest of the attack, next to the injury that appears to be resulting from it — a loss of ten per cent in the fields attacked — lies in the fact that the depredator is the larva of a saw-fly, holding a family relationship to our well-known currant saw-fly, *Nematus ventricosus*. None of our saw-fly larvæ hitherto known to us, possess this cutting habit, or attack the wheat; thus, the honeysuckle saw-fly, the gooseberry saw-fly the currant saw-fly, the strawberry, raspberry and ash saw-flies, all eat the leaves, making incisions into the margins; others eat the surface of the leaves, as the rose-slug; some produce galls. A species occurring in Europe, known as the corn saw-fly, *Cephus pygmæus*, eats into the stalk of the wheat, and then burrows downward in the stem.

Curtis, in his "Farm Insects," has given an interesting account of the sudden appearance of a saw-fly larva, in large numbers resting upon the heads of the wheat or fastened in the awns. They were nearly dead when seen and had probably come there to die, but where they came from could not be discovered. His description of the larva corresponds so closely with an example of this new wheat depredator above noticed, that it may possibly prove to be the same. The mature insect was not obtained by Curtis, but judging from the larval structure, he thought that it might be a species of *Tenthredo*.

The larva now before me is quietly feeding upon a tender stalk of grass given it, stretched out to a length of an inch and a tenth

upon the stalk, with which it nearly agrees in color, holding firmly by its three pairs of long legs and eight pairs of conspicuous prolegs, with its flattened, round, large head, which is white in front black on the sides and brown above, busily plying its quadrate black mandibles as it bites from the tip of the stalk, and turns its head and part of its body about the stalk for that purpose. If disturbed, it simply draws its head inward without curling sideways, or elevating its terminal end, or emitting a liquid after the manner of so many of the saw-fly larvæ.

The number of legs that this larva has — twenty-two — will at once serve to distinguish it from the caterpillars of our moths and butterflies, which never have more than sixteen legs. The general resemblance to a caterpillar in most of its other features has given to the group the name of "false caterpillars."

I would be very glad, if this attack is observed elsewhere, particularly in the State of New York, that the information be sent me, together with a number of the larvæ for rearing the perfect insect that the new depredator may be ascertained.

Until we know what the insect is, and its habits and transformations, the information asked for in the above communication cannot be given.

Effort was made to rear the larvæ that were sent me, but they came in so poor condition that but one made its cocoon, and that will probably not mature.

Mr. L. O. Howard, of the Division of Entomology, Department of Agriculture at Washington, in a communication made to me based upon publications of this insect attack in the *Country Gentleman* of June twenty-fourth, writes:

I beg to call your attention to pages 387, 388 of Prof. Riley's report for 1884. One of the larvæ described by Mr. Webster is identical with the species which has done so much damage this season in New Jersey, Pennsylvania and Delaware. We have reared and figured at the department three distinct species feeding on wheat, and the one which you have is probably *Dolerus arvensis* Say.

I had previously examined the larval descriptions of Prof. Webster and could not reconcile either of them with the examples before me.

In Bulletin No. 4, Division of Entomology of the Department of Agriculture, 1884, page 76, mention is made of some larvæ

discovered in inconsiderable numbers on wheat heads in Minerva, Ohio, which "take a portion of the grains out of the heads that they attack."

The same larva was reported by W. S. Chamberlain, secretary of the Ohio State Board of Agriculture, as occurring on wheat at Columbus. No mention was made of its severing the heads. An example of the larva was sent to Washington, but from the condition in which it was received it could only be identified at Washington as one of the *Tenthridininæ*, none of which at that time had been recorded as injuring wheat in this country.

THE RED-HUMPED APPLE-TREE CATERPILLAR AND PARASITE.

From Mr. G. W. Duvall, of Annapolis, Md., some caterpillars were received July first which were infesting his apple trees at that date, and had also been injurious the preceding year.

They are of the species known as the red-humped apple-tree caterpillar, or *Œdemasia concinna* (Sm.-Abb.). They have a prominent red hump on the top of the fourth segment; the head is coral-red, the body is striped in yellow, black, and white lines and bears above two rows of short, black spines and shorter ones upon the sides. The hind end is elevated in walking. The caterpillars usually congregate on a single limb, and are sometimes quite destructive, particularly to small trees.

The specimens sent presented a very curious appearance. Each had been preyed upon by a parasite, which had eaten out the entire contents of the caterpillar and had used the outer skin for its cocoon. The cocoons were seen as white oval forms, between three and four-tenths of an inch long, impressed with six or eight more conspicuous rings (the larval segments), each of which is ringed with a row of short, black spines. The head of the larva, now changed to shining black, marks one end of the cocoon and the black terminal prolegs the other. The parasite, which is a small wasp-like creature, with yellow legs and the tibial joint of the hinder pair banded with black and white, eats its way out of the cocoon through a large round hole invariably placed near the larval head. Altogether it is one of the most peculiar looking cocoons that we have met with in the large family of *Ichneumonidæ*. The parasite is known as *Limneria fugitiva* (Say).

The same curious cocoons (transformations of the same caterpillar) were also sent to me during August by Mr. A. S. Fuller, of Ridgewood, New Jersey, he having received them from a friend in Virginia, with the statement that the caterpillars had eaten off all the leaves of his apple trees.

It is interesting that this Limneria parasite manifests a special fondness for the cocoon-spinning moths of the silk-worm family — the *Bombycidæ*. It is known to infest *Euchætes egle* (Drury), *Œdemasia concinna* (Sm.-Abb.), *Hemileuca Maia* (Drury), *Anisota stigma* (Fabr.), *A. senatoria* (Sm.-Abb.), *Dryocampa rubicunda* (Fabr.), and *Clisiocampa sylvatica* Harris. Dr. Fitch has recorded it as infesting the larva of one of our butterflies, *Pyrameis cardui*.

The Forest Tent-Caterpillar.

Clisiocampa sylvatica Harris.

Although the insect above named has long been known, and much has been written of it, yet the following note received from Mr. H. Babcock, of St. Albans, Vt., gives some particulars of its habits that have not been recorded.

I find on my apple trees colonies of caterpillars, unlike the common apple-tree worm. They are found *en masse* anywhere on the trunk or limbs, and when disturbed will drop and spin a silken thread like a spider, but have no nests. They are of different sizes, evidently not full-grown. The head is large, and of a dark blue color. The backs of the largest ones are jet black, with a row of bright yellow spots extending the whole length. On the side is a dull blue stripe, bordered by very minute orange-colored lines. There seems to be not much hair on the backs, but the belly is covered with long yellow-brown hairs. They are alike on cherry, plum, and apple trees. Last year I saw such colonies on two or three plum and cherry trees, and supposed them to be full-sized common apple-tree worms that had crawled from some neglected nest, and swept them down and put them in the stove. This year the same worms are thick on my apple trees, and knowing that I had thoroughly fought the common worms, I examined and found them to be a different species. There is also a species that in late summer or early fall build nests on the ends of the limbs, inclosing leaves in their nests.

The caterpillar described and its habits given in the above communication, is the *Clisiocampa sylvatica* of Dr. Harris, named

also by him the "Forest tent-caterpillar," in distinction from the common apple-tree tent caterpillar. The two species in appearance closely resemble one another, the principal difference being that while the latter is marked along its back with a white line, the former has a row of somewhat oval spots, which are either white or yellowish. Their habits are quite different, for while the apple-tree species spins large and conspicuous web-nests in the forks of the limbs in which it congregates at night, the webs of the other are seldom seen, as they are usually placed upon the surface of the trunk of the tree, and covered and concealed by the larvæ, which use it merely as a resting place and not for a shelter.

The common name of this insect is an unfortunate one, for it is probably observed as often upon apple trees as upon forest trees. Although Dr. Harris gave as its habit, "living in communities under a common web or tent made against the trunk or beneath some of the principal branches of the trees," yet this so seldom occurs that it has been questioned. Prof. Riley, however, records (*Third Report Insects of Missouri* p. 126) that he has seen exceptional instances of their collecting within or beneath their web, especially when young. I do not find that Dr. Fitch confirms Dr. Harris by stating that "the worms live under a large cobweb nest," as quoted by Prof. Riley (*loc. cit.*), but that "these caterpillars build their nest against the side of the tree instead of in a fork of the limbs" (*First and Second Reports on the Insects of New York*, p. 198). The statements upon page 199 that "a few of the caterpillars remain upon the tree and continue to occupy the nest," and, also, "many of the cocoons found in the old nests," etc., obviously refer to *Clisiocampa Americana*, in continuation of its history as given on page 194.

In reply to a request made to Mr. Babcock for some additional information upon this insect, as it was evident that he had observed it with more than ordinary care, he has written me under date of May twenty-fifth, as follows:

At the time of sending my first communication, there was not a nest in sight; now they have nests much flatter than those of the apple-tree worm. One that I saw this morning encircled a limb of four inches in diameter for over half a yard. When I first saw the caterpillars they were in patches on the trunks and larger limbs, about eight or ten inches long by two to four inches wide all lying parallel to each other. The patches were generally in

two parts, and the stragglers seemed to be moving to reach the other cluster — the whole evidently advancing upward. The clusters that I have found have been on apple, plum, cherry and maple trees. They seemed thicker on the maples. I was plowing in a garden under an apple tree, when, having been disturbed by my horse, I suddenly found myself in a cloud of them, dropping down on their silken thread like spiders. I had swabbed out the nests of the common kind with kerosene, when they were not a half-inch long, for several days in succession, until there was not a nest in either orchard, when all at once we were overrun with this species.

This statement of Mr. Babcock contains items of interest in the history and habits of this species, and therefore deserves record.

The species referred to in his communication as building nests on the ends of the limbs and inclosing leaves, in the early autumn, is the "fall web-worm," *Hyphantria textor* Harris.

Remedies — The remedies for the forest tent-caterpillar are the following: Hunt for and destroy the eggs late in the season after the leaves have fallen, which will be found encircling twigs in short rings, like the well-known egg-clusters of the common apple-tree caterpillar. These are distinguished by terminating flatly at the ends instead of being rounded, and in not being covered with a thick coating of a varnish-like substance. Or, jar the tree suddenly upon which they occur, and as they drop and hang suspended by their silken threads, sweep them off and destroy them. Another way: Search for the colonies in the early morning or late in the day, when not scattered for feeding, and crush them upon the limbs or trunks.

The Spring Canker-Worm.

Anisopteryx vernata (Peck).

The inquiries received for information concerning this pest of our apple orchards have been quite frequent, and among them have been several from different sections of the State of New York, showing an increase of its depredations and a lamentable lack of knowledge respecting its natural history and means for preventing its ravages. Mr. Henry D. Barry, of Dutchess county, N. Y., has written of it as follows:

The past two years my apple orchard has been stripped of leaves by a worm which comes the last of April or first of May and disappears the last of June or first of July. The worm is three-

quarters of an inch to an inch long when it has its growth, of dark color, travels like a measuring-worm, and on jarring the tree spins down on a fine single web. The trees look as if they had been scorched by fire after the worms get through. Please give me what information you possess as to the name and characteristics of the worm; also, what will prevent their coming, or drive them away when here?

The spring canker-worm and its characteristic depredations are described in the above note of inquiry.

The increase and spread of this apple-tree pest throughout our State should arouse our orchardists to the importance of employing active measures against it upon its first notice. If operations are commenced in time, it can be exterminated with comparatively little labor. The insect — one of the moth family — is not distributed by flight, as are nearly all our insect pests, as the female moth is destitute of wings. For a year or two, or for a longer time, its attack may be limited to a single tree in an orchard. Whenever it appears in a new locality its introduction is probably through human agency.

The following brief description of the insect will aid in its recognition by those who are unacquainted with it:

The caterpillar, when its operations disclose its presence, is about half an inch in length. It is a slender creature, which travels by arching its body after the manner of the other "measuring-worms," to which class it belongs. At first of a dark olive-green or brown color, it becomes darker with age, as it approaches maturity, when it changes to a dark brown color — in some cases almost black. It is marked longitudinally with several pale or yellowish stripes, particularly upon its sides. When full grown it measures about an inch in length.

The female moth is without wings, clothed with grayish hairs, which are sprinkled with black, and with a black stripe upon the back of its abdomen. Its general appearance is spider-like and the ordinary observer would not suspect its being a moth. The male moth, which rarely comes under notice, has an expanse of about one inch. The wings are large in proportion to the body, thin, gray in color, with usually three crooked, transverse, dusky lines upon the front pair. The hinder pair are without markings.

The remedies to be used against this pest have been so often published in our agricultural papers that it hardly seems necessary

to repeat them as often as inquiry is made. The best approved preventive and remedial measures have been given by me in detail in the *Country Gentleman* for May 18, 1882, page 393, and for July 10, 1884, page 577. A reference to these will furnish the information asked for in the above note of inquiry. My *Second Report on the Insects of New York*, pages 7–9, may also be consulted.

It may be well to state that at the time when the frost is leaving the ground myriads of the pupæ of the insect may be destroyed by breaking up the ground beneath the trees to the depth of six inches. Swine have often been found of service in this work and for feeding at the same time on other apple insects.

Almost entire protection has been obtained by the use of bands about the trunks of apple trees, of tar and molasses, of printers' ink, of special mixtures sold for the purpose by dealers in agricultural supplies, of tin bands prepared after instructions given, of tin troughs containing kerosene oil, etc. All of these are used for the purpose of preventing the wingless moth, after hatching from her pupal case in the ground beneath the tree, from climbing up the trunk and depositing her eggs upon the limbs.

Probably a less laborious and expensive method is to poison the caterpillars very soon after they have commenced to feed and before they have had time to injure to any serious extent the foliage. The poison may be arsenic dissolved in boiling water to the strength of one pound to 200 gallons of water, Paris green, or London purple. The last will be found the easiest in preparation and in use. To be told just *how to do it* will perhaps lead many into *doing* it. A correspondent has given the method as follows:

I placed three empty coal-oil barrels, having a capacity of about fifty gallons each, in a wagon and filled them with water. I then took a pound of London purple for each barrel, first mixing it well in a pail of water and pouring it into the barrel. The wagon was driven along the windward side of the row of trees, if there was much wind; and with a fountain pump with a fine rose, the liquid was thrown over the tree. The water in the barrels must be constantly stirred during the operation to prevent the poison from settling. Great care should be taken not to breathe any of it, nor to allow the wind to carry the liquid toward men or horses. With two teams and four men three or four hundred trees could be sprayed in a day. The entire cost, including pumps, barrels, poison and labor, was about *three cents a tree* for twice spraying. In rainy weather the application should be repeated two or three times.

The above proportion of the purple would not be needed for killing the young and tender larvæ, and might possibly brown the newly opening leaves. Of course no greater strength should be used than necessary. As the eggs hatch unequally a second spraying after the lapse of a week may be important, even in the absence of rain.

An apparatus has been lately devised by Messrs. Moody & Sons, nurserymen, of Lockport, N. Y., by means of which the power for the agitation of the liquid and the working of the force pump is obtained from the revolution of the wheels of the wagon holding the tank, as it is driven through the orchard, and the discharge pipe is held and directed by the driver.

AN UNKNOWN GRASS PEST.

An attack upon grass which has long been noted, but never investigated, has recently been brought to my notice through specimens of the injured grass sent to me from Emmett, Ohio, with inquiry of its cause. The communication states that more than thirty per cent of the stalks of the June grass have been dead since the tenth of May.

The same attack occurs in specimens of June grass sent to me from Union Springs, N. Y., by Mr. J. J. Thomas, who had observed it for many years. I also find it in a small grass plat in my own garden, at the present time (last of June). Examination fails to disclose the presence of any insect, either within the sheath or the stalk itself. The stalk, in most examples, appears to have been eaten after the manner of the wheat-stem maggot, which produces the fly described by Dr. Fitch, in his second New York report, as *Meromyza Americana*, an account of which is given at some length in my *First Report on the Insects of New York* (pp. 221–227), together with a figure showing the manner in which the larva preys upon the stem. The operations of the grass-stem insect may be supposed to be similar to this; and if it be looked for about the middle of May, it should be found working upon the stem in the same manner. It is not unlikely that it is some small fly belonging to the family of *Oscinidæ*, which contains many species injurious to grain crops in Europe and in this country.

The following note probably refers to the same attack:

At the commencement of the past summer, an early species of grass, called June grass in this vicinity, was in several localities prematurely destroyed soon after flowering, the stalks, from some one of the joints, upward, withering and turning to a straw color, and to such an extent that one person informs me, on casually approaching his meadow one morning, it presented so white an appearance that his first thought was that it was covered with hoar-frost. The connection of the stem immediately above the joint seemed to be entirely destroyed, so that the slightest force withdrew it from its sheath, by which it alone continued to be sustained in an upright position. From the analogy of this affection to that produced by the Hessian fly in wheat, I infer it to have been caused by a kindred species of *Cecidomyia.* (*Quarterly Journal of Agriculture and Science*, 1, 1845, p. 263.)

In some examinations made by me, I have found the stem not roughened and eroded, but simply shriveled almost to a thread, but its outer surface unbroken. If this is also the result of insect attack, it must be from another species, which enters the stem and feeds within it. Possibly this is a later attack than the preceding, for in some of the stalks of grass sent to me by Mr. J. J. Thomas, showing apparent external erosion directly above the two upper joints, one contained, just within the sheath of the grass blade, a half dozen globular, transparent, rather large eggs, which have subsequently hatched, and the young larvæ are now being fed by me *within* sections of grass stems which I have given them. These larvæ are of some species of moth, and when observed, in changing their food to fresh stems, show themselves as remarkably active loopers or measuring worms. (They failed to reach maturity.)

Under another sheath were found some dark-colored eggs, shaped like a banana, which apparently belong to some bug of the order of Hemiptera.

It would seem from the above that there still remains much to be learned of our grass insects.

Prof. Peck, State Botanist, has expressed his opinion that the shriveling of the stem, as above noticed, is not the result of any diseased condition of the grass. He thinks that in former years he has observed small larvæ associated with the eroded condition of the stem.

An editorial notice of the attack in the *New England Farmer* for June, 19, 1886, ascribes it to "a species of thrips." This may

prove to be correct, but as it is unsupported by any statement of observation and identification, we fear that it is based mainly upon a disposition to refer many obscure attacks to the operations of "thrips,"— a family of insects of which we really know very little. Whatever the insect may be, the recommendation made for its destruction in the notice which we quote, will probably prove of material value.

In many localities June grass, *Poa pratensis*, is being much injured by a minute insect, a species of thrips, which inhabits the stalk just above the upper joint, and by sucking the juice of the grass causes that part above it to wilt and die. In some old fields and door yards where the grass has been mowed many years, more than half the heads of the June grass will be found white and dead, causing quite a depreciation in the value of the hay. The insect in its larval state is scarcely large enough to be seen readily by the naked eye, being not more than a tenth of an inch long and very slender. Where it is not desirable to plough the ground, as in yards about the buildings, we would advise cutting the grass as soon as the heads begin to turn white. Feeding it out green immediately will destroy the insects, and probably if the grass is made into hay very early it will tend to prevent the thrips from coming to maturity. We should judge that the transformations occur in the field and near to the place of birth. A field that was badly infested last year is found equally so this year, while an old pasture that has been kept fed down close for several years, but not pastured this year, is almost free from the insect. Except in lawns, we should recommend ploughing and planting a couple of years to clear the land entirely of this little pest.

A New Strawberry Insect.

Bembidium quadrimaculatum (Linn.).

Mr. J. P. Little, of Columbia, Conn., has sent the following note of inquiry of an insect attack upon his strawberry plants:

A new enemy to the strawberry plant has appeared on my newly-set plants; at least it is new to me. It is a small brown bug which eats the leaves of the newly-set plants, and thus entirely destroys them. I send samples of the pest herewith.

The beetles received are *Bembidium quadrimaculatum* (Linn.). Their occurrence, as at present found, is quite interesting, for, although the insect has long been known, and is referred to by Dr. Fitch as "very common in our garden" (Eleventh Report, p. 504, *Transactions of New York State Agricultural Society*),

it has never, so far as known to me, been recorded as feeding upon vegetable material. Dr. Fitch remarks of it, after pointing out its resemblance to the four-spotted variety of the striped flea-beetle, *Phyllotreta vittata:* "Its motion will readily distinguish it from this beetle. It never hops, but sparkling like a diamond in the bright sunshine, it runs briskly in a very serpentive or zig-zag track, a few inches, till it gains some crack in the ground or other covert, in which it abruptly disappears. It feeds on other insects — its strength and agility enabling it to overpower those that are much larger than it in size."

Notwithstanding the ascription of carnivorous habits to this beetle by Dr Fitch and others, yet from the circumstance under which it has been brought to notice, it is quite probable that it is guilty of the charge made against it, of injury to strawberries. True, it belongs to a blood-thirsty family, the *Carabidæ*, which embraces a large number of our eminently predaceous beetles, most of the species of which are insectivorous, and of essential service in diminishing the number of the injurious pests of our garden and fields. They are not, however, exclusively carnivorous, for, according to Westwood, some of the species in Europe are known to feed upon growing grain. Thus *Zabrus gibbus* occasionally destroys entire fields of corn by eating off the young shoots at night; and species of the genus *Amara* find their chief support in the pith and stems of grain and succulent roots, while they also eat the larvæ of other insects (*Westwood's Introduction* i, pp. 62, 63).

As features of the attack of this insect, Mr. Little states that in a bed of five rows of strawberry plants near a stone-wall, the first row was entirely destroyed; the second, nearly so; the third, badly injured, while the fourth and fifth were eaten but little. Another bed, twenty rods from this, had not been injured at all. The explanation of the greatest injury nearest the wall may be found, probably, in the known habit of the Bembidium beetles of hiding beneath stones and in crevices of walls.

The slight doubt that still exists of the Bembidium being the real depredator upon the strawberry will be settled by the experiments to be made of confining it with uneaten leaves. Its carnivorous tastes will also be tested by inclosing small insects with it.

[The insects needed for the above tests could not be obtained when application was made for them.]

A Meal Insect—*Læmophlœus alternans.*

A barrel of "Arlington wheat meal" was found (in Massachusetts) to be infested — to what extent not stated — with a small insect, which, as near as could be determined from the examples received, was *Læmophlœus alternans* Er.

Upon inquiry of the manufacturers of the meal, reply was made that the insect was entirely new to them, and no complaint of its occurrence had previously been received by them.

With our limited knowledge of these insects, we are unable to say when they were introduced in the meal or what drew them thither. Most of the members of the family of *Cucujidæ*, to which *Læmophlœus* belongs, are carnivorous in their larval stage. Many live under the bark of trees where they subsist upon other insects, acari, etc. The *Læmophlœus* larva may possibly have been present in the meal for feeding upon the flour-mite, *Tyroglyphus siro* (Linn.), with which the meal may have also been infested without their minute forms having been noticed. Perhaps the mature beetle may feed on meal, but of this nothing as yet is known.

It will be difficult to name a remedy for this beetle when infesting meal. It is so small — less than one-twelfth of an inch in length — that it could not be removed through sifting. The experiment might be made of placing in the flour a small package of gum camphor, naphthaline or some other substance of strong odor that may prove disagreeable to the insects, and thus drive them out. If but a few are present, and the natural prejudice against eating insect-food could be overcome, no harm would follow if some of them should happen to be served up with the cooked meal.

A Grass-burrowing Beetle.

Cebrio bicolor (Fabr.).

A beetle sent from Nashville, Tenn., was accompanied with the statement that in a grass-plat, which had been sodded late in the preceding year, whenever it rained, this insect threw up small mounds of earth, and had filled the ground with holes of about one-fourth of an inch in diameter. A remedy for its defacement of the grass-plat was desired.

The beetle was identified as *Cebrio bicolor* (Fabr.). It is a very interesting species, belonging to the extensive family of *Elateridæ*, or snapping beetles, and to the sub-family of *Cebrioninæ* (formerly regarded as of family value), which has but few representatives in our country, and those confined mainly to the Southern States. In the eastern continent they inhabit the south of Europe and the north of Africa. The females are destitute of wings, which, indeed, would be useless to them from their habit of living beneath the surface of the ground. They usually carry their burrows to the surface after or during heavy rains, at which time they are found by the males — a more slender insect, with longer antennæ and fully developed wings — and copulation takes place.

Westwood relates (*Introduction to the Classification of Insects*, vol. 1, pp. 244, 245), that in Europe, *C. gigas* appears only during the early autumnal showers; at which period, if the weather be fine, few only are to be found; but if very wet, great numbers of males are observed creeping about the ground (from which they have recently emerged) and eagerly searching for the females. At the time of coupling, the female protrudes from the ground a long horny tube, the extremity of which contains the organs of generation.

Judging from the habits of other of the *Elateridæ* or snapping beetles, most of the popular remedies employed against the ravages of the well-known larvæ, "the wire worms" would be efficacious with these. In a grass-plat, the frequent plowing or turning over of the surface soil, so generally recommended, could not be conveniently resorted to. An effective method of destroying the beetles might be, if the burrows were not very numerous, to pour hot water in them. An equally efficient method of destruction, and one which would better subserve the purposes of science, would be to dig up each female when the burrow appears, drop it in a small bottle of spirits, and send the bottle, packed in sawdust, to the New York State Entomologist, who would gladly place the specimens in various collections in the Northern States, where the species, from its subterranean habits, is a rarity. If this were faithfully done for one season, from the first indication of the presence of the insect, the infested grass-plat could furnish but few, if any, additional specimens the following season for further distribution.

A Dung Beetle.

Aphodius inquinatus (Herbst).

Insects are sent for name and history from Annapolis, Md., which, in the month of October, are represented as filling the air with their numbers. Farmers in the vicinity know it as "the young tumbler bug." Ducks are very fond of them, and consume a great many.

The insect is a small beetle about one-fifth of an inch in length. Its antennæ are club-shaped, terminating in three lamellæ or flat lobes, showing it to belong to the lamellicorn beetles, of which the sacred Scarabæus of Egypt is a well known representative. Its head is black and two-thirds as broad as the thorax, which is also shining black and nearly as broad as the abdomen. The abdomen is oblong, depressed and rounded behind. The wing-covers have about nine rows of minutely pitted stripes and are of a brown color, with longitudinal black markings on the anterior, posterior and lateral portions. The legs are hairy and armed with several teeth.

The beetle is known as *Aphodius inquinatus* (Hb.). It is a European species, which, with other of its congeners, has been introduced into this country. It has two annual broods, occurring both in the spring and in the autumn, and has often been observed in immense numbers, as in this present instance. Its eggs are deposited in the excrement of animals, upon the partially decomposed portions of which the young, when hatched, subsist. The tribal group of *Aphodiini* to which it belongs, follows next in systematic arrangement to that of the *Coprini*, in which is contained the common tumble-dung beetle — *Canthon lævis* (Drury). It is therefore probable that its habits are so closely allied to that species as to have suggested the name which has been given to it, as above stated — "the young tumbler-bug," but I do not know that it deposits its eggs in a pellet of excrement, and rolls it about until it finds some suitable place for its burial, after the manner of *C. lævis*.

All the species of the genus are of small size, rarely exceeding a quarter of an inch in length. They are usually black, but in some instances have red or brown wing-covers, or marked in these colors. No less than seventy North American species of the genus are

recorded in Henshaw's check-list of the Coleoptera. *A. fimetarius* (Fabr.), is also a common species which has been observed abundantly, according to Dr. Packard, on the carriage road of Mount Washington. *A. fossor* (Linn.), has also been introduced from Europe.

These species pass the winter in the larval and pupal states, to appear in the spring as perfect beetles, which are readily attracted to the newly dropped excrement of horses and cows, and may often be observed swarming over it.

The Sugar Maple Borer.

Glycobius speciosus (Say).

A lady writing from Canajoharie, New York, complains with much feeling of the ravages of a borer which is rapidly destroying some highly valued maples which shade and adorn her home.

From the account given of its operations, it is undoubtedly the maple borer above named, which was first described by Say in 1824, in *Long's Second Expedition to the Source of St. Peter's River* (ii. p. 290), as a rare insect. In addition to the specimen taken on the Wisconsin river during the expedition, one other only was known, which had probably been taken in Pennsylvania and was in the possession of the Philadelphia museum. It was subsequently illustrated in Say's *American Entomology* Dr. Harris has noticed and figured it in his *Insects Injurious to Vegetation* giving at the same time one of those popular and graphic descriptions which enable his readers to recognize the insect unaided by illustration, and have lent such a charm to his invaluable report. Of later years the beetle has become comparatively abundant, being found in nearly all collections, and having been frequently written of and figured. It is one of our most beautiful species, as its specific name of *speciosus*, meaning beautiful, imports, being a member of the family of longicorns (*Cerambycidæ*), measuring over an inch in length, marked with the strongly contrasting colors of orange and black, and bearing conspicuously a W-like character on the front part of its wing-covers.

Despite its beauty, it is a highly pernicous insect. Not content, as are most of it associates, with burrowing in dead or sickly vegetation, its attack is usually made on perfectly healthy trees.

It was my privilege several years ago to follow an attack of this insect on a row of maples at Schoharie, New York, which I passed daily, and had for years observed with pleasure their vigorous and healthful growth. As adding to the testimony of Dr. Packard of the attack of healthy trees (*Insects Injurious to Forest and Shade Trees* — Bulletin No. 7 of the United States Entomological Division, p. 103, 104), I herewith copy the record made under date of November 30, 1859:

"I have noticed this autumn, for the first time, that our sugar maples, which we have always regarded as our most valuable shade tree, from the almost complete immunity which they have enjoyed in trunk and leaf from insect depredation, have been attacked by a *borer* so pernicious in its work as to threaten their destruction unless some means shall be found to check its ravages.

In its simplest form it reveals itself by the bark parting longitudinally and breaking away, disclosing the wood of the tree in a narrow strip for some five or six inches in length. On the surface of the wood can be seen the furrow of the grub, cut to a slight depth, gradually increasing in its dimensions as it descends, and at the lower end entering the trunk of the tree. Over the borders of the groove the growth of sapwood made since the injury, impinges. This, I presume to be the work of a grub proceeding from an egg deposited late in the season and compelled to seek an early refuge by approaching winter. A wound no more serious than this, would close over in two or three years and no permanent injury result. But when the grub has had full time allowed it for its work the injury is far more important.

In several instances I have traced the furrow, packed tightly with fine powder for two feet or more in extent, with an average breadth at its lower portion of over half an inch and nearly one-fourth of an inch in depth. To render it the more serious the grub almost invariably before entering the tree, leaves its downward path and winds nearly horizontally around the trunk until it completes about half a circuit. It then enters the trunk an inch or thereabouts back from the end of its burrow, ascending at an angle of about ten degrees. The perfect insect emerges from the tree above through an opening which can be probed horizontally for three of four inches, the mouth of which is smoothly cut and somewhat elliptical, the broadest diameter being about .35 of an inch.

One maple which I have examined, of some ten inches diameter at the base, which has been more seriously affected than others, and probably the first to be attacked, has been nearly destroyed. Several of the grubs have commenced their ravages side by side, and by their united cuttings have in places exposed the trunk for over a hand's breadth. The tree has been attacked in various

places from above its first limbs nearly to its base, extending beneath the surface of the ground. The entire circumference of the tree has been grooved, although not continuously. Circulation is still maintained by winding around and among the burrows, but one more season's work, will, it seems, take the life of the tree.

In a row of maples bordering a lawn scarcely a single tree is entirely exempt from injury — all apparently the work of this grub. If these injuries are to continue and increase, and I see nothing to prevent it, our maples, which we prize so highly, will share the fate of the locust and be abandoned to the borer as too unsightly a tree for ornamental use."

The "beautiful Clytus" is a difficult insect to control, and very many of the fine old maples, which have ornamented our streets and afforded us so agreeable shade, have been or are being killed by it. A few years ago it was a source of much pain to me to see at Bennington, Vt., the large number of old maples that were standing dead upon the street or rapidly dying from the merciless burrows of this borer that had scarred and excavated their trunks. Recently the same ravages, although not as yet to the same extent, were observed by me at Glens Falls, N. Y.

Probably the best method of arresting the ravages of this pernicious borer would be to watch for the commencement of the operations and kill the young larva. The eggs are laid in July and August. It is said that the place where the egg has been deposited upon the bark of the trunk may be detected "by a rusty discoloration of the bark about the size of a cent: and especially by the frass or castings which, to the length of an inch or more, are attached like a broken corkscrew to the bark." The larvæ upon hatching burrow upward, remaining in the bark until the following spring, when they leave the bark and burrow into the solid wood. At this season of the year [October] the larvæ may be found beneath or not far from these discolored spots of egg deposit. If by cutting into these the burrow is found to have extended too far to follow it with the knife without injury to the tree, a flexible wire may be used as a probe for reaching and destroying it, as is done for the notorious apple-tree borer, *Saperda candida* Fabr.

The Potato Stalk Weevil.

Trichobaris trinotata (Say).

A communication to the *American Rural Home*, of July 24, 1886, gives information of a severe attack of the above named insect upon the potato crop in Arizona, from which it will be seen that it is a more serious evil in that region than it has thus far been in the Eastern States. This may, in part, be due to the larger form that the beetle assumes in its western distribution — in Upper and Lower California and in Arizona, according to Dr. Le Conte (*Rhynchophora of North America*, 1876, p. 288):

To the Editor:

Sir.— I send inclosed, specimens of a bug that has almost entirely destroyed the potato crop in this section this season. I never saw it before, nor have any of my neighbors. It bores into the heart of the stalk at the top of the ground while small, in the larva stage, and, completing its growth, passes the chrysalis stage and emerges the specimens inclosed, leaving the plants in a shriveled and dying condition. There are from one to six or eight worms in almost every vine, sometimes boring the entire inside out of the stalk for from three to ten inches of its length.

Can you tell me what it is? Is there any remedy or preventive? By answering the above you will greatly oblige the readers of your paper in this place. We plant our potatoes in this climate in February, and they ripen in June. Some of the earliest escaped, as the potatoes were sufficiently matured not to be much affected, but the later ones are almost a total failure, as the tubers remain in whatever stage of growth they are when the worms begin on the vines.

GEO. P. DYKES.

Zenos, Maricopa County, Arizona.

The above communication gives us some additional knowledge of the destructive habits of the larva of a snout beetle (one of the *Curculionidæ*), popularly known as the potato stalk weevil, and scientifically as *Trichobaris trinotata* (Say). It is about three-twentieths of an inch long; oval, with the characteristic projecting curved beak of the curculios, of an ash-gray color from its clothing of short gray hairs, and with three small black spots (whence its specific name), one on each hind angle of the thorax and another behind its middle angle. It is figured in Dr. Harris' *Treatise on Insects Injurious to Vegetation*, as *Baridius trinotatus*, and referred to as not known in New England, but occurring in the Middle

States. I have heard no complaint of its injuries in the State of New York, nor is it mentioned in the Fitch New York Reports, but it has proved quite destructive in Pennsylvania and in some of the Western States. It appears to be more abundant and injurious in the south-western portion of the United States.

The injuries inflicted by the beetle are correctly stated in the accompanying communication, while the attack seems to be more formidable than hitherto reported. Prof. Riley, in his notice of the insect (*First Report on the Insects of Missouri*, 1859, pp. 93, 95, where description and illustration are given), states that the female deposits a single egg in an oblong slit about one-eighth of an inch long, which she had made with her beak; but in this attack, from six to eight eggs are said to be placed in each vine.

Fortunately, the remedy for this destructon of the vines in successive seasons, is found in the habit of the insect changing to its pupal and perfect stages within the vines. As soon as the plants begin to wilt, pull them up and burn them, with the insects contained in the stalks or roots. If this be done by all potato growers, as the insect, so far as known, confines itself to the potato, the continuance of the species in the infested locality will be arrested.

"An Ugly Bee-Slayer."

Phymata erosa Her.-Sch.

Mr. G. W. Duvall, of Annapolis, Md., to whom we are indebted for many valuable observations on insects, has contributed to the *Country Gentleman* the following account of the habits of the carnivorous insect above-named — a member of the order of Hemiptera, comprising bugs proper, and a common species of general distribution in the United States:

I send by this post a bottle containing an ugly bee-slayer, on a twig of golden-rod, their favorite bloom, in which they conceal themselves, so as to spring upon the unwary honey-gatherer; also two of its victims — a small butterfly and a bee. They secrete themselves in the yellow bloom (which is nearly their own color) of the golden-rods, false sunflower (*H. autumnale*), and others of the *Compositæ* which yield honey and have a white or yellow bloom, and are so tucked away among the thick efflorescence, that they are not perceived by the busy and unsuspecting honey-seeker, until he actually crawls into their deadly embrace. They suck the

blood and juices of their prey, which is accomplished in a few moments, through their proboscis, when they leave it hanging among the bloom, and ensconce themselves in their fragrant and cozy retreats for fresh ones. Their victims are killed instantaneously, without a struggle; and are grasped by their powerful sickle-like claws, drawn in and stabbed with their proboscis. They are as fierce looking as the fabled dragons.

The interesting account above given relates to the "stinging bug," as it is sometimes called, the scientific name of which is *Phymata erosa.* In the *American Entomologist* (vol. ii, p. 25), the following account is given of it in reply to a correspondent: "It is a singular, craggy-looking bug, about 0.38 of an inch long, of a yellowish-green color, variegated with brown, with the legs green and a transverse deep brown band running superiorly across from one side to the other of the dilated abdomen. The genus is characterized by the immensely swollen front thighs, and by the last joint of the antennæ being also swollen. The statement that one of these bugs stung you does not surprise us. The stinging was, of course, done by the beak, which is three-jointed and somewhat resembles that of *Harpactor cinctus* (Fabr.). The plant on which you found these bugs we take to be *Parthenium integrifolium.* We have noticed them ourselves in the latter part of summer lying quietly in wait for their prey upon a great variety of wild flowers, but mostly on such as like themselves are of a yellowish color so as to conceal them from view. We have also often seen this bug with its beak inserted into a small bee or a small wasp, which it is wide-awake enough to hold at arms length with its prehensile forelegs, so that the poor unfortunate captive has no chance to sting it."

The butterfly sent with the bug as one of its victims is an example of *Chrysophanus Americanus* D'Urban — a common species throughout the Middle and Northern United States and British America.

Prof. Glover, in his *Manuscript Notes on the Hemiptera*, states that a specimen of the bug was taken near the Maryland Agricultural College as it was lying concealed among the petals of a rose busily engaged in sucking out the juices of a small blue butterfly which it had caught and killed, and that many others were observed apparently lying in wait in various flowers for the insects attracted to them.

Mr. F. G. Sanborn is quoted in the *American Naturalist* (vol. 1, p. 329), as ascribing much smaller game to this insect than bees, wasps, and butterflies. He states of it: "These insects have been taken in great numbers upon the linden trees in the city of Boston, and were seen in the act of devouring the aphides which have infested the shade trees of that city for several years past. They are described by a gentleman who watches their operations with great interest, as 'stealing up to a louse, coolly seizing it and tucking it under the arm, then inserting the beak and sucking it dry.' They are supposed to feed also on other vegetable-eating insects as well as on the plant-louse." A figure of the bug accompanies this statement, and one is also given by Prof. Glover (*op. cit.*, plate iii, fig. 13).

Its beneficial character, in mitigation of its destruction of honey bees, is also confirmed by the observations of Dr. Uhler, of Baltimore, who represents it as very useful in Maryland in destroying caterpillars and other vegetable feeding insects, but he is compelled to state that it is not very discriminating in its taste, as it would as soon seize the useful honey-bee, as the pernicious saw-fly. Its hiding place has at times been observed to be in the axil of a leaf or stem — probably on flowerless plants or when they are not in bloom.

Mr. B. D. Walsh refers to this species (*American Entomologist*, vol. 1, p. 141) as common everywhere in the Northern States, and found even in the streets of New York city. It was met with by me abundantly in my collections in Keene valley, in August last, upon golden-rod, as also in Long Lake (both Adirondack localities), the preceding year.

Prof. Riley, in his report to the Department of Agriculture for 1883, records the insect as destroying the imported cabbage butterfly, *Pieris rapæ*. See, also, a notice of its habits by Prof. A. J. Cook, in the *Canadian Entomologist* (xi, 1879, pp. 17–20), as "a bee enemy," in which he describes the structural peculiarities of its formidable raptorial claws and proboscis, by means of which it so readily seizes and sucks the juice of the various species of insects upon which it preys.

Prof. Barnard has also given an interesting notice of it in the *Proceedings of the American Association for the Advancement of Science*, for 1880.

From the critical revision to which our Hemiptera have been subjected by Dr. Uhler, in his recently published *Check-List of the Hemiptera Heteroptera of North America*, it would appear that the familiar name under which we have so long known this insect, viz., *erosa*, and so descriptive of its appearance of having had its sides eaten out or eroded, will have to be abandoned for an unmeaning proper name — that of *Wolffii*, given to it by Stal. In the Check-List referred to, *erosa* is reserved for a Mexican form.

In Stal's *Enumeratio Hemipt.* (part 5, p. 133) the author has used the name *erosa* Linn. for a species from Surinam, the *erosa* of Her-Sch. for a species from South America (Mexico, Uhler), and the *erosa* of Guer. for a species from the West Indies.

Stal cites as synonymous of *Wolffii*, "*Acanthia erosa* Wolff (*Icones Cim.* 3, p. 89, f. 83), *Phymata erosa* A. & S. (*Hémiptères*, 1843, p. 290, 2)."

For the above citations I am indebted to Mr. E. P. Van Duzee, of the Grosvenor Library at Buffalo, N. Y., who is devoting special attention to the collection and study of our greatly neglected Hemiptera.

Melon Vines Attacked by the Squash Bug.

Anasa tristis De Geer.

A correspondent writes: "My melon vines for the past two years have been nearly destroyed by a long-legged bug, from one-half to three-fourths of an inch long, of a dark brown color, and in form (of its back) somewhat kite-shaped. They girdle the main stalk of the vines, and later I find that the young ones have partly burrowed about the root-stalk, the younger of which are of a semi-white color."

The bug above described as destroying melon vines is probably the notorious squash bug, *Anasa tristis* of De Geer. Although accounts of its injuries have been for the most part confined to the squash and the pumpkin, yet it also attacks others of the *Cucurbitaceæ*. We find no mention of its injuries to melon vines in the writings of any of our economic entomologists, yet that it is injurious at times appears from the above statement, and also from that of Miss Murtfeldt that its eggs occurring very abundantly upon some melon vines under her observation had been parasitized

to an extent of ninety per cent by a small chalcid fly, in July, a species of Telenomus (*American Naturalist*, 1882, page 915).

This is a very injurious species, at times, when allowed to prosecute its depredations unmolested. Fortunately, much can be done to mitigate its injuries. First, the parent bugs that, after passing the winter as perfect insects, come forth from their hiding places during the latter part of June or early July should be captured and destroyed before they have deposited their eggs. As they do not lay their eggs all at one time, for several days at this season a search for them, where they are abundant, will be repaid. They are usually to be found upon the plants near the ground, or upon the ground adjacent, where they pass the day hiding quietly, to come abroad at night for oviposition. Later the patches of their eggs which are round and flattened on two sides, may be found on the under side of the leaves and crushed. When first hatched the young bugs have a green body with the head, thorax, and antennæ pink. At this time they are usually associated in little companies. Two days after hatching the body becomes ash-gray and the other portions black.

During the fore part of July the vines should be inspected daily for the egg patches and clusters of young, and if this be faithfully done, most of the future damage from the insects will be prevented. The bug molts four times before it obtains its wings and the color and form which is so familiar to most gardeners during the months of September and October. A figure of it may be found in Dr. Harris' *Insects Injurious to Vegetation*, edition of 1862, page 194, together with an interesting account of it.

Another method of reducing the number of the bugs is to trap them by laying pieces of board on the ground near the hills and examining them morning and evening. Still better success is said to attend trimming off the lower leaves that touch the ground and spreading them under the plants. As the bugs display a special fondness for wilted leaves they may often be found in numbers beneath them, feeding on their juices. (*American Entomologist*, ii, 1870, p. 91.)

The complaint made of the girdling of the main stalk of the vine, which is effected by the bugs congregating there to suck its juices, is best to be met (when they have not all been killed by the methods above indicated) by drawing away the ground from the

roots and putting in a mixture of dry ashes and salt. Without this precaution it is said that the bugs will at times burrow in the ground out of sight to feed upon the sap of the stalk. Fertilizing freely is an excellent preventive of injury from this insect and, indeed, from most all others.

The Grain Aphis.

Siphonophora avenæ (Fabr.).

The grain aphis, which has borne several different names, as *Aphis avenæ* Fabr., *A. granaria* Kirby, *A. cerealis* Kalt., and *A. hordei* Kyber, is an introduction from Europe, which has been very destructive in some years in portions of the United States, as recorded by Dr. Fitch in the year 1861, when "over all the New England States, over all the State of New York except its western section, through the north-east portion of Pennsylvania, and in several parts of Canada, every grain field was invaded, and most of the fields literally thronged by it." No subsequent attack of this insect has approached this in severity, nor has it since been very destructive over broad districts. But it is not at all improbable that the coming year it will become numerous in our grain fields, and the occasion of unusually severe injuries. The past summer has been very favorable to the multiplication of aphis life, as shown in the almost entire failure of the hop crop in the State of New York from the ravages of the hop aphis, *Phorodon humuli*, upon the unfolding leaves and blossoms.

Early in the month of September last myriads of minute insects, which almost filled the air in the streets of Albany, were identified by me as this grain aphis; and in a note addressed to the *Albany Evening Journal*, and contained in the issue of September ninth, the fear was expressed, based upon the remarkable abundance of the insect at this time, that the coming year might bring with it a repetition of the memorable demonstration of the summer of 1861, above referred to.

The opportunity escaped me of examining more than a few of these insects, but it is not improbable that the flight consisted very largely, if not entirely, of females — all of the summer broods, of which there are several, being produced without the presence of the male sex — and that, having just deserted the grain fields,

where they had been feeding until the matured grain could give them no further sustenance, they were now seeking or waiting the fall-sown wheat or rye upon which they could deposit eggs, and thereby provide for the new life-cycle of the coming year, the present cycle being upon the point of completion.

It is proper to state that the cause and purpose of the flights, as outlined above, is simply conjectural, based on our knowledge of other species, for the full life-history of the grain aphis is still unknown, and in several particulars it is proving quite enigmatical to us. No description of the male appears in any writings to which I have access, and in 1862 Dr. Fitch wrote as follows of it:

I have watched the grain aphis this year round so closely that I am perfectly assured that no eggs were laid and no males were produced. When and under what circumstances males occur, if they ever do occur, is yet remaining to be discovered. At present it seems as if these insects might go on forever producing young, without any intercourse of the sexes. (*Transactions N. Y. St Agricul. Soc.*, xxii, 1862, p. 36.)

A year earlier (in 1861, in Sixth Rept. Ins. N. Y.) Dr. Fitch had stated that the eggs remain through the winter to be hatched by the warmth of the following spring. Subsequent observations failed to sustain this conjecture, as it was found that some of the insects hibernate under the ground to lay their eggs the following spring; or, that the eggs laid in the autumn hatch soon after they are deposited and that the annual round, to be continued through most of the ensuing twelve months, is then commenced. This appears from observations of Dr. Thomas, formerly State Entomologist, of Illinois, who, in 1878, published the following as additional contributions toward the life-history of the species:

When the winter wheat appears above the ground in the fall it passes [to it] from its hiding place at that time, wherever that may be. * * * Here they work upon the leaves and stalks singly while the weather is not too cold; but when winter appears they move down toward the ground — some of them, at least, entering the soil and feeding upon the sap of the roots. At any rate I find the apterous ones at this time working upon the roots, but, at the same time, I find a winged individual above ground. I have also observed them heretofore at the root of the wheat late in the winter, while the snow was on the ground; and, what somewhat surprised me, I found them busy at work under the snow and the apterous females bearing well-formed larvæ. I am therefore led

to believe that in this latitude the species passes the winter in other than the egg state. This will also probably be found true wherever winter wheat is grown. (*Third Report on the Insects of Illinois*, p. 53.)

A species of aphis, so exceptional in its habits as to continue its feeding and propagation throughout the winter in northern localities, might also surprise us by depositing autumnal eggs, to hatch the same season.

This grain aphis is a very pernicious species as it feeds on wheat, rye, barley, oats and various kinds of grain and is extremely prolific. Dr. Fitch has shown that "the wingless ones come to maturity in three days. A single one producing four young daily, and these becoming equally prolific when they are three days old, her descendants in *twenty days* will number upward of *two millions* and will be increasing at the rate of a million daily."

Preventives. — We can do nothing of importance to save from destruction a grain crop which is badly infested with this aphis. A field of winter grain, in which its presence to any considerable extent is unmistakably ascertained, should at once be sacrificed by some method that would arrest its continued multiplication through the winter, such as heavy salting, application of gas-lime, dragging out the plants, or any other means through which the insect could be deprived of its food. A deep plowing under of the grain would hardly accomplish this. English writers have recommended dusting with lime or soot, and probably some benefit would result from such measures.

In a communication to the *Country Gentleman* of November 25, 1886 (page 893), Mr. W. A. Stewart, of Denton, Maryland, notes that in a field of rye sown September seventh, which had made a vigorous growth, he discovered many places in it that were turning yellow. Later, upon taking up for the examination of the roots some of the supposed sunburned plants, he found that the appearance "was caused by millions of parasites" feeding thereon.

The "parasite" beyond doubt is the grain aphis, and its autumnal presence may be regarded as indicating serious injury from its multiplication the coming year, in accordance with the fear expressed in the communication made by me to the *Albany Evening Journal* above referred to.

The Hop-vine Aphis.

Phorodon humuli (Schrank).

The following notice of the above-named insect was sent to the editor of the *Waterville Times*, of Waterville, N. Y., under date of July 19, 1886, in response to a note of inquiry from him:

Dear Sir.— Yours of the sixth instant, making inquiry of the hop aphis, accompanied with specimens of the leaves of the hop covered with "honey-dew," was duly received. Your communication states:

I send you by this mail a box containing hop leaves, upon which you will find honey-dew, lice and black flies (said to be the English aphis and breeders of the lice). Vines all over the State are covered with this sort of vermin. Lice appeared about June fifteenth, and have increased steadily since. For the benefit of my numerous hop readers I would like to have your ideas on them, briefly or at length, as to origin, nature, life, and connection with honey-dew.

I regret that I cannot possibly, in consideration of my other engagements, give you at this time a full notice of this insect pest, such as I would like to send you. It would be too late to be of much service at the present time, but I hope to have it in readiness for my next report.

The leaves when received were found to be thickly covered with honey-dew, which had already, perhaps from inclosure in the box, commenced to assume the black appearance which, when further advanced, is known as "black blight." This blight, as it is called, is simply a later stage of the honey-dew, when, from exposure, it has undergone decomposition.

The honey-dew was thickly sprinkled with little white bits of matter, which are the cast-off skins of the young lice at their moltings.

The lice upon the leaves were the young and older forms of the hop-louse, *Aphis humuli*, known by our later authorities as *Phorodon humuli*, which is identical with the European species, for many years very destructive in Europe, but first noticed in this country about the year 1862. Upon the leaves were also some yellowish worm-like forms, of one-quarter of an inch long or less, holding to the leaf by their hinder extremity, and reaching out their head in different directions in search of the lice upon which

they feed. They are the larval forms of one of the Syrphus flies, and as they render most excellent service in killing myriads of the lice, their presence should always be welcomed.

Another form fastened to some of the leaves, which may be the "black flies" to which you refer, is the pupa of a lady-bug, *Anaitis* 15-*punctata* Oliv. It is about one-tenth of an inch in diameter, almost round, fastened by its narrower end, of a dark cream color, with some paler markings on the back. The larvæ of these are slate-colored, and travel rapidly over the leaves, eagerly catching and devouring the lice. A black species, common in England, is known by the common name of "nigger." The more numerous that the lady-bugs and their larvæ occur the fewer are the lice.

As to the origin of the hop lice, the latest observations seem to indicate that in the spring the winged fly makes its appearance on the upper leaves of the plants, upon the borders of the fields, and commence bringing forth the young lice: in England this has been seen about the twenty-eighth of May. It is believed that the winged flies at this season come from plum trees. But in an instance where a free, clean hop plant was protected by a fine muslin covering from all outside attack, it was found covered thickly with the aphides (lice), which must have come up from the ground, or from crevices in the sticks or roots where they may have hibernated. (Miss Ormerod's *Report of Observations on Injurious Insects* for the Year 1883, Appendix, p. 10–11.)

The lice have been reported several inches under ground in the autumn, after the removal of the crops, as if they had retired for the winter, but the most diligent search has failed to find them in the spring. The life-history of this insect is not fully known. Thus we do not know why it is so rarely seen in June, and then why about this time it appears so suddenly in immense numbers. Its history is being more carefully studied, and when we have full knowledge of it we shall probably be able to do much toward the prevention of its ravages. [See note appended.]

The present year promises to be unusually favorable for its increase and destructiveness. Aphides have been remarkably abundant thus far as the result of atmospheric conditions. I have never known them so numerous upon apple trees, rose bushes, currants, and several other plants. Their injuries to hops might have been predicted.

With our present knowledge it seems that hops, when badly infested, can only be saved at the cost of considerable labor, by the methods frequently resorted to in England, viz.: washing them by means of a hand engine and hose with some liquid that will kill the lice. The best wash for the purpose is said to be: 100 gallons of water (if hard water, with soda added); 4 to 5 pounds of soft-soap; 6 to 8 pounds of quassia. This is to be thrown, as far as possible, on the under surface of the leaves.

The efficacy of this washing has been clearly shown. Planters using it in England grew crops of from seven to nine hundred pounds per acre, while those not using it grew nothing, or next to nothing.

It must be used as soon as the lice make their appearance, and continued until they are all removed.

It is now too late for this remedy in our New York yards. Judging from the reports made, the crop is doomed for this year, unless favorable weather and heavy rains come to its rescue. Much may be done in preventives early in the season.

As to the cause of the honey-dew coating the leaves, it was thus explained by Dr. Fitch: "Each aphis has two little horns projecting from the hind part of the back, which horns are termed the honey-tubes. From these tubes the fluid called honey-dew is ejected, in the form of minute drops, like particles of dew, which, falling upon the leaves beneath them, the upper surface of the leaves become coated over with this fluid, more or less copiously as the aphides producing it are more or less numerous."

This opinion is pretty generally accepted, as giving also the explanation of the honey-dew on our elms, which, at the present time, is blackening the sidewalks beneath these trees in many of our cities. Others believe that the leaves, from some diseased condition, give out the honeyed substance. As lending color to this opinion, we have in the report of Mr. J. B. Smith, agent of the United States Department of Agriculture, in an examination made of some hop-yards of our State, the following statement: "July twenty-first, saw honey-dew for the first time. The current belief is that this is caused by the lice, but there certainly are not lice enough now to produce all this 'honey-dew.' Mr. Eastman and Mr. Fuess think the lice have nothing to do with it. They say they have seen lice without honey-dew, and honey-dew in abundance where there were no lice."

Mr. Wm. Trelease, a botanist of note, referring to honey-dew as sometimes secreted by aphides, adds: "But in some cases this substance is an excretion from the leaves, apparently due either to the climatic conditions obtaining at the time, or to a diseased state of the plant. Small glands are found at the tips of the serrations on the leaves of many plants, and some of these produce a plentiful supply of nectar." (*Report of Cotton Insects*, 1876, p. 326.)

[Note. — Appended to the above, November 28, 1887. — Since the above was written, the life-history of this interesting insect has been worked out, *completely*, it is claimed, by Prof. Riley, Chief of the Entomological Division at Washington, and the assistants under his direction. The following is a brief summary: The eggs are deposited on the twigs of plum trees in the autumn (October). They hatch at the putting out of the leaves the following spring. Three generations follow on the plum, of which the last only is winged, which at once migrates to the hop-yards. The fourth and succeeding generations on the hop to the eleventh inclusive, are wingless females. The twelfth generation consists of winged males and females — the latter, agamic, and these return to plum trees in September. Here, the thirteenth generation is composed of sexual wingless females, which, after mating, deposit the eggs which are to hatch the following spring in continuation of the species. For a detailed statement of the above see a communication made by Mr. L. O. Howard, of the Division of Entomology, under instructions from Prof. Riley, in the *Country Gentleman*, for November 17, 1887, p. 875, giving also, the latest studies of Prof. Riley upon the insect, made in England during the present autumn.

The Apple-tree Aphis.

Aphis mali Linn.

The unusual abundance of this insect the present year, as previously noticed, brought with it from many localities in the Middle and Eastern States inquiries of its character and how it best could be destroyed. To an inquiry from St. Albans, Vt., accompanied with specimens which the writer had never seen before, which an old tree-pruner could not tell what they were, and which were represented as having been at first observed on the leaf-buds but were then traveling over the trees — reply was made through the *New England Homestead*, as follows:

The insects infesting the apple trees are the common apple-tree aphis, sometimes popularly known as the apple-louse. They belong to a class of insects named aphides or plant-lice and have long been

noted for their injuries upon almost every known plant. There is scarcely a vegetable growth that is free from their attack and many of the long list of species known confine themselves to a single species or genus of plant. They belong to the order of hemipterous insects which take their food through a beak or proboscis which they insert into the tissues and feed upon the sap. They are exceedingly prolific, multiplying with marvelous rapidity, so that, as has been computed, from a single egg, 729,000,000 may be produced in seven generations, and some of the species have twenty generations in a year. It is difficult to compute such multiplication — and impossible to comprehend it. It will be readily seen that a multiplication even approaching the above would inevitably be fatal to the vegetation upon which it depends for subsistence, entirely consuming all the sap of the young and first developing leaves. But fortunately the young plant-lice are quite delicate and very susceptible to certain meteorological conditions. Cold is destructive to them, frost is fatal, as are also severe and continued rains.

The myriads of the apple-tree aphis now upon the trees are from the young which were hatched three or four weeks ago (the middle of April) from small, shining black eggs which were deposited last autumn in the crevices of the bark. When first hatched they resort to the opening buds, which they frequently injure to an extent that prevents their unfolding. Later they may be found distributed over all the leaves, the under surface of which they puncture, causing them to twist and curl and shrivel in the manner characteristic of an aphis attack. At this season of the year all the aphides are females and destitute of wings. They mature very rapidly and in ten or twelve days are capable of producing young, which are brought forth alive, about two daily, it is stated, for the period of two or three weeks, when the female dies. Her progeny continues to multiply with even greater prolificacy and rapidity as with the advancing season the temperature increases. All this occurs without the interposition of the male sex. It is not until the approach of cold weather in the autumn that the males are produced, when, uniting with the females, the eggs above noticed are deposited for the spring brood.

During the month of July winged females will be found associated with the wingless ones, both of which produce living young. The winged females have the head, antennæ (horns),

and body between the wings, black, with a grass-green body, dotted with black on the sides, and yellowish legs with black feet and knees. The wings are long, green next the body, transparent, with few veins and a single black spot near the tip.

It is probable that these aphides are not newcomers in the orchards where they are now abounding. It would be difficult anywhere to find an apple tree entirely free from them. Yet it is only occasionally that they abound to such an extent as to arrest attention at this season of the year. In 1882 they were very abundant in several portions of New York State, as in Wayne, Oswego and Monroe counties, and caused serious injury to the apple crop.

In the event that the cold and heavy rainfall, which at the date of the present writing (May eighth) we have been experiencing for the last twelve hours in Albany, with no indication of its speedy cessation, shall extend into Vermont, there is every probability that it will arrest this aphis attack and its threatened injury. If so, it will not be one of the least benefits to result from its coming at this time. Throughout a large portion of the State of New York this aphis has abounded during the past three weeks and justly alarmed our orchardists. To those who have made inquiry of me for instruction how best to destroy the pest, I have promised relief through such a rain, should we be favored with it, as that which is now visiting us. In localities which it does not reach, the trees infested should be thoroughly showered with the aid of a force pump. Water alone has been found to be efficient when not thrown as a spray but in a stream. Soap-suds could be applied in spray to admit of its more general distribution; or a still better application would be a tobacco solution, made by pouring boiling water upon tobacco, in the proportion of a gallon of water to a quarter pound of tobacco.

Experiments have been made which are reported as having been successful, of washing the bark of infested trees with a solution of sal-soda. The aphides were killed or driven away, it is believed, by the alkali having been taken into the circulation, and the sap proving poisonous or distasteful to them. Soft-soap or a very strong suds has also been used in the same manner and with good effect. As in the control of all insect depredations prevention is preferable to cure, it is very desirable that where the apple aphids' attack is continued throughout the year its recurrence the following year should be prevented by the destruction of the autumnal

deposit of eggs. Their black color will reveal their hiding places in the crevices of the bark, in the fore part of the month of November, when they may be destroyed by a thorough application of the alkaline washes mentioned above.

The earnest effort that is being made in various quarters for the protection and encouragement of our insectivorous birds may find a strong argument in its favor, in the great service rendered by several of the species in their destruction of plant-lice. A number of our smaller birds, among the warblers and finches, as the Tennessee warbler (*Helminthophaga peregrina*), the purple finch (*Carpodacus purpureus*), and others, feed quite largely upon these minute insect pests. Their presence should therefore be encouraged in apple orchards for the service they may render us.

Potato Plants Attacked by Aphides.

Potato leaves badly infested with plant-lice were received in the early part of the month of July, from Springfield, Mass., with the statement that some fields of potatoes in the vicinity had been almost destroyed by the insect. It attacked the leaves upon their under side, where it was difficult to reach them by spraying, although tobacco water had been thrown upon them with some effect.

Later (under date of July nineteenth) the same insect was received from Wyoming, Pa., where it was proving more destructive than in Massachusetts. It threatened to prove to the potato growers of that portion of the State a greater pest than the Colorado potato beetle. Entire fields had been ruined, and little hope was entertained of securing a remunerative crop.

No plant-louse attack on potato had previously come to my notice, nor do I find, in any of the entomological literature at my command, mention of a potato-feeding aphis. Dr. Thomas, formerly State Entomologist of Illinois, in the Eighth Illinois Report (1879), in which he records all of the North American *Aphididæ* known to him, names and describes a species found by him on tomato vines, as *Megoura solani*. The potato aphis may be identical with this tomato one, but all the examples of the former that I received were in too poor a condition to admit of comparison with the description (quite brief) of the latter. Before the reception of the

Springfield examples, I had heard of an aphis attack on tomato plants in Albany, which was curling and otherwise injuring the foliage, but the specimens which were promised me were not brought. It is quite probable that the present year, in its favorable condition for an unusual multiplication of aphides, has multiplied the tomato species, and caused it to overflow on the potato, where it has found conditions still more propitious to its increase.

That the two are the same finds some support in the observations of Mr. A. W. Cheever, agricultural editor of the *New England Farmer*, who has written me, under date of July twenty-ninth, that both were occurring with him. Upon potatoes they had been very abundant for the preceding two weeks, but his chickens, which were the first to discover their presence, had been efficient in reducing their numbers. Not so many occurred on the tomato plants; these were much lighter-colored than the others, but would feed readily on the potato leaves if transferred to them, as would also those of the potato when placed on the tomato.

M. Lichstenstein, in "La Flore des Aphidiens" of the world, published in 1884, records, in addition to Dr. Thomas' species above mentioned, but four other species known to feed on *Solanum* viz.: *Aphis nerii* Kalt., *A. silybi* Pass., *A. solannina* Pass., and *Siphonophora solani* Kalt. To these may be added *Siphonophora solanifolii* Ashmead, described in the *Canadian Entomologist* (xiv, 1882, pp. 92, 93), from examples found in Florida (?) feeding on *Solanum jasminoides*, or "pepper vine"—according to Gray, a woody-stemmed house-plant from Brazil.

In localities where the potato aphis abounds, I would recommend for its destruction, as preferable to the tobacco water, the use of the hop-wash employed in England for the hop-aphis, viz.: 100 gallons of water (soft water if possible), four to five pounds of soft-soap, and six to eight pounds of quassia, well boiled to extract the strength. In applying the liquid the plants should be turned downward, so that the under side of the leaves can be reached where the insects congregate.

It is not probable that this aphis will continue, in future years, to be a serious potato pest, but it will be but a proper precaution if all the dead stalks and leaves, together with such other garden refuse as might furnish winter harborage for the eggs or the mature insect, be gathered and burned.

Aphis Attack on Carrots and Parsnips.

From Oakley Park, Massachusetts, report is made that the carrot and parsnip crops of the vicinity had been nearly destroyed by plant-lice. No particulars were furnished nor examples sent for examination.

The unusual prevalence of plant-lice the present year has caused them to attack a number of plants upon which they had rarely been noticed before and had not previously proved injurious. Thus they have been destructive to potato vines in some localities have injured tomato plants, and in the above communication are reported as having been quite harmful to carrots and parsnips. We have also noticed statements in some of our agricultural papers of injuries to these two last mentioned crops.

No mention of injury to either of these crops by plant-lice is to be found in the writings of any of our economic entomologists at hand. They do not appear to be known in this country. No mention is made of them in the reports of Miss Ormerod, from which we infer that they are not serious pests of these crops in England. Curtis, however, mentions as a species preying upon carrots in England, *Aphis dauci* (Fabr.); while in M. Lichtenstein's list of aphides seven other carrot-feeding species are recorded as known, three of which also attack the parsnip, in the same family — the parsley family, *Umbelliferæ*.

Dr. Thomas, in his volume on the Hemipitera, describes the European parsnip plant-louse, *Siphocoryne pastinacæ* (Linn.), as, with little doubt, existing in this country, but not having been detected by him. It is said to infest the underside of the leaves and the tender stems of the plant. *S. capreæ* (Fabr.) and *Aphis carotæ* Koch., are also recorded as European species.

The Beech-tree Blight.

Pemphigus imbricator (Fitch).

Mr. James T. Whitaker, of Penn Yan, N. Y., makes request through Dr. E. L. Sturtevant, of the New York Agricultural Experiment Station at Geneva, for some note of the peculiarities and capability for harm of a species of insect which he finds covering the under side of beech leaves. He states of them that they are "about

one-sixteenth of an inch long, with a tuft-like down attached to the end of the body. They are found in large numbers in the woods, but only on the beech. The limbs are so thickly covered with them that in their continual swaying motions back and forth they all keep time. Underneath, the leaves and ground are covered with a blue or drab-colored substance, undoubtedly the offal from them."

The insect is one of the aphides (*Aphididæ*, commonly known as plant-lice), having the scientific appellation of *Pemphigus imbricator*. Popularly, it is known as the beech-tree blight.

It was first described by Dr. Fitch in 1851, in the *Fourth Annual Report of the New York State Cabinet of Natural History*, and as that publication is almost inaccessible, the description is herewith transcribed:

"*Eriosoma imbricator*. Black; three last segments of the abdomen blue-pruinose; stigma brown; longitudinal nerve and a line on the middle of the inner margin black. Female (?) winged; abdomen fulvous, with a black spot on the disk; legs pallid. Larva pallid, with two fuscous dorsal stripes; posterior half of the abdomen covered with a tuft of cotton-like down, from which proceed two longer and coarser filaments. Length, 0.22 inch. On the under side of the branches of the beech tree, covered with snow-white down. On the slightest jar of the branch, a shower of tiny drops of a water-like fluid falls from these insects."

This species has been noticed by but few of our writers. Dr. Thomas, in the *Eighth Report on the Insects of Illinois* (p. 139), refers to it, quoting from Dr. Fitch, and assigns it place in the genus *Schizoneura*. It does not, however, belong to this genus, as its third discal vein is not forked. Dr. Packard, in his *Insects Injurious to Forest and Shade Trees* (p. 131), cites it among beech insects, also designating it as a *Schizoneura*.

A peculiar feature of this insect and of its allied species, which so often draws attention to them, is the white substance in which they are enveloped, resembling threads of cotton or wool, and which has given to them the name of "woolly aphides." It appears in the form of threads or fibres, which are sometimes long and flattened, as in the beech-blight, and sometimes in the form of a fine powder. The substance is secreted by glandular organs in the abdomen and thorax, and is of a peculiar character,

being insoluble in water, alcohol, or solution of potash, and is not melted by the application of heat. The purpose which it serves in the economy of the insect is not known.

The allied species of woolly aphides above referred to are those of the apple (*Schizoneura lanigera*), of the elm (*S. Rileyi*), of the oak (*S. querci*), of the pine (*S. strobi*), of the hickory (*S. caryæ*), of the alder (*Pemphigus tessellata*), and a few others less frequently met with. Of these the last-named species is quite common, and often occurs in great abundance, completely enveloping in its white coating the branches of the alder.

The "blue or drab-colored substance upon the leaves and ground" underneath the insects, is the powdery secretion that enveloped the various sized globules of excreta given out from the anal extremity of the aphis, which fall to the ground "in a shower of tiny drops on the slightest jar of the branch." Numbers of these little meal-coated globules may be seen within the galls of some of the gall-making *Pemphiginæ*, the coating of which prevents the fluid from attaching itself to the plant-lice that move about freely among them.

A large portion of the white substance fastened to the under surface of the beech leaf received, consisted of the cast skins (*exuvia*) of the plant-lice at their different moltings, packed upon one another in a half-dozen or more layers.

Of course, all the aphides are injurious to the vegetation that they attack — the amount of their harm depending upon their numbers, and the consequent quantity of the sap that, by means of their beaks inserted into the bark or leaves, they are able to divert from the circulation.

As the peculiar coating of these woolly aphides protects them from most of the insecticides that could be applied to them in a liquid form — shedding the fluid without absorption — perhaps the best remedy for them is crushing them with a cloth, stiff brush or broom, as they occur in their conspicuous masses upon the trunks and branches.

These woolly aphides, in some localities, find a formidable enemy in the larva of one of our butterflies, *Feniseca Tarquinius* (Fabr.). The butterfly deposits her eggs upon the twigs of beech, alder, etc., in the midst of a colony of the aphides. The larvæ, upon hatching, shelter themselves beneath a thin web, and, feeding voraciously

upon their natural food so conveniently at hand, they mature and assume their chrysalis stage within the shortest period known for any butterfly larva — thirteen days. For the full life-history of this interesting butterfly, which has only been learned during the present year, see "The History and Preparatory Stages of Feniseca Tarquinius (*Fabr.*)" in the *Canadian Entomologist*, for August, 1886.

The Cockscomb Elm Gall

Glyphina ulmicola (Fitch).

Leaves taken from two elms, in Mercer county, New Jersey, were covered with the above gall. Other elms in the immediate vicinity of these were not affected. Without doubt they were of different species from the infested trees, although not so stated in the communication.

These peculiar elevations upon the leaves, which have been figured in several entomological reports, are the cockscomb elm gall. As described by Dr. Fitch, they are "an excrescence or follicle like a cock's comb, arising abruptly from the upper surface of the leaf, usually about an inch long and a quarter of an inch high, compressed and its sides wrinkled perpendicularly, and its summit irregularly gashed and toothed, of a paler green color than the leaf and more or less red on the side exposed to the sun; opening on the under side of the leaf by a long, slit-like orifice; inside wrinkled perpendicularly into deep plaits." The gall is located between the veins of the leaf, and usually parallel with them.

About the first of May these galls may be discovered forming on the leaves as slightly elevated ridges on their upper side. Soon after this, opposite to these, may be seen elongate openings to the interior of these ridges, upon the spreading apart of which the author of the gall may be seen within the cavity as a glossy plant-louse of an olive-brown color — the progenitor of the colony which is to people it.

During the month of June, four or five weeks after the commencement of the gall, an examination of its interior would show the "stem-mother" to have completed her reproduction and surrounded with an abundant offspring in different stages of growth. Distributed within the gall, among its occupants are many little

balls or globules, of various sizes, of a sweet liquid which have been excreted by the aphids. As the young emerge through the opening, which spreads apart for their egress, the excretion of the "honey-dew" continues, and, when the trees are badly infested, falls almost in showers to the leaves beneath and to the ground. When the elm is a shade tree upon our streets, the honey-dew may often be seen covering and blackening the pavement beneath it. All the members of this second generation are females and winged.

A third generation follows these, which do not produce galls and from which we have, later in the season, sexual individuals and the deposit of the eggs in sheltered places beneath the bark, destined to survive the winter and give forth the "stem-mother" the following spring.

The scientific name of this aphis is *Glyphina ulmicola* (Fitch). So far as known, its galls are formed only upon the white elm, *Ulmus Americana*, and upon the younger trees of the species — seldom over twenty-five feet in height. The best account of the species that we have is that of Messrs. Riley and Monell, cited below.

Remedy.— Nothing could be done to check the operations of this aphis during its gall stage. Later, when it deserts the gall and is distributed over the tree, its numbers may be reduced by spraying with soap-suds and quassia water, or with tobacco water. Fortunately it seldom becomes very abundant or destructive.

Bibliography.—As with many other of our aphides, this species has been obliged to submit to so many changes in name since its original description by Dr. Fitch, in 1859, that it would be difficult to recognize it under its various appellations without the aid of a synonymical table, such as is herewith given:

Bryoscripta ulmicola Fitch: Trans. N. Y. St. Agr. Soc., xviii, 1859, pp. 843–4; 5th Report Ins. N. Y., 1859, pp. 63–4, No. 347.

Thelaxes ulmicola. Walsh: Proc. Ent. Soc. Phil., i, 1862, p. 304; Amer. Entomol., i, 1869, p. 108, f. 90, p. 224.

Pemphigus ulmicola. Packard: Guide Stud. Ins., 1869, p. 524, f. 525; Ins. Inj. Forest and Shade Trees, 1881, p. 68 (Colopha).

Colopha ulmicola. Monell: Canad. Entomol., ix, 1877, p. 102.

Thelaxes ulmicola. Lintner: Count. Gent., xliii, 1878, p. 455.

Colopha ulmicola. Riley–Monell: Bull. U. S. G.–G. Surv. Terr., v, 1879, pp. 9–13, pl. 1, f. 2.

Glyphina ulmicola. Thomas: 8th Report Ins. Ill., 1879, pp. 142–144, figs. 21, 22, p. 204.

Colopha compressa Koch. Œstlund: G.–N. H. Surv. Minn., 1886, p. 55.

An Unrecognized Insect Attack.

A peculiar insect injury to the leaf-stalk of Norway maples was sent to me by Mr. George T. Lyman, of Bellport, N. Y. It consists of an elongated (slit-like) puncture, which had healed over, on the upper side of the stem, at a point distant from the base of the leaf-stalk about three-fourths of an inch. Directly opposite the puncture the stalk breaks and the leaf bends over at an obtuse angle, splitting the stalk by the flexure at several points on its diameter for the space of perhaps a half-inch or less. The injury causes the leaves to separate from the twigs at their point of attachment and fall to the ground.

A careful microscopic examination of several of the broken stalks failed to show the presence of any egg or remains of an egg, larva or larval burrowing within the stem. It would rather appear as if the puncture had been made by some haustellate insect for the purpose of feeding on the sap. But, if so, why then the remarkable uniformity shown in the location of the wound — the range of variation not exceeding a fourth of an inch in a stalk-length of about four inches.

The attack was not recognized, nor had it been observed, by some of my entomological friends to whom examples were submitted.

Specimens have been placed in the State collection.

A Grass-infesting Mite.

Trombidium ? bicolor (Herm.).

Specimens of a mite were received from Mr. William Trimble, of Concordville, Pa., under date of April twenty-eighth, which were very destructive to timothy fields in that neighborhood. The infested places looked as if they had been scalded. June grass, *Poa pratensis*, was untouched, as were also all the other grasses except timothy. They were first noticed about a year ago, and seemed to be increasing rapidly.

The Acarina, or mites, have not been made a special study in this country, and for that reason comparatively little is known of our species. Prof. Riley has described several species which are parasitic on other insects, and others have been described and illustrated by Dr. Packard in the American Naturalist, and elsewhere. Recently Prof. Herbert Osborn, of the Iowa Agricultural College, has taken up their study, and we hope soon to know more of these minute but interesting and often quite injurious creatures. In the Canadian Entomologist of the present year, Prof. Osborn, in connection with Prof. Underwood, of the Syracuse University, has given a "Preliminary List of Acarina of North America." Ninety-nine species are recorded in the list, and their literature given.

The common "red spider," which is such a serious pest to gardeners, and especially óbnoxious in the green-house, is a mite, known scientifically as *Tetranychus telarius* Many of the species of this genus are quite injurious to plants, shrubs, and trees. The "lice" that infest canary birds are also mites, known as *Dermanyssus avium.* Other examples are the cheese mite, the itch mite, the sugar mite, the "jigger" of the South, etc.

Many of our species are identical with those of Europe, and have probably been introduced from thence.

Not being able to find any notice among our writers of a mite injurious to grass, some of the examples above referred to were sent to Dr. Hagen, of the Cambridge Museum, for such information as he might give of them, he having at his command, in the extensive entomological library of the museum nearly all the foreign literature upon the subject. The mites were dead and dried when received, and consequently in very unfit condition for study; but after undergoing maceration for two days, Dr. Hagen was able to send me the following information in regard to them:

"This species is very similar to *Trombidium bicolor* (Hermann, *Mém. Aptères*, p. 25, pl. 2, f. 2); and Koch (Fasc. 151, No. 28), from Alsace and Germany. The only related species would be *Trom. assimile* (Koch, ibid, No. 19), but, after all, the species seems to be *T. bicolor*, or very near to it. I do not know if these species have since been put in another genus, perhaps in *Tetranychus*; the claws agree, but the legs are six-jointed."

The body of these mites is black, and the legs red, from which we have the specific name of *bicolor*. I shall endeavor to learn more of the history of the species, as its attack, as above mentioned, is the first record of the kind that we have, and therefore quite interesting.

A Mite infesting Smoked Meats.

Tyroglyphus siro (Linn.).

The well-known cheese-mite has been honored with quite a number of names, popular and scientific, as the result of the different conditions to which it has displayed a readiness to adapt itself. A correspondent from Everett, Pa., has sent a piece of meat infested with living forms which were abounding on some hams and shoulders. He had washed them off a few weeks previously with hot soap-suds, but they had become as numerous as ever. The inquiry is made — what do they come from, and would the use of the meat be hurtful?

The meat was found infested with, and to show the operations of, the common cheese-mite, *Tyroglyphus siro* (Linn.). This species is far from being confined to cheese (where it occurs more frequently and more abundantly than elsewhere), for it is also found in flour, from which it has been described as *T. farinæ* and also in sugar, when the additional name was given it of *T. sacchari*.

Of late it has been quite frequently heard from as infesting smoked hams. Last year pieces of ham were sent to me by a provision broker in New York city, with the statement that the hams in store so swarmed with the mites as to resist all efforts made to arrest the attack, and rendered them unsuitable for sale. Some Western pork-packing houses had previously been found to be infested with it and with an associated species of somewhat larger size, *Tyroglyphus longior* (Gervais). It had also been recorded by a European entomologist, De Geer, as infesting smoked meats in Europe. (See the *Thirty-ninth Annual Report New York State Museum Natural History*, 1886, pp. 114–116.)

The question is asked, from what does the mite come? When it is discovered in hams purchased in market, the infestation may have originated in the packing-house from which they came, as some of the Western establishments have been known to abound with them in immense numbers. In the instance of the New York attack,

they were not observed when the consignment was received, nor until the hams had been smoked for market. It was suggested that they might have been present, but not detected from their similarity of color to the cured meat before its smoking.

In home-prepared hams the mites may have migrated from some neighboring infested cheese, or from musty flour barrels.

No harm could result from the use of the ham in which these mites are present. Most of them would be upon the surface and could be removed by washing or scraping. The others that remain would be destroyed in cooking and rendered entirely innocuous.

Remedy.— Washing with hot soap-suds, as above stated, fails to arrest the attack. It might destroy most of the mites, but would not kill the eggs, protected as they are by the fatty matter among which they are placed, and the peculiar mould-like powder thickly covering them when the attack has been long continued, consisting of the cast skins, egg-shells and excremental matter of the mites, fragments of meat, and spores of microscopic fungi. Nor would re-smoking afford the desired relief, as shown by experiments made with the New York meats.

Perhaps the most simple and effectual method of arresting the attack would be to remove, either by brushing or by scraping, all the loose, powdery material which accumulates upon the surface of the meat, as the result of the operations of the mites, and then dip it, for about a half minute, in a wash of one part of carbolic acid dissolved in ten of alcohol and diluted with ninety of water. The alcohol would serve to carry the carbolic acid to the eggs and the one per cent of the acid, which is of sufficient strength to kill the eggs with which it comes in contact, would at the same time not render the meat dangerous for use. It is believed that even double the quantity of the carbolic acid could be used with safety, if found necessary.

A Severe Attack on Potatoes.

By Myriopoda, etc.

Frequent complaints of injuries to various crops from Myriopoda, or thousand-legged worms, is made to this department, although not embraced within the range of entomological study. The injuries committed by them, however, is so similar to those result-

ing from the attack of wire-worms (larvæ of beetles of the family of *Elateridæ*), that the same methods of treatment would, to a great extent, be applicable to either.

Mr. A. F. Chaffee, of Cooperstown, N. Y., has written as follows:

I send you by mail a potato, which is a fair sample of many which I have this year found in my garden. I send it as this will give you a perfect idea of the worm and its work. Last season this worm destroyed fully one-half of my potatoes. This year the worm's work is not so bad, as I have harvested fully a month earlier than last year. Still the ground is full of the pests. I am not alone anxious over this worm; many of my neighbors and some farmers around here have difficulty with the same worm. Will you favor me by first naming it; second, by giving me directions as to how I may rid my garden of them? Phosphates, lime, or ashes do not seem to effect them at all.

The specimen potato sent was in a very bad condition—perhaps one-fourth of its interior having been eaten and the cavities filled with excremental matter and soil. The injury to it had in the greater part resulted from an attack of a species of Milliped or thousand-legged worm known as *Julus cæruleocinctus* Wood.

It is, in its full growth, a little over an inch in length, smooth and polished, dark brown above and paler beneath, and with each joint marked with from forty to fifty minute striæ or lines with flattened spaces between and bearing two pairs of legs. There were, perhaps, two hundred of them burrowing in cavities in the potato — many of them being quite young, and of a pale color almost white, except a lateral row of round brown spots of one on each ring.

Most of the Julidæ feed upon decaying vegetable matter, but this species has frequently been sent to me depredating on potatoes. When injuring them but slightly upon the surface, it has been supposed to cause "the scab" in potatoes, and it is probably justly chargeable with one of the forms of scab of which there appears to be several kinds resulting from different agencies. I have also received it from Geneva, N. Y., as abounding in the soil of a nursery, where they must have been drawn by some crop previous to the introduction of the nursery stock. I have identified it from Madison, Wis., where it was found eating out the ripening kernels of corn. In the Eleventh Illinois Report (p. 44), *Julus impressus* Say, is named as "feeding upon the kernels of corn on ears which lay upon the ground."

Associated with the above species were perhaps half as many of a smaller form, being about a quarter of an inch long, whitish, pale brown above, each of the eighteen rings flattened above and extending out rectangularly on the sides and bearing three transverse rows of papillæ. I take this form to be *Polydesmus complanatus* (Linn.), but have not its description at hand for verification. This species has been reported by Miss Ormerod as quite injurious to potatoes in England, especially to the Magnum Bonum variety (*Eighth Report of Injurious Insects*, pp. 77, 78). Curtis records it as very destructive to the roots of wheat in England. Dr. Fitch mentions it in his *Tenth Report on the Insects of New York* (p. 27), as eating irregular patches in cucumbers, feeding upon the roots of onions (p. 28), and as probably causing the "club-root" in cabbage (p. 29).

Prof. L. M. Underwood, of the Syracuse University, who is at present engaged in the study of the Myriopods of North America, has kindly furnished me with the following bibliography of the two species above noticed.

Julus cæruleo-cinctus Wood: In Proc. Phila. Acad. Nat. Sci., 1864, p. 14; Myriapoda of North America, p. 204 (1865).

J. hortensis Wood: In Proc. Phila. Acad. Nat. Sci., 1864, p. 14; Myriapoda of North America, p. 205 (1865). Young.

J. multistriatus Walsh. Practical Entomologist, ii, pp. 34, 70 (1866).

Polydesmus complanatus Latreille: Hist. Nat. d. Crust., etc. vii, p. 79 (1804).

Julus complanatus Linn.: Syst. Nat., ed. xii, ii, p. 1065.

P. serratus Say: In Journ. Phila. Acad. Nat. Sci., ii, p. 106.

P. serratus Wood: Myriapoda of North America, p. 215 (1865).

P. complanatus Gervais: Apteres iv, p. 105.

P. complanatus Latzel: Die Myriopoden der Oesterreich-Ungarischen Monarchie, ii. 150 (1884).

? *P. complanatus* Fitch: Tenth Report Ins. N. Y., in Trans. N. Y. St. Agricul. Soc., xxiv, for 1864, pp. 458–461 (1865).

A large number of small mites of two or three species — members of the Acarina — dark brown, smooth, shining, ovoid in form,

and hard-shelled, also occurred in the cavities with the Myriopods. One of them was *Uropoda Americana* Riley. Its presence here and mode of occurrence shows that it is not necessarily attached to other living forms, by its excremental thread. Another, present in large numbers, was apparently a species of *Gamasus*, but not the *Gamasus juloides* of Say, which has been observed upon the body of *Julus marginatus* and *Polydesmus Virginiensis* (Say's Entomology, ii, p. 18), nor can it at present be referred to any known species. If not identical with some European species, it is probably an undescribed form.

It is of a somewhat larger size than *Uropoda Americana*, more shining and of a darker brown color. While that species has its greatest breadth posteriorly, this is broader anteriorly, and it is more prolonged at each end. It has a distinct sternal plate (not occurring in the other), and also a distinct cylindrical projection near the margin, between the second and third pairs of legs. The posterior legs are placed at about the middle of the body, while in *Americana* they are placed behind the middle.

The above differential features have been pointed out by Prof. Riley, upon comparison with his types of *U. Americana.* Should the species prove to be undescribed, it may be named as *Gamasus obovatus.*

None of the above mites were observed upon the Myriopods, and they are believed to have been feeding on the potato.

A few examples of a small staphylinid beetle, which has been identified as *Oxytelus rugosus* (Fabr.), were also found associated with the above.

Remedial Measures.— The injuries committed by the "thousand-legged worms" to garden and field crops have long been known, without the discovery of any simple method adapted for general use for their arrest. Some of the species which visit the surface of the ground at night for feeding, may be attracted by slices of potatoes or other vegetables laid upon the ground, and collected from them in the morning and destroyed. But this method, of course, could not be available in an infested potato field.

Perhaps the only substances that could be used for destroying the worms while in the ground would be gas-lime or alkali waste from gas-works. A liberal application of either of these, when

they are procurable, applied at the latter part of winter or early spring, and plowed in, should serve to rid the soil of their presence.

There is good reason to believe that salt, if used in sufficient quantity — several hundred pounds to the acre — would act as a preventive of attack, by making the tuber distasteful for food, as does a tablespoonful of the material spread over a hill of corn after planting render the roots distasteful to the white grub. How the salt could be used so as to act the most effectively, must needs be learned by experiment. A liberal handful of it might be sprinkled over each hill after planting, to be washed in by rain, and enter into the circulation of the plant. Successive and larger applications would have to be made later in the season, and especially at about the time when the attack commences, which might be ascertained by opening a few hills. Perhaps, too, the foliage of salted plants might not be agreeable to the Colorado potato beetle, the blister beetle, the flea beetle, and other foliage eaters, and the two or three species of stalk borers. Experiments in this direction are desirable.

NOTES ON VARIOUS INSECTS.

Microgaster pieridis.— Some larvæ of *Pieris rapæ* collected at West Albany, N. Y., on the ninth of October, gave on the thirteenth of the same month clusters of the yellow cocoon of *Microgaster pieridis*, spun in each instance alongside of the larva, but detached from it.

Habits of Wasps.— Mr. C. R. Moore, of Johnson Town, Va., states that he has seen the common brown wasp [*?Polistes fuscatus*] seize the green worms on cabbage [*?Pieris rapæ*], sting them repeatedly and then carry them away.

He further states, that after a number of dead katydids [*Platyphyllus concavus*] had been drawn up by the bucket from a well in his vicinity, a "mud-dauber" [probably *Pelopœus cæruleus*] was frequently seen to fly to the well with a katydid and drop it in.

Gortyna nitela *Guenée.*— Mr. E. G. Fowler, of the *Orange County Farmer*, Port Jervis, N. Y., sends, through Dr. Sturtevant, stems of tomato burrowed by a larva which I identify as that of *Gortyna nitela.* The larva is quite young, only about three-eighths inch in length, but showing plainly its characteristic

interrupted lateral stripes. Mr. F. writes that it is destroying tomato plants in that vicinity by boring a hole into the stalk about the size of a large knitting needle, eating out the center until it breaks over, and that plants half as large again as a lead pencil have been utterly destroyed.

PARTHENOS NUBILIS *Hübn.*— Miss Emily L. Morton reports finding frequently larvæ of *Parthenos nubilis* feeding on *Robiniæ* only at night, after nine o'clock; also, *Biston ursaria* Walker, feeding on the young shrubs of wildcherry and on several other plants.

NEMATOCAMPA FILAMENTARIA *Guenée.*—A larva of this species was found on a black walnut tree, on the tenth of June, differing in color and ornamentation from other larvæ that I have seen of the species. Its general color is dark brown. Before the anterior appendages are two transversely oval white warts, one on each side of the dorsal line, and a pair of white dots close together behind these; these and the curled appendages are apparently on the fifth segment. On the back part of the fourth are two tubercles which are nearly as broad basally as the curved appendages, and about as high as broad; each bears a hair apically.

BUCCULATRIX sp. ? — Mr. Shelby Reed, of Scottsville, Monroe county, N. Y., sends leaves of the yellow birch, *Betula lutea*, infested with a small caterpillar, which are very numerous (forty-eight had been counted on a single leaf) and eat the upper and lower surfaces of the leaves, leaving only the transparent inner tissue. "The trees infested with them have a brown and scorched appearance, and light comes down through the thickest foliage as through a softened skylight."

The caterpillar is 0.18 to 0.22 long, slender, deeply incised at the joints, tapering at the extremities, and subcylindrical; head pale brown, slightly bilobed, ocelli and mandibles black, mouth-parts projecting; body dull, pale green, bearing a few short hairs on the usual spots, and longer ones on the first segment; terminal pair of prolegs projecting. Walks slowly and hangs by a thread when it falls.

A few of the larvæ had spun cocoons on the surface of the leaf when received. On the following day, nearly all had made or were engaged in making their cocoons.

TISCHERIA MALIFOLIELLA Clem. — Prof. C. H. Peck brought from his residence at Menands, Albany county, N. Y., leaves of apple, each containing several of the mines (from three to eight) of *Tischeria malifoliella* Clem. The portion of the mine first constructed, before it enlarges and extends it in an irregular blotch, suggests in its appearance an oyster-shell with its successive imbricated transverse lines of growth, of which the crescents are white, contrasting with the brown of the intervening spaces and the orange of the blotch. The segments of the larva are much more deeply incised than shown in Mr. Brunn's figure in the Second Report, Dep't. of Entomology of Cornell University Experimental Station (pl. 6, f. 1a), being almost moniloform. The largest of the larvæ were apparently nearly full-grown when received on September thirteenth.

TRYPETA (STRAUSSIA) LONGIPENNIS *Wied.*— Several examples of this species were taken June twenty-first, while resting on or slowly walking over the under surface of the leaves of the sunflower. It is easily taken by putting the mouth of the cyanide bottle slowly over it, as it is not readily alarmed.

On June twenty-seventh it still continued on sunflower. Twenty examples were taken this date, and it was seen to oviposit in the stalk a few inches from the tip. The fly bends the tip of its body in a curve, extends its long ovipositor, inserts it into the stem, expands its wings at almost a right angle with the body, and continues in this position for from twenty to thirty seconds. The operation was seen to be repeated several times by the same fly. Captures of the insect were made daily to July tenth.

ADALIA BIPUNCTATA (*Linn.*). — This species has been quite abundant in its larval stage, upon some peach trees, rose bushes and the black currant, feeding on the aphides with which the peach, rose, and currant swarmed. About two weeks ago one of the peach trees, a small one, was having every leaf killed by the aphides, when a number of the larvæ were collected and placed upon it. To-day (June 1), hardly an aphis is to be found thereon. *A. bipunctata* is just emerging from the pupæ which have been observed for the past few days, mostly upon the upper sides of the leaves. It has abounded all June, continued into October, and during November examples of it were frequently sent for name and habits. The insect had entered dwellings in numbers and fears were entertained that it might be the carpet beetle.

Anthrenus scrophulariæ *Linn.*— Mr. A. W. Cheever, of the *New England Farmer*, states that he has had in his possession in confinement in a small paper box, for more than two years, a larva of *Anthrenus scrophulariæ*, and that it is still quite lively. It has moulted three times, and appears to have eaten a brother specimen meanwhile. It had also had one or two very light feedings of wool, but shows no apparent increase in size.

Prof. H. M. Seely writes that the above named insect invaded Middlebury, Vt., in 1884 and 1885, to an alarming extent. To suppress its ravages he had prepared and distributed among some of his friends an insecticide consisting of napthaline, camphor and kerosene. This was used both as a liquid and as a solid. In the latter case it was sprinkled at the borders of the carpets with a view of destroying the insect if present, and preventing the deposit of the eggs. The result was to be observed upon raising the carpets, and reported at the next house-cleaning. As no report was received, the experiment was probably not successful.

Prof. W. F. Robinson, of Elizabeth N. J., states that he found this larva eating the cotton lace of an infant's cloak [?]. He had nearly exterminated the insect from his house by persistently fighting it. He had purchased four gallons of naptha and poured it along the floor joinings and base boards.

Trichodes Nuttali Kirby.— This insect occurs abundantly at Centre, Albany county, N. Y., feeding on the pollen of the ox-eye daisy, *Leucanthemum vulgare;* forty eight examples were taken in ten minutes from a road-side patch. One example of *T. apivorus* Germ., was among them.

Psenocerus supernotatus (Say).— An imago of this longicorn beetle was found within a burrow in a small stalk of *Memispernum Canadense*, among some material collected January 25, 1873, as per label, and laid aside for examination.

Dactolypius destructor Coms.— This insect was received for name from Dr. H. Knowlton. See *Entomologist's Monthly Magazine*, for December, 1886, pages 154, 155, for the recent detection of this Coccid, in England, infesting some cucumber plants in a forcing-pit.

Ptinus quadrimaculatus Mels.—Three of the beetles were taken, February seventeenth, dead, from a box of dragon-flies (Odonata)

received the previous year from South Britain, Conn. Two dead individuals had previously been discovered in another case of insects.

The species may, therefore, be enrolled in the entomological black-list of museum pests, where it has not hitherto had place.

ANTHONOMUS MUSCULUS Say.— A new strawberry pest made its appearance on Staten Island, N. Y., early in June, 1884. It proved to be a small beetle belonging to the *Curculionidæ* or snout-beetles, known as *Anthonomus musculus* Say. The first notice of it as a strawberry pest was in July of 1883, when its ravages were brought to the notice of Prof. A. J. Cook, of the State Agricultural College at Lansing, Mich., as having appeared in countless thousands at Phœnix, Mich., and was ruining the entire strawberry crop by puncturing the fruit. The attack is noticed and a figure given of the beetle, with its description, in the *Thirteenth Annual Report of the State Horticultural Society of Michigan*, for the year 1883 (p. 155).

Upon Staten Island, according to Prof. Riley's observations of it, the beetle attacked the buds, causing them to droop or shrivel and dry up. The "Sharpless" variety was found to have suffered the most from the attack.

ATROPOS DIVINATORIA (*O. Fabr.*).— Prof. E. W. Claypole, of Akron, O., referring to the notice, in the *Second Report of the New York State Entomologist*, of *Atropos divinatoria* infesting a dwelling-house (pp. 189–201), states that a similar case had been brought to his notice by one of his colleagues, where a room was found similarly infested and the like suspicion of their introduction by guests was entertained. Recommendation was made of scouring and airing the room for their extermination. The short time that had elapsed (about three months) did not suffice to show the effects of the recommendation.

Prof. Claypole also reports the presence of *Anthrenus scrophulariæ* in Akron, Ohio, for the past seven years.

CONTRIBUTIONS.

The following contributions to the Collections have been received during the year:

Examples of *Bombus fervidus* Fall., *B. Virginianus* Oliv., *Vespa vulgaris* and *Pelopœus cæruleus*. From Mrs. Emily Smith, Coeymans, N. Y.

Cocoons and imagines of *Limneria fugitiva* Say, from *Œdemasia concinna* (Sm.–Abb.). From A. S. Fuller, Ridgewood, N. J.

Examples of a minute chaleid, *Copodosoma truncatella*, reared from a larva of *Plusia brassicæ* Riley. From Mrs. Julia P. Ballard, Easton, Pa.

Larvæ of a saw-fly, *Dolerus* sp. which cuts off the heads of wheat and feeds upon the stalks. From J. E. Wittmer, Slab, York county, Pa.

Papilio Asterias Linn., *Tetracis lorata* Grote, and *Mesographa stramentalis* Hübn. From Mrs. E. Smith, Coeymans, N. Y.

Larva of *Thecla Irus* Godt., burrowing in a plum. From E. Moody & Sons, Niagara Nurseries, N. Y.

Bembidium quadrimaculatum (Linn.), sent as injuring strawberry leaves. From J. P. Little, Columbia, Conn.

Telea Polyphemus (Cramer). From H. C. Hunt, Albany, N. Y.

Actias Luna (Linn.). From J. F. Black, Albany, N. Y.

Larva of *Cossus Centerensis* Lintner, apparently full-grown, July second, and galleries of the same in *Populus*. From Bernard Schmidt, Jr., Albany, N. Y.

Larvæ, less than half-grown, of *Gortyna nitela* Guen., burrowing in stems of tomato, June eighteenth. From E. G. Fowler, Port Jervis, N. Y.

Larvæ of *Phakellura nitidalis* Cram., from muskmelons. From H. C. Schmitz, Crozet, Va.

Larvæ and cocoons of *Bucculatrix* sp. ? on yellow birch, *Betula lutea*, September fourteenth. From Shelby Reed, Scottsville, Monroe county, N. Y.

Larvæ of *Tischeria malifoliella* Clem., mining apple tree leaves, September thirteenth, at Menands, N. Y. From Prof. Charles H. Peck, New York State Museum of Natural History.

Larvæ of *Cecidomyia betulæ* Winnertz, within the catkins of the white birch, *Betula alba*, March twenty-fifth. The imago obtained. From W. H. Payne, Albany, N. Y.

Sphinx quinquemaculatus Haworth — moth of a second brood, taken September twenty-fourth from a basket of peaches. From Dudley W. De Witt, Albany, N. Y.

Dytiscus fusciventris Say, drawn from a well, June seventh. From C. M. Reed, Sinclairville, N. Y.

Dytiscus Harrisii Kirby, from a cistern, May eighteenth. From R. H. Sabin, M. D., West Troy, N. Y.

Euphoria melancholica (Fabr.), from ripe peaches, October ninth. From C. H. Hedges, Charlottesville, Va.

Maple twigs newly cut off by the larva of the oak-pruner, *Elaphidion parallelum* Newm., at Pawling, Dutchess county, N. Y., July twentieth, from which the beetles were obtained late in November. From A. T. Thomas, New York city.

Otiorhynchus ovatus (Linn.)=*O ligneus* Lec., from beneath carpets, June second. From Miss Effa A. Elmore, Bergen, N. Y.

Scythropus elegans (Couper), taken at light, May twenty-fourth. From P. Barry, Rochester, N. Y.

Pissodes strobi Peck — the larvæ in cells in tips of white pine, June twenty-seventh. From G. A. Schmitt, Wellesley, Mass.

Cylas formicarius (Fabr.), in its larval, pupal and perfect stages, and the larvæ operating in a sweet potato — examples from Texas; also, borings in a branch of an apple tree of *Xyleborus obesus* Lec., received from Rhode Island. From A. S. Fuller, Ridgewood, N. J.

Phlœotribus liminaris (Harris), from peach trees at Paterson, N. J. From Ellwanger & Barry, Rochester, N. Y.

Leptoglossus oppositus (Say), occurring in clusters on grapevines; also, examples of *Lygranthœcia rivulosa* Guenée. From C. M. Hedges, Charlottesville, Va.

Belostoma Americana Leidy. From Charles S. Scattergood, Albany, N. Y.

Galls of *Pachypsylla celtidis-mamma* Riley, on *Celtis occidentalis*, and subsequently therefrom numerous examples of the imago. From W. H. Vandenberg, M. D., Amsterdam, N. Y.

Melaphis rhois (Fitch), in the *Rhois tomatos* gall on the leaves of the staghorn sumach, *Rhus typhina*. From Mrs. H. D. Crane, Schenectady, N. Y.

Pemphigus imbricator (Fitch), from a beech tree. From James S. Whitaker, Penn Yan, N. Y.

A large Arachnid, *Epeira* sp. ? (undescribed ?), which had descended by its thread from a limb of an elm tree, about sixty feet from the ground. From Hon. Abraham Lansing, Albany, N. Y.

Chernes Sanborni Hagen (of the Pedipalpi), attached to the legs of a fly, *Limnophora* sp. From E. N. Holly, Amsterdam, N. Y.

Uropoda Americana Riley, and *Uropoda* n. sp., from cavities in a potato associated with *Julus cœruleocinctus* Wood, *J. hortensis* Wood (is immature *J. cœruleocinctus*), *Polydesmus complanatus* Linn, and a Staphylinid beetle *Oxytelus rugosus* Grav. From Mr. Chaffee, Cooperstown, N. Y.

Cermatia forceps Rafinesque (of the Myriapoda). From John C. Russell, Albany, N. Y.; W H. Moore, Pittsburg, Pa.; D. L. Boardman, Troy, N. Y.; Miss Church, Albany, N. Y.

PUBLICATIONS.

The following publications have been made by the Entomolgist during the year. It will be observed that several of them have been introduced in the present report.

The Spring Canker-Worm — Anisopteryx vernata (*Peck*). (The Country Gentleman for April 1, 1886, li, p. 249, c. 2–3 — 34 cm.)

Defoliation of trees for two years past in Dutchess county, is recognized as a canker-worm attack. Importance of preventing its spread is urged. Reference is made to remedies and preventives, in the C. G. for May, 1882, and July 10, 1884. Pupæ may be killed by working the ground beneath the tree at this season. Mention of the different kinds of bands used as preventives; of poisoning by Paris green and London purple, and a method for doing so economically, and of a spraying apparatus where the power is furnished by the revolution of the wagon wheels, transporting the material.

The Cause of Gapes. (The Country Gentleman for April 8, 1886, li, p. 260, c. 1–3 — 63 cm.)

The windpipe of a chicken killed by gapes, submitted, shows no indication of the false membrane believed to have caused its death,

but the presence of one mature specimen of the gapes parasite *Syngamus trachealis*. Reference is made to a prize treatise on the Gapes by M. Megnin, a French investigator (published in 1882 ?), an abstract of which is embodied in this and the following paper. In this is briefly sketched the history of the disease in Europe and description of the parasite given. M. Megnin's detailed description conforms nearly to that given by Prof. Verrill, in a paper published in 1870, which is here quoted and its accompanying illustration of the parasite copied.

Cause and Treatment of Gapes. (The Country Gentleman for April 15, 1886, li, p. 289, c. 2–4 — 61 cm.)

In treating of the life-history of the parasite, it is stated that the eggs are only liberated by the death of the female and destruction of its body. For their development, moisture and a temperature of 68° Fahr. is required, and a period of about thirty days. The disease is communicated by poultry consuming the expelled syngame, and by taking up the embryos in their drink. The nymphal stage is passed in the air sacs and pulmonary bronchi. As remedies for the disease, urine in the drinking water has been found useful; removal of the worms by a feather or looped horse-hair, and mixing garlic and asafœtida with a prepared food is given, and disinfection in infested localities.

Birch-seed Insect. (The Country Gentleman for April 15, 1886 li, p. 287, c. 2 — 8 cm.)

A small, footless, orange-red larva found within the seeds of the white birch, submitted, from Albany for name, is not recognized. No insect is known with this habitat, and it will probably prove to be new to science. Some of the infested seeds have been carefully laid aside in the hope of obtaining shortly the perfect insect from them.

Aphis mali — The Apple Plant-louse in Ontario Orchards. (The Ontario County Times for May 12, 1886, p. 3, c. 6 — 50 cm.) (Copied in the Watkins Express, N. Y., for May 20, 1886; The Palmyra Courier, N. Y., for May 28, 1886; The Sentinel, Trumansburg, N. Y., May 19, 1886.)

The insects infesting orchards in and about Canandaigua, N. Y., first noticed about the middle of April, are *Aphis mali*, hatched from eggs of last autumn. The present season is unusually favorable for their increase. Those now seen are all females. One individual may produce in seven generations 729 millions. The *A. mali* has more than seven generations — how many not known. Heavy rains at this season are destructive to them. The remedies that may be employed against them are mentioned.

A Curculio Demonstration. (The Country Gentleman for May 13, 1886, li, p. 366–367, c. 4, 1 — 10 cm.)

A beetle, torn from the bleeding tongue of a young chicken which had tried first to swallow the insect and afterward to dislodge it, sent from North Carolina, is identified as *Pachylobius picivorous* (Germ.). Fastened as it was, by its mandibles and tarsi and resisting removal, it would probably have caused the death of the chicken.

Orange Insects. (The Country Gentleman for May 13, 1886, li, p. 370, c. 3–4 — 30 cm.)

The report published by the Division of Entomology, Department of Agriculture, was ordered by Congress, four years ago. After preliminary reports, this is the final publication, based on the studies of Mr. H. G. Hubbard, in the orange plantations of Florida during 1881–1885. Nearly 100 pages are devoted to the *Coccidæ* infesting the orange in Florida and California. Orange rust produced by the rust-mite, *Typhlodromus oleivorus* Ashmead, is treated of. New species of insects are described in the appendix, and experiments with insectides given. The report is highly commended, as well as the general work of the Entomological Division.

The Apple-tree Aphis infesting our Orchards. (The New England Homestead, May 15, 1886, xx, p. 189, c. 3 — 35 cm.)

Character, abundance and prolificacy of aphides; development and habits of the apple-tree aphis; abundant in New York in 1882; the heavy rain occurring will probably arrest the attack; the best remedies are showering with water; spraying with soap-suds or tobacco water; washing the bark with sal-soda or soft-soap, and protecting insectivorous birds.

The Canker-worm and Codlin Moth described. (The New England Homestead, for May 15, 1866, xx, p. 192, c. 4 — 26 cm.)

In compliance with a request made, the caterpillar and wingless female moth of the canker-worm are described. The Codlin moth, *Carpocapsa pomonella*, the mature form of which is so little known by fruit growers, is also described, accompanied with a figure showing the transformations and operations of the insect. The Paris green remedy for the two insects is given — one pound of the green to one hundred gallons of water.

Insects and Other Pests. (New England Homestead for May 22, 1886, xx, p. 189, c. 5 — 20 cm.)

Notice of a method for restricting the ravages of the currant saw-fly *Nematus ventricosus*, in picking off the lower leaves of

the bushes as soon as they show the small holes eaten into them by the young larvæ; also, a correction of the substitution of figures of the raspberry root-borer, *Bembecia marginata* (Harris), in a preceding number of the paper, for the currant saw-flies — figures of both sexes of each species accompanying.

Horizontal Borings in Tree-Trunks. (The Country Gentleman for May 27, 1886, li, p. 409, c. 1–2 — 32 cm.)

To inquiry of the insect that bores round holes in a circle around tree trunks, reply is made that it is not an insect attack, but of the yellow-bellied woodpecker, *Sphyropicus varius* (Linn.). Of the explanations given of the purpose of these holes by different writers — feeding on the inner bark and feeding on the sap — the latter is regarded as the true one. Mr. King's observations, quoted, show this conclusively. Borings made in a horizontal line gives a better sap supply than if made perpendicularly.

The Elm-leaf Beetle. (The Country Gentleman for May 27, 1886, li, p. 409, c. 2–3 — 27 cm.)

Insects occurring by thousands in a house in Whitestone, N. J., are *Galeruca xanthomelæna*, which have hibernated, as is their habit, in the upper rooms of the house, and are now resorting to the windows to make their exit and attain the elm trees for oviposition. The benefit of killing the beetles before they escape for oviposition is urged. Reference is made to the principal publications upon the insect which is proving injurious in Pennsylvania, New Jersey and south-eastern New York.

A Plea for Entomological Study. (The Glens Falls [N. Y.] Republican for June 1, 1886.)

Extracts from an address before the Agassiz Association of Glens Falls, in which are noticed the facilities offered for entomological study, and the importance of economic entomology, in consideration of the large number of insect pests and the extent of their ravages.

The Apple-tree Aphis. (The Country Gentleman for June 3, 1886, li, p. 429, c. 1–2 — 26 cm.)

Aphis mali Linn., from Mossville, Ill., May 16 (some of which were winged), identified. Unusual abundance of aphides this season of various species, *Aphis ribis ?* having been observed to have nearly killed some black currant bushes. Arsenical applications not available for destroying them. Tobacco smoke is fatal, but not available for trees. Soap-suds or tobacco solu-

tion will kill the young aphids. Sal-soda solution applied is the bark said to cause the aphids to abandon the tree, but it to questionable if it would be taken in the circulation by this means. It might be done through spraying the leaves or applied to the roots.

The Asparagus Beetle. (The Country Gentleman for June 3, 1886, li, p. 429, c. 2 — 22 cm.)

The insect injuring seed-beds of asparagus in Chestertown, Md., identified and figured in its several stages, with notice of its introduction at Astoria, on Long Island, thirty years ago. For full account of it, reference is made to the *Country Gentleman* of April 14, 1881. The best remedy for it is freshly slacked lime as tested and vouched for by Mr. A. S. Fuller. The lime is also a valuable fertilizer. Poultry are serviceable for destroying the beetle.

A New Strawberry Insect. (The New England Homestead for June 5, 1886, xx, p. 216, c. 5 — 11 cm.)

Beetles occurring in large numbers in Columbia, Conn., on strawberry plants, very badly eaten, are found to be *Bembidium quadrimaculatum* (Linn.). Dr. Fitch, in his remarks upon this common garden insect, states that its habits are carnivorous. Some of the *Carabidæ*, however, are known to be herbivorous; and the circumstances under which this species occurred as detailed, render it probable that it was the depredator upon the strawberry plant.

The Grapevine Scale Insect. (The New England Homestead for June, 12, 1886, xx, p. 221, c. 6 — 14 cm.)

Scales on a grapevine from Springfield, Mass. (described), are identified with some doubt, as *Pulvinaria vitis* of Linnæus. The eggs were hatched at the time received, June 4, without any cottony excretion visible. As remedies, crushing the scales, which are quite tender, by rubbing the vine with a cloth wet with a carbolic acid solution, or scraping them into a vessel of water and kerosene, are recommended.

Apple-Tree Bark-Louse. (The Country Gentleman for June 17, 1886, li, p. 469, c. 4 — 29 cm.)

Apple twigs sent from Virginia are covered with the scales of *Mytilaspis pomicorticis*. Trees completely infested, should be burned. From young and but partially infested trees the scales should be scraped in the autumn by some instrument that will at the same time crush the eggs beneath them, to be followed by an alkaline wash.

The best remedy is to scour the infested portions in the spring, when the insects have just hatched, with a solution of soft soap and carbolic acid. According to Dr. Le Baron, greasing the tree with lard or linseed oil has proved an effectual remedy. His experiments with these substances are stated.

The Forest Tent Caterpillar. (The New England Homestead for June 19, 1886, xx, p. 229, c. 4–5 — 30 cm.)

Caterpillars described, collecting in masses on apple and cherry trees in St. Albans, Vt., are the *Clisiocampa sylvatica* Harris; its differing habits from *C. Americana;* its common name unfortunate as it is not limited to the forest, nor is it a tent occupier; the peculiar masses in which it collects on apple, plum, cherry, and maple described. Remedies are removing the egg-belts, jarring the larvæ from the trees, and destroying the masses of the larvæ in mornings or evenings.

The Squash Bug. (The New England Homestead for June 19, 1886, xx, p. 229, c. 5 — 21 cm.)

Insects imperfectly described, and represented as girdling the stalks of melon vines, are probably *Anasa tristis*, a species not often injurious to the melon, but at times so, as appears from Miss Murtfeldt's observation of eggs upon it.

Remedies for it: Search in the hiding places by day for the hibernated bugs during their period for oviposition in June and July; later, destroy the egg-patches on the under side of the leaves; trap the bugs with pieces of board near the hills, or wilted melon leaves spread on the ground. Place ashes and salt around the root stalks to prevent the injury of the bug to it.

A New Attack on Wheat. (The Country Gentleman for June 24, 1886, li, p. 487, c. 2–3 — 30 cm.)

A green larva an inch long, with brown head and twenty feet, which has attacked wheat in Salem, N. Y., and in York, Pa., is recognized as a saw-fly larva. The species is not identified, for no known species has this habit of cutting off the heads that it may feed downward on the stalk. *Cepheus pygmæus*, of Europe, burrows into the stem. Curtis describes a saw-fly larva which appeared suddenly on the heads of wheat, the description of which nearly accords to this species. The habits of the larva are given.

An Unknown Grass Insect. (The Country Gentleman for July 1, 1886, li, p. 503, c. 1–2 — 27 cm.)

An injury of thirty per cent of the stalks of June grass, reported from Emmett, Ohio, in which the tops turn white and the stalks, readily pulled from the sheath, eaten at the end —

is a common attack of wide distribution and long observed. No insect is found in the examples sent, but it is believed to be produced by a small fly, one of the *Oscinidæ*, having habits similar to the wheat-stem maggot. A notice of the same attack in Ohio in 1845 is quoted. Of eggs found within a sheath of grass sent some seem to be Hemipterous, and others, which have hatched and are feeding, are of some species of moth.

[Gortyna nitela destroying Tomato-plants.] (The Orange County Farmer for July 1, 1886, p. 4, c. 7 — 21 cm.)

A larva sent as boring downward into the stems of tomato-plants, in Port Jervis, N. Y., and destroying numbers of them, is the "stalk-borer," *Gortyna nitela* Guenée. Its food-plants and habits and the appearance of the moth are stated. Cutting out the larva with a knife is the best remedy. For further information reference is made to the First Report of the New York State Entomologist, pages 110–116.

Hop Vine Insects — Origin of Honey Dew. (The Waterville Times [N. Y.] for July 16, 1886, p. 2, c. 2–3 — 73 cm.)

In reply to inquiries of the hop aphis, "black-fly," and honey-dew, answer is made that the aphis, *Phorodon humuli*, identical with the European species, was first noticed in this country in 1862. The "black-fly" may be the larva of the lady-bug. The life-history of the aphis is not completed; it is not known how it hibernates; is believed to come from the ground in the early spring, but has not been found in the ground at that time. The hop crop of this year is doomed to destruction. The formula for the wash used in England is given. Honey-dew is generally supposed to be secreted by the aphides, but there are reasons (given) for believing that it is also secreted by the leaves. Prof. Trelease is quoted on honey-dews.

Honey Dew of the Hop Vine. (The Country Gentleman for July 22, 1886, li, p. 553, c. 4 — 20 cm.)

To inquiries made from Waterville, N. Y., of honey-dew and character of the "nigger" that preys upon the hop aphids, answer is made that the honey-dew is secreted by the aphids, and is given out by the two honey-tubes. In its occurrence upon some plants, it is regarded by some botanists as a true nectar. The "nigger" or "devil" is the larva of *Adalia bipunctata* (Linn.), which abounds this year upon various plants and is very active in destroying plant-lice.

A New Attack on the Potato. (The New England Homestead for July 24, 1886, xx, p. 273, c. 1 — 15 cm.)

Potato plants in some gardens in Springfield, Mass., have been almost destroyed by an aphis attack — not before, so far as

known, recorded in this country. No mention of it is found in any of our entomological reports. The specimens sent were not in condition for study. The aphis may prove to be the *Megoura solani* of Thomas, recorded as feeding on tomato. The wash used in England for the hop-aphis — 100 gallons water, five pounds soft soap, eight pounds of quassia, might be used for this aphis. The dead stalks and leaves, and other garden rubbish which might afford hibernating shelter, should be burned.

Potato-Stalk Weevil — *Trichobaris trinotata* (Say). (The American Rural Home for July 24, 1886, xvi, No. 30, p. 8, c. 4–5 — 22 cm.)

Beetles sent from Maricopa county, Texas, as having almost destroyed the potato crop in that section, by boring the stems, are recognized as *Trichobaris trinotata*, of which a description is given. It occurs in the Middle States, but is seldom very injurious except in the Southern States. As the transformation to the perfect stage takes place in the stalks, a preventive of future attack is found in pulling up the plants as they commence to wither and burning them. No other food-plant is known for it.

A Plant-Louse on the Potato. (The Country Gentleman for July 29, 1886, li, p. 569, c. 1–2 — 23 cm.)

A plant-louse received from Wyoming, Pa., where it is destroying entire fields of potatoes, is identical with examples received from Springfield, Mass., two weeks previous. They were in too poor condition, when received, for study or identification. No potato-feeding species is recorded. They may be the same as reported from Albany as infesting tomatoes the present year, and possibly the *Megoura solani* of Thomas. The English hop-wash of water, soft-soap and quassia, is recommended for their destruction. As a preventive, stalks and all garden refuse should be burned.

[Notice of Dr. Walker's communication on "Experiments in Gapes."] (The Country Gentleman for July 29, 1886, li, p. 576, c. 1 — 6 cm.)

No evidence adduced of identity of the parasite in earthworms with the *Syngamus*. Earthworms not the only media by which the gapes can be communicated — the media serve no purpose for development. The experiments cannot set aside those of Dr. Megnin.

The Stalk Borer. (The New England Homestead for July 31, 1886, xx, p. 277, c. 1 — 20 cm.)

A borer damaging corn in Hampden county, Mass., by burrowing in the stalk from the blossom downward, is *Gortyna nitela*

Guen. The caterpillar is described, and its injuries in Wisconsin, its habits, the transformation of the insect, and the general features of the moth, stated. As the best remedy for the attack, cutting out the borer is recommended, and as a preventive, not permitting the insect to mature within the withered stalks.

A Maple-Tree Pruner — Elaphidion sp. (The Country Gentleman for September 9, 1886, li, p. 677, c. 2–4 — 76 cm.)

Twigs of maple cut off in a transverse section by an internal borer, at Pawling, Dutchess county, N. Y., are sent with the statement that some ornamental maples are being seriously disfigured by the attack. The borer, from its operations, is recognized as an *Elaphidion*, and probably *villosum* or *parallelum*. The former, the "oak pruner," usually attacks oaks. Elaphidion attack on maples is mentioned only by Dr. Le Baron. The method of burrowing of the larva is stated and reference is made to Dr. Fitch's account and to figures. Speculations on the object for excising the twigs. Destruction of the larvæ by its enemies. The burrowed twigs received, described. Transformations of the insect. Remedy for attack — collecting and burning fallen twigs with their contained insects. [Proves to be *Elaphidion parallelum* Newm.]

[Myriads of Minute Insects in the Air.] (The Albany Evening Journal for September 9, 1886, p. 4, c. 1 — 10 cm.)

The insects were not observed in flight by the writer, although they attracted so much attention, but from examples received they are identified as *Aphis granaria*, the species so destructive to grain crops in New York and New England in 1861. Their present appearance may be explained by the unusual prevalence of plant-lice, this year, in New York. The hop crop has been destroyed, the apple crop reduced three-fourths, potato fields attacked, and other crops not previously infested have been injured by them.

Apple-Tree Pest and Parasite. (The Country Gentleman for September 16, 1886, li, p. 695, c. 1 — 18 cm.)

Caterpillars submitted from Annapolis, Md., are the red-humped apple-tree caterpillar, *Œdemasia concinna* (Sm.–Abb.). All the larvæ received are infested with a parasite, *Limneria fugitiva* (Say), which uses the outer skin of the caterpillar for its cocoon, changing it to a white color, and otherwise presenting a very strange appearance. The same parasitic cocoon was also received from Virginia. This parasite displays a fondness for the *Bombycidæ* larvæ — seven other species of Bombycids are mentioned which it infests.

Carrot and Parsnip Aphides. (The Country Gentleman for September 16, 1886, li, p. 695, c. 1–2 — 22 cm.)

The unusual prevalence of plant-lice this year has caused attack of crops which had before escaped, as the potato, tomato, and now the above mentioned. No mention of injury to these is recorded by our writers; is probably unusual in England. Curtis mentions *Aphis dauci* (Fabr.) on carrots, and Lichtenstein records seven other species. Dr. Thomas describes *Siphocoryne pastinacæ* as likely to occur on parsnips in this country, but not yet detected; two other European carrot-feeding species known. Some remarks are made upon the cherry aphis, *?Myzus cerasi*, reported with the above, as limited to one row of trees in the garden. Winds may not have been favorable to its general distribution.

A Ham-infesting Mite. (The Country Gentleman for September 16, 1886, li, p. 695, c. 2–3 — 28 cm.)

A piece of smoked ham, from Bedford county, Pa., is infested with a mite, recognized as the cheese-mite, *Tyroglyphus siro* (Linn.), identical with *T. farinæ* and *T. sacchari*, from flour and sugar. The same mite recently infested hams in a New York City provision store, received from a western packing house. De Geer has recorded it as infesting smoked meats in Europe. The mite, unless very abundant, would become innocuous in cooking the ham. The attack fails to be arrested through washing with hot soap-suds or by re-smoking. A remedy would be a wash of one part carbolic acid dissolved in ten of alcohol, diluted with ninety of water.

The Cockscomb Elm Gall. (The Country Gentleman for September 23, 1886, li, p. 713, c. 3–4 — 35 cm.)

The galls, received from Mercer county, N. J., are described, and their growth, with the life-history of their occupant, *Glyphina ulmicola* (Fitch), given. The honey-dew that the galls contain is noticed. The gall is believed to be confined to young trees of the white elm, *Ulmus Americana*. The aphis is only vulnerable after leaving the gall, when it may be sprayed with soap-suds and quassia or tobacco water. The synonymy and bibliography of the species is given, under *Bryoscripta*, *Thelaxes*, *Pemphigus*, *Colopha* and *Glyphina*.

U. S. Entomological Report. (The Country Gentleman for September 23, 1886, p. 715, c. 2–3 — 20 cm.)

Notice of Prof. C. V. Riley's Annual Report to the Department of Agriculture for 1885, mentioning articles on silk culture, silk-worm diseases, the periodical Cicada and several other insect pests, and reports on various subjects by special agents of the Entomological Division.

A New and Destructive Borer to be Conquered. (The New England Homestead for September 25, 1886, xx, p. 341, c. 4 — 16 cm.) (Copied in the Country Gentleman for November 11, 1886, li, p. 853.)

A borer stated to have killed cherry, peach, and plum trees, at Philadelphia, Pa., of which the appearance and habits are given, is probably (no examples are sent) *Scolytus rugulosus* (Ratz.). Its history in this country is detailed. Trees attacked in force by it cannot be saved. They should be cut down and burned. A soap and carbolic acid wash would act as a preventive of attack. *Phlœotribus liminaris* (Harr.) may also concur in the above attack.

Honey-Dew on Maple Leaves. (The New England Homestead for September 25, 1886, xx, p. 344, c. 2 — 18 cm.)

Maple leaves are sent covered with honey-dew, which bees were collecting. Its value to bees is asked. The leaves show no indication of plant-lice. They are not always present. The honey-dew may be conveyed a short distance by wind and deposited on uninfested leaves, as in an instance related. It is not usually desirable for honey purposes, but this on the maple is doubtless wholesome. Bees are known to collect from *Pemphigus imbricator* (Fitch), on beech, and *Lachnus dentatus* (Le Baron), on willow. An occurrence of abundant honey-dew, on willows in California, is quoted.

The Gapes in Fowls. (The Country Gentleman for September 30, 1886, li, p. 731, c. 4 — 31 cm.)

In comments upon a letter from Dr. Walker, the author of a paper under the above title, it is shown by quotations from the paper that the parasites found in the earth-worm have not been shown to be syngami. The paper does not invalidate the studies and published observations of Dr. Megnin, as it is claimed by its author to do, and attempted to be shown through imperfect quotations. Dr. Walker's investigations of the gapes, have resulted in little of scientific value, and some of the conclusions drawn therefrom are clearly erroneous.

The Muskmelon Worm. (The Country Gentleman for September 30, 1886, li, p. 733, c. 3–4 — 50 cm.)

Larvæ received, with good descriptions and habits, from Albemarle county, Va., are identified as *Phakellura nitidalis* (Cramer), with reference to C.-G. of July 23, 1885, for description of the *young* caterpillar, the moth, and for the best remedies. It is becoming a great pest of muskmelons and extending its ravages. It is not known in New York. Its transformations

noticed — those received are preparing (Sept. 13), for pupation. Said to feed also on squash and potato. Its literature given. The reported presence of the carnivorous *Chauliognathus marginatus* in the infested melon patch indicates its preying on the muskmelon larvæ. The Coleoptera sent for name are *Hippodamia convergens.*

Silk-Culture. (The Country Gentleman for September 30, 1886, li, p. 735 — 12 cm.)

Notices "The Mulberry Silk-Worm — a Manual of Instructions in Silk-Culture," by C. V. Riley, as issued by the Division of Entomology of the United States Department of Agriculture, in a pamphlet of sixty-two pages and two plates. The subjects of the several chapters are named, and the manual commended as a full treatise upon the silk-worm and silk-culture and indispensable to all engaged or about to engage in the industry.

A Queer Bug and Other Insects. The Country (Gentleman for October 7, 1886, li, p. 753, c. 4 — 18 cm.)

Leptoglossus oppositus (Say), occurring in large clusters in Charlottesville, Va., upon the grape and corn, is characterized with remarks upon its supposed carnivorous habits, like those of *L. phyllopus*, while *Metapodius femoratus* (Fabr.) is reported as injurious to cherries. Observations on its food-habits are desired. Other insects from the same locality, viz.: *Euschistes* sp., *Arctia Phylira* (Drury) and *Lygranthœcia marginata*, are remarked upon, in their features and distribution.

A Severe Attack on the Potato. (The Country Gentleman for October 14, 1886, li. p. 773, c. 3–4 — 46 cm.)

A potato sent from Cooperstown, N. Y., as a specimen of a half-destroyed crop, harbored within large cavities eaten into it, *Julus cœruleocintus* Wood (perhaps 200 in number), a species of *Polydesmus*, probably *complanatus* Linn., in large number, many minute mites of *Gamasus* sp. and probably undescribed, and a few Staphylinid beetles of an undetermined species. As remedies, gas-lime or alkali waste would destroy the myriopods. Salt, applied as suggested, might prevent attack and also repel leaf-eating insects of the potato plant.

The Beech-Tree Blight. (The Husbandman [Elmira, N. Y.] for October 27, 1886, xiii, No. 636, p. 1, c. 1–2 — 38 cm.)

Plant-lice, covered with flocculent matter, occurring on beech-trees in woods, and covering the ground beneath with a blue or drab-colored substance, are *Pemphigus imbricator* (Fitch). Its original description by Dr. Fitch is given, with notice of reference to it by other writers. The flocculent matter upon the insect is

noticed, also its allied species. The substance observed upon the ground beneath them is the remains of their excreta, dropped in meal-coated globules. Their exuvia occur thickly on the leaves. Injuries of aphides noticed. The best remedy for the woolly aphids may be found in crushing them as they occur massed on the branches.

The Grain Aphis in Maryland. (The Country Gentleman for November 25, 1886, li, p. 893, c. 2–4 — 44 cm.)

"Millions of parasites" reported in rye-fields in Maryland, causing the young grain to appear as if sunburned, are probably the grain aphis, *Siphonophora avenæ* (Fabr.). The insect was very destructive in the United States in 1861, but not seriously so since that time. The abundance of aphids the present year and an extensive aphis flight, observed in Albany early in September last, identified as this species, indicate that it may occasion serious injury the coming year. Portions of its life-history are not yet known. Extracts from Drs. Fitch and Thomas upon it are given. Its food-plants and rapid increase are referred to. The best preventive of its increase would be to destroy infested crops in the autumn.

Annual Address of the President of the Entomological Club of the A. A. A. S., at the Buffalo meeting, August 17, 1886. (Entomologica Americana for October and November, 1886, ii, pp. 143–160.)

Gives the evidences of the progress in entomology during the year, as shown in publications made in the several orders, of which a list is given — in the rapidly increasing lists of North American insects (about 25,000 species at present described) — and in some of the entomological events of the year.

A Sweet-potato Pest. (The Albany Express for December 8, 1886.)

Abstract of remarks made before the Albany Institute at its meeting on the seventh of December, on the sweet-potato weevil, *Cylas formicarius* (Fabr.), examples of which, in its larval, pupal and perfect stages, together with an infested potato, were exhibited. The insect threatens to prove in Texas a more serious pest than the Colorado potato beetle.

REPORT OF THE STATE GEOLOGIST.

REPORT.

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN.— The duties of the State Geologist at the present time are chiefly confined to the preparation and publication of the Palæontology of the State. This work has heretofore been carried on in private working rooms, connected with abundant museum facilities, in private buildings of the State Geologist. During the past year (1886) the offices and working material have been principally transferred to the State Hall, where the work will hereafter be carried on.

Considerable delay occurred in completing the second volume of the Lamellibranchiata, owing to causes heretofore stated, and which were beyond the control of the author. After the publication of this volume a considerable time was occupied in properly labeling the large collection of duplicate specimens which occupied about 800 drawers. Thirty-five series or sets of these fossils were selected for distribution to museums, colleges and normal schools. This work of labeling occupied a considerable time, and was not completed till the month of May. Such work, however, is necessary and unavoidable at the close of each volume, or otherwise we should become overburdened with a mass of duplicate specimens in an unorganized condition. While the preparation of this volume is in progress it is absolutely necessary to accumulate large collections for study and comparison, and for which the necessary material may be selected for the required illustration. After the completion of each volume a considerable proportion of the first accumulation in any department of the work can usually be classed as duplicate material, and it becomes desirable to find means of disposing of the same. After having been carefully studied during the progress of such work, and finally authentically labeled, such specimens acquire a value as typical forms of the species, and are

prized in all museums where scientific investigation is carried on as well as in colleges and schools where studies are made in palæontology. I would, therefore, recommend that the matter of the disposition of our duplicate collections be carefully considered, and that they should be bestowed only where we have a reasonable assurance that they will be useful and will also be preserved. To have arrived at a point where we can distribute a hundred species of authentically labeled fossils has cost much money, time and earnest labor, and they should only be bestowed with due care and consideration.

The extensive collections of fossils made by the State Geologist and his assistants from the years 1856 to 1866, for the illustration of the Palæontology of New York, have, for want of space elsewhere, remained in private buildings belonging to him. The law of 1883 authorized the incorporation of these collections with those of the State Museum proper, and at the same time provided that the whole should be transferred to the State Hall as the rooms in that building should become vacated by the removal of the State officers. Pursuant to this plan a portion of the upper story of the State Hall was fitted up for the reception of the collections of corals and other fossils, and during the present year (1886) the greater part of all the specimens have been removed from the premises where they had been kept, and are now arranged in the State Hall. For this purpose additional drawers were required, and these were supplied from the stock of drawers which the specimens occupied while in the custody of the State Geologist. There are now more than 3,500 drawers arranged in the State Hall and occupied or to be occupied by the collections. Three rooms on the second floor of the building have been fitted up as offices for the director of the museum and assistants and for the State Botanist, with the library and herbarium.

Owing to the necessity of removing these large collections to the State Hall and their arrangement in a systematic order, the time of the author and his assistants in the palæontology was given to this work for several months, and this, with other duties connected with this transfer of material, has seriously interfered with the progress of the palæontology. The greater part of the time of Mr. C. E. Beecher since the beginning of May, 1886, has been taken up with the work of rearranging the collections in the State

Hall, and with miscellaneous museum duties and the fitting up of the offices.

Through the liberality of the committee upon the State Museum the services of Mr. J. M. Clarke have been secured for the special work on the crustacea, which constitute the chief subject matter for volume VII of the Palæontology. Mr. Clarke having spent some time in the field in the collection of additional material has since been at work preparing these collections for study and illustration.

The printing of volume VI of the Palæontology was begun in August last, and about fifty pages put into type, when it became necessary to suspend this work in order to give my time to the removal of the collections to the State Hall, and it has not since been resumed. In the meantime, however, Mr. Simpson has been engaged in preparing material and completing the drawings for that volume. Of the sixty-five plates authorized for volume VI, sixty have already been lithographed and the drawings for the remainder will soon be completed. The printing will be resumed as soon as we can take possession of our new working rooms and remove thither the material upon which we are at work for that volume, which will be during the month of January, 1887.

The following memoranda were made on the 26th of November, 1886, in regard to the material which had been transferred to the State Hall, and of that still remaining in the private buildings. The work of transferring these collections is now going on.

Memoranda of Material Brought into the State Hall from the Private Buildings of the Director.

Fossils of all classes, systematically arranged, occupying 1,646 drawers.

Several large tables and pyramids of shelves occupied by corals and other fossils.

One large glass-fronted case extending across the north-west room, a length of thirty feet, filled with corals.

One hundred and two boxes filled with fossils stored in the south-west corner basement of the State Hall.

Sixty-seven boxes sent down, and now in the third story of the building awaiting arrangement in drawers.

On the same floor twenty-one large boxes filled with fossil corals.

The following is an approximate statement of property belonging to the State of New York, now in custody of Professor James Hall, and arranged in buildings owned by him. (November 26, 1886):

Lamellibranchiata, types and typical specimens, occupying	76 drawers.
Brachiopoda, types and typical specimens, occupying,	45 drawers.
Gastropoda, types and typical specimens, occupying,	20 drawers.
Pteropoda, types and typical specimens, occupying,	10 drawers.
Cephalopoda, types and typical specimens, occupying,	15 drawers.
Sponges, types and typical specimens, occupying	5 drawers.
Corals, types and typical specimens, occupying	16 drawers.
Iowa collection, including types, occupying	13 drawers.
Warren county, Pa., collection	11 drawers.
Crustacea, occupying	3 drawers.
Cephalopoda, duplicate collections	30 drawers.
Gastropoda, duplicate collections	20 drawers.
Brachiopoda, duplicate collections	40 drawers.
Graptolites, duplicate collections	60 drawers.
Corals, duplicate collections	40 drawers.
Portage and Genesee slate	30 drawers.
Bryozoans, including typical specimens and duplicates	200 drawers.
Miscellaneous, occupying	20 drawers.
	* 654 drawers.

The present condition of the forthcoming volumes is essentially as given below. The work of drawing and lithography will, of course, change from day to day.

Vol. VI. Corals and Bryozoa.

This volume is to comprise 300 pages of text and sixty-eight plates; sixty plates are already lithographed; eight plates still remain to be lithographed. About fifty pages of the text are now in type.

The description of the species are essentially all written, and only require revision to be ready for final publication.

The descriptions of the figures on plates 1 to 23, and 25 to 42

* All the material here enumerated has been delivered at the State Hall, the delivery being completed in the early part of July, 1887.

(except 31 and 32), in consecutive order, together with plates 44, 45, 49, 50, 51 and 53 have all been written out and put in type. This work has occupied much time, and is an important element in forwarding the final publication of the volume.

Recent investigations among our own collections and the great amount of literature recently published upon this class of fossils have shown the necessity for re-examining the generic relations of the species, and the establishing of new genera. To this end many specimens have been cut, and photographs of structure have been made. This work, while it hinders the present or immediate progress of the work, will facilitate the final publication of the volume.

Vol. VII. To Include the Crustacea and the Supplementary Matter upon Pteropoda and Cephalopoda.

This volume is to comprise 325 pages of text and sixty-six plates. Twenty-two plates are lithographed and printed; two other plates are in the hands of the lithographer, and one of these is completed. At present one lithographer will continue at this work, while the other one will complete the few remaining plates of the bryozoa. Drawings are already made for about thirty plates, leaving fourteen to be provided for.

A considerable amount of manuscript, has been prepared for this volume, but none of it has yet been put in form for the descriptive text.

The greater part of the species have been heretofore described and the explanations of a considerable number of the plates have been written and printed in the volume of Illustrations of Devonian fossils.

The volume in all its preliminary work is in fair and satisfactory progress.

Vol. VIII. Brachiopoda.

This volume is to contain 300 pages of text and fifty-seven plates. Of the latter, twenty-seven plates have been lithographed and printed, and the explanation of the figures also printed. Photographs for illustrating the microscopic structure of the shell have been prepared for about six plates, and more are yet to be made. No manuscripts, except the explanations of plates, is in form for the printer.

This volume was originally intended to embrace a revision of the genera of the class Brachiopoda, with illustrations of the generic and structural features, together with the microscopic shell structure of all the genera. There is still much work to be done in the collection and preparation of material and its illustration before the volume can be regarded as in a forward state toward completion. I have heretofore called attention to our deficiencies in this respect, and the necessity of making farther collections for this work.

As soon as volume VI shall be published, the work on volume VII will be pushed rapidly forward.

While the removal to the State Hall has been accepted as a most gratifying result of the past efforts to secure the occupancy of working rooms and museum facilities, there are some considerations which should not be lost sight of in our felicitations, or in our estimate of what may be accomplished in the future.

The buildings and working rooms, which were originally provided at my own personal cost, and at first fitted up, and for a long time maintained, from the same source, were located so far from the busy part of the town that we were free from interruption and pursued our work in a quiet way. For many years my own work began as early as six o'clock in the morning, often earlier, and was continued late at night. The rule for my assistants was eight o'clock in the morning.

It was this system of earnest and unremitting labor of my assistants, draughtsmen, lithographers and myself through so many years prior to 1881 that accomplished an amount of completed and preparatory work in lithographed plates and manuscript which in 1883 made it possible to define the limits of the work, and to promise the completion of these volumes of palæontology within any definite period of time.

In the later years conditions have changed, the system of work broken in 1881 will never be revived. My assistants wish to recognize public office hours, my own energies are not equal to what they have been in years past, and therefore an allowance in time must be made for the completion of this work. Beyond these things there remains the fact that we shall now be located in public offices, subject to many interruptions, and it will be quite impossible to carry on our scientific investigations in the quiet and seclusion of past years.

With these changed conditions there will finally and inevitably come a deterioration in the quality of the work produced in every stage. This change is already especially apparent in the character of the lithographic work produced under the contract of 1883.

I estimate that fully one-third more time will be required to complete the work in hand in our present offices than would have been required had we remained in our former quarters. While I have no doubt that every one will try to do his duty, he will find interruptions which he cannot anticipate or provide against.

From the end of April of last spring, my own time has been almost entirely given to the direction and supervision of the packing and removal of the collections from my own premises to the State Hall. At the time of communicating this report, we are not established in our new offices and working rooms.

While I am glad to see all this accumulation of collections, which will afford means for study and investigation for many years to come, arranged in a public building during my life-time, I cannot help feeling that more retired quarters, especially adapted for such work, would have greatly facilitated progress in scientific research.

I am, very respectfully, your obedient servant,

JAMES HALL,

January, 1887. *State Geologist.*


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