PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

WASHINGTON.

Volume 1.

1884–1889.

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Publication Committee for Volume I.

E. A. Schwarz. J. B. Smith. Dr. W. H. Fox.

L. O. Howard. B. P. Mann.

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This first number of the Proceedings of the Entomological Society of Washington will be followed from time to time by other numbers with a consecutive pagination, until the completion of the volume, when a title page and index will be furnished.

Single numbers may be obtained from the Corresponding Secretary at fifty cents each. Address JOHN B. SMITH, U. S. National Museum, Washington, D. C.

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GIBSON BROTHERS,
PRINTERS AND BOOKBINDERS.

ENTOMOLOGICAL SOCIETY OF WASHINGTON.

ORGANIZATION.

In response to a circular call, of which the following is a copy, a number of persons interested in entomology met at 1700 Thirteenth st., N.W., Washington, D. C., on Friday evening, February 29, 1884:

(*Copy of Call.*)

Entomology is now so well represented at the national capital that some organization of those persons interested in it seems desirable, both on social and scientific grounds. The undersigned, voicing what we believe, after considerable inquiry, to be the general desire of all those in any way interested in insects, both in Washington and Baltimore, hereby invite you to an informal meeting at the residence of Prof. C. V. Riley, 1700 Thirteenth st., N.W., on Friday evening (February 29), at 7.30 P. M.

At this meeting it is proposed to discuss, informally, the advisability of forming such an organization, and, if the general sentiment prove favorable, to provide for permanent organization at a subsequent meeting to be then and there decided upon.

You are earnestly invited to attend, or, if unable to do so by reason of prior engagement, to address either of the undersigned by letter, giving your views on the subject:

C. V. Riley,
E. A. Schwarz,
L. O. Howard.

After a thorough discussion the following resolution of organization was unanimously adopted:

"Whereas, an Entomological Society is demanded at Washington, we, as persons interested in entomology, do herewith constitute ourselves an organization for the purpose of coöperation to advance, encourage, and enjoy pure and economic entomology and the social relations called for by our mutual interests."

A committee was appointed to draw up a constitution and to call a second meeting immediately on its completion. This second meeting took place at the residence of Dr. C. V. Riley, on Wednesday evening, March 12, 1884. The Constitution which follows was adopted.

CONSTITUTION.

ARTICLE I.

NAME.

The name of this organization shall be The Entomological Society of Washington.

ARTICLE II.

OBJECTS.

The objects of the Society shall be to promote the study of entomology in all possible bearings, and to cultivate social and friendly relations between those in any way interested in the science.

ARTICLE III. / as amended, p. 78

MEMBERS.

The Society shall consist of active, corresponding, and honorary members. Candidates for membership shall be proposed in writing by at least two active members, and, upon recommendation of a majority of the Executive Committee, shall be balloted for at any subsequent meeting of the Society. A majority vote of the active members present when the ballot is taken shall be necessary for election.

ARTICLE IV.

OFFICERS.

The officers of the Society shall be a President, a First Vice-President, a Second Vice-President, a Recording Secretary, a Corresponding Secretary, and a Treasurer, to be elected by ballot at the annual meeting. There shall be an Executive Committee, consisting of the officers of the Society and three members to be elected by the Society in the same manner.

ARTICLE V.

DUTIES OF OFFICERS.

Section 1. The President, or, in his absence, one of the Vice-Presidents, shall preside at the meetings of the Society and of the Executive Committee. It shall be the duty of the President to deliver an address at the closing meeting of the year.

Sec. 2. The Recording Secretary shall take and preserve correct minutes of the proceedings of the Society, and shall preserve all publications and other property belonging to the Society.

Sec. 3. The Corresponding Secretary shall conduct all the official correspondence of the Society, shall keep a list of all members, together with their addresses, and shall give due notice of all meetings.

Sec. 4. The Treasurer shall have charge of all moneys of the Society, and shall make disbursements only under direction of the Executive Committee. He shall collect all fees and assessments, and notify all members who are in arrears, and submit a report of the state of finances of the Society at the annual meeting or whenever called for.

Sec. 5. The affairs of the Society shall be conducted by the Executive Committee, whose duty it shall be to act on nominations for membership, have direction of the finances, audit the accounts of the Treasurer, and provide for the meetings and for publication, and transact any other necessary business.

ARTICLE VI. (II 325

MEETINGS.

The regular meetings shall be held, unless otherwise ordered, on the first Thursday evening of each month. The annual meeting for the election of officers shall be the regular meeting for the month of January. Special and field meetings may be called by the Executive Committee.

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ARTICLE VII. (as amended, see pp. 17

FEES.

The initiation fee of active members shall be one dollar; the annual fee, one dollar, payable at each annual meeting thereafter. Any member in arrears for one year may, after due notification, be dropped from the rolls. No member in arrears shall be entitled to vote.

ARTICLE VIII.

AMENDMENTS.

The Constitution of the Society may be amended at any regular meeting by a two-thirds vote of the active members present, specific notice of such amendment having been given in writing to all active members at least one month previously.

ARTICLE IX.

ORDER OF BUSINESS.

The order of business at the regular meetings, unless otherwise ordered by the Executive Committee, shall be as follows:

1. Reading and approval of minutes.
2. Reports of officers and committees.
3. Election of members.
4. Miscellaneous business.
5. Reading of papers, discussions, and exhibition of specimens.

LIST OF OFFICERS AND MEMBERS.

1884–1885.

President,	C. V. RILEY.
1st Vice-President,	J. G. MORRIS.
2d Vice-President,	GEO. MARX.
Recording Secretary,	E. A. SCHWARZ.
Corresponding Secretary,	L. O. HOWARD.
Treasurer,	B. P. MANN.
Executive Committee,	A. J. SCHAFHIRT, W. S. BARNARD, P. R. UHLER.

MEMBERS.

BARNARD, W. S.	Washington, D. C.
BIRNEY, H. H.	Washington, D. C.
BRUNER, LAWRENCE S.	West Point, Nebr.
BURGESS, EDWARD S.	Washington, D. C.
CASEY, THOMAS L.	San Francisco, Cal.
DODGE, CHARLES RICHARDS.	Washington, D. C.
HEIDEMANN, OTTO,	Washington, D. C.
HOWARD, L. O.	Washington, D. C.
HUBBARD, H. G.	Crescent City, Fla.
JOHNSON, LAWRENCE C.	Holly Springs, Miss.
KŒBELE, ALBERT,	Washington, D. C.
LACEY, R. S.	Washington, D. C.
LUGGER, OTTO,	Baltimore, Md.
MANN, B. PICKMAN,	Washington, D. C.
MARX, GEO.	Washington, D. C.
MORRIS, J. G.	Baltimore, Md.
MURDOCK, JOHN,	Washington, D. C.
OERTEL, T. EUGENE,	Washington, D. C.
PERGANDE, THEO.	Washington, D. C.
RILEY, C. V.	Washington, D. C.
SCHAFHIRT, A. J.	Washington, D. C.
SCHWARZ, E. A.	Washington, D. C.
SHUFELDT, E. A.	Washington, D. C.
SMITH, JOHN B.	Washington, D. C.
STEWART, ALONZO H.	Washington, D. C.
UHLER, P. R.	Baltimore, Md.

PROCEEDINGS.

April 3, 1884.

Fourteen persons present. President Riley in the chair.

A letter from Professor Baird was read granting the use of the council-room of the U. S. National Museum for the meetings of the Society.

Mr. Schwarz exhibited specimens of *Quedius vernix* Lec. and *Q. ferox* Lec. and called attention to a character, hitherto overlooked, of these two species, viz: the presence of an onychial seta, which is simple in the latter and double in the former species.

Dr. Barnard remarked on the hibernation of the Elm-tree Leaf-beetle (*Galeruca xanthomelæna*) on the grounds of the Agricultural Department, great numbers of the beetle having sought shelter in the crevices of telegraph poles near the infested trees. Under these circumstances he advocates the killing of the beetles in winter time.

Prof. Riley read a short communication by Mr. Fred Oates, of England, relating to an incident of the early life of the late Prof. Townend Glover. Mr. Dodge promised to give at some future meeting some other communications on the life of Prof. Glover.

Mr. Murdoch read a paper, of which the following is an abstract:

Insect-collecting at Point Barrow, Arctic Alaska.—Much could not be done in the way of collecting insects, as the snow did not melt till the middle of June, and freezing began pretty permanently by Sept. 1st. Besides, the time of the party was occupied by other observations of all sorts, and insect-collecting could only be followed incidentally. The country is a tolerably level marshy plain, interspersed with innumerable lakes and small ponds, and scantily covered with grass and flowering plants. A complete beetle was found in the stomach of a newly-arrived Lapland Longspur on May 20th, and a hairy caterpillar was found crawling on the snow May 23d. Flies resembling the common house-fly were also seen crawling on the snow at the same date. Dipterous larvæ were also very abundant in the pools early in June, and the gnats left the pupa stage and rose from the surface of the pools in the middle of June. A warm calm day always brought out considerable swarms of mosquitoes, but the summers of both 1882 and 1883 were cold and the mosquitoes were more troublesome. Beetles were collected crawling on the dry sunny spots, and the pools in early summer swarmed with small black *Podurids* resembling grains of gunpowder. Peculiar brown carrion-flies, resembling bird-parasites, were very numerous around the dead bodies at the native cemetery. Insects were seldom seen flying, but were occasionally to be met with along the sunny bank of one lagoon, especially crane-flies, and a few large humble-bees. A few moths were hatched from cocoons picked up on the tundra, but only one was seen flying in the two seasons we were at the station.

In connection with Mr. Murdoch's communication, Dr. Barnard remarked on the food of Poduridæ which he had observed feeding on the remains of dead clams in Louisiana; Dr. Riley on an interesting, not yet determined, Dipteron found around the Esquimaux burying-grounds by Mr. Murdoch; Mr. Schwarz on the Coleoptera, and Mr. Marx on the spiders collected by Mr. Murdoch.

Mr. Howard read a communication on the so-called Mistaken Parasite, *Platygaster error* Fitch. He showed how this species had been connected with a series of mistakes from the time of its original description, mainly from the fact that the characters given by Fitch were not specific. He called attention to the improbability of the reported observations of Herrick and Cook on the oviposition of this species in the eggs of *Cecidomyia destructor*, and, in closing, exhibited specimens of an allied species of the genus *Telenomus* bred from eggs of *Chrysopa*.

Mr. Schwarz read a paper on the insect fauna of the District of Columbia. He calls attention to the complexity of the faunal regions of North America as compared with the simplicity of the palearctic fauna. As to the fauna of the Atlantic slope, the number of subdivisions formerly adopted have been gradually reduced to three—the boreal fauna, that of the Northern and that of the Southern States. The fauna of the District comes, of course, very close to the dividing zone between the two last-mentioned regions, but must, in his opinion, still be attributed to the Southern fauna. The topographical features of the District are exceptionally favorable for harboring a very rich insect fauna, and every one who has paid any attention to the collecting of insects in the vicinity of

Washington must be struck with the great number of species occurring within that limited area. Mr. Schwarz finally urged that it should be one of the duties of this Society to collect and compile materials for an insect fauna of the District, a work that would be facilitated by the large collections that have already been made in the District, and a part of which has already been put on record in the literature.

June 5, 1884.

Twelve persons present. Vice-President Marx in the chair.

Mr. Stewart exhibited a number (32) of parasites which he found dead within a pupa of *Antheræa cynthia*. Mr. Howard identified the parasite as *Smicra mariæ*.

Mr. Stewart further remarked on a trilobed gall he observed on Elm leaves, and Mr. Pergande thinks it referable to the Cocks-comb Elm-leaf Gall produced by *Colopha ulmicola*.

Mr. Stewart also mentions the issuance of an undetermined parasitic larva from the imago of a Dragon-Fly (*Odonata*).

Mr. Schwarz exhibited specimens of a beautiful and undescribed species of *Orchestes** and of *Apion walshii* which he found infesting *Betula nigra* in the vicinity of Washington. The larva of the former species has not yet been found, but larvæ of the Apion were exhibited infesting the catkins of the birch.

Mr. Pergande exhibited a collection of European Hymenoptera representing types of genera and which he had just received from Dr. Schmiedeknecht, of Germany.

Mr. Howard exhibited specimens of *Inostemma boscii* (?) and gave a short history of the theories concerning the curious thoracic appendage, arriving at the conclusion that it is a secondary sexual character.

Mr. Howard also exhibited specimens of a new species of *Schizaspidia*, collected in Florida by Mr. Schwarz, and which were also furnished with remarkable thoracic prolongations.

Mr. Schwarz exhibited specimens of *Eleusis pallida* (family Staphylinidæ) and *Ino immunda* (family *Cucujidæ*), remarking

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* Since described by Dr. Horn as *O. betuleti*.

that the extraordinary resemblance between these two insects of two quite different families must be a purely accidental one, having no connection whatever with mimicry.

Dr. Barnard exhibited a specimen of *Harpalus pensylvanicus* infested by a Hair-worm, and remarked upon the structural characters, the development and habits of *Gordius* and *Mermis*. He also mentioned the fact that *Mermis acuminata* has been found in the Apple-worm (larva of *Carpocapsa pomonella*), and in explanation of this fact he proposed the theory that immature larvæ from fallen fruit returning to the tree get attacked while thus on the ground, and ascend to enter other fruit thereafter on the tree, and that this will account for the cases observed.

Mr. Marx read a paper on the geographical distribution of Arachnida in North America, going through the natural families of the Order, and dwelling upon the peculiarities exhibited by each family in connection with the geographical range.

Mr. Marx offered some remarks on the mode of respiration in *Epeira sylvatica* as observed in a living specimen which he had received from Ft. Stevenson, Dakota. The pneumatic stigmata were found to open and close alternately at regular intervals, whereas the hitherto accepted theory was that the stigmata leading to the lungs were constantly open and prevented from being closed by the horny ring, or bulla, surrounding the aperture.

Mr. Marx read some biological notes on *Latrodectus mactans*, especially on its mode of capturing insects by means of a sticky fluid exuded from the spinnerets. The variability in general appearance, coloration and markings exhibited in this species in its different molts is really wonderful, and the following specific names must be considered as synonyms: *L. perfidus* Walk., *variolus* Walk., *formidabilis* Walk. and *intersector* Fabr.

Mr. Howard stated that the collection of Lepidoptera of Mr. Mead had been purchased by the Rev. Mr. Holland, of Pittsburg, Pa.

October 2, 1884.

Six members present. Vice-President Marx in the chair.

Lieutenant Casey remarked upon, and illustrated by drawing, a monstrosity observed in a Longicorn beetle of the genus

Acmæops. The left front leg has three tarsi, the two additional ones originating, not as is usual in such cases from the tip of the tibia, but from the tip of the first joint of the regular tarsus.

Mr. Schwarz exhibited a specimen of a rare Curculionid, *Hilipus squamosus*, found in southern Georgia.

Mr. Howard mentioned a curious instance of irregular development of the wings in a Chalcid. The specimen described is in the collection of Dr. Riley, and is a female of *Isosoma tritici*. The fore-wings are represented by mere rudimentary pads, while the hind-wings are fully developed. The rule in this species is no wing development whatever, but occasionally a fully winged specimen occurs.

November 6, 1884.

Ten members present. President Riley in the chair.

Mr. Hubbard read a paper on the habits of *Hypotrichia spissipes* as observed by him at Crescent City, Florida. He exhibited a specimen of this rare Lamellicorn beetle which had impaled itself upon a spear of grass, and called attention to the thinly chitinized structure of the male which rendered it liable to such accidents. The rapid flight of the male and its habit of seeking out the female by burrowing into the sand was noted. Mr. Hubbard then remarked upon the sexual differences in this and the allied genus *Plectrodes*, and pointed out the close relationship of both forms with *Pleocoma*, a genus which has been placed by LeConte among the Scarabæidæ pleurosticti.

Mr. Hubbard made a communication on the life-history of *Mallodon melanopus* and the dwarfing of oaks caused by the larva of this large Cerambycid. The larva lives in Florida in the roots of highland varieties of the Live Oak (*Quercus virens*) and forms a sort of root-gall, reducing the tree to a cluster of shoots. The insect being common throughout Florida, large tracts of land which might become forest thus remain barren oak shrub in consequence of its attacks.

Dr. Riley remarked that his own and Mr. Geo. Noble's observations in the vicinity of Savannah, Ga., had corroborated Mr. Hubbard's experience.

Mr. Mann commented on the extensiveness and variety of the literature of science as a whole, and the impossibility of obtaining a knowledge of the literature relating to special departments of research without the aid of summaries or indices prepared for the purpose. He then dwelt upon the multitude of separate partial indices now in existence, upon the difficulties experienced in making use of these indices, and the waste of labor expended in disconnected attempts to obviate these difficulties. He adverted to the advantage which would accrue to all students through co-operative effort to obviate the difficulties described, and remarked upon the necessity, in case such co-operation is to take place, of determining upon a system of carrying it out. He concluded with remarks on the appropriateness of the execution of a plan of co-operation in connection with the work of the Division of Entomology in the U. S. Department of Agriculture.

Mr. Schwarz read a paper on the changes that take place in the imago state of Coleoptera. After briefly referring to the changes brought about by the inclemency of the weather, old age and other external influences, he explained the general differences between the immature and mature imago, and more particularly such differences of a more structural character. These are the loss of the front tarsi in certain coprophagous Scarabæidæ and the loss of the mandibular appendages in the family Otiorhynchidæ. As a third instance of such changes Mr. Schwarz exhibited immature specimens of *Mezium americanum*, which are all covered with rows of very conspicuous clavate bristles, whereas in the mature specimens these bristles are so completely lost on the elytra that even their points of insertion cannot longer be observed.

A discussion on the habits of *Mezium* followed. Dr. Riley stated that he had found it in old hay. Mr. Hubbard mentioned finding it in immense numbers in a rat's nest, and Mr. Pergande stated that he had commonly bred the allied *Ptinus brunneus* from rat's dung.

Dr. Riley made some remarks on the collection of insects made at Point Barrow, Alaska, by Prof. John Murdoch,* calling attention to the fact that, as with other collections from arctic regions, a large percentage of the species was common to both

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* *Vide* p. 9.

America and Europe. The species were just such as would be expected from a country characterized by low herbage, with the exception of *Urocerus flavicornis*, which had doubtless been introduced in timber.

Dr. Riley made some remarks on the phytophagic habits of the genus *Isosoma*, instancing further corroborative proof thereof as shown by the habits of a new species which he described as *I. grande*, and in which he had been able to examine the female in the act of ovipositing.

Dr. Riley gave a description of a new species of *Acrobasis* (*A. vaccinii*) which, in the larva state, is the well-known "Cranberry Fruit-worm," hitherto unknown in the imago state.

He criticised the conclusions recently assumed in the Bulletin of the Brooklyn Entomological Society as to the lignivorous habits of *Rhyssa lunator*, giving his own experience to show that it is parasitic.

Dr. Riley also criticised a recent report in *Psyche* of Mr. Lugger's statement in reference to the habit of *Tiphia* and *Rhipiphorus* as found upon *Lachnosterna fusca*, stating that the account of the oviposition of both species was manifestly incorrect.

December 11, 1884.

Ten members present. President Riley in the chair.

Mr. H. G. Hubbard was elected a member of the Society.

Mr. Stewart exhibited a large number of insects collected at the electric light on the dome of the Capitol. Mr. Schwarz remarked that among the insects thus collected, there were many hitherto not known to be attracted by light. Prof. Riley also spoke upon the collection, and Prof. Riley remarked that he was called upon the latter part of September by the architect of the Capitol, Mr. Edward Clark, for advice as to the disfigurement of the buildings, which had been cleaned at great expense during the summer. He found that the hosts of small soft-bodied Dipterous and Neuropterous insects, attracted by the electric light, had made the building a paradise for spiders, which, by their webs and the carcasses of their victims, had sadly disfigured the building. He advised the non-use of electric light during August, September and October.

Prof. Riley also presented a list, prepared by Mr. Marx, of the species of Arachnida thus found, and stated that most of them were probably aërial species, *i. e.*, species having gossamer habits. Mr. Marx added some remarks on these spiders and on the families in which gossamer habits have been observed.

Mr. Hubbard read a paper on the discovery of a species of *Anophthalmus* in Luray Caverns, Virginia. The only specimen observed was found in the immediate vicinity of an electric light about half a mile from the entrance of the cave and proved to be identical with *A. tenuis*, which was hitherto known only from Erhard Cave in Montgomery Co., Virginia, at least 140 miles distant from Luray. Mr. Hubbard added some remarks upon the geographical distribution of the North American species of Anophthalmus, there being only one known from Virginia, five from Kentucky, and two from Indiana; further, on their mode of living and the mode of collecting them.

Mr. Schwarz spoke on parasitic Coleoptera, enumerating the different modes of parasitism known to occur in that Order. He mentioned (1) species known to be parasitic only in the imago state, as exemplified by the genera *Platypsyllus*, *Leptinus* and *Amblyopinus;* (2) genuine parasites, as exemplified by the family Stylopidæ and the genus *Rhipidius;* (3) the *Meloidæ* and most of the *Rhipiphoridæ*, which present in the larva state a much less pronounced parasitism; (4) some isolated cases still more leaning toward predaceous habits, as exemplified by the genus Trichodes and by *Brachytarsus scabrosus*.

Dr. Riley said that he missed *Aleochara anthomyiæ* in the enumeration of parasitic Coleoptera, and thinks that its parasitic nature is well established by Mr. Sprague's observations. Mr. Schwarz replied that from analogy with the known habits of other Aleocharinæ he considers this Aleochara to be merely a predaceous species.

A discussion on the terms commensalism and parasitism followed.

Mr. Hubbard mentioned in this connection the probable occurrence of *Platypsyllus castoris* in the Lake Superior region as reported by beaver hunters.

January 8, 1885.

Ten persons present. President Riley in the chair.

The election of officers then took place, and the officers of the Society for the year 1884 were re-elected for the year 1885.

Dr. Riley exhibited a specimen of the larva of the Dipterous genus *Scenopinus* found by Dr. E. Bessels infesting the blanket of a Navajo Indian. He related the history of *Scenopinus pallipes* as observed by Mr. Sanborn and remarked upon the species of the genus hitherto observed in the United States. Mr. Schwarz pointed out the great external resemblance of this larva to that of the Coleopterous genus *Cardiophorus*.

Dr. Marx reported the discovery of the male of the Arachnid genus *Gasteracantha* by Mr. H. G. Hubbard, of Crescent City, Florida.

March 12, 1885.

Eight persons present. Vice-President Morris in the chair.

The Corresponding Secretary read a letter from Mr. Lawrence Johnson, of Gainesville, Florida, in relation to a number of insects observed in Florida injurious to vegetation, among them more especially a Pyralid larva injuring Paw-paw (*Asimina*).

Mr. Mann offered some remarks on the advisability of exact transcription of titles in making references to publications, as otherwise such works often could not be identified with certainty by the titles quoted.

Mr. Schwarz exhibited twigs of Sumac (*Rhus glabra*) infested, and probably killed, by a Scolytid beetle, *Pityophthorus consimilis*, and remarked upon the work of this species.

The President then delivered his annual address:

ANNUAL ADDRESS OF THE PRESIDENT.

Fellow-Members:—Your president has experienced some difficulty in choosing a subject upon which to address you as required by our constitution. Our Society is too young for retrospect, while a review of entomological events of a general character is in a measure forestalled by the various publications devoted to our science and by the English and German Zoölogical

Records. Some of the incidents of the year, so far as North America are concerned, are also recorded in my annual report as U. S. Entomologist. Yet it may be interesting to briefly refer to a few facts that have characterized the year just closed and that are sufficiently interesting to warrant comment.

On May 20th, Prof. A. J. Cook sent me some Noctuid larvæ about one-third grown, which were appearing in vast bodies, like the Army Worm, in parts of Michigan. While resembling most the darker forms of the larva of *Laphygma frugiperda* Sm. & Abb., they yet differed and did not fully correspond with any of the numerous Noctuid larvæ known to me. The species subsequently, upon being reared to the imago by Prof. Cook, proved to be *Agrotis fennica* Treitschke, and, as subsequent reports showed, was abundant and destructive over a wide area and particularly in the Ottawa district in Canada. The larval history of the species had not previously been known; neither had the species been counted as among our injurious insects. It is widely distributed, occurring in all parts of the Northern States and on the Pacific. The worm first appeared in April, and the destructive brood in May was probably a second brood. Prof. Cook gives a good account of it with very poor figures in his "Notes from the Entomological Laboratory of the Michigan Agricultural College," published independently and without date. It seems to be a general feeder, though affecting principally grass, clover and strawberries.

Almost every year some species scarcely heard of before thus becomes conspicuous, and this sudden and wide-spread appearance of a species not previously noticeable is one of the most interesting phenomena presented for our consideration, and I have discussed it in a paper on "New Insects Injurious to Agriculture," read at the Cincinnati meeting of the A. A. A. S. in 1881, part of the abstract of which is in these words:

"These new destructive species may either be (1) recently introduced species from some foreign country, (2) native species hitherto unobserved or unrecorded, and new in the sense of not being described, or (3) native species well known to entomologists, but not previously recorded as injurious.

"The author argues that in the last two categories, more particularly, we frequently have to deal with newly-acquired habits, and in the second category with newly-acquired characters that in many cases systematists would consider of specific value. In short, he believes that certain individuals of a species, which has hitherto fed in obscurity on some wild plant, may take to feeding on a cultivated plant, and with the change of habit undergo in the course of a few years a sufficient change of character to be counted a new species. Increasing and spreading at the rapid rate which the prolificacy of most insects permits, the species finally becomes a pest, and necessarily attracts the attention of the farmer. The presumption is that it could not at any previous time have done similar injury without attracting similar attention; in fact, that the habit is newly acquired. The author reasons that just as variation in plant life is often sudden, as in the 'sport,' and that new characters which may be perpetuated are thus created, so in insects there are comparatively sudden changes which, under favoring conditions, are perpetuated. In this way characters which most systematists would consider as specific, originate within periods that are very brief compared to those which evolutionists believe to be necessary for the differentiation of specific forms among the higher animals."

The cut-worms seem to have been unusually abundant during the spring of 1884, and one species, viz., *Hadena devastatrix* Brace, common to both Europe and America, attracted a great deal of attention and did much injury in Manitoba.

Another insect which deserves particular mention is *Nematus erichsonii*. This was first ascertained to be the cause of the death of the Larch, or Hackmatack, in Maine and other parts of New England, during the year 1883, when I had the opportunity of witnessing, in company with Dr. Packard, the wide-spread devastation which it had caused. It was fully reported on by Dr. Packard in the annual report of the U. S. Entomologist for 1883, and has, during the past year, been observed doing similar injury to Larch in parts of Canada.

The Clover Leaf-beetle (*Phytonomus punctatus*) also attracted unusual attention in 1884 and was said, at the meeting of the Entomological Club of the A. A. A. S., to have attacked beans. It has also been reported as quite abundant in parts of Ontario, and the beetle was found in countless numbers on the western shore of Lake Erie. Nothing further as to its life habits has been added to that published by me in 1881, but its occurrence in such numbers, and over so large an extent of country, so soon after its first injuries were reported, presents abundant cause for reflection and would indicate that the species is rapidly extending its range, especially westward.

Another species of the same genus, namely, *P. nigrirostris*, has been found in Canada by Mr. Jas. Fletcher, of Ottawa, also feeding upon clover.

Pulvinaria innumerabilis was unusually abundant in 1884 in all parts of the country. There is need of very careful study of the forms found upon so many different trees, forms which, on account of their general resemblance, are looked upon as being one and the same species. So far as experiments go, some which I made some 12 years since at Kirkwood, Mo., by transferring the young from one plant to another, prove, so far as such evidence is proof, that the species found upon Oak, Maple and Grape-vine are the same; but where such evidence is wanting, we must study not only the young and the males but the structural characteristics, especially those of the anal plate in the females, before we can feel assured that we have to deal with but one species.

That cosmopolitan butterfly *Pyrameis cardui* attracted considerable attention during the year, feeding upon our nettles and thistles. I refer to it, however, chiefly because of its migrations, notices of which have been abundant in European journals. The fact of the extended migration of butterflies has only recently come to be fully appreciated. I have discussed these butterfly migrations, so far as our *Danais archippus* is concerned, in an article in the *Scientific American* for April 6th, 1878, entitled "The Migration of Butterflies," and shown that there is a very general southward movement, accompanied by congregation and concentration, from the extreme northwestern portion of the country to the Gulf States in autumn, and a return migration and dispersion the ensuing spring and summer.

It is a noteworthy fact that migrating butterflies have a wide range. That *Pyrameis cardui* flies in vast numbers over large stretches of the European Continent and across the Channel to the British Isles is a well-established fact, and the migratory tendencies have their explanation, in all probability, in the same promoting causes as those of our Rocky Mountain locust, *i. e.*, chiefly excessive multiplication and want of fresh food. Throughout southern Europe, or at least large proportions of it, the month of July is apt to be excessively dry. I witnessed last year, early in July, in South France, a phenomenal occurrence of this butterfly. Its larvæ had absolutely devoured all the thistles and even the cultivated artichokes in those portions of the *Midi* which I visited, and I saw as many as 30 chrysalides upon a single grape-leaf in a vineyard adjacent to a railroad. The butterflies were excessively numerous along the lines of the different railroads, seeking in vain for fresh plants upon which to lay their eggs, and it is no wonder that under such circumstances they congregate in increasing numbers and finally rise in the air and travel such long distances, guided by the prevailing winds. What is true of this particular species is likewise applicable to some of the Yellows (genus *Colias*). I shall never forget an experience on the morning of July 2d in training from Montpellier northward. As the train swept along it stirred up for many miles a continuous cloud of brown, yellow, and white butterflies, consisting chiefly of the species just mentioned and the common *Pieris rapæ*. In reference to this last species it may perhaps be well to mention the successful introduction, here at Washington, of one of its chief parasites, the *Apanteles glomeratus*.

Osten Sacken has recently called attention, in the *Wiener Entomologische Zeitung*, to the fact that P. J. Stepanoff has published in Russian (Proc. of the Nat. Hist. Soc. of the Univ. of Kharkoff, vol. xv), an account of the parasitism of the larva of *Systœchus leucophæus* Meig. in the egg-sacs of *Stauronotus vastator* Stev. His observations seem to have covered also the years 1879 and 1880, the same period during which I was gradually getting the truth as to the true character of the Bombyliid larvæ infesting the egg-sacs of *Caloptenus spretus*. It will be remembered by most of you that Mr. J. Calvert, as subsequently appeared in the Transactions of the London Entomological Society, was, during the same period, making similar observations in the Dardanelles. While the observations of Mr. J. G. Lemmon in California were subsequent to and instigated by my own (he having been employed by me to make observations and report on *Camnula pellucida*), and our observations cannot therefore be considered independent, there seems little doubt that those of Calvert and Stepanoff were entirely independent, and, as Osten Sacken points out, it is a little remarkable that in three different parts of the world similar original facts on the same family and even the same genera were being observed during the same year. Such coincidences are not at all rare in the history of discovery; indeed, they are sufficiently frequent to lead to the conclusion that they are due, in no small measure, to similar favorable opportunities owing to the abnormal abundance of the species observed.

The correspondence between Stepanoff's observations and my own go still farther, for he also found an Anthracid, namely, *Mulio obscurus*, similarly feeding in the larva state on the locust eggs, just as I found *Triodites mus* associated with *Systœchus oreas;* while he discovered also an Anthomyia egg-parasite which he determined as *Anthomyia radicum*, thus referring it to the very species to which originally I referred ours, but which was subsequently decided by Meade to be *Anthomyia angustifrons*.

While touching on the egg-parasites of the Acridiidæ, it may be of interest to mention that I have recently received from Dr. A. Ernst, of Caracas, Venezuela, a number of specimens of a *Scelio* which he found very abundant in the eggs of *Acridium peregrinum*. The receipt of the specimens from Dr. Ernst has led me to study more carefully the species originally described as *Caloptenobia ovivora*, but which was subsequently, upon further examination, referred to *Scelio famelicus* Say. The result of the recent studies would indicate that *Caloptenobia ovivora*, while belonging properly to the genus *Scelio*, is really quite distinct from *Scelio famelicus*, and will therefore hold good specifically. The specimens were bred from eggs of *Œdipoda carolina* by Mr. S. H. Scudder. Those from Dr. Ernst are larger and constitute a new species which I propose to call *ernstii*, while others bred from the eggs of *Caloptenus atlanis* constitute a third species intermediate in size between the other two, and which will be described as *caloptenorum*. Dr. Ernst has also found some other parasites of the locusts themselves, and notably *Priononyx striata* Sm., just as we found *P. atrata* St. F. attacking *spretus;* also a species of Mermis. All these facts go to show how great is the unity of habit in the same genus in widely different parts of the world.

During the year I have had an excellent opportunity of studying the course of the French people in their fight against *Phylloxera vastatrix*, and it has been most gratifying to see how at last the insect is no longer feared by those who have tried most persistently to deal with it. With the improved methods of applying bisulphide of carbon, both by hand injectors and by more complicated machines drawn by horses, the French grape-grower can measurably protect his vineyards, and I have every hope that future experience with the kerosene emulsion will give them another important and valuable remedy; but the chief reliance is on the resistant American vines, and it was most gratifying to find, over hundreds of square miles, vineyards previously devastated entirely reconstituted by such means. In fact it was noticeable that the grape-growers there were in far greater dread of the Downy Grape-leaf Mildew, *Peronospora viticola*, which was imported in 1877 upon American vines, than of the *Phylloxera*.

Perhaps one of the most interesting discoveries of the year 1884 is the mode of oviposition in some of our Carabidæ. Schaupp (Bull. Br. Ent. Soc., I, p. 35) states that, having placed several specimens of *Carabus limbatus* in a breeding cage on March 31st, he observed afterwards in the cage one larva and several eggs; again he says (l. c.) that in a cage wherein several *Chlænius æstivus* and *Galerita janus* were kept he observed, on July 4th, one larva of *Galerita*, two of *Chlænius*, and "several eggs." He does not describe the eggs and only refers to them (l. c., p. 26) as "usually imbedded in the earth."

From the terrestrial habits of most of our species one would expect that the eggs are deposited within the ground, and such may yet prove to be the case with many; but I have proved by actual breeding from eggs to the imago that it is not so with *Chlænius impunctifrons*, and have strong proof that *Chl. æstivus*, *Scarites subterraneus* and the genera *Dicælus* and *Galerita* share with that species its singular mode of oviposition. The remarkable and unexpected fact, in insects so essentially terrestrial, is that the eggs are laid singly on the leaves of trees and shrubs and encased in a covering of mud or clay. I had often observed these little convex mud-cells on the underside of leaves while collecting along the Mississippi in Missouri in years gone by, and was puzzled to make out their real nature. In May and June, 1883, while collecting on the Virginia side of the Potomac with other members of this Society, I found these clay cells tolerably common and, fortunately, fresh, each containing a large soft white egg. That year I obtained larvæ, but only during the past year were any of these reared to the imago. Similarly remarkable oviposition away from the food or habitat of the larva is known in the Lepidoptera and Neuroptera.

Gentlemen, it is just one year ago this evening that we organized, and while we have little to review, it may not be unprofitable to anticipate our future, or at least what we should hope and aim for.

We organized to promote the study of Entomology in all its bearings and to cultivate social and friendly relations between those in any way interested in the science. Those most interested in the organization had the latter object most prominently in mind.

We have here in Washington a number of collectors and amateurs and some well-known specialists, in addition to the force of the Entomological Division of the Department of Agriculture. The Division constitutes a force that I feel justly proud of, and the working of which has been commended by those who have had occasion to become familiar with it. Yet how far it falls short of my own ideal and of the necessities of the country, or how difficult it is to build it up to that ideal under the unfortunate political unscientific atmosphere that pervades the Department, no one more fully appreciates than myself. The facts remain, however, that there is a good number of active observers whose interest in the subject of entomology is not confined to the particular biologic and economic work of the Division, but encompasses much that could not properly be brought within its scope. The members of the Division have, naturally, become members of the Society and form a good basis for its existence; yet it would be manifestly unnecessary, if not improper, for the members of the force to band together in private simply for the discussion of those entomological subjects which they are working with me to further in official capacities.

It was to get away from official surroundings, away from the work of the U. S. Entomologist, that the members of the Division decided to join in the organization of this Society. It was still more to get better acquainted with those of kindred tastes outside the Department, in Baltimore and elsewhere, as well as in Washington, and to cultivate social intercourse and interchange of views and experience.

From this standpoint it was, perhaps, unfortunate that you chose me as your presiding officer; for I feel deeply that we should avoid everything that may create the impression that the Society is but an echo of the official organization.

Our efforts to enlist the sympathy and co-operation of all the entomologists have been measurably successful, if not as fully so as we have wished; but by perseverance and creditable work, we may hope to enlist the co-operation of all, and in time add them all to our roll of members.

The field is wide and there is an abundance of work to do, and more particularly serious work. It is more creditable to any author to publish some full and complete account of any one insect, whose characters and habits have hitherto been unknown, or a synopsis or monograph of some genus or family, than to cast to the world a whole number of hasty descriptions of species; for while descriptive work thoroughly and faithfully done is of the highest order and most creditable, it is a fact that many entomological writers have busied themselves with descriptive work which has had little other result than to confuse and perplex all subsequent honest and serious workers in the same field.

Certain recent descriptive Coleopterological workers might be cited, by way of illustration; but it is chiefly among Lepidopterists that the unsatisfactory and careless descriptions prevail. I would earnestly urge upon all the members of our Society the great value and significance of anatomical, embryological and histological work, and such monographic work as I have already indicated.

We are fortunate, not only in our surroundings here in Washington, but—and we may say it without vanity—also in the diversity of the interests which our membership represents.

Messrs. Schwarz and Hubbard are already known for their work in Coleoptera. Mr. Howard is devoting himself to the study of the smaller Hymenoptera, and will easily be led to interest himself more and more in the whole Order. Our neighbor in Baltimore, Mr. Uhler, is authority in Hemiptera, and Mr. Heidemann has begun to collect in this Order with enthusiasm. Mr. Pergande has for some time been carefully studying the Thripidæ. Mr. Bruner is taking up the Orthoptera. Mr. Smith is doing good work in the Lepidoptera, while Mr. Marx is well qualified in Arachnida.

In the general bibliography of the subject Mr. Mann has few superiors, and we have several enthusiastic collectors who in due time will, let us hope, make their mark in some specialty.

My own studies are confined to no one Order, but rather embrace biologic studies in all Orders, though by way of specialty I have for many years been accumulating material and notes on galls and gall insects, of all Orders, on the Homoptera and on the Diptera.

While six years ago there were no collections in Washington worthy the name, beyond that of Coleoptera by Mr. Ulke and that of Lepidoptera by Mr. Schoenborn, we have to-day, what with the private and national collections at command, very fair representation in all Orders.

We have started on a moderate basis in the belief that it is better to go slow at first than to exhibit abnormal activity that could not be kept up in subsequent years. Slow development is correlated with longevity in the animal kingdom, and the principle has been exemplified in the history of some societies.

> "Large streams from little fountains flow,
> Tall oaks from little acorns grow,"

and let us hope that there is a great future for the Entomological Society of Washington.

We have for reference, aside from our private libraries, those of the Department of Agriculture, the National Museum, and of Congress, which are rapidly growing more extensive and valuable. We have, moreover, a most interesting faunal location, in which are represented many interesting species; for, while our fauna is essentially southern, many forms belonging to the northern and southern faunas unite, and have their limit line in the District. We have already planned the preparation of an insect faunal list of the District, and I sincerely hope that during the coming season further material for this work will be diligently collected; for the publishing of such a list, preliminary though it should be, will prove a fitting *début* before the world. We have therefore every reason to be hopeful for our Society.

Many of us are connected with Government work, and official life at best is more or less uncertain. Some of us may not tarry long in Washington, or may soon cease to become active members, but there is every promise that others will take the places of those of us who may leave, and in closing this first presidential address of the Entomological Society of Washington, I can but express my earnest hope that it will have a grand future, and help to promote all that is high and noble in the study of insect life, and to raise that study in the eyes of our fellow-men; to render it, in other words, worthy of the highest talent and the deepest thought.

April 2, 1885.

Six members present. Second Vice-President Marx in the chair.

Mr. Mann exhibited a specimen of *Rhagium lineatum* captured two days previously in the streets of Washington. Mr. Schwarz remarked upon the early appearance of this Cerambycid on the walls of houses or at other places within cities. The species lives under pine-bark and hibernates as imago under such bark. Thus it is frequently brought into cities with pine wood, and as such wood is often stored in cellars and other sheltered places, the beetle appears quite early in the season, or even in midwinter on warmer days.

Mr. Schwarz exhibited specimens of *Rhopalopus sanguinicollis*, and remarked that this is one of the few species of Coleoptera peculiar to the mountainous regions of the Alleghanies. The scarcity of species peculiar to the higher montane region of that range, and the almost complete absence of such peculiar forms on the lower altitudes, is strongly contrasted with the abundance of montane and colline forms in Europe. As the probable reason of this difference, he gave the influence of the long-established cultivation of the soil in Europe, by which the fauna and flora of the plains have been gradually brought in contrast with those of the less cultivated hills and, still more strongly, with the not cultivated higher mountains. In North America the corresponding faunas and floras representing the more original state of things have not yet become separated. The fauna of the Alleghanies nowhere represents an alpine character, that of the White Mountains in New Hampshire being essentially arctic in its character.

Mr. Howard made a statement in regard to the parasites of *Thyridopteryx ephemeræformis.* He had found a Chalcid larva feeding within the bags of this species upon the larva of the Ichneumonid parasite, *Hemiteles thyridopterygis*, and surmised that the Chalcid would prove to be the Pteromalus often bred from Thyridopteryx bags. This observation shows that one of the so-called parasites of the Bag-worm is secondary, and so injurious rather than beneficial. The speaker generalized on the distinction so difficult to draw between primary and secondary parasites and urged the importance of close observation and extending rearing of parasites in order to form a basis for a separation between the injurious and beneficial species.

Dr. Marx spoke on the Arachnida collected by Dr. L. M. Turner in northern Labrador. As was to be expected in a country almost destitute of trees, the species living under stones and moss were much more represented than the web-constructing species living among trees. The best represented family is that of the *Lycosidæ*, next the *Drassidæ*, and then the *Thomisoidæ*.

Mr. Schwarz exhibited specimens of *Eutyphlus* and *Nicotheus* of the Coleopterous family Pselaphidæ, the latter genus being recently established by Lieutenant Casey. After a close examination of the two genera, he has no doubt that *Nicotheus* is synonymous with Eutyphlus, and that even the specific difference of the two insects may be doubted, the only difference being the well developed eyes in Nicotheus.

May 6, 1885.

Six persons present. Dr. Barnard in the chair.

Mr. Stewart inquired as to the best places and best methods for collecting Neuroptera, and Dr. Barnard, Mr. Howard and Mr. Schwarz gave their experience in regard to several families and genera of that Order.

Mr. Schwarz exhibited specimens of *Epicærus imbricatus* and stated that this Otiorhynchid beetle has been very abundant early this spring under stones along the Potomac river. All specimens still possessed the mandibular appendages, thus showing that they were freshly hatched. One specimen illustrated the process of losing these appendages. They do not break off in one piece, but the basal third remains attached to the mandibles and must be lost at a later time.

Mr. Schwarz, referring to the hibernation of *Rhagium lineatum* as imago under pine bark, stated that this mode of hibernation, as exemplified by this and some other Cerambycidæ, as well as some other insects, differs from what ought to be considered as the true hibernation of the imago. The true hibernation as imago takes place in insects which have moved about and taken food in the course of the previous summer or fall, and which have then, upon the approach of cold weather, or sooner, sought out, and gone into suitable winter quarters. In the case of this *Rhagium* the imago hatches in the place prepared by the larva. It is born in its winter quarters and remains therein in a dormant state until spring.

June 4, 1885.

Five persons present. President Riley in the chair.

Mr. Howard remarked upon his experience regarding the edibility of the Periodical Cicada. He had continued the experiments begun by Dr. Riley, the latter having been called away from town. With the aid of the Doctor's cook he had prepared a plain stew, a thick milk stew and a broil. The Cicadas were collected just as they emerged from the pupa and were thrown into cold water, in which they remained over night. They were cooked the next morning and served at breakfast-time. They imparted a distinct and not unpleasant flavor to the stews, but were not at all palatable themselves as they were reduced to nothing but bits of flabby skin. The broil lacked substance. The most palatable method of cooking is to fry in batter, when they reminded one of shrimps. They will never prove a delicacy.

Dr. Riley related some of his observations made this season on the Periodical Cicada, dwelling more particularly on the following points: the changes taking place in the insect after immersion in alcohol; the mode of issuing of the imago from the pupa and the resemblance of this act to the same in the *Acridiidæ;* on the sexual differences in the pupa.

Mr. Heidemann exhibited colored sketches illustrating two stages of the issuing of the Cicada from the pupa.

Mr. Schwarz remarked on a species of *Scolytus*, bred from Hickory twigs by Dr. Hamilton of Allegheny City, Pa., and referred by him, in a recent number of the *Canadian Entomologist*, to *S. rugulosus*. This species from Hickory is undoubtedly different from the last-named species and apparently undescribed.

Dr. Riley stated that he had bred *Walshia amorphella* from roots of Loco Weed, the species having previously been known as a gall-maker on *Amorpha fruticosa*. In this connection he also stated in reference to another gall-maker on Solidago, (which he had illustrated with the above-named species in his 2d Report on the Insects of Missouri), that his recent researches led him to doubt the synonymy of *Euryptychia saligneana* Clemens with *Pædisca scudderiana* Clem.

Dr. Riley further stated that *Sphida* Grote had no existence in nature, *Sphida obliquata* Gr. & R. being synonymous with *Arzama densa* Walk. He had examined the type in the British Museum.

November 18, 1885.

Ten persons present. President Riley in the chair.

An invitation from the Chemical Society of Washington to attend the Annual Address of the President was read and accepted.

Mr. Lugger exhibited photographs of the different stages of *Cænia dimidiata* Fabr., and gave an account of its larval history and habits. The following is an abstract of his paper:

In May, 1883, he found the same larva as figured by Packard, (*Guide to the Study of Ent.*, p. 466, fig. 433), and which had never been bred before. He found no less than 214 specimens clustered together at the base of a willow tree, but slightly covered with dead leaves and very little moss. The larvæ closely resemble the cast-off skins of the common *Oniscus* found in similar localities. Scattered between the leaves were numerous specimens of a young *Helix*, evidently born in that locality. The bark of the tree near these larvæ was slightly decayed; a stone pressing against the growing tree being the cause of this decay. Taking the larvæ home to a breeding cage, they remained motionless for some days. Later, however, with increase of temperature, they showed signs of life by slowly crawling about, evidently with the view of fastening themselves more securely to pieces of bark, stones, etc. Their motion was very sluggish—a Helix moving with the velocity of lightning express in comparison with them. The peculiar waxy appendages of the segments of this larva are not fleshy, as stated by Packard, but are hollow tubes and not flexible. The larva otherwise is well figured in the *Guide*.

In the course of about ten days some of the larvæ had transformed to pupæ. The pupa is formed inside of the larval skin, and no outward indications are perceptible, excepting a slightly paler and more uniform white color of the larva; its shape does not change at all. A longitudinal slit along a subdorsal suture on each side is only revealed by pressing the larva. The white pupa is thus snugly hid from view, and the resemblance to a skin of Oniscus is even more perfect than before. In six days a perfectly white imago would issue from one of these slits, leaving the empty pupal skin in the posterior part of the larval skin. The imago changed its color very rapidly; first, to a very light sky blue; later, the posterior portion of the wing-covers acquire a dark blue, and the anterior portion an orange color. The beetles are very sluggish for some time, but during the warm hours of the day would fly about quite actively. They freely copulated, but only one egg was obtained, which, being unfertilized, soon shrank up. He doubts that these larva are carnivorous, but thinks them to be vegetable feeders.

Dr. Riley called attention to the similarity in structure and habit of the larva of *Calopteron terminale* to that of the Cænia. That of Calopteron is gregarious and lignivorous. He had also known *Photinus pyralis* to feed on snails.

Mr. Mann explained at length the Dewey decimal system of classifying and arranging books. This system uses decimally cumulative Arabic numerals corresponding and attached to the divisions of a logical classification of subjects, in combination with an alphabetic index referring by number to the several divisions, thus combining the advantages of logical and alphabetic classification without their disadvantages. It can be used in as great or little detail as desired, and is especially applicable to indices rerum and library shelf classifications. Its definite character renders it a standard, and it is already more widely in use than any other system of subject classification. Dr. Riley took the ground that, while the system is an admirable one for large libraries, there is no need of it for limited or private collections of books.

Mr. Smith read a translation of a paper by Dr. Gerstæcker on the position of the genus *Pleocoma* LeConte, in the Lamellicorn series, from the *Stettiner Entomologische Zeitung*, 1883, Dr. Gerstæcker maintaining that *Pleocoma* has to be removed from the *Scarabæidæ laparosticti* and to be placed among the Melolonthidæ of the group *Scarabæidæ pleurosticti*, and further that the larva described by Osten Sacken as that of *Pleocoma* cannot possibly belong to that genus nor to any genus allied to *Geotrypes*, and that it is undoubtedly that of a Lucanid.

In discussing the paper Mr. Schwarz said that Dr. Gerstæcker was no doubt correct in his views regarding the position of Pleocoma, but that he did not sufficiently emphasize the fact that Dr. LeConte had at his disposal for his first two papers only a single mutilated specimen without abdomen, and that in his subsequent publications on the subject Dr. LeConte had relied on the characters drawn from that broken specimen. The most interesting question, however, is: what is the larva described by Osten Sacken as that of Pleocoma, since there is no Lucanid known to occur in California which is of the size indicated by the larva.

Mr. Howard called attention to the fact that the *Thoracantha floridana*, described by Mr. Ashmead in the July (1885) number of the *Entomologica Americana* as new to the United States, is the same insect as that exhibited by him to the Society in the fall of 1884, and which was collected by Mr. Schwarz at Haw Creek, Florida, in July, 1883.

DECEMBER 3, 1885.

Eleven persons present. President Riley in the chair.

Mr. Lugger presented to the Society a Persimmon cane which was carved in a remarkable and at the same time beautiful manner by the uncovered larval galleries of *Dicerca obscura*.

The cane was accepted with thanks to the donor, and the Society decided to turn it over to the National Museum.

In this connection some remarks were made by Prof. Riley,

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Single numbers of No. 1 of the Proceedings may be obtained from the Corresponding Secretary at fifty cents each; single numbers of No. 2, at seventy-five cents each.

Address OTTO LUGGER, Department of Agriculture, Washington, D. C.

Messrs. Lugger and Schwarz, regarding the food-habits of Buprestidæ, mainly discussing the question whether the larvæ attack healthy trees or only such as are diseased or dying, and, further, whether they are able to live and finish their transformations in dry wood.

Mr. Smith exhibited a specimen of *Pleocoma Behrensi* which he had received from Utah Territory. This locality is interesting, since the species of this genus have hitherto been recorded only from central California.

Mr. Smith exhibited a careful drawing of the larva of *Aphorista vittata*, made from specimens found in October, near Washington, feeding on a kind of snow-white mould on the under side of a log. He gave a description of the full-grown larva of this Endomychid beetle,* drawing particular attention to the peculiar lateral appendages and the peculiar structure of the hairs.

Several theories were advanced by the members present to explain the nature and function of the lateral appendages in this and other Coleopterous larvæ, representing several widely different families.

Dr. Riley spoke on the larval habits of *Lixus*. In 1872 he bred *Lixus macer* from the stems of *Chenopodium hybridum*, the larva boring down the axis of the stem, as usual, and the beetle issuing through a circular hole in the side of the stem. Mr. F. M. Webster had bred the same species from *Helianthus*, the larva girdling the stem from within at the upper end of the burrow and plugging up the girdle with fibre. The beetle then issued from the cut end. Another species, *Lixus parcus*, from California, is also anomalous, the larva producing a gall on the stems of *Amelanchier*.

Dr. Riley also called attention to the girdling habits of *Pædisca obfuscata* Riley, MS., which also issues through the amputated end, but in this case the orifice is plugged up with a web spun by the larva.

Mr. Schwarz exhibited specimens of an undescribed Calandrid beetle, which is interesting on account of its food-habit, the larva and imago having been found by Mr. Hubbard in southern Florida

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* This description is published in full in *Entomol. Amer.*, ii, No. 5, August, 1886, pp. 85–87.

boring into the roots and lower parts of the stems of *Acrostichum aureum*, a fern growing near salt water.

Mr. Howard spoke concerning the larval respiration of *Corydalus cornutus*, calling attention to the fact that the contraction of the branchiæ is more frequent in proportion as the water in which the larvæ are kept grows more stagnant, and that there is a definite relation between the heart-beat and this contraction.

Mr. Mann illustrated the use of the Dewey decimal system by exhibiting samples of Dr. Dimmock's method of preparing classed title-card headings, the system being, in his opinion, even more valuable to scientific workers than for library purposes.

January 7, 1886.

Ten persons present. President Riley in the chair.

Prof. Herbert Osborn was elected a member of the Society.

The election of officers for 1886 took place. Dr. C. V. Riley was elected president, but declined to serve on account of his ill-health and as he had already served two terms. A second ballot resulted as follows:

President, L. O. Howard; 1st Vice-President, Dr. J. G. Morris; 2d Vice-President, Dr. Geo. Marx; Corresponding Secretary, J. B. Smith; Recording Secretary, E. A. Schwarz; Treasurer, B. P. Mann; Members of Executive Committee, Dr. C. V. Riley, O. Lugger, and Theo. Pergande.

The Corresponding Secretary read the following letter from Judge Lawrence Johnson:

MINDEN, LA., *Dec.* 16, 1885.

MR. L. O. HOWARD:

* * * Still let me send in my contribution to specimens:

1. Fragments of iron ore and other rock, with cases of Ephemerids attached. There is a larger rock for you in one of my geological boxes. It is from Poston Bayou, of Red River, Bossier Parish. The principal thing worthy of note is how the little fellows adapt themselves to circumstances. In the softer clay of the same bank they excavate burrows, and where the rock is too hard they have contented themselves with a caddis of silk and bits of silt adhering to the rock.

2. A vial containing Mallophagous parasites of the large White Pelican of Bisteneau Lake, La. * * * The bird had been killed about twelve hours,

and it was so that he hung with his head just out of water, with a large part of the body immersed. The insects climbed to the highest point, and were trying to get their daily meal off of the naked parts in or near the mouth. This gave me opportunity to collect a good many at once.

3. In a smaller box is saved the chrysalis of a worm I found among the Beech Aphids, and, as I thought, eating them. But after I brought down the twig low enough to see certainly what he was doing he became restless, and, after capture, ate nothing that I certainly saw, but soon changed to present form.

In regard to the latter insect, Mr. Howard stated that, according to Mr. Lugger, the caterpillar is that of *Feniseca tarquinius*, and that he (Mr. Lugger) had bred the species during several seasons at Baltimore, having found the larva always among Aphids on beech trees.

Prof. Osborn read a paper of which he has submitted the following abstract:

Observations on certain species of Hemiptera.—Hemiptera were unusually abundant in Iowa during the fall of 1885, and certain species, which have as a rule been scarce or seldom noticed, were so plenty as to be quite noticeable.

Corynocoris distinctus abundant on blossoms of Golden rod (*Solidago*); *Alydus eurinus* on Red clover (*Trifolium pratense*); *Jalysus spinosus* on Squash vine (*Cucurbita*); *Anthocoris insidiosus* more common than usual, on a variety of plants; *Phylus angulatus* very plenty on *Solidago*, especially at Fairfax, Ia.; *Miris sp.* quite abundant; *Blissus leucopterus*, not destructive, at Ames, Ia.; *Calocoris rapidus* very plenty on Red clover leaves and blossoms, likely to become of economic importance; *Lygus lineolaris* about as common as usual; *Phymata erosa* common. Specimens of ♂ and ♀ exhibited; the ♀ the day after being pinned captured a fly, and its method of piercing this insect was described, while the specimen showed the manner of holding. *Acholla multispinosa* abundant on *Solidago* blossoms; *Cicada tibicen* more abundant than usual; *Ceresa bubalus* plenty, infesting a variety of plants; *Publilia concava* occurred in great numbers on leaves of *Helianthus perfoliatus*; *Brochymena arborea* and *annulata* common in the Mississippi valley; specimens of *Loxa flavicollis* from Florida bring the range of that species into the United States.

Mr. Lugger spoke of the peculiar life-habits of *Mesites subcylindricus* and *Platypus flavicornis*:

The former I found in immense numbers in the roots of the Old-field Pine (*Pinus tæda*, L). This pine grows very abundantly upon the sandy and barren soils of the southern part of the peninsula of Maryland and Virginia, and usually close to the shores. The pine roots in which I found these colonies were always dead, and were either sticking in the high banks bordering the eastern shore of the Chesapeake Bay, or they had fallen down upon the beach. But in either case they were daily twice submerged by the tide. During the months of June and July the beetles would slowly emerge at ebb-tide from the roots, if sufficiently dry; not by many individual holes of exit, but only by some few. Some of the roots infested for many years by these insects would look as if riddled by small shot. The beetles crawled slowly about these roots as long as the wood was dry, and never even attempted to fly. Some specimens would frequently re-enter the holes, but chiefly males showed such a habit. The outer surface of these roots, which are always more or less denuded of bark, becomes, in time, very hard and tough—perhaps one reason why comparatively so few holes were made Splitting open one of these roots I found the whole interior a perfect net-work of large and irregular burrows crossing each other in every conceivable direction, and all partly filled with sand dashed in by the waves. Only few roots were thus inhabited by these beetles, notwithstanding that great numbers of suitable ones were scattered everywhere. I soon found that only those were inhabited that received at regular intervals a thorough wetting by the salt water; the rest evidently were too dry to suit the beetles. I noticed, also, that the same roots had been populated for many seasons, and in particular one large root which had been carried out some distance in deeper water, and was thus always resting upon moist sand. I obtained such beetles for four years in succession, or as long as I had occasion to visit the spot.

Mesites rufipennis Lec. seems to be nothing but the immature red form of *subcylindricus*, and both species issued from the same hole. Specimens varying from vivid red to dark brown and black could be found together; the species varies also very greatly in size.

Notwithstanding close collecting during the summers of four years, I never found a specimen of *Platypus flavicornis* in situ. One morning, however, and just before sunrise. immense numbers of these beetles were flying about; they could be caught in numbers by sweeping the air with the hand or hat. As soon as the sun rose all disappeared as by magic, and none could be found; nor on the three succeeding mornings, when the conditions of wind and temperature were the same. The only trees growing in the vicinity are clumps of the *Pinus tæda*, the great majority of them dead and decaying from a severe storm some winters ago. These pines are perfectly riddled with holes and inhabited by numerous coleopterous larvæ, which can be plainly heard when passing such trees. Whenever a dead tree falls against a still healthy one the latter is doomed to die in a very short time in consequence of insects migrating to the point of junction.

Mr. Schwarz added that some other Calandridæ, including the genera *Dryotribus* and *Macrancylus*, exhibit habits similar to this *Mesites*, and that these maritime species constitute a peculiar feature of the Rhynchophorous fauna of North America. He also stated that, in his experience, our species of *Platypus* never attack the tops of trees, but are always found in the lower part of the trunk, being usually inquilinous in the galleries of other wood-boring beetles.

Dr. Riley exhibited drawings of larvæ and pupæ of *Aphorista vittata* and *Epipocus punctatus* and explained the differences between the corresponding stages of the two species. The larva of *Epipocus* is more ovoid and smoother than that of *Exorista*, the antennæ relatively shorter, the lateral appendages dorsal, much less spinous, and 5 in number in *Epipocus*, whereas, in *Exorista* they are ventral and 7 in number. The pupæ of both species are provided with lateral spines, thus showing great resemblance to those of *Cassida*.

February 12, 1886.

Eleven persons present. President Howard in the chair.

Mr. Howard read a note from Dr. Riley in relation to the food-habits of the larva of *Feniseca tarquinius*, in which he stated that he had for some time had in his notes records of observations by Mr. Pergande who had found the larva actually feeding on the following species of *Aphididæ: Pemphigus fraxinifolii*, *Schizoneura tessellata*, and *Pemphigus imbricator*. The last named species is the Beech Aphis referred to by Mr. Johnson and Mr. Lugger.

Mr. Howard read a paper on the Chalcid genus, *Podagrion*, which is peculiar for the reason that it unites the characters of several subfamilies, and that the species of the genus seem to be exclusively parasitic on Mantis eggs. He related his experience in breeding these parasites, and referred more particularly to the mode of oviposition through the hard covering of the egg-masses of Mantis.

Mr. Howard mentioned that Dr. Schafhirt, of this city, had given him a specimen of *Lasioderma serricorne* found alive in Pyrethrum powder, which was said by Dr. Schafhirt to be still strong enough to kill cockroaches.

Mr. Lugger exhibited a new pattern of an aquarium which is very convenient for rearing and observing all sorts of aquatic animals, even in a very small room. The aquarium consists of a tin box one foot square in front and about three inches thick, with a glass front. Over this glass front slips a round-oval picture-frame. If the inside is painted and filled with water the whole looks like a suspended picture of rather unusual thickness. Several such aquaria can be grouped together like so many pictures. If connected by syphons carefully graded, a constant flow of water can be obtained, which produces the necessary current and supplies the needed amount of oxygen. In such aquaria aquatic larvæ and insects can be studied with great convenience. The addition of some water plants adds greatly to the beauty of these aquarial pictures.

Mr. Smith read the following abstract of a paper by Prof. von Dalla Torre, entitled "Die Duftapparate der Schmetterlinge" (Kosmos, xvii, pp. 354–364, Nov., 1885; pp. 410–422, Dec., 1885):

THE ODORIFEROUS APPARATUS IN LEPIDOPTERA.

The author starts with a statement of the facts that led to the discovery some time since that the female of many Lepidopterous insects gives out an odor perceptible to the male, and thus induces copulation. Of the anatomy of these organs nothing definite is yet known, but it seems proven that by extending the ovipositor the ♀ can cause the dissemination of the odor which attracts the ♂.

He mentions the discovery by Fritz Müller (Zeitschr. für wissensch. Zoologie, xxx, p. 167) that a butterfly, the larva of which feeds on the "maracujá," has in both sexes an organ exhaling a very offensive odor, which he deems protective. In the ♂ this organ consists of two sacs or glands at the inner side of the side-pieces (After-klappen); in the ♀ the glands are situated between the terminal and sub-terminal segments, and are somewhat larger; in addition the female has two very small clavate filaments, the extrusion of which suddenly and strongly intensifies this odor.

These "protective" odors are not further treated of; but he proceeds then to his second group of odor-giving organs, which are found on the wings in the form of peculiarly shaped scales.

He credits Baillif, a Frenchman, with the discovery of these peculiar scales; but this author rather considered them as aberrations, and failed to recognize the fact that they were found in one sex only. Deschamps, in 1835, discovered that these peculiar scales are found in the ♂ only, and he especially studied the situations of the scales and the method of their insertion into the wing membrane, evidently deeming them part of the tracheal system.

Watson, in 1865, studied these same scales, and also came to the conclusion that they were part of the tracheal system. In 1869 he further examined the "battledoor" scales of the *Lycænidæ* and other Lepidoptera, and enumerates 131 species in which they occur.

Fritz Müller, in 1877, called attention to these scales and hair tufts, and first asserted their function as odor-giving glands.

Aurivillius in his work on secondary sexual characters of northern diurnals devotes a large space to the discussion of these scales. The author then describes the form of scales in some species, finding them of various shapes, usually very different from the other wing scales, and always striate. In *Thanaos* they are hollow. Many of the scales, especially in the *Lycænidæ*, are covered with rows of very minute globules set into the scale by a pedicel. In *Pieris* and some other genera the tip of the scale is furnished with a tuft of fine hair, while the shape is very different from that of the others on the wing. In some species of *Satyrus* the tip is densely set with fine hair giving a brush-like appearance.

In some species of *Hesperidæ* the scales are articulate, consisting of several joints, which are easily separated.

The distribution of these scales is then treated of, and, while they are, in rare instances, scattered over the wing, they are usually massed into spots, often differing in color from the other parts of the wing. Often, also, they occur on the anterior margin of the secondaries, which is covered by the primaries, or at the inner margin, which is usually more or less folded.

Not only are the ♂ scales often placed where they are more or less shielded, but there are often special structures looking to their protection. In *Pamphila comma* the oblique black dash in the ♂ is composed of such scales, and they are set into a depression of the wing and overlapped by ordinary scales, while in many other Hesperids there is a costal fold, tightly closed, and in which these peculiar scales are massed.

In *Danais* the peculiar raised spot of the secondaries so well known to all collectors forms a sac in which the ♂ scales are concealed. What are the functions of these scales, and why do they need such protection? Fritz Müller says they are odorous, and the author proceeds to cite cases where the odor was intense enough to be perceived by the human sense of smell. In *Callidryas argante* a musky odor was perceptible when the ♂ scales were exposed, and this was observed in all specimens. In *Prepona laertes* the odor is like that of a bat, in *Dircenna xantho*, vanilla like; in both only noticeable at the anterior margin of the secondaries, where the ♂ scales are situated.

In *Papilio Grayi* the odor is as agreeable and intense as in flowers. *Didonis biblis* has also a distinctly odorous spot on the secondaries. That we are unable to perceive a distinct odor in all cases the author does not consider as militating against the idea that the scales give out an odor, for he considers the sense of smell much more highly developed in the Lepidoptera than in man.

The fact that the scales are always more or less shielded is explained by the statement that the odor is thus retained until the insect desires to disperse it. It is claimed that the insects have the power to open the various sacs or folds containing the scales, and, where the scales are protected only by their compact massing, they can be erected, so as to expose their entire surface. Thus it is calculated that *Pamphila comma* can expose a surface of 160 square mm. from a spot less than one millimeter square! The author cites Weismann for the statement that the wings of the Lepidoptera contain connected and living cells, capable of secreting the odor-giving substance, and claims the presence of minute glands at the base of these scales.

As a separate group of odor-giving organs, the tufts on the feet and body of many species are instanced. A number of these are described; but they all take the form of a pencil of hair capable of expansion and ordinarily concealed in a cavity of the leg. In *Hepialus hecta*, in which the arrangements for protecting the tuftings are very abnormal, Dr. Bertkau has found the cells secreting the odor-giving substance. In many species a distinct odor is perceptible when the leg containing the tuft is crushed. Another group of organs is found in the abdomen, also usually so concealed and protected as to be invisible.

In *Danais gilippus, erippus*, and *archippus* there is between the eighth and ninth segments on each side a closed sac, which, opening on pressure, exposes a ball of fine hair that gives out a distinct odor.

Many of the *Glaucopidæ* have the power of protruding from the abdomen odor-giving filaments, while many *Zygænidæ* have within the side pieces (After-klappen) glands filled with a sweetly-scented fluid. *Didonis biblis* is especially favored with odor-giving glands. Not only have both sexes a sac between segments four and five of the abdomen, which exhales a very unpleasant (protective) odor, but the males have, in addition, a pair of glands or sacs between segments five and six, from which proceeds a very agreeable, heliotrope-like smell. That the Sphingids, or many of them, exhaled a very distinct odor has been long known, and Fritz Müller, in 1876, located it in a tuft of hair at the base of the abdomen, which fits into a groove in the first segment, so as to be ordinarily invisible. Reichenau, in 1880, described at length the structure in *Sphinx ligustri*, and our author snmmarizes his discoveries.

Mr. Smith added the following remarks:

Prof. Dalla Torre offers little or nothing that is actually new; but he brings together and collates the almost unknown and inaccessible notes of other authors, and produces a decidedly interesting and valuable paper. Within the last year or two a number of structures similar to those cited have been observed by American authors, and one very remarkable structure in *Cosmosoma omphale* was discussed at the late meeting of the Entomological Club of the A. A. A. S., where none of the gentlemen present were able to give any satisfactory explanation of the structure. Attention was also drawn to a structure in *Lygranthœcia marginata*, which, in some points, resembled that in the Sphingidæ, and Prof. Riley mentioned that in *Aletia xylina* there were similar, yet still undescribed organs. In many of the genera of the Deltoids the feet tuftings assume remarkable and startling forms, and quite a number of these have been studied, and will form a chapter strongly confirmatory of the views advanced in this article.

Mr. Mann remarked upon the interesting character of the communication, and the value of such a summing up of the subject as that by Fritz Müller, which formed the basis of Dalla Torre's paper. He called attention to the observations made upon the subject in this country, and to the citations of literature which had been given in PSYCHE. He said he had observed the protrusion of the tufted appendages at the tip of the dorsal surface of the abdomen by the living insect in Brazil, and noticed the strong odor proceeding from these appendages. The species upon which the observation was made seems to be *Heliconius phyllis*. Not having his collection at hand he could not be certain of the species further than to say that if there exists any other common species in Brazil closely similar to *H. phyllis* he cannot make the distinction from recollection; otherwise the determination is good.

Mr. Mann expressed his doubts whether any muscular action could take place on the surface of the wings of Lepidoptera, such as to erect or move the scales individually, or any physiological process go on to replenish the scent scales after their odor had been dissipated.

Mr. Schwarz added that among the many forms of secondary sexual characters in Coleoptera some would likely be found to be analogous in function to the odoriferous apparatus just described. He referred more particularly to the tuft of hair on the mentum in the males of Trogosita, and those on the ventral segments in the males of Dermestes. Differences in the character of the vestiture in the two sexes are known to occur in Coleoptera; *e. g.*, the genus Hoplia, but in this instance it is hardly possible that we have to deal with odoriferous organs.

MARCH 4, 1886.

Eight persons present. President Howard in the chair.

Mr. Howard exhibited specimens of the so-called Jumping gall produced by *Cynips saltatorius*, and of an interesting Chalcid parasite which had been bred from it. The specimens were sent to him by Prof. C. H. Fernald who received them from a correspondent in California. Mr. Howard concluded his communication with a brief account of the literature of the Jumping gall.

Mr. Howard also mentioned the fact that the well known "Die-back" fungus of the Orange had been described in MS. by Mr. Ellis as *Nectria coccicola*,* the describer having seen specimens under which were some of the common Mytilaspis scales of the Orange, and thereby forming the impression that the fungus was parasitic on the scales.

Mr. Smith called attention to the fact that in the group of Bombycids classed as *Attacinæ* and *Ceratocampinæ* the antennæ had in the ♂ two pectinations to each joint, and proposed to limit the family *Saturniidæ* by this character. He explained the differences between the proportions of the branches and their relative situations, and thinks the character a very important one in classification. Two sub-families are well indicated by the fact that in the *Attacinæ* the pectinations extend to the tip of the antennæ, while in the *Ceratocampinæ* they extend only two thirds the distance and then end very abruptly.†

Dr. Marx read a paper on the genus *Thelyphonus*, exhibiting at the same time a careful drawing of the North American *Th. giganteus*. He stated that *Th. excubitor* Girard is simply the ♂ of *giganteus*, as the distinguishing characters of the two supposed species are precisely the same as found in the two sexes of Scorpions. *Thelyphonus* has 12 eyes, and not 8, as hitherto stated by all authors, since there are two distinct, though very small, accessory ocelli situated on each side near the externo-posterior slope of the ocellar tubercle. No poison glands could be detected on the mandible; in fact the only means of defence appears to be a very strong and penetrating odor, but the position of the odoriferous glands could not be ascertained from an examination of dried specimens.

In commenting on this paper Mr. Pergande gave the following statement as to the habits of a specimen of *Thelyphonus* sent to Dr. Riley, and kept alive for some time in a glass jar at the rooms of the Entomological Division:

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*Since published in *Journal of Mycology*, ii, No. 4 (1886), p. 39.

† See Proc. U. S. Nat. Mus., 1886, pp. 414-437.

The jar in which the animal was kept was solidly packed with sand to the depth of about ten inches. Shortly after the specimen was put in and had surveyed its habitation it went to work to dig for itself a gradually sloping channel, the deepest portion of which, after being finished, was about five cm. below the surface. The transverse section of the burrow is in accordance with the general shape of the animal, *i. e.*, transversely oval, and not much higher or wider than is necessary to allow the animal to move freely forward or backward in it. The mode of operation when digging is, as far as remembered, as follows: It appears to select a place where there is already somewhat of a depression in the sand, when it commences to scrape with one or the other of the powerful palpi a quantity of sand into a small heap in front of it. It then grasps the heap, when of sufficient size, between both palpi, and, moving backward for some distance from the burrow, turns around and deposits its load, patting and smoothing it somewhat with one or the other of the palpi. It then rests for a moment, with only the antennæ playing, as if in thought, and, turning around, retraces its way to the opening, always using its long and slender antennæ cautiously to discover its path. When reaching the burrow it goes through the same performance as before. The "antennæ" are laid backwards during the digging, so as not to be in the way. The channel, when done, had reached a length of about 75 or 100 mm., but it took several days before it was completed, as the animal often either rested for several hours motionless in its burrow or went outside on a hunting expedition. In this case the animal was provided with roaches, and its *modus operandi* was as follows: It moved very slowly and cautiously about, with its formidable palpi outstretched and opened, whilst the antennæ were in constant and quite active motion, feeling and touching all objects about it and on all sides, to discover some unlucky insect in its way, which it might grasp. When near a roach it either stopped at once or moved so slowly as to appear almost motionless. The roaches in the jar were evidently much alarmed by this rather formidable-looking creature, and ran about in great haste, and, if happening to be on the sand, kept away from the Thelyphonus as far as possible, generally running up the side of the jar. The larger and, therefore, heavier roaches had to keep, however, more or less on the sand, and, in their haste to escape this enemy, often ran right between its arms, though they generally escaped, by losing a leg or antenna on account of the too slow movements of their foe. Sometimes a roach sat quite close in front of the Thelyphonus, but with its antennæ constantly playing and evidently on the alert to avoid a sudden attack.

The Thelyphonus meanwhile moves his antennæ quite actively though very cautiously, stretching now one as far as possible and then the other, tapping the roach gently on one side or the other to induce the poor victim to move forward. In this endeavor, after many failures, it gradually succeeds, and if a roach at last happens, through much coaxing, to get between the opened shears in a favorable position, it is suddenly grasped with one or both and brought close to the powerful jaws, where it is soon killed. The prey is then carried, as a cat carries a mouse, into the burrow and is devoured with leisure.

Mr. Schwarz made a short communication on *Rhyncolus corticalis*. This Calandrid beetle, described by Boheman more than 40 years since, had hitherto remained unknown to American Coleopterists. A specimen from Florida, collected by Mr. H. G. Hubbard, corresponds exactly with the description, and the species must be referred to Horn's genus *Allomimus*. It is closely allied to *A. dubius* though apparently specifically distinct.

Mr. Schwarz also stated that upon examination of about one hundred and fifty specimens of the common *Tomicus materiarius* Fitch (now *Gnathotrichus materiarius*) he had failed to find any males among them. In fact, the male sex appears to be entirely unknown and has never been described. He alluded to the great rarity of, and difficulty in finding, the males of most species of those Scolytid beetles which bore into the solid wood, because the males probably never leave the burrows.

APRIL 1, 1886.

Seven persons present. Mr. Mann in the chair.

Prof. John Murdoch tendered his resignation as a member of the Society.

Dr. Riley stated that on account of severe illness he had been prevented from attending the last two meetings of the Society, and asked permission to present his address as retiring president at one of the next meetings. This permission was unanimously granted.*

Mr. Schwarz offered some remarks on North American Scolytids. He exhibited a section of the trunk of Red Oak, showing the work of *Monarthrum mali*, the species being hitherto known only to attack Apple trees. About twenty specimens of the beetle were found in a single gallery. The main gallery runs in the solid wood concentric with the bark; the secondary galleries branch off rectangularly from the main gallery and run upward or downward. They are but little longer than the beetle itself,

* Continued ill health prevented Dr. Riley from writing out his address.

of equal width throughout, though much narrower than the main gallery, and are presumably made by the larvæ.

Mr. Schwarz further spoke on a large colony of *Xyleborus pubescens* which he found in March near Washington in the solid wood of *Pinus inops*. The tree was dead, and of the hundreds of beetles contained therein not one was alive. The beetles had honey-combed the solid wood in all directions, thus obscuring and obliterating the work of the parent beetles and their larvæ. That the beetles were all dead appears to be a significant fact as throwing some light upon one of the means employed by nature to prevent excessive multiplication of these Scolytids. It appears that, during the development of this large brood, the wood of the tree had become dry and shrunken, so as to prevent the perfect beetles from issuing from the entrance hole made by the parent beetle. Among the numerous specimens cut out from the wood there were a few specimens of the hitherto unknown male of the Xyleborus, which strikingly differs from the female.*

Mr. Schwarz also called attention to the fact that the *Tomicus xylographus* Say of Fitch's Fourth Report cannot be Say's species, but must, in all probability, be referred to *Xyleborus cælatus;* and, finally, that *Xyleborus obesus* Lec. is, in all probability, the male of *X. pyri*.

Mr. Smith called attention to some features in the structure of the *Saturniidæ*. The family, as he proposes to limit it, has two branches to each antennal joint in the ♂; no tongue, retracted head, short palpi; plump body, hind legs short and weak, tibiæ without spurs, tarsi without spines, no frenulum, veins not more than 11, usually 10, sometimes only 9. The *Attacinæ* have the antennæ pectinated to the tip in both sexes. Except in *Telea* and *Actias* the discal cell of both wings is open. He considers that *Samia*, *Platysamia*, *Philosamia*, and *Callosamia* are all congeneric, and explained the differences and agreements between them. *Telea* seems congeneric with some of the European species referred to *Saturnia*. In *Hyperchiria io* the antennæ are as in *Attacus*, but simple or only serrate in the ♀. In the *Ceratocampinæ* the pectinations never extend to the tip; the ♀ has the antennæ simple, except in *Adelocephala bicolor*, in which they

* The male is described in *Entomolog. Americ.*, ii, p. 41.

are pectinated as in the ♂, except that there is only a single branch to each joint of the antennæ. The discal cells of primaries are always closed, and the difference in venation of the species was pointed out. The secondaries have the cell unusually short in this sub-family, and the relation to *Gastropacha* is evident.*

MAY 13, 1886.

Four persons present. President Howard in the chair.

The Corresponding Secretary read the following communication from Lieut. Casey, U. S. A.:

Agylenus brunneus Gyll.—A colony of about forty individuals of this common European species was taken on the 26th of December last in the suburbs of San Francisco. The specimens were closely crowded together on the underside of a board which had long been imbedded in a thick, grassy turf In the United States it has thus far only been recorded from St. Louis, Mo. (Horn.—Proc. Am. Phil. Soc., xvii, p. 577).

I have very little doubt of the identity of these specimens with the European insect, as they agree almost perfectly with Du Val's description. There is, however, a slight difference, which may be due to changed conditions of life or other similar cause. Du Val states that the European species has the prosternum "sillonné" [grooved.] This part, in the Californian representatives, is simply punctate, with scarcely any trace of grooves or furrows.

The Corresponding Secretary further read a letter from Capt. Shufeldt, U. S. A., regarding a misprint on page 8 in No. 1 of the Proceedings, Capt. Shufeldt's initials being R. W. and not E. A.

Dr. Marx then read the following paper:

NOTES ON PHRYNUS Oliv.

BY GEO. MARX, M. D.

On a former occasion, in speaking of *Thelyphonus* Latr., a member of the order *Pedipalpi*, and of the high place which this order must occupy in the class *Arachnoidea* on account of its advanced organization, I endeavored to demonstrate this latter theorem by pointing out the difference in insertion, as well as the change in structure, which the first pair of ambulatory organs have here assumed.

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* For further particulars see Proc. U. S. Nat. Mus., 1866, pp. 414–437.

I will now mention the second representative of that order, viz., *Phrynus* Oliv., and will first draw your attention to the much higher development of the first pair of legs which demonstrates more evidently the close relationship of these organs with the *labial palpi* of the insects.

We have seen that in *Thelyphonus* the first pair of legs is not inserted into the prosternum but into the lateral sides of the broad labium; that the femur is altered into an extremely long and thin part; that the patella, which in the other limbs is extraordinarily well developed, is here wanting; that the tibia and metatarsus are abnormally long and filiform; and that the tarsus, instead of being 3-jointed as in the other legs, is here composed of eight joints and *not provided with the typical tarsal claws.*

In *Phrynus* the insertion of the first pair of limbs is the same, although the labium as an external organ is in some genera (*Damon* and *Admetus*) wanting; but the development of these organs has gone still higher. While the femur is as in *Thelyphonus*, only more prominently elongate and filiform, the patella is present, but the tibia as such has disappeared and is represented by an extremely long and setaceous part composed of numerous (from 25 to 40) joints. The metatarsus and tarsus are also transformed into a long and thread-like appendage with many (90 to 130) minute joints and unarmed with tarsal claws. Thus the first pair of legs has ceased to be ambulatory in the order *Pedipalpi*, and has become structurally and functionally true palpal or tastile organs.

Another point of great interest in *Phrynus* is the presence of an organ, new to the class of *Arachnoidea* and the true character of which has hitherto been overlooked by naturalists—the ligula with a pair of paraglossæ.

The genera of the family *Phrynoidæ* possess a well-developed sternal plate, and in the genus *Phrynus* we find a labium inserted into the anterior margin of this sternum. This labium bears a long, cylindrical organ—the ligula—into which is inserted a pair of bristle-like appendages—the paraglossæ—analogous in structure to homologous parts in insects. This ligula, placed between the base of the maxillæ and reaching with the tip of its appendages into the oral orifice, enables the paraglossæ to act as organs of taste in the process of mastication. In the genera *Damon* and *Admetus*, where the labium is absent, the ligula is inserted in the front margin of the sternum.

It is interesting to observe the peculiarity in which the superior state of organization manifests itself in the higher orders of Arachnoidea. We do not meet with a gradually uniform and homogeneous advancement of all organs, but we notice in one single organ the unambiguous assumption of a higher state of development, or the sudden appearance of a new organ, the property of a superior class, while the rest of the organization still presents relationship with the lower orders.

Mr. Schwarz offered some remarks on the oviposition of *Xyleborus cælatus* and on the galleries of *Monarthrum mali*, exhibiting samples of the work of both species and prefacing his remarks by a classification of the North American Scolytids from the biological standpoint. The oviposition of the first-named species was observed by Mr. Smith and himself on April 25 in a stump of a freshly-felled *Pinus inops*. The parent beetle bores through the bark and then straight downward between the outermost two layers of wood. The egg-grooves are rather large, usually only upon one side of the primary gallery, and contain each from three to five eggs. Modifications in the primary galleries were observed when the beetle had entered the wood from the cut edge of the stump, and especially when several beetles had entered through the same hole. The work of *Monarthrum mali* was illustrated by several pieces of Red Oak wood. The parent beetle bores through the bark straight into the wood to a distance of from five to seven mm. Then follows a transverse gallery, and, in most cases, a second transverse gallery immediately behind the first; in several instances there is still a third gallery. The secondary burrows, in which the larvæ undergo their transformations, and which, in all probability, are made by the larvæ, start rectangularly upward or downward from the transverse galleries, and are but little longer than the beetle. Oviposition in this species has not yet been observed, and it remains also uncertain whether only one or several beetles have been at work when there are two or three transverse galleries present.

Mr. Smith exhibited colored drawings sent to him by Mr. Möschler from Germany, illustrating variations in color and markings of the wings of *Deiopeia bella*.*

JUNE 3, 1886.

Eleven persons present. President Howard in the chair.

Mr. Smith read a paper on the scent organs found protruding from a narrow opening between the seventh and eighth ventral segments of two Bombycid moths, *Leucarctia acræa* and *Pyrrharctia isabella*.†

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* See "On the American species of the genus Utetheisa, Hübner." By H. B. Möschler (*Entom. Amer.*, ii, pp. 73–75); see also letter from A. G. Butler, *l. c.*, p. 212.

† This paper has been published by Mr. Smith in *Entomol. Amer.*, ii, pp. 79, 80, under the title, "Scent-organs in some Bombycid Moths."

Mr. Schwarz read the following note:

ON A NEW FOOD-PLANT OF PIERIS RAPÆ.—On April 25th, Mr. Smith and myself made an excursion on the Brightwood road, near Washington, and, while observing several specimens of *Anthocharis genutia*, Mr. Smith mentioned that Mr. Schönborn had just found the eggs of *Anthocharis* on two species of Cruciferous plants, one of them being the common Winter Cress (*Barbarea vulgaris*). As several specimens of this plant were just then in blossom along our road we went at once to work to examine them. Within a few minutes several butterfly eggs were found attached singly to the underside of the larger leaves, and more especially of such plants as grew isolated. Upon comparison, however, these eggs proved to be different from those of *Anthocharis*, and, in short, turned out to be those of the common *Pieris rapæ*. The Winter Cress is not mentioned by Dr. Riley (Report of the Commissioner of Agri., 1883, p. 111) among the known food-plants of the Imported Cabbage Butterfly, and also in Europe the same plant is not known to be attacked by this species. At least Kaltenbach does not mention it as such.

Pieris rapæ—as is well known—is one of our earliest butterflies, appearing in the vicinity of Washington toward the end of March. As there are no cabbage plants in the fields thus early in the season, it appears highly probable that the first annual generation of Pieris larvæ normally subsists on some wild plant, and this common Winter Cress will no doubt be found to be the principal food-plant of this species, though it cannot be asserted that it is the only food-plant thus early in the season.

Mr. Lugger offered some remarks on the following subjects:

1. *Introduction of certain foreign insects into this country.* He first found in 1878 some few specimens of the European *Aphodius erraticus* in the droppings of the Virginia deer which are kept in large numbers in Druid Hill Park, Baltimore, Md. In the course of a few years the Aphodius became very abundant, in early spring feeding upon the droppings of sheep. Now they are found in any excrement, and not alone in Druid Hill Park, but through a large extent of the neighboring counties. They are so numerous that they have actually replaced the formerly common *Aphodius fimetarius*. He also mentioned the capture of a specimen of *Agra ænea*, a native of Surinam, and of various South American Cerambycidæ in the vicinity of the wharves at Baltimore.

2. *On the fertilization of Cypripedium acaule and the Hard Maple* [Acer.] He described the structure of the flower of our common Lady's Slipper, which permits an easy entrance to a

species of *Andrena*, but forces the insect to make its escape in such a way as to assure the fertilization of the plant. As to the Hard Maples he mentioned an observation of his made during the present spring, viz., that the seeds of the numerous specimens of Hard Maples in the Smithsonian Grounds were, this year, uniformly sterile, owing, perhaps, to the inclement weather during the flowering season, which prevented the bees from visiting the flowers.

3. *On a case of faulty instinct in one of our Tachina flies*, which he had observed depositing eggs upon the hard body of *Rhodobænus 13-punctatus*. The fly had apparently mistaken the bright-colored surface of the beetle for a caterpillar, and it seemed impossible for the young larvæ to pierce anywhere the hard covering of the beetle.

In connection with the remarks on imported insects Dr. Marx stated that some time since he received several specimens of *Epeira diademata* from Minnesota, and thus there cannot be longer any doubt about the occurrence of this European spider in North America.

Mr. Howard mentioned a remarkable case of muscular force exhibited in a specimen of *Canthon* (probably *vigilans*) which he had captured at night and placed in an empty inkstand. The beetle had repeatedly pushed off the very heavy cover, although working at a great disadvantage through being obliged to cling to the overhanging glass sides.

Mr. Schwarz called attention to the unusual abundance of several species of *Lachnosterna* during the present season. The foliage of various trees in the Smithsonian Grounds had severely suffered from these May-beetles, and the damage was particularly noticeable in the immediate vicinity of the gas-lamps.

Mr. Schwarz also said that he had frequently seen this spring, under pine bark, the cocoons of the Braconid which is parasitic on *Pissodes strobi*, and that upon referring to the literature he was surprised to find that the name of this Braconid was nowhere mentioned in connection with the natural history of the Pissodes, although the existence of the parasite was well known to the older authors.

Mr. Howard stated that among numerous other insects a specimen of *Epicauta cinerea* had lately been attracted by the light in his house.

Mr. Smith related his experience with one of our common Blister-beetles (*Macrobasis unicolor*) which accidentally got crushed on his neck, when he had an excellent opportunity to note the remarkable vesicatory property of our native Meloidæ.

JULY 8, 1886.

Six persons present. President Howard in the chair.

The Corresponding Secretary read a note from Dr. G. H. Horn stating that *Harpalus caliginosus* stridulates very well. The noise is produced by the edges of the last two abdominal segments being rubbed against an alutaceous space on the inner edge of each elytron.

Mr. Schwarz exhibited a specimen of this Harpalus, showing the structure referred to by Dr. Horn. He added that Dr. Horn's observation is quite novel, since in Carabidæ only the genus *Cychrus* was known to be stridulating, but that, in his experience, the genus *Nomaretus* is also able to produce a noise.

Mr. Smith said that he had never been able to perceive any noise produced in *Harpalus caliginosus*, although he had handled many specimens.

Mr. Schwarz read the following passage from a letter from Mr. H. G. Hubbard, dated Crescent City, Fla., June 20, 1886:

* * * "I also send a *Bradycinetus ferrugineus* which came flying to the light a day or two ago. This *Bradycinetus* died as I held it in my hand. It had been very active, and made powerful efforts to escape. Suddenly it 'fainted' and died at once. Can this have been the result of excitement? I often find specimens of *Strategus* lying dead in the path in the morning without sign of injury, and very frequently perfectly fresh and limber. I have suspected that death resulted from excitement or exertion."

Mr. Schwarz exhibited a male of *Hydrophilus ovatus* in which the last two joints of the maxillary palpi are notably flattened. He had seen only one male of this species, and could not tell, therefore, whether this character was an abnormal one, or whether it occurred in all males of the species.

Mr. Smith made some remarks on the systematic position of the genus *Quadrina* Grote. The species *Q. diazoma* is based on a unique specimen which, by the kindness of Prof. F. H. Snow, he was able to study. Mr. Grote places it among the *Hemileucini*, but the most cursory glance shows at once its relationship to *Cossus*, and it is in the *Cossidæ*, and nowhere else, that this insect belongs. He gave a detailed description of the venation, pointing out the Cossid affinities of the species.*

Mr. Schwarz read the following note:

CICADAS AT FORTRESS MONROE, VA., IN JUNE, 1886.—While on an excursion near this locality, on June 17, Mr. Heidemann and myself had the opportunity to hear the noise made by some Cicadas. There were some nine or ten specimens in the trees and shrubbery in or near the cemetery, not far from the fort, but unfortunately we did not succeed in seeing, and still less in capturing, a single specimen. In the year 1885 I had, for the first time in my life, the opportunity to listen to the song of the Periodical Cicada, to the shrill and continuous notes produced by them where they appeared in large numbers, as well as to the more mournful song wherever they were less numerous. But on that day, near Fortress Monroe, I experienced, also for the first time, the difficulty in distinguishing, from memory, the song of the Periodical Cicada from that of other species of the same genus, and I admired then the musical ear of Prof. L. F. Ward. It will be remembered that Dr. C. V. Riley had last year quite a sharp controversy with Prof. Ward, who, from listening to the notes of some insect sitting on a tree or shrub, came to the firm conclusion that the insect in question was the Periodical Cicada. And this was in the month of October, a most unusual time for the appearance of *Cicada septendecim!*

Neither Mr. Heidemann nor myself could come to a conclusion whether or not the Cicadas at Fortress Monroe were the Periodical species; but, in either event, the appearance of a Cicada at that season is of sufficient interest to go on record, for the following reasons: If the Cicadas were the Periodical species they must either be stragglers of Riley's Brood XXII, which appeared in 1885, or belong to a Brood appearing in 1886, and at regular intervals of seventeen or thirteen years thereafter. In the former case the locality for Brood XXII would be of interest, as will be seen from Dr. Riley's map, in the Agricultural Report for 1885, illustrating the extent of Brood XXII. The brood is not known at all from the southeastern portion of Virginia or from the southern part of Maryland. If these Cicadas belong to a regular brood appearing in 1886 they must either belong to what is known as Riley's Septendecim Brood I, which is reported from a widely distant locality, viz., southern Massachusetts and northern Connecticut; or they must belong to an hitherto unknown thirteen-year brood. Both assumptions are somewhat improbable. Finally, if these Cicadas were not *Cicada septendecim*, they indicate a species of Cicada which appears at the

* This communication has been published in full by Mr. Smith in *Entomol. Amer.*, ii, p. 124.

same season with that species. It will be remembered that one of the best means of distinguishing the Periodical Cicada from other Cicadas is the season in which they appear the former appearing always some weeks before the Dog-day Cicada and other species. If there is at Fortress Monroe, and probably also in other sections of Virginia, a species of Cicada appearing at the same time with the Periodical species, great caution is necessary in entering Cicada reports coming from the section of the country just indicated.

Judge Johnson spoke on the ravages of a Cecidomyious gall-maker on twigs of *Bumelia lanuginosa*, as observed by him in the vicinity of Shreveport, La. The young trees suffer severely from the attacks of this insect.

Dr. Marx said that he had recently received from California a species of *Segestria* which appears to be identical with the European *S. perfida*. This Arachnid genus contains in Europe six species and was hitherto not known to occur in North America.

Mr. Howard made a communication on the food-habits of the House Wren (*Troglodytes aëdon*) in which he stated that a pair had built under the eaves of the porch of his house and raised two broods of young of four each. The first brood was fed in the nest from June 1st to June 13th, and on the latter date the nest was thrown down by the birds and the young flew to the grass where they were observed for several days in company with the old birds. The nest was rebuilt in a different place. The second brood was fed from June 30th to July 11th. The food was exclusively insects. On several occasions the old bird was observed to carry a bit of bread to the nest, and each time was seen to carry it away untouched. The main food of the first brood consisted of small black beetles, probably Carabidæ, but many small grasshoppers and crickets were also carried to the nest, and a few green caterpillars, probably larvæ of *Drasteria erechtea* and *Platyhypena scabra*. With the second brood the proportion of the larvæ increased very greatly and the beetles correspondingly diminished. A few specimens of *Macrodactylus subspinosus*, however, were noticed to be carried. The birds were most active between 5 and 9 a. m. and between 4 and 7.30 p. m. A calculation of the average rate of returns of the old to the nest and of the length of time of feeding showed that about 1,500 insects were fed to the first brood while still in the nest.

Mr. Schwarz spoke on the habits of two species of Horse-flies, *Tabanus mexicanus* and *T. psammophilus*, as observed by him in Florida. The former species flies only shortly after sunrise and shortly before sunset, but attacks warm-blooded animals; the latter is a strictly maritime species, occurring only on the open beach of southeastern Florida, and probably never attacks warm-blooded animals.

September 2, 1886.

Five persons present. Vice-President Marx in the chair.

Mr. Schwarz, referring to remarks made by him at the last meeting, stated that during the months of July and August he had handled many living specimens of *Harpalus caliginosus* but without being able to perceive any stridulation; and further, that the flattening in the palpi in male of *Hydrophilus ovatus* is not an abnormal character, but occurs in all males of this species.

Mr. Lugger, referring to the account of the swarm of Cicadas observed at Fortress Monroe, Va., on June 17th, said that he had visited that locality on July 5th, and captured a specimen of *Cicada pruinosa*. Mr. Schwarz said that on July 5th he heard the first *Cicada pruinosa* at Washington.

Mr. Smith read a paper on the peculiar odor emitted by *Dynastes tityus*. This is well known to entomologists, but during the present season the species has developed into a pest. In two States—Virginia and Tennessee—they have been locally so abundant as to saturate the air with the penetrating stench. The local boards of health, especially that of Memphis, Tenn., disinfected all sorts of foul and suspected localities without success, and only by accident was the true source of the smell discovered. It must have required many thousands of specimens to have produced such an effect, and it is an interesting instance of a new way in which insects can render life burdensome to man.*

In discussing this communication Mr. Lugger said that the favorite food-plant of the *Dynastes* is the Water Ash (*Fraxinus sambucifolia*), which is quite common in the vicinity of Mem-

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* See the Article, "Beetles as a nuisance," by J. B. Smith, in *Popular Science Monthly*, xxx, pp. 409–410.

phis. Mr. Schwarz said that in this and other allied genera of Scarabæidæ the odor is emitted by the imago as well as by the pupa, whereas the larva is not, or at least much less, odoriferous.

Mr. Lugger said that even in the phyllophagous Scarabæidæ, *e. g.*, the genus Lachnosterna, the imagos emitted a faint, though not unpleasant, odor. Mr. Smith added that also in the coprophagous genera, especially Canthon, the odor of the imago is quite strong and unpleasant.

Mr. Schwarz exhibited the following species of insects which are new to the fauna of the District of Columbia: 1. *Merope tuber* of the Neuropterous family *Panorpidæ*. One specimen, a male, was found on August 22d under a stone in the woods on a dry hillside near Rock Creek. Upon being disturbed the specimen ran off rapidly, its fore wings vibrating in the manner seen in many Noctuids, the hind wings, at the same time, covering the abdomen excepting the forceps. Mr. Schwarz reviewed the history of this remarkable insect, of which only a few specimens are known to be in collections. Of its earlier stages nothing is known, and of its habits we have only a short note by Dr. Fitch in his Fourteenth Report, stating that the two specimens he captured were attracted by the light in his house. 2. *Chætocœlus setosus* of the Coleopterous family *Malachiidæ*, found on August 28th on dead oak twigs near Bladensburgh. The only other known locality for this species is Columbus, Tex., where it occurred on old grape vines in the darkest portions of the bottom woods. The male appears to be extremely rare; the female is among our most larviform Coleoptera, and, for this reason, liable to be overlooked by collectors.

Mr. Smith described a peculiar brush of hair at the base of the abdomen in *Schinia marginata* (family *Noctuidæ*). It is a pencil of fine twisted strands set into a cup-shaped membrane, and usually concealed in a groove between the dorsal and ventral parts of the basal two segments of the abdomen. When first removed from this groove, the same smell of laudanum, so noticeable in *Leucarctia acræa*, is also observable here. Spread out, a considerable brush of hair is presented. The insect has the power of voluntarily spreading out this tuft, and probably, also, of again withdrawing and folding it into place.

Mr. Schwarz exhibited samples of the bark of Red Oak, showing the work of an undescribed Scolytid beetle of the genus *Pityophthorus*. The galleries which are partly in the bark and partly in the outermost layer of the wood are the primary galleries, *i. e.*, those made by the parent beetle, and exhibited a feature hitherto not observed in any other Scolytid. The female beetle bores straight through the bark; then follows a very short gallery vertically downward, and this is crossed immediately below the entrance hole by an extremely long transverse gallery. The novelty consists in the short vertical gallery, which evidently is constructed only for the purpose of enabling the beetle to turn around without getting on the outside of the tree. The larval galleries, if there be any, are not yet known.

The new species belongs to LeConte's group B, and may be called *Pityophthorus querciperda*. It is closely allied to *P. minutissimus*, with which it agrees in size, form, and coloration, but from which it differs in the sculpture and pubescence of the elytra. In *minutissimus* the elytra are finely and rather indistinctly punctulate; the pubescence is fine, very sparse or nearly absent on the basal portion of the elytra, and denser on the declivity, but always hair-like. In *querciperda* the elytra are quite distinctly rugosely punctulate, and, therefore, less shining. The pubescence is stout, moderately dense on the anterior part of the elytra and still denser and scale-like on the declivity. In the two Californian species of the same group the pubescence consists of long and short hair intermixed. *P. querciperda* occurs from New York to Florida.

October 4, 1886.

Eight persons present. President Howard in the chair.

Mr. A. Bolter, of Chicago, Ill., was elected a member of the Society.

Referring to the nuisance created this season by *Dynastes tityus*, Mr. Howard remarked that the smell had also been quite noticeable this season at Raleigh, N. C., on a street lined with Hackberry trees (*Celtis*). Mr. Smith asked whether the larvæ of Dynastes mature in one or several seasons. He knew, from actual observations made by himself and Mr. Schaupp, that *Lucanus dama* has a period of at least two years. Mr. Schwarz said that, so far as he was aware, no observations had hitherto been published on the duration of the larval state in Dynastes. Mr.

Lugger added that *Osmoderma* requires two full years from the egg state to maturity.

Mr. Howard presented a paper on the larval habits of the Trichopterous genus *Hydropsyche*, as observed by him in the month of August in the vicinity of Washington.*

Mr. Schwarz added that in a small creek on the Virginia side of the Potomac he had observed vast numbers of a Trichopterous net which seemed to differ from that described by Mr. Howard. It is cup-shaped, without any terminal tube, and fastened with one side to large rocks in places where the water falls in a thin sheet vertically or nearly vertically over the rocks. There were no larvæ in the webs at the time of the observation, toward the middle of September.

Mr. Lugger spoke about the fauna of the island of Abaca, one of the Bahama Islands:

Some members of the Johns Hopkins Zoological Laboratory had made a small and superficial collection of insects, etc., during their stay upon that island. The following list comprises the whole of the collection:

Cycloneda sanguinea Linn.
Carpophilus pallipennis Say.
" dimidiatus Fabr.
Monocrepidius lividus De G.
Chauliognathus marginatus Fabr.
Lachnosterna (two species).
Cyclocephala immaculata Oliv.
" punctata (a Cuban species).
Chalepus obsoletus Lec.
Eburia stigma Oliv.
Chion cinctus Dr.
Callichroma plicatum Lec. (?)
Acanthoderes decipiens Hald.
Bruchus obsoletus Say.
Glyptotus cribratus Lec.
Cistela sericea Say.
Isomira sp.
Nacerdes melanura Linn.
Oxacis dorsalis Melsh.
Pachnæus sp. (a Cuban species).
Calandra granaria Linn.

Looking at the species before him, he was struck by their great similarity to those of the fauna of the sea-coast of Maryland or Virginia. In fact, the great majority of them could be collected there as well as upon the island of Abaca. The few wasps and ants are not North American; the two Hemiptera collected are both North American. The terrestrial snails, however, of which quite a number had been gathered, were entirely different from any found in the United States; all belonged to the Cuban fauna, with, perhaps, the exception of a small *Pupa*.

Mr. Schwarz remarked that a small collection of insects made

* This paper has been published in the Report of the Comm. of Agric., 1886, p. 510.

by a non-entomologist usually does not throw any light upon the character of the fauna of the particular locality in which the collection has been made. The most obvious insects that are most liable to be gathered by a non-entomologist are by no means always among the characteristic species of a given locality. This can plainly be seen from the collection of Coleoptera just analyzed by Mr. Lugger. As to the fauna of the Bahama Islands, his experience, from a few days' stay on two of the islands, was that at the first glance the insect fauna, especially in the Lepidoptera, did not seem to differ superficially from that of Florida; but that, upon more careful collecting, the majority of the species proved to be different from those occurring in the United States. Mr. Smith added that a collection of Lepidoptera Heterocera from the Bahama Islands, which he had occasion to examine, proved to be quite different in character from the Floridian fauna.

Mr. Schwarz commented on two recent publications by European authors on North American Coleoptera. 1. The occurrence of *Leptura variicornis* Dalm. in North America, as reported by Mr. C. A. Dohrn (Stett. Ent. Zeit., 1886, pp. 191–192).* 2. Mr. Fleutiaux's attempt in Le Naturaliste, VIII, No. 41, Sept. 1, 1886, p. 327, to revive the question of the specific distinctness of *Amblychila Picolominii*. This article brings no new arguments, and is certainly quite superfluous, in view of the opinion repeatedly set forth by Drs. LeConte and Horn, after repeated examination of the type specimen. Moreover, Mr. Fleutiaux does not seem to be aware of the fact that, at least so far as this Amblychila is concerned, the material now accumulated in American collections is by far more complete than that in European collections, and that for this reason American Coleopterists are more competent to judge on this question than the European entomologists.

Mr. Schwarz gave a short review of the history of the spread, within the United States, of the Asparagus beetle (*Crioceris asparagi*), and stated that he had observed it this season at Fortress Monroe, Va. This locality had been visited by him annually, for a series of years, but no trace of the beetle had been found there previous to the present season. It appears probable, therefore, that the species has appeared this season for the first time

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* See *Entomol. Amer.*, v. ii, pp. 161–162.

south of the Chesapeake Bay. Quite a number of specimens were seen, on June 17th, washed up by the sea on the beach, among myriads of *Doryphora 10-lineata* and their constant companions, the various species of Coccinellidæ. From this mode of occurrence, and, further, from the fact that no asparagus is grown anywhere near Fortress Monroe, it might be concluded that the Crioceris had flown directly across the bay from the opposite shore of Virginia. There can hardly be any doubt that the Crioceris will have reached, this year, the asparagus growing region back of Norfolk, Va.

In discussing this communication Mr. Lugger made some remarks in regard to the regions more recently invaded in Maryland and Virginia by *Crioceris asparagi* and *C. 12-punctata*. The former had been, for years, very common in the vicinity of Baltimore and along the banks of the Patapsco river where the wild asparagus grows abundantly. Two years ago the species appeared suddenly in large numbers on Kent Island, doing great damage, and in the same year it reached to within a few miles north of Hungar's Wharf, eastern shore of Virginia. The specimens observed by Mr. Schwarz, at Fortress Monroe, came probably from that vicinity, which is almost opposite the fort. The *Crioceris 12-punctata* has spread slowly and has reached portions of Anne Arundel County, and even Washington City.

NOVEMBER 12, 1886.

Five persons present. President Howard in the chair.

Mr. Howard read a letter from Judge Johnson, dated Meridian, Miss., Nov. 4, 1886, in relation to the havoc caused by fleas among young chickens at Gainesville, Fla. Only the very young, downy chickens are affected, and upon these the fleas settle like ticks, especially about the head. One of the first symptoms observed is the loss of the voice in the chicken; then the down drops off, to be succeeded by knots, lumps, and sores. The chicken finally dies, and from a large brood only four remained after two weeks. Application of kerosene killed the fleas, but also the chickens; and pyrethrum powder had only temporary effect. Mr. Howard added that specimens of the flea in question had been sent by Judge Johnson, and that it might be identical with *Pulex gallinarum*. Mr. Lugger alluded to a similar injury inflicted on the chickens by a species of mosquito in parts of Louisiana.

Mr. Dodge entertained the Society by giving his long-promised account of the life and work of the late Mr. Townend Glover. Mr. Glover had always been a lover of Nature, but in his earlier years he led a wild life until he decided to settle down. He bought a place on the Hudson and began to be interested in entomology by taking care of his garden. He then began to write for local papers, and to picture insects in their various stages. Harris heard of Glover: they met, and a correspondence between them was carried on. At the suggestion of Harris and other entomologists Glover began to engrave his drawings, and from that time he conceived the idea of producing a great illustrated work on insects. After his visit to Florida he intended for some time to publish an octavo work on economic entomology, but he changed his plan to that finally adopted, viz., to arrange the insects according to orders. His earlier plates are much better than many of the later ones, when he engraved with great haste, producing plate after plate in very short time; but his drawings were always and uniformly very careful and accurate. His manuscript work on Lepidoptera and Coleoptera, which includes most of his original notes and observations, forms a nearly complete encyclopædia on these two orders, and is now in the possession of the Smithsonian Institution. By industrious work, and by keen power of observation, he had accumulated a vast amount of valuable original notes; but, strangely enough, throughout all his publications he shrank from making use of his own notes, and always preferred to cite the "authorities." Mr. Dodge interspersed his account with narrating various incidents and anecdotes illustrating the character of Mr. Glover, his mode of work, and the many peculiarities of his private and office life.

Mr. Mann reminded the members that after the death of Dr. F. E. Melsheimer, in 1873, he had come into possession of the entomological manuscripts and library, and the remainder of the collections of Melsheimer, including some of the manuscripts of the elder Melsheimer, and the correspondence between Melsheimer and other entomologists of his day, such as Say, Harris, Haldeman, LeConte, and others. He exhibited a number of manuscript and rare printed books from this collection. Some of the manuscript volumes contain original descriptions, with colored figures of larvæ raised by Melsheimer, with notes on the habits of larvæ; others contain descriptions of genera and species of insects, compiled or original, intended apparently for a faunal work; others contain transcripts of scientific writings which Melsheimer had been unable to purchase. One quarto volume contains a list of Coleoptera (probably those of Pennsylvania), with notes on the season, food-plants, and habits of many species. Among the printed books there was a copy of the Catalogue of the Coleoptera of Pennsylvania, by the elder Melsheimer, published in 1806, with manuscript additions and corrections by Melsheimer.

Mr. Lugger gave a list of insects which he had noticed outdoors this year very late in the season. They are species not usually found at this season. The list is as follows:

Oct. 19. *Leptostylus aculifer*, found on the electric light in Baltimore during a cold and windy evening.

Oct. 21. *Attacus luna* ♂, flying about a street-lamp in front of his house in Baltimore; weather rainy and cold.

Oct. 26. *Chærocampa tersa*, found flying during a sunny afternoon in the Agricultural Grounds.

Oct. 27. A very large swarm of Cotton Moths *(Aletia xylina)* at the electric lights on Capitol Hill. Wind due west; all the specimens were fresh (Schönborn).

Oct. 27. A few Cotton Moths at the electric light in Baltimore, but only at elevated points.

Oct. 28. All the streets in Baltimore provided with electric lights were crowded with Cotton Moths. The same phenomenon occurred six years ago, during a heavy rainstorm. It was so cold at that time that snowflakes were mixed with the rain, and snow remained on the streets until the following noon. Specimens quite fresh.

Nov. 1. *Scepsis fulvicollis;* one specimen flying about at Washington.

Nov. 8. A few Cotton Moths flying about the electric lights on Capitol Hill (Schönborn).

Nov. 11. *Colias eurytheme*, or rather a very pale variety of it, looking like *Pieris*, was flying about some flowers of *Dandelion* in the Agricultural Grounds.

Nov. 11. A female of *Mantis carolina* was found in the Smithsonian Grounds.

Nov. 12. A fresh specimen of *Cicada pruinosa* was taken at the same place.

DECEMBER 2, 1886.

Six persons present. President Howard in the chair.

Mr. J. D. Sherman, Jr., of Peekskill, N. Y., was elected a member of the Society.

Dr. Riley made some remarks on the larvæ and larviform females of *Phengodes* and *Zarhipis*, of which he furnished the following abstract:

NOTES ON PHENGODES AND ZARHIPIS.

I read with some interest, while in Europe last July, the account in *Science* for July 9th of Dr. Horn's remarks on the larviform female of *Ph. laticollis* and *Zarhipis Riversii*. I have been familiar, since 1869, with the luminous larva which was then, following Osten Sacken, referred with a question to *Melanactes*. I exhibit alcoholic specimens of the form found by myself and others in Missouri, and which was first figured by me in LeBaron's 4th Rep. Ins. of Ills. (1874); of another series corresponding with *Zarhipis* received in 1883 and 1884, from Mrs. A. E. Bush, of San Jose, Cal.; one received from Henry T. Thomas in 1869, of Franklin, Mo.; one (*Phengodes*) received from Mr. J. W. A. Wright, Greensborough, Ala., June, 1886; two (apparently *Phengodes*) received in 1875 from Mr. B. P. Mann, Cambridge, Mass.; others received from L. R. Alexander, Piocha, Nev., in September, 1883; and, finally, one (*Phengodes*) from Mr. O. Lugger, found near Baltimore, Md., in 1876.

The structure in all these larvæ is essentially identical, but they are divisible into three groups doubtless corresponding to as many genera. In the first group (*Phengodes*) the most common form is pale or yellowish in general color, with a medio-dorsal series of small, paler, double spots near the hind margin of each joint; the mandibles sharp and sickle-shaped and the prothoracic joint elongate and narrowed anteriorly. Another colorational form in this group—the one originally described by Osten Sacken—has the horny parts much darker, almost black, with a series of pale brown or fulvous dorsal spots, two to each joint. In the second group (*Zarhipis*) the color is equally variable, some of the specimens being pale brown and showing the small, geminate, medio-dorsal paler spots at base of each joint, but most of them being much darker, almost black dorsally with no lighter markings. The surface is rather more noticeably shagreened and the medio-dorsal depressed line more marked in this group than in the first, from which it is at once distinguished by the broader, more transverse head; but particularly by the broader, more transverse prothoracid joint, not narrowed anteriorly. With these exceptions the structure in these two groups is essentially the same. In both, the larvæ possess a large ocellus at base of antennæ, and in both they exhibit a remarkable peculiarity hitherto not noticed, viz., a pair of small spiracular or spiraclelike apertures on the dorsal sutures between joints 4–11, and normally quite hidden by the telescoping of the joints. The nature of these openings can only be speculated upon, as no dissections have yet been made; they may be olfactory organs.

In the paper, "Zur Biologie der Käfergattung Phengodes Ill.," by Dr. Erich Haase, published in *Isis* for 1885 (pp. 10–11), the author, without referring to Osten Sacken's paper, cites the observations of Dr. Hieronymus, of Cordoba, which first established the relation of the male Phengodes with this larva as the female. From a larva received from Missouri in 1883, and which was kept for some weeks in a glass jar where it could be seen until it reached the pupa state, I had, with Mr. Schwarz, already at that time decided that the larva must be referred to Phengodes, though there had been no occasion to publish the conclusion, because the specimen had unfortunately disappeared during one of my absences, and probably flown out as a beetle. The third group consists of the smaller larva from Nevada, which may eventually prove to be the young of one of the larger forms, though more probably it will prove to belong to some other genus. It is less narrowed in front, the head is broader, and the whole body is sparsely beset with spinous hair. The color is pale, and the ocellus very conspicuous each side, looking almost like a compound eye by virtue of its being placed on an irregular black patch. No dorsal spiracular orifices are noticeable.

So far as the specimens justify any conclusion, the only difference observable between the perfect female and the larva is in the more feeble mandibles and tarsi of the former.

A long discussion on various topics connected with this Phengodes matter followed the reading of Dr. Riley's paper. Mr. Smith related his experience with one of the luminous larvæ found at Britain, Conn., and which was kept in captivity for a number of weeks; but it finally died. Mr. Mann spoke on the numerous luminous larvæ which he found in and around Cambridge, Mass. Among them he had observed two forms, one with blunt, the other with pointed mandibles. A third form, of jet-black color, could extinguish their light at will, and there were also differences in the anal segment. All were kept in captivity for a considerable length of time, but none transformed. Mr. Schwarz gave a review of the geographical distribution of the North American *Phengodini*, and related that on one occasion he had found in Florida, during daytime, 4 or 5 male specimens of *Phengodes plumosa* on one spot among the roots of grasses.

Mr. Schwarz exhibited samples of small, square rods of naphthaline which, in this form, is known in commerce as "white carbon," and used for intensifying the flames of gas-light. The material is very cheap, costing only 8 cents per pound wholesale, and much purer than the naphthaline cones now in market. When broken up into small pieces, and wrapped in thin paper, it can most conveniently be used in insect boxes.

Dr. Marx read some abstracts from his work on North American Scorpionidæ which he intends to publish. He gave an historical review of the various systems of classification proposed by different authors for these Arthropods. The system of the older authors, such as DeGeer, Leach, and Koch, was based upon the number of eyes, but the more recent investigations by Peters, Thorell, and Karsch showed that this character is without any systematic value. The North American Scorpionidæ have been monographed but once, viz., by Dr. Wood in the *Journal of the Philadelphia Academy* for 1874, where 13 species are enumerated. Wood still follows the old classification, and, consequently, described all but two of his species as *Buthus*. Dr. Marx had the opportunity to examine the types of Wood preserved in the U. S. National Museum, and, following the more recent classification, he finds that not one of Wood's species is a *Buthus*. The type of Wood's *Scorpio Allenii*, as well as two of the other species described by Wood, cannot be found and appear to be lost.

January 6, 1887.

Twelve persons present. President Howard in the chair.

Mr. J. H. Kuehling, of Washington, D. C., was elected a member of the Society.

The election of officers for the year 1887 then took place, and resulted in the re-election of the old board of officers.

The Treasurer and the Secretaries presented their annual reports.

The President then read his annual address. After congratulating the Society upon its progress during the year and recommending certain matters of policy connected with the conduct of meetings, with the character of papers, with the membership, and with the business of the Society, he proceeded with the subject proper of his address:

ANNUAL ADDRESS OF THE PRESIDENT.

A Brief Consideration of Certain Points in the Morphology of the Family Chalcididæ.*

By L. O. HOWARD.

The number of systematic workers upon this interesting and extensive family of parasitic Hymenoptera has always been small. Excluding more general writers, we may confine the number of specific workers of prominence to the following short list: Dalman, Nees von Esenbeck, Ratzeburg, Förster, Reinhardt, Walker, Haliday, Thomson, Mayr, Rondani, Kirby, and Cameron. The work upon the family is, in fact, but just begun. The European fauna is by no means thoroughly worked up, except in a few sub-families, while in America probably not one species in a hundred has been described.

Nees (1834) described 316 species of 32 genera; Walker (1839) described 703 species of 12 genera; the British Museum catalogue (1846) mentions 1,094 species of 130 genera; Förster (1856) characterized 173 genera; Kirchner (1867) catalogues 2,407 species of 210 genera in Europe, and Thomson (1875) gives 658 Swedish species, belonging to 211 genera. The European genera, since Kirchner's catalogue, have been largely added to, and the species rather less so in proportion, and we may now roughly estimate the described European species at 2,800, and the genera at 300. In North America, including the West Indies and Mexico, 474 species of 72 genera have been described up to this date.

The insects of this family are quite closely related to the Proctotrupidæ both in structure and in habits, and to the Cynipidæ in structure and in the habits of certain forms of the families, *i. e.*, certain Cynipidæ are parasitic, and certain Chalcididæ are gall-makers. The Chalcididæ are distinguished from the Proctotrupidæ principally by antennal, terebral, and pronotal characters, in addition to that summary of all characters which Europeans call *habitus*, or general appearance, and which enables the practised eye to at once place a species in its proper group. With

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* This paper, as published, is considerably abridged from its original form as read. It is but a hint at the external anatomy of the family, and will serve to give simply a general idea of the structure and some of its principal variations.—L. O. H.

the Chalcididæ the antennæ are always elbowed, and have one or more ring-joints between pedicel and funicle. With the Proctotrupidæ they may be elbowed or not, and seldom have a single small ring-joint, in which case they are not elbowed. With the Chalcididæ the ovipositor arises below and anterior to the tip of the abdomen; with the Proctotrupidæ from the tip. To this character I know of no exceptions, though Thomson, without specifying them, states that there are such. The most perfect distinguishing character is, however, that in the Chalcididæ the pronotum never reaches to the tegulæ, while in the Proctotrupidæ it is always separated from the tegulæ by a simple suture only. The wing-cells are always undeveloped in the Chalcididæ, while certain ones are occasionally found in the Proctotrupidæ. The colors of the Chalcididæ are almost invariably metallic, and such colors are very rare with the Proctotrupidæ.

[A discussion of the characters used by different authors is here omitted for the sake of brevity.]

In order to indicate the confusion which exists among the different authors in points of nomenclature, I introduce a table of the nomenclature of the veins of the fore-wings according to the three principal systems:

Walker and Haliday.	*Förster and Mayr.*	*Thomson.*	*Proposed.*
humerus	humeralis	postcosta	submarginal
ulna	marginalis	stigma	marginal
radius	postmarginalis	metacarpus	postmarginal
cubitus	stigmaticus	radius	stigmal
carpus	clavus	clavus	club
		uncus	hook
		basalis	1st spurious
		cubitalis	2d "
		spurius	3d "

From this collection of names almost every writer on the group has adopted just so much as he chose, so that, except from the context, it is almost impossible for the student to understand what is meant by any one name. After a careful consideration I have adopted in my papers the nomenclature given in the fourth column. No term needs explanation, and for this reason I use it, although, as soon as perfectly satisfactory homologies are established between these veins and those of higher Hymenoptera, and particularly with other orders, I shall gladly adopt a better. Throughout the entire body structure great difficulty arises in homologizing with other groups, and in this brief review of the external anatomy and some of its variations I have not attempted to alter existing names, nor to suggest relationships, offering it simply as a statement of form and variation which can, perhaps, be read to advantage by one commencing the study of the group.

The Head.

In comparison to the size of the body the head is large. Its anterior (dorsal) aspect varies from a broad oval to an elongate triangle with rounded superior angles. Its dorsal (posterior) aspect also varies from nearly parallelogrammatic, through oval, to subcordate. It is usually carried nearly at right-angles to the thorax, so that the face is anterior, the occiput posterior, and the vertex superior. In the *Eurytominæ* and some others it slopes towards the pectus, but in other groups it has the opposite tendency—towards bringing it into the same plane with the thorax.

The *occipital margin* is sometimes sharp (*Encyrtinæ*) and sometimes rounded (*Eupelminæ*). In *Caratomus*, Dalm., a curious modification of the usually regular ridge is seen; a deep cleft occurs behind each eye, and on each side of the indentation is a marked prominence of the ridge. The *face* is sometimes strongly convex, and occasionally angulate at the middle or at the insertion of the antennæ; usually, however, it is nearly flat. The *antennal grooves* are frequently entirely obsolete; sometimes, however, deep and strongly marked. With some genera they are parallel, with others approaching either before or behind, and with a median separating carina of varying strength. The *clypeus* is transverse, and is either smooth, rounded, or dentate. It usually covers the *labrum*, but sometimes, as in *Encyrtus*, the latter is very evident. The *epistoma* is seldom distinguishable. The *cheeks* are either rounded, straight, or compressed. They are frequently traversed by a suture, running from the eye to the base of the mandible, and this suture is always broadest next the eye. It is the *sulcus genalis* of Thomson.

The *eyes* are large and protruding, usually round, sometimes verging upon the pyriform, occasionally pubescent, and again perfectly naked. They may approach close together or be widely separated; *Chiloneurus* and *Caratomus* being two extremes in this respect. They vary in color from bright coral red, through reddish-brown and slate to black. The red shades are preserved in balsam-mounted specimens, but are lost in pinned specimens after death. With certain groups of genera the eyes invariably sink in and present a concave centre after death, while with others they always preserve their normal form. This sinking in also extends to the other parts of the head, very seldom to the other parts of the body, so that in these genera, notably in the *Tetrastichinæ*, the head characters have to be studied from fresh specimens.

The *ocelli* are comparatively large, and are placed in the form of a triangle which may be very acute or very obtuse angled, depending to some extent upon the degree of separation of the eyes. They vary in color as do the true eyes. Sometimes they are small and so hidden by the pubescence of the head as to be almost indistinguishable. In the anomalous group *Aogonidæ* of Walker there is much variation in the presence or absence of eyes and ocelli. *Eupristina*, for instance, has neither eyes nor ocelli in the male, while the female has large oval eyes, but inconspicuous ocelli. In *Walkerella* the ocelli are absent and the eyes are small. This is also the case with *Sycoscaptella* and *Otitesella*.

The *mandibles* are usually strongly developed, although not so much so as with some of the Proctotrupidæ. They are quite strongly convex dorsally and are often transversely impressed at base. At the apex, and along the median line when closed, they are furnished with from two to four teeth. The teeth of the two opposite mandibles often differ in number, the right having four and the left three. With the *Macrocentri* the mandibles are usually stronger and with more teeth than with the *Microcentri*, in which group they are seldom more than bi-dentate. The *maxillæ* are small and consist almost entirely of *stipes*. The *galea* is imperceptible in the genera examined, and the *lacinia* is simple with almost imperceptible teeth. The *maxillary palpi* are usually 4-jointed, but may be 3-jointed. The *labial palpi* are 3-jointed with the higher forms, but with the lower they are rudimentary.

The *antennæ* are very important organs in the classification of the group. They vary in number of joints from seven to thirteen, never exceeding the latter number. The *bulb* is not well separated from the scape. The *scape* is long, usually the longest joint, and slender; usually sub-cylindrical, sometimes distinctly fusiform, occasionally with a leaf-like ventral expansion (some species of *Encyrtus* and *Aphycus*), or with a flattened tip (*Melittobia*), or flattened out and rolled from side to side (*Cerapterocerus*). Its insertion on the face varies considerably. With the *Pireninæ* it is inserted near the border of the mouth, but usually it arises from a point nearer the middle of the face. The distance apart of the two bulbs also varies somewhat. The *pedicel* is usually obconical with its apex somewhat curved. It is not inserted directly upon the apex of the scape but upon an articulating facet ventrad of its distal end. Following the pedicel come, in many instances, two *ring-joints*. These reach their maximum of development in the *Pteromalinæ* and in some other subfamilies are not perceptible. Following the ring-joints come from one to six *funicle-joints*. These present much diversity of form. Their simplest form is that of a long, naked cylinder, as in the female *Psilophrys*. The joints of this form vary all the way from ten times as long as wide to much wider than long. They may present a serrate appearance collectively, as in *Habrolepis;* they may become gibbous dorsally, as in the male *Eurytoma*, or each may give off a long branch, as with *Eulophus*. They may also be flattened out so that one face is several times wider than long, as in *Mira* and *Anusia*. One discouraging fact to the student of collected specimens is that the antennæ of the two sexes of the same species may differ more widely from each other in form than do those of different subfamilies. This is markedly so in all *Encyrtid* genera. The female antennæ in this subfamily are usually regularly sub-clavate and naked, while those of the male are usually linear, with each joint strongly constricted above and furnished with one or more whorls of strong hairs curved at the tip. A similar difference may be seen with some of the *Eurytominæ*. The number of joints is quite constant in genera, and also with the two sexes. Excluding the apparent exceptions to this latter rule, in which the club is divisible in the one sex and not in the other, the only absolute exception which I have noticed as yet is *Dilophogaster*, in which the male antennæ are nine-jointed and the female ten-jointed. Following the funicle proper comes the *club*. This is normally three-jointed, but the joints often coalesce, so that they cannot be distinguished. It may be conical (*Leucaspis*) or obconical (*Cercobelus*); it may be squarely truncate at tip (*Sphegigaster*), or obliquely truncate (*Copidosoma*), or it may be laterally flattened (many genera). The second joint may have a tooth-like projection (*Notanisus*), or the tip may be prolonged into a filamentary process (*Chrysocharis*). It may equal in length the whole funicle, or it may be shorter than the last funicle joint. At the tip of the scape the antenna is always abruptly elbowed, and this was formerly considered one of the most important of the family characters; but, as we have already indicated, it is sometimes found with the Proctotrupidæ, notably in the sub-family *Scelioninæ*.

The Thorax.

The prothorax.—This segment is composed almost entirely of *notum*, which extends ventrally below the latero-ventral angle, and is nearly continuous ventrally, with the sub-family *Chalcidinæ* in particular. It is usually quite short, although assuming considerable size in the *Eurytominæ*, *Aximinæ*, and *Toryminæ*. Occasionally, when seen from above, it appears conical (*Eulophinæ*), again transverse quadrate (*Chalcidinæ*). The *prosternum* is usually narrow and transverse, but is occasionally triangular, with its apex directed anteriorly. The *proëpisterna* are usually narrow and situated in an oblique cephalo-ventral plane. In *Smicra* they are one-half as broad as long.

The mesothorax.—With the Chalcididæ the *scutum*, *scutellum* and *postscutellum* of the *mesonotum* are distinguishable. The so-called *postscutellum* of Förster is, however, believed by Thomson to belong to the *metanotum*, and would hence be *metapræscutum*. The diversity in certain points of the *mesonotum* has afforded good classificatory characters. The *mesoscutum* may be either entire or its lateral portions may be separated from the dorsum by deep sutures, forming the so-called *parapsidæ* (MacLeay), *plagæ scapulares* (Haliday), or *scapulæ* (Thomson). These sutures, known ordinarily as *parapsidal sutures*, usually approach posteriorly and sometimes almost meet at the scuto-scutellar suture. The *mesoscutum* may have a median longitudinal carina, as with *Euplectrus*, but is usually entire. The *mesoscutum* is divided from the mesoscutellum by a deep transverse suture running between the fore wings, and which may be straight (*Spalangia*) or concave anteriorly (*Torymus*), or posteriorly (*Cherchysius*). The *mesoscutellum* is never entire, but consists either of three or of five pieces. Two very deep sutures, which usually converge anteriorly, separate the scutellum proper from the *paraptera* (MacLeay) or *axillæ* (Thomson), and these again with many genera are separated from small triangular pieces, which Thomson has called the *axillulæ*. The *mesoscutellum* proper may be either unmarked or it may have a delicate transverse central suture (*Syntomaspis*) or two sublateral longitudinal parallel sutures (*Tetrastichus*). The *mesopostscutellum* is small, triangular or quadrate. The *mesosternum* varies considerably in size and shape, from a small, rounded disc to a large, irregular, obliquely-placed sclerite. The *mesepisterna* and *epimera* are large, well developed, and distinctly separated. The *episterna* project up so as to intervene between the *pronotum* and the *tegulæ* on either side.

The metathorax.—The *metapræscutum* and scutum are represented by chitinous transverse bands. The former is usually interrupted by the mesoscutellum and appears as a triangular piece on each side. The *metascutum* is also occasionally so interrupted, and appears as two patches parallel with and similar to the above; but it is also frequently continuous from side to side. The *metascutellum* usually contains entirely within its borders the metathoracic spiracles and is quite variable in form. It has not been used in classification to any extent except by Thomson. It has often a well-marked central longitudinal carina, which divides at the *neck*. The *neck* is the somewhat elevated posterior portion of his sclerite and overlaps the petiole of the abdomen. There are often two lateral, usually curving, carinæ, sometimes replaced by delicate sutures, which cut off the side pieces containing the spiracles from the centre of the sclerite. The lateral edges of the metascutellum are frequently thickened and often turned up, in which case they are usually furnished with rather long whitish hairs, as in certain of the *Pteromalinæ*. *The metasternum* is well marked, sometimes notched caudally, and has often a median longitudinal carina. The *metepisterna* and *metepimera* are large and distinctly separated.

The wings.—Curious and constant differences may be seen in the shape of the fore wings by which the family is readily divided into two groups. With the *Microcentri* the wings expand with approximate equality on both cephalic and caudal borders towards the distal border which is abruptly rounded. With the *Macrocentri*, on the contrary, the caudal margin has almost invariably an angle, more or less distinctly marked, from which a long curve sweeps up to the apex which is near the cephalic margin. The *submarginal* vein extends out into the wing a short distance behind the costa and more or less gradually joins the costa at some distance from the base. From the point where it joins the costa it becomes the *marginal*. It is often broken near the marginal, and this makes a good division of the *Microcentri* into two groups. The marginal is almost invariably longer with the *Microcentri* than with the *Macrocentri*. With the latter it is sometimes entirely lacking, in which case the *stigmal* proceeds directly from the *submarginal* (*Aphycus*). The *postmarginal* varies greatly in length. It may be wanting (*Entedon*) or may extend nearly to the tip of the wing (*Gastrancistrus*). The *stigmal*, with its *club* and *hook*, is always more strongly marked with the *Macrocentri* than with the *Microcentri*. With the latter the *uncus* is often represented by a chain of large cells. The spurious veins are usually only seen in certain lights and are unimportant. The *first spurious* connects the second with the *submarginal*. The *second spurious* extends from the *submarginal* to a point below the tip of the wing. The *third spurious* is usually given off from the second, but sometimes from the first, and reaches the margin at a point cephalad of the second. The *tegulæ* vary from triangular to quadrilateral in shape, and vary also in size and color. The wings are in general evenly covered by a minute pilosity except at base. In certain genera (*Aphelinus*) an oblique hairless streak, of varying width, extends from below the stigma to near the base of the fore wing. In certain Encyrtids also there is a hairless streak near the tip of the wings. In *Trichogramma* the pilosity is arranged in regular lines. The borders of the fore and hind wings are furnished with cilia (except along costa). In *Psilophrys* the marginal cilia are not developed. In *Gyrolasia* they are very long. In the great majority of cases the wings are clear and transparent. In many genera, particularly with the females, they are clouded in patches. I have seen but one species the wings of which are entirely clouded. It is allied to *Smicra* and is from Brazil.

The legs.—As a general thing the legs are rather slender and increase in length and size from before backwards. With the *Encyrtinæ* and *Eupelminæ*, however, the middle legs are the longest and strongest, the hind legs ranking next. With *Homalotylus* the middle legs are particularly long. With the *Chalcidinæ* the hind femora are greatly enlarged and are usually (except with *Haltichella*) toothed along the ventral edge. These huge femora are of positive inconvenience to the insects in locomotion and are not, as some authors state, "leaping legs." The coxæ are free and the trochanters are apparently 1-jointed. The front femora are often somewhat swollen in the middle and are furnished with a curved spur at tip. The tibiæ of the other legs are generally of uniform width and are ordinarily provided with a single straight spur at tip, but sometimes have two. With the *Encyrtinæ* and *Eupelminæ* the middle tibiæ are lengthened and widened at tip and the apical end is greatly enlarged and more or less toothed or serrate along its tarsal edge. With *Euplectrus* there are two very long hind tibial spurs. The tarsi are 3-, 4-, or 5-jointed, and the groups *Trimera*, *Tetramera*, and *Pentamera* were founded on this peculiarity. The *Tetracampinæ* have females with five joints, and males with four, and upon this subfamily Reinhart founded the group *Alloëmera*. With the *Pentamera* the first four joints diminish in length, the fourth being smallest and considerably shorter than the terminal joint which is furnished with two claws and a central pulvillus. The first tarsal joint of the middle legs becomes strangely modified with the *Eupelminæ*, less so with the *Encyrtinæ*, and still less so with the *Aphelininæ*. With the first-mentioned group it is swollen vertically and is furnished along its ventral edge with a strong comb of chitinous teeth, represented in the other subfamilies by simple bristles.

The Abdomen.

The abdomen varies greatly in shape and relative size. Two extremes in shape are *Omphale*, in which it is very long and slender, and *Perilampus* and *Eunotus*, in which it is broader than long. It is composed of eight *tergites* and six visible *urites*. The first segment is the petiole, in which we find great variation. It may be considerably longer than the rest of the abdomen, as in *Eucharis* and *Stilbula*, or it may be imperceptible without mutilating the specimen. The relative lengths of the different tergites, especially of the second and third, are important in some subfamilies as generic characters. This is especially true with the females. In the singular subfamily *Ormyrinæ*, composed exclusively of gall-parasites, the dorsum of the abdomen is remarkably sculptured in both sexes, whereas ordinarily it is smooth. With certain *Torymid* genera constant differences are seen with the hind border of the second tergite. Thus in *Holaspis* it is incised in the middle with the females only, while with *Oligosthenus* it is smooth and straight in both sexes, and with *Monodontomerus* it is somewhat incised in both sexes. It is very common for each of the tergites to be fringed along its posterior border with one or two rows of fine hair, but often also this appears to be entirely absent. The spiracles are visible (sometimes from above) at the sides of the seventh tergite. The last ventral segment, forming the ventral valves, may be ridged or smooth. The urites are always more easily seen with the males than with the females and often have a median carina. With the females they are often entirely closed by the tergites. The ovipositor approaches more closely in its structure that of the Braconids than that of the Proctotrupids. The two sheaths are hard and strong, semi-cylindrical, and usually covered with short strong bristles. The ovipositor proper is straight, slightly swollen at tip, pointed, with the dorsal edge of the apex more or less serrate. This serration is quite marked in the larger gall-parasites, such as *Syntomaspis* and *Torymus*. The ovipositor may be short and hidden, or it may be longer than the whole body, and between these two there is great variation. The penis has two rudimentary claspers at base, and is, so far as I have been able to ascertain, usually bipartite at tip. It is seldom extruded in death. In *Eupelmus* the cleft is rounded and it has rounded sides; in *Aphelinus* it is more or less pointed and the cleft is sharply triangular; and in such specimens of *Pteromalus* as I have examined it is subtruncate and the cleft is linear. In *Thoracantha* it is not cleft.

FEBRUARY 10, 1887.

Five members present. President Howard in the chair.

Mr. Smith presented a notice of an amendment of Article III of the Constitution.

Mr. Mann gave a review of his work on the Bibliography of Economic Entomology, partly done by him privately in former years and partly done during his connection with the United States Entomological Commission and the United States Department of Agriculture.

Mr. Schwarz then read the following communication:

ON THE GENUS PHYTOBIUS.—The Curculionid genus *Phytobius* Schœnherr, as restricted by more recent authors, comprises two rather rare European species and was introduced into our fauna because a single specimen had been found in 1874, in Michigan. Dr. LeConte determined the same as being identical with the European *Ph. velatus.* The genus is at once known by the narrow, filiform tarsi, the 3d joint not being lobed; by the very long claw-joint and the very slender tarsi Every one of these three characters is unique in the tribe *Cryptorhynchini* to which the genus Phytobius belongs, but the same combination of the same characters recurs in another tribe of Curculionidæ, as well as in several other widely different families of Coleoptera, *e. g* , *Haliplidæ*, *Byrrhidæ*, *Elmidæ*, *Dascyllidæ* and *Chrysomelidæ.* Wherever this combination of characters occurs it points, so far as our experience goes, toward an aquatic or at least semi-aquatic mode of life, and so it does in *Phytobius.* But this genus is remarkable in being the only known really aquatic genus among the Rhynchophora, all other hydrophilous genera of the family, *e. g.*, *Bagous*, *Stenopelmus*, *Lissorhoptrus*, *Tanysphyrus*, *Lixellus*, *Barilepton*, etc., being more or less semi-aquatic only. In *Phytobius* the larva, pupa and imago live constantly under the surface of the water, the imago only coming ashore to hibernate under debris in very wet ground. The life-history of the genus has been carefully studied by Mr. Édouard Perris, and I may be permitted to insert here, in translation, a short abstract from his remarks (Ann. Soc. Ent. de France, 1873, p. 88). Mr. Perris found the insect in all its stages under water on the filiform leaves of *Myriophyllum spicatum*, a plant which is also very common in North America. "The larva does not differ essentially from those of the typical Curculionidæ, but as in those species which live exposed above ground on plants, *e. g.*, *Phytonomus*, *Cionus*, etc., it is covered with a viscous liquid which is insoluble in water, and by means of which the larva is able to retain its position even in a pretty strong current. When about to transform it secretes from the anus a larger quantity of the gummy substance than ordinarily, or possibly also a different substance. This substance is spread out over the whole body by a peculiar movement of the segments, and finally covers the whole larva as a pretty thick coating which gradually dries and hardens. When the process of drying is completed the body of the larva detaches itself from the covering, and the larva finds itself inclosed in a testaceous, parchment-like cocoon which is almost spherical and firmly attached between the leaflets to a petiole or a branch of the plant. This is all very curious, but still more astonishing is the faculty of the larva as well as the perfect insect to live continuously submerged. The weevil is certainly too lazy and too poor a swimmer to come from time to time to the surface of the water for a fresh supply of air, and the larva without any doubt never ascends to the surface."

This subaquatic mode of life is no doubt the reason that specimens of *Phytobius* are so rare in our cabinets, and I have hitherto seen only three specimens of *Ph. velatus* found in North America. Last fall, however, Mr. Hubbard and myself were fortunate enough to find, near Detroit, Mich., a number of specimens hibernating in moist ground on the banks of the Rivière Rouge, which at that locality is filled with *Myriophyllum*, and I exhibit herewith some of them. In comparing them with the descriptions of the two known species of *Phytobius*, I found that the species before you differs structurally in many details and notably in the absence of thoracic spines and tubercles. When alive the species is one of the handsomest Curculionids known to me; its underside is snow-white, the upperside of a silky-gray, and the yellow patches of scales on thorax and elytra of the brightest sulphur-yellow. In spite of all precautions in killing and mounting the specimens, the colors gradually faded away and the specimens have now lost every trace of their original beauty.

Since there are in our collections many undescribed species of the tribe *Ceutorhynchini*, the naming and describing of this new *Phytobius* would be rather inopportune at this place, and is better deferred until the whole tribe or family can be synoptically revised.

Mr. Schwarz also read a note on the secondary sexual characters of the North American species of *Anaspis*, of which the following is an abstract:

There is great discrepancy in the descriptions of these characters. Dr. LeConte (Proc. Ac. Nat. Sc. Phil., 1862, p. 44) says: "In the male two long, slender appendages are seen proceeding from between the fourth and fifth ventral segments; the fourth and fifth and sometimes the others are longitudinally excavated." Mr. J. B. Smith (Trans. Amer. Entom. Soc., x, 1882, p. 77) quotes the above remarks of Dr. LeConte and adds: "I must admit, however, that I have been entirely unable to discover these processes, although I have examined hundreds of specimens of *A. rufa* to this end alone. Males I have found with the excavated ventral segment, but never the processes." It seems strange that there should be such difference of opinion regarding this character in our *Anaspis*, which by no means rank among the smallest Coleoptera, but the superficial appearance of this structure is, indeed, a most deceptive one. As Mr. Smith correctly says, one can examine many males, and in all the abdomen appears to be excavated, the excavation extending in an elongate-triangular shape from the apex of the fourth segment to the tip of the abdomen. Such will be found to be the case in most specimens which have been collected in alcohol, but in well-preserved specimens there should be no doubt about the real nature of this structure, which can be described briefly as follows: Two more or less slender, movable appendages arise from the apex of the fourth ventral segment; the abdomen is not excavated, but the last segment is emarginate, or notched. The appendages are stiff, of nearly equal width throughout, covered with rather sparse, black hair, and movable in an up- and downward direction, but do not seem to be capable of lateral movement. When closely applied to the surface of the abdomen they resemble in an extraordinary degree the abrupt ridges which in the males of certain other Coleoptera limit the excavation of the abdomen. In three species (*M. nigra*, *atra* and *flavipennis*) the appendages are straight or nearly so, and start from one and the same point at the apex of the fourth segment, diverging posteriorly; while in *M. rufa* the appendages are curved and widely distant at their starting place. Of the remaining species no males could be examined.

Mr. Schwarz then read the following note:

STRIDULATION IN HARPALUS CALIGINOSUS.—I inquired of Dr. Horn, while he was in Washington on a recent visit, concerning his observation (alluded to on p. 51), and he told me that there can be no doubt regarding the stridulating power of *Harpalus caliginosus*. One evening his attention was called by some apparently large insect flying against his window, and on opening the same he was disappointed in seeing that it was only a specimen of this Harpalus *which was now quietly resting* on the window sill in the bright glare of the electric light near by. While looking at the specimen he distinctly heard the stridulating noise, and at the same time he plainly saw that the noise was produced by the beetle moving its abdomen up and down against the inner edge of the wing-cases.

In view of this observation the reason of the failure of both Mr. Smith's and my own efforts to hear the stridulations in *H. caliginosus* becomes at once apparent; for we expected to hear the noise while handling the specimens, and from our experience we were correct in stating that the Harpalus does not stridulate while being so handled. In Coleoptera sound-producing apparatus are generally but little developed, but occur in several widely different families. They are present in *Carabidæ*, *Dytiscidæ*, *Hydrophilidæ*, *Lucanidæ*, *Scarabæidæ*, *Chrysomelidæ*, *Curculionidæ* and *Anthribidæ*. In each of these families, and no doubt also in others, we find a smaller or larger number of genera, or single species, which possess stridulating powers. But in all these stridulating Coleoptera the sound is always heard when the specimen is handled, or when it feels approaching danger, or when it is otherwise in a state of unusual excitement, *e. g.*, during the act of copulation. Our *Harpalus caliginosus* appears to make a remarkable exception from this rule, and it remains for observers to ascertain whether or not other species of Harpalus, or species of other genera in *Carabidæ*, participate in this habit.

MARCH 3, 1887.

Six persons present. Vice-President Marx in the chair.

Mr. Smith's proposed amendment to Article III of the Constitution was read, discussed by sections, and finally adopted with amendments.

Article III of the Constitution as amended stands, therefore, as follows:

SECTION I. The Society shall consist of active, corresponding, and honorary members. Active members must be residents of the cities of Washington or Baltimore or vicinity. Corresponding or honorary members may be from any State or country.

SECTION II. Any active member of the Society, in good standing, who may leave the cities or district above named to reside for a year or more elsewhere, may, on motion of any active member of the Society, or at his own request, be transferred to the list of corresponding members, and shall from that time have the privileges of such members only.

SECTION III. Candidates for active membership may be proposed at any stated meeting by any active member, but shall not be elected until the next following meeting except upon motion of some person other than the proposer, and upon unanimous consent of those present. A two-thirds' vote of the active members present shall be required to elect an active member.

Corresponding members, except such as become such by removal, may be proposed in the same way as active members, but the name must be referred to the Executive Committee, who shall at the next meeting report upon the same. A two-thirds' vote of the active members present shall be required to elect.

Honorary members shall be proposed only by the Executive Committee, and may be elected at any stated meeting without lying over as in the case of active members. A unanimous vote of the active members present is required to elect.

The election of active or corresponding members may be by ballot or *viva voce.* Honorary members shall be elected by ballot only.

Mr. J. D. Sherman, Jr., of Peekskill, N. Y., sent the following communication:

COLEOPTEROLOGICAL NOTES FOR THE YEAR 1886.—*Cychrus stenostomus* was found several times under fungi where, I suppose, it had stationed itself in order to feed upon the insects inhabiting the fungus.

Amara impuncticollis is found on *Lepidium virginicum* during the warmer parts of the day in May; whether or not it feeds on the plant I am not certain.

Lebia pulchella was found under stones on May 18 and October 8.

Cercyon prætextatum and *Silpha americana* were found in fungi.

The following *Coccinellidæ* are found on *Asclepias cornuti: Hippodamia glacialis, convergens, parenthesis, Coccinella novemnotata, Adalia bipunctata, Brachyacantha ursina.*

Dermestes caninus in a vacated bird's nest.

Cryptorhopalum triste, common on *Taraxacum dens-leonis*, in May.

Cryptarcha strigata, in fungi where *Pocadius helvolus* is common, also on bruised pears, in September.

Tenebrioides corticalis and *Adelocera discoidea* common under the bark of dead Pitch pines *(Pinus rigida)*, where, on February 10, I secured a single specimen of *Dicerca punctulata.*

Acmæodera culta common on *Taraxacum* in May.

Oxyomus porcatus common in dried horse manure in April.

Both sexes of *Geotrupes splendidus* I found in a smooth-surfaced, nearly round cavity situated at the bottom of a winding hole some three or four inches deep, which communicated with the interior of the stem of a fungus; with them I found a pupa, which no doubt belongs to this species.

The species of *Trox* fly in the hot sunshine in April (*T. monachus* and *unistriatus)*, are attracted by light at night (*T. terrestris* and *unistriatus)*, and are found in filth *(T. terrestris*, or allied species).

Macrodactylus subspinosus was unusually uncommon on the rose, doing but little damage; nevertheless it was as abundant as ever on the Ox-eye daisy.

Molorchus bimaculatus, common on *Viburnum prunifolium* during the latter part of May.

Colaspis brunnea abundant on *Ambrosia artemisiæfolia.*

Mr. Smith called attention to a peculiarity observed by him in the antennæ of *Cressonia juglandis.* They have in the male two branches to each side of each joint, precisely as in the Saturniidæ. This feature is unique in the Sphingidæ of North America; nor did he know of its occurrence in exotic genera. He emphasized the relation of the Smerinthids to the Bombycids, even though the venation of the wings and the larvæ are essentially sphingiform.*

Mr. Smith also stated that he had found that among the insects usually named *Euerysthia phasma*, two species were embraced which differed decidedly, not only in markings, but in structure.†

Mr. Smith also offered some remarks on the North American species of *Callimorpha.* In arranging the material of the U. S. National Museum he had come to the conclusion, from a study of the series of *Callimorpha* in the collection, that most of those forms now marked as varieties were really good species. He said that, at some future time, he would present a careful study of the forms.‡

Mr. Schwarz presented the following list of Scolytids found by him on *Pinus inops*, in the vicinity of Washington: *Gnathotrichus materiarius*, *asperulus*, *Pityophthorus sparsus*, *pullus*, *hirticeps*, *puberulus*, *Hypothenemus dissimilis*, *Xyloterus bivittatus* (probably imported from farther north), *Xyleborus pubescens*, *cælatus*, *Dryocœtes affaber*, *Tomicus calligraphus*, *cacographus*, *pini*, *Carphoborus bifurcus*, *Dendroctonus terebrans*, *Hylastes porculus*, *tenuis*, *Hylurgops pinifex.* The mode of work of many of these still remains unknown. Among the less common species is *Pityophthorus pullus*, the galleries of which were exhibited and explained. The female beetle (or both sexes ?) constructs under the bark of the trunk a rather large, round or oval central chamber, from which from three to five long and slightly undulating galleries lead off in various directions, but usually more or less upwards or downwards. The larval galleries do not present any particular features, but are rather shorter than in allied species. All these galleries are more within the bark than in the outermost layer of wood.

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* See Mr. Smith's article, "Notes on the genus Cressonia," Societas Entomologica, vol ii, 1887, p. 3.

† The new species has been described by Mr. Smith as *E. trimaculata* in Entom. Amer., iii, p. 17, and in Proc. U. S. Nat Mus., 1887, p. 336.

‡ The results of his study have been published by Mr. Smith in Proc. U. S. Nat. Mus., 1887, pp. 338-353.

April 7, 1887.

Nine persons present. President Howard in the chair.

Mr. Schwarz read a paper entitled "In Memoriam of Thomas Say." After briefly narrating the circumstances of Say's removal from Philadelphia to New Harmony, Ind., and the death of the great naturalist at the latter place, he continued as follows:

Until very recently I was quite ignorant of the fact that the last resting place of the "Father of American Entomology" was still recognizable or even marked by a monument. Some time last winter, however, I learned from Mr. C. Fleischmann, of this City, that during a few months' stay at New Harmony, he had every day the opportunity of looking from his window at the grave of Thomas Say. I begged Mr. Fleischmann for further particulars, and through his kindness I have come into possession of two photographs of the monument, which I herewith exhibit, and of a copy of the inscriptions thereon.

At New Harmony, Thomas Say lived and died in the house built by William Maclure, president of the Philadelphia Academy of Sciences, the life-long friend and adviser of Say, and the leading spirit in the New Harmony colonization scheme. His house, a very stately building, was after Say's death occupied by Alexander Maclure, the brother of William, and is now owned by a Mrs. Owen, the widow of the son of one of the founders of New Harmony. It occupies one street corner in the centre of the present little town of New Harmony, and in the garden, which extends from the house through the entire block to the next street, is the grave of Say, about fifty yards distant from the rear porch of the house. The grave is marked by a mound about three feet high, from which the monument arises, and surrounded by handsome trees, thus forming a very conspicuous object. From the inscription on the west side we learn that the monument was erected in the year 1846 (12 years after Say's death) by Alexander Maclure in the name of his deceased brother William. It is of white marble, about six feet in height, of the quadrangular form still frequently seen in our cemeteries, and surmounted by a vase. It is quite imposing, although not a great success as a work of art. The photographs represent the east and north sides of the monument, which even after a lapse of 40 years appears to be in an excellent state of preservation.

The following inscriptions, which are incised on the four sides of the monolith which forms the middle piece of the monument, do not need any comment further than to state that the signature "A. M.," on the west inscription, means Alexander Maclure:

East Side.

Thomas Say. The Naturalist. Born in Philadelphia. July 27th, 1787. Died at New Harmony. October 10th, 1834.

South Side.

One of the founders of the Academy of Natural Sciences of Philadelphia. January 25th, 1812.

West Side.

The friend and companion of Wm. Maclure, whose surviving brother erected this monument. 1846.—A. M.

North Side.

Votary of Nature even from a child,
He sought her presence in the trackless wild;
To him the shell, the insect and the flower
Were bright and cherished emblems of her power.
In her he saw a spirit all divine,
And worshipped like a pilgrim at her shrine.

Mr. Smith gave a brief review of specific characters in the genus *Arctia*, criticising the recent papers by Hulst, Neumœgen and Grote on the subject, and pointed out certain features in maculation which, in his experience, form constant and reliable specific characters.*

Mr. Ulke made some remarks in regard to the exchange and sale of insects. He contended, that exchanges had the tendency to make collectors careless, and that these became more interested in possessing numbers of the check list than species. The exchanges, facilitated by the check lists, added nothing to the entomological knowledge of the persons engaged therein. He had received large numbers of species to be named by him, and he invariably found that the majority of names obtained by exchange were wrong. The sale of insects in his opinion was even worse, many collectors actually forming a corner in some local or showy species. He further claimed that dealing in insects had the tendency to produce cheating and to give wrong localities. Mr. Smith contended that exchange between collectors was the only means by which beginners could hope to ever obtain sufficient material to enable them to study their favorite group.

May 5, 1887.

Six persons present. President Howard in the chair.

Mr. Howard spoke briefly of the *Hydropsyche* larvæ described

* See Mr. Smith's article, "What makes a species in the genus Arctia," in *Entomol. Amer.*, iii, pp. 109–112.

by him at the September, 1886, meeting of the Society. He had visited Rock Creek on May 1, 1887, and found the larvæ in all stages of growth, just as he had found them the previous August. He thought that the species remained at least two years in the larval state.

Mr. Smith gave a brief review of the classification of the *Smerinthinæ* from the date of the creation of the genus *Smerinthus* by Latreille, showing how and on what characters it had been divided and subdivided, and explaining the characters used by the various authors. He criticised the most recent production of Mr. Grote on the subject, showing that Mr. Grote really worked in the dark and without any very distinct idea of what limitations to set to his genera. Except *myops*, every American species of the subfamily has been made a distinct generic type. He also gave a brief description of the genital structure of the group which here, as elsewhere, gave valuable information as to the location of species. His arrangement, of which he gave a brief definition, would be as follows:

Triptogon modesta.
Smerinthus ophthalmicus.
" *cerisyi.*
" *geminatus.*
Paonias excæcatus.
" *myops.*
" *astylus.*
Cressonia juglandis.

Mr. Lugger presented a sketch of an entomologist, met by him many years ago in Detroit, Mich., in which he described the unique collection made by that gentleman, and the method adopted by him to combine business and pleasure.*

Dr. Marx spoke about the North American species of scorpions, of which about fourteen are known. He said the study of these animals was made very difficult on account of the poor descriptions by former authors and the numerous synonyms, which were very perplexing. The species known as *Buthus carolinianus*, for instance, is neither a *Buthus* nor is it *carolinianus*.

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* This communication has been published by Mr. Lugger under the title, "An Entomological Curiosity," in *Entomol. Amer.*, iii, pp. 83–84.

Mr. Lugger referred to a statement by Dr. Hamilton, in the *Canadian Entomologist* (vol. xix, 1887, p. 64), in regard to the habit of *Clœotus aphodioides.* Dr. Hamilton found these beetles in cavities in the bark of a small dead tree, in which the bark had not yet become separated from the wood. Dr. Hamilton thought these beetles had sought the old burrows of some other wood-boring beetle to hibernate. Mr. Lugger said that he had frequently bred these beetles from their eggs, and had also found them in all stages *in situ*, viz., under the bark of dead trees, where they found food in the decaying material. It is very likely that the specimens found by Dr. Hamilton did not enter these holes to hibernate, but rather had made them to leave the place of their birth.

JUNE 2, 1887.

Nine persons present. President Howard in the chair.

Mr. Smith gave in brief the characters of a new Arctiid genus, which he proposes to call *Cerathosia.* The only species, *C. tricolor*, has the appearance of a Lithosiid, but is Arctiid in character.*

Dr. Marx spoke on the Arachnid fauna of the District of Columbia. He is preparing a list of the local fauna, and possesses already about 200 species found in the vicinity of Washington.

Dr. Riley mentioned the peculiar fact that, in some instances, where trees have been enfeebled from other causes, spiders can prove quite injurious to them. Young elms in his grounds, recently transplanted, had been covered with spider-webs to such an extent as to prevent normal growth, and the spiders showed a great predilection for such in comparison with vigorous trees.

Mr. Luebeck, of Philadelphia, spoke on the habits of *Dicælus dilatatus.* The beetle feeds, like the genus Cychrus, upon snails. In a number of instances he found the Dicælus with the head inserted in the shells of *Helix alternata*, eating the enclosed snail.

Dr. Riley exhibited various specimens, and made remarks thereon as follows:

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* The new genus has been more fully described by Mr. Smith in *Entomol. Amer.*, iii, p. 79.

Notes on the Life-Habits of Ægeriidæ.—A specimen of *Melittia gloriosa* Hy. Edw., from San Diego, Cal., the food-habits of which, so far as I know, are not yet recorded, though the moth itself has been found flying around cucurbitaceous plants by Mr. Edwards, and it was naturally inferred that the larva might live, like its congener, *M. cucurbitæ*, in the roots of these plants. This species, however, was reared by Mr. F. E. Blasedale from the roots of *Rhus laurina*. The pupal exuvium shows that the spines are more strongly marked than in any other Ægerian with which I am acquainted, the frontal thorns being noticeably strong, and recalling the same parts in the larger *Asilidæ* and *Anthracidæ*.

Ægeria impropria Hy. Edw. (specimens of imago, larva and pupa) is injurious, in the larval state, to strawberries in southern California. I have, for some years, known of great injury to strawberry roots by some borer of a Lepidopterous character, but the species had remained undetermined, as I had been unable to obtain specimens. As soon as I had an opportunity of examining some strawberry plants on the plantation of Mr. I. V. Wilcox, of Santa Clara, Cal., it was evident that the larva belonged to the *Ægeriidæ*. The larva of *impropria* has been hitherto unknown and the name may be said, paradoxically, to be quite proper, and yet quite improper; for Mr. Edwards had also described a species of *Ægeria* by the name of *fragariæ*, the larva of which was not yet known, though Mr. Edwards informs me that it was found on the flowers of strawberry. The bred material shows that *impropria* is very variable in colorational markings of the body.

A third *Ægeriid* exhibited is the very pretty *Phemonoë 5-caudata* Ridings, the larva of which I have received from Dr. J. C. Neal, of Archer, Fla., who found it boring in the root of a grafted Japan Persimmon. The imago issued April 11, 1887. I also exhibit specimens of *Sciapteron robiniæ* from Los Angeles county, Cal., reared from larvæ boring in *Salix californica*; also specimens of *Ægeria albicornis* Hy. Edw. from southern California, reared from larvæ boring under the bark of *Salix californica*. An interesting fact connected with this last species is that the type is from Centre, N. Y., where the larva is not known; so that the species occurs on both coasts.

Finally, a specimen of the very small *Ægeria pyri* Harr., bred at the Department of Agriculture from apple, is included.

Color-variation in the Larva of Agraulis vanillæ.—I would also call attention to an interesting variation which I noticed at Los Angeles in the coloration of the larva of *Agraulis vanillæ*. The eastern form of this larva is generally reddish or vinous-brown in color, with an indication of two darker longitudinal rays, as my notes and preserved material, and the figures by Smith and Abbott and the older authors show. Those found at Los Angeles were very striking by virtue of the general color being of a bright leaden-blue or pale indigo-blue, with a broad bright lateral cream-colored stripe more or less diversified with ferruginous, the head distinctly marked with vertical pale vittæ and with a pale crown.

Miscellaneous Insects.—I also exhibit a number of alcoholic specimens of the larva and pupa, as also a mounted imago of the brilliant black, green and rust-red Lepidopteron, *Eumenia atala* Poey, recently collected by Mr. Schwarz at Cocoanut Grove, Fla., on *Zamia integrifolia*. The insect, on account of its brilliancy and its bright reddish larva, has been frequently treated of. I also exhibit another Lepidopteron—a Noctuid—received from Mr. Schwarz, viz., *Cloantha derupta* Morr., the larva of which Mr. Schwarz found upon Egg plant in southeastern Florida. It is interesting because of the great general resemblance which the larva bears to that of *Laphygma frugiperda*.

Finally, I would present specimens of a new genus, *Dendrotettix*, family *Acrididæ*. I had reared the species which formed the type of the genus many years ago in Missouri in all its stages, and propose to describe it under the specific name of *quercus*. The peculiarity of the genus is that, as far as we know, it is essentially tree-inhabiting.

Dr. Riley also read the following paper:

Further Notes on Phengodes and Zarhipis.

By Dr. C. V. Riley.

I exhibit herewith some further larvæ of *Zarhipis* and its female. As compared with *Phengodes* this *Zarhipis* larva is somewhat more depressed, more parallel-sided, the thoracic joints less attenuated, and the pro-thoracic joint is more particularly shorter and transverse. When immature the color is pale, with but little brown, but when full grown the color becomes darker brown, and the general aspect, when the larva is stretched and active, is one that recalls the Myriapods upon which it feeds. The dead and dry specimens convey but a poor idea of the real form, as in life the larva can stretch to more than two inches in length and crawls easily and rapidly. The structure of the head is essentially similar but differs notably in the following particulars: The head itself is broader and more transverse, with the jaws broader and apparently more strongly elbowed near base. The antennæ have a very strong bulbus and are three-jointed, as in *Phengodes*; the nipple or terminal joint being stronger and the second joint being more often elbowed on the basil, *i. e.*, directed more outward; the joints are also somewhat stouter and shorter than in *Phengodes*. All the other trophi are similar to those of *Phengodes*, but broader and shorter; the maxillary palpi diverging more just as do the antennæ. There are a few very strong bristles around the head, one near the front and one just behind the antennæ being particularly noticeable. The surface of the body is somewhat more distinctly shagreened than in *Phengodes*. The medio-dorsal depression the whole length of the body is stronger, and in the pale specimens the brown on the superior surface leaves a similar medio-dorsal spot each side this line near the base of each joint, just as in the paler specimens of *Phengodes*.

I had the good fortune of seeing three of these larvæ alive while in California, last April. One of them had been found December, 1885, by Mr. A. Koebele, who had kept it in a jar of earth with dead leaves. It died while I was there, in April, 1887, having remained motionless and without food for nearly fifteen months. The second was in Mr. Rivers's possession and had shed its larval skin on April 2, 1887. This Mr. Rivers kindly gave me, and it shed its skin again April 18, and it is more particularly to this brief period of about two weeks that I wish to call attention because it represents a stage of development hitherto insufficiently characterized, and which may be likened to the pupa state. It is in reality a pseudo-pupal condition, the insect being neither larva nor imago During this brief period the color is pale, there is no disposition to move, and the mouth-parts are more soft and undeveloped; the joints of antennæ and palpi are less distinctly formed and shorter, while the jaws proper are reduced to little more than useless tubercles. The perfect, larviform female, after shedding this pseudo-pupal skin (which differs from the other shed skins in being pale and more delicate), becomes darker again and in general appearance much more like the full-grown larva before it entered the pseudo-pupal condition. The color in the adult is uniformly dark brown above and much darker beneath than in the larva. In short, the perfect female is more strongly chitinized throughout, while the mouth parts are also darker and stronger, with more bristles, and the mandibles more distinctly elbowed and longer. The third specimen was given to me by Mrs. A. E. Bush, of San José, and, though not fully grown, died and became shrunken and rigid within a week in the box of dry earth in which I carried it while travelling.

The second specimen, from Mr. Rivers, was placed in a large jar with earth and placed where the male might reach it, and on April 25 had attracted a male. She subsequently laid eggs. These are spherical, 1.8–2 mm. in diameter, with occasionally an irregular impression no doubt caused by external pressure. Color yellowish-white when fresh, turning gradually to dirty yellow. Tolerably shining and with no sculpture visible.

July 7, 1887.

Seven persons present. President Howard in the chair.

Dr. Riley exhibited various specimens, and made the following remarks upon them:

Notes on the Eversible Glands in Larvæ of Orgyia and Parorgyia, with Notes on the Synonymy of Species.—Dr. A. S Packard has called attention (Am. Nat., 1886, page 314) to the fact that the two coral-red tubercles on the back of joints 9 and 10 in the larva of *Orgyia leucostigma* are in reality eversible glands, similar to that previously found by Mr. E. R. Poulton (Trans. Ent. Soc., Lond., 1886, page 16) on the 10th joint of the European *Orgyia pudibunda*.

I have long known of the eversible nature of these protuberances, and observed them first in 1873 on the larvæ of *Parorgyia clintonii* Grote. In my descriptive notes of this species, made June 4, 1873, I referred to these glands on the middle of the back of joints 9 and 10 of the larva, commenting on their curious character and on their recalling in function the osmaterium of Papilio larvæ; also to the fact that they are coral-red and without apparent odor. Later observations led me to believe that this note was inaccurate as to the odor, and that all larvæ of both *Orgyia* and *Parorgyia* possess these tubercles, and that they are really scent-organs, like the osmaterium in *Papilio*. I have noticed quite a strong odor from those of *Orgyia*, and, in fact, a fine spray of liquid is sometimes thrown from them.

I exhibit blown larvæ of the European *O. pudibunda* and of *Orgyia antiqua*. This last species also occurs in this country, our specimens being somewhat smaller, on the average, than those of Europe. This larva shows two crimson-red eversible tubercles.

I also exhibit, in addition to the common *Orgyia leucostigma*, blown specimens of *O. gulosa* Hy. Edw. and *O. vetusta* Bd., both of which I recently observed living in California, and both of which have the same crimson-red organs, and have been reared to the imago by Mr Koebele.

I also exhibit blown larvæ of a *Parorgyia*, which, from the bred specimens, I believe to be *P. leucophæa* Smith & Abbott. I have bred one male of this from the larva feeding on Persimmon. In an endeavor to determine my bred material in this genus, I have concluded that there are fewer species than have been made by Lepidopterists. The imagos vary considerably in details of coloration and markings, and it is quite probable that *obliquata* will prove to be synonymous with *leucophæa*. The larva, as figured by Smith and Abbott, is probably misleading, in having the dorsal tufts too conspicuously shown on joints 8, 9, and 10, for in my specimens they have been, as in other species of this genus, large and conspicuous on joints 4, 5, 6, and 7, inclusive, but far less so on the other joints.

I also exhibit various blown larvæ of *Parorgyia clintonii* Gr. These vary in the color of the tufts according to state of growth, and there is also individual variation. My original specimens were found feeding on Honey Locust, but I have also found it on various other plants, as wild plum, elm, etc. Both these *Parorgyia* larvæ show the same eversible glands, though they are less conspicuous than in *Orgyia*, on account of the greater density of the hairs surrounding them. As to the synonymy of this species, my experience with the adolescent states leaves little doubt that *clintonii* is a synonym of *achatina* Sm. & Abb., and I question whether, with more complete knowledge, *parallela* and *basiflava* and even *cinnamomea* will not prove synonymous with the same species.

FURTHER REMARKS ON PHENGODES.—In connection with the remarks made at a previous meeting, I also exhibit a female of *Phengodes laticollis* received from Prof. Geo. F. Atkinson, of the University of North Carolina. This is an undoubted female, having attracted the male and laid eggs, some of which also accompany the specimens. It agrees in every respect with my original figure published in LeBaron's fourth report on the insects of Illinois, and is distinguishable from the larva by its smaller jaws, and smaller, finer ungues.

INTERESTING LEPIDOPTERA.—I also call attention to a very pretty species of *Syntomeida* with metallic green wings and steel blue abdomen, tipped with ferruginous red, and with large white spots on the body, collected by Mr. Schwarz at Cocoanut Grove, Biscayne Bay, Fla. It will doubtless prove to be a new species.

Also specimens of another interesting, silvery white moth, the position of which is not very clear, and which Mr. Schwarz also collected. The interest attaching to them is that long strings or pencils of hair are seen to issue from the tip of the body made by the death movement of the ovipositor separating and welding the hairs from a conspicuous anal tuft which the female possesses.

Mr. Schwarz commenced an account of a recent trip through the coral region of southeastern Florida, and narrated his experience during a short stay, in the month of April, on the island of Key West. The following is an abstract of his remarks:

The island of Key West, extending in a west-easterly direction, has a length of from six to seven miles, with a width of from one to two miles. The western third of the island is occupied by the city of Key West, and the trees in the gardens and on the streets are all artificially imported from the West Indies or South America. A rather wide beach, partly rocky and partly sandy, extends all along the south side; the north side is without beach and covered with a dense growth of mangrove trees, or rather bushes, which extend also in a wide belt along the south side back of the beach. The middle of the island is occupied by an extremely thick growth of shrub-like trees, not higher than about 15 feet, but without much undergrowth. This shrubbery represents what is known as the semi-tropical forest of southern Florida, and its low growth on Key West and the other smaller Keys is no doubt attributable to the small elevation of the land above the level of the sea. There is a complete absence of fresh water springs, creeks, and swamps, and consequently, the Dytiscidæ and all other families living in or near fresh water are not represented on the island. The ground is either rocky or covered with coralline sand, and since the porous rock absorbs at once every drop of the frequent showers, the surface of the ground is constantly dry. The few herbaceous plants growing in the woods or on the open places are all of a maritime character.

The whole aspect of the island is, entomologically speaking, by no means inviting, and my first attempts in collecting resulted in disappointment. It took some time before I found out that, owing to the extreme dryness, collecting under stones, and sifting the old leaves and other *débris* in the woods, produce hardly anything, and the sparse vegetation of herbaceous plants also harbors a very scant fauna of no special interest. On the beach 16 species of Coleoptera were found, of which number only 3 (a *Trichopteryx*, an unknown Aleocharid, and *Blapstinus opacus*) do not seem to occur north of Cape Florida. The bulk of the fauna is represented by the species living in or on the trees of the semi-tropical forest. There is, therefore, on the island of Key West (and, I may add, also on the other Keys and on the shores of Biscayne Bay, south of Miami river), a very striking scarcity of predaceous, rhypophagous, and coprophagous Coleoptera and an equally striking preponderance of certain phytophagous families. Among the latter, the *Rhynchophora* are by far the best represented family in the number of species as well as specimens; the *Cerambycidæ* follow next; the *Ptinidæ* occupy the third place; the various bark-inhabiting families of the *Clavicornia* are fairly represented, while the *Elateridæ*, *Buprestidæ*, phyllophagous *Scarabæidæ* and *Chrysomelidæ* are represented only by a very small number of species.

During a stay of five days on the island—the whole of which time could not be devoted to entomological excursions—129 species were found living in or on the forest trees. An analysis of this fauna shows that 36 species thereof are of general distribution in the more southern portion of the United States; 70 are not found north of Florida, and 52 represent the "semitropical fauna." Of *Rhynchophora* 36 species were found; of *Cerambycidæ* 18, and of *Ptinidæ* 13 species. Of the whole number, more than one-fourth are species hitherto not known to occur in the United States. Some are no doubt undescribed, but since the food-plants are all, or nearly all, of West Indian origin, most of the species are either described from the West Indies or will no doubt be found to occur in that region.

Before adjournment the following shorter communications were made: Dr. Riley spoke on the large collection of American Coleoptera of the late Mr. G. D. Smith, of Boston, Mass., which is still offered for sale; Mr. Ulke, on the peculiar features of the collecting season of the present year; Mr. Schwarz, on the great usefulness of naphthaline in preserving and protecting collections of insects in the South; and Mr. Howard related the wanton destruction by children of Wheel-bugs (*Prionidus cristatus*) and their larvæ which had stationed themselves on a fence to intercept the *Hyphantria* larvæ crawling along the fence.

August 4, 1887.

Seven persons present. President Howard in the chair.

Dr. Marx made some additional remarks regarding the types of the *Scorpionidæ* described by Wood. As stated at a former meeting (see p. 64) ten of these are preserved in the U. S. National Museum. The remaining three he had believed were lost, but during a recent visit to Philadelphia he succeeded in finding two of them in the collection of the Academy of Natural Sciences. This discovery enables him to correctly place in the recent system all but one of Wood's species as follows:

1.	Buthus biaculeatus	= Centrurus biaculeatus Lucas.
2.	Buthus boreus	= Vejovis boreus Girard.
3	Buthus Californicus	= Centrurus vittatus Say.
4.	Buthus Carolinianus	= Centrurus vittatus Say.
5.	Buthus emarginaticeps	= Hadrurus emarginaticeps W.*
6.	Buthus eustheneura	= ? (type lost).
7.	Buthus exilicauda	= Centrurus exilicauda W.
8.	Buthus hirsutus	= Hadrurus hirsutus W. (Thorell).
9.	Buthus Lesueurii	= Diplocentrus Lesueurii G.
10.	Buthus punctipalpi	= Vejovis punctipalpis W.
11.	Buthus spinigerus	= Vejovis spiniger W.
12.	Centrurus phæodactylus	= Uroctonus phæodactylus W.
13.	Scorpio Allenii	= Bróteas Allenii W.

Mr. Smith exhibited a section of *Abies Douglasi*, from California, with the burrows of a Longicorn beetle, *Notorhina aspera*, and read a letter from Mr. L. E. Ricksecker in regard to the oviposition of this species.

Mr. Howard spoke on retardation in the development of *Bombycidæ*. He instanced European cases of such retardation, and narrated that in October, 1885, two cocoons of *Samia cecropia* were received by a lady friend of his. About two months ago these cocoons were cut open, and the pupæ were still alive, so that the imagos would probably not appear before next year.

In discussing this communication, Mr. Smith stated that a retardation of one year has frequently been observed in most of our large *Saturniidæ* and in many *Sphingidæ*. Mr. Ashmead said that he had kept a Cynipid gall for two years, and the larvæ therein were still alive; application of water speedily brought the flies out. Dr. Marx mentioned another case of retardation in *Argiope basilica*, the eggs of which, collected in 1882, did not hatch until four years afterwards.

Mr. Howard then read a paper, of which he has prepared the following abstract:

ON ENCYRTUS MONTINUS PACK.—This Parasite was described by Packard

* This is probably only a mutilated specimen of *Hadrurus hirsutus*.

in his paper entitled "Some Ichneumon Parasites of New England Butterflies," and has since been considered as a parasite of the White Mountain butterfly (*Chionobas semidea*). Recently, however, the type specimen has come temporarily into my possession through Mr. Scudder, and I find that the only authority for such consideration is the old label which reads: "Found alive in an old chrysalis case of *semidea*." An additional label credits the collecting to Mr. Sanborn. Study of the specimen shows that the species belongs to the *chalcostomus* group of the genus *Encyrtus*, approaching very closely to *E. lunatus* Dal. It has no connection with *E. swederi* Dal. with which Dr. Packard compares it, and which belongs to *Comys*. All of the *chalcostomus* group, including *lunatus*, are parasites of Coccidæ, the only exceptions being *barbarus* and *Rogenhoferi*, the habits of which are not known. Moreover all are parasites of the genus *Lecanium*. No true *Encyrtus* is known in Europe to have been bred from a Lepidopteron, and no species of the subfamily Encyrtinæ from any diurnal. *Encyrtus bucculatricis* How. is the only American exception to the former rule.

From these facts it seems to me extremely improbable that *E. montinus* is a parasite of *C. semidea*, but rather that the occurrence of the type specimen in the old empty chrysalis case was entirely an accident, and that it had issued in all probability from some neighboring *Lecanium*. The type specimen is a female and not a male as stated by Dr. Packard.

Mr. Smith spoke on the structural features of the Sphingidæ. He compared the general type of genital structure with that of other families, finding here a universal existence of a peculiar supra-anal process, which takes on more or less of a claw-like form, very different from the ordinary simple curved hook of most families, or even the double hooks of some Bombycids. He showed a tendency to abnormity in certain species and a curious lack of agreement in other details of genital structure in species of the same genus.

The peculiar structure of *Dilophonota* was explained. Here there are *two* superior plates, both furcate, but the curvature of the forks are not coincident. Several other features of genital structure were pointed out, and drawings of these structures in nearly all the American species were exhibited.

The armature of the tarsi in some of the genera was discussed and explained, as well as the peculiarities of the venation of the family. The classification of the *Macroglossinæ* was briefly touched on, as was the relationship of the family with some Bombycid families. Mr. Smith thinks that there are two distinct leads into or from the Bombycids, the *Smerinthinæ* being more closely related to the

Saturniidæ, while the *Sphingidæ* are allied rather to the Ptilodonts. He gave a brief history of classification, with the special view of demonstrating the error of English and many American authors in the use of the term *Sesia*, and, finally, remarked on some of Boisduval's descriptions of *Sphingidæ* from drawings and the difficulty of positive identification.

Mr. Schwarz made the following additional remarks on the Coleopterous fauna of Key West:

The Mangrove belt which encircles the island is composed chiefly of three species of tree-like shrubs, the Black Mangrove (*Avizennia nitida*), the White Mangrove (*Laguncularia racemosa*), and the Buttonwood (*Conocarpus erecta*). This last is the only food-plant of *Chrysobothris impressa* * which would be greatly destructive if the wood would serve any other use besides fuel and the manufacture of charcoal. *Chrysobothris chrysœla* is also extremely common in this tree, besides several species of *Leptostylus*, among them *argentatus*. *Elaphidion cinereum* and *Neoclytus devastator* also develop in the branches of *Conocarpus*, but are not confined to that tree. The last-named species is one of the most common insects on Key West and breeds in all sorts of the harder forest trees. On the Black Mangrove I never was able to find any insect whatever, except a Cecidomyious gall on the leaves. The White Mangrove is the food-plant of *Elaphidion irroratum*. This species occurs in North America, in my experience, only along the coast of southern Florida, and I seriously doubt the correctness of the localities, "Illinois" and "New York," as given in Mr. Leng's *Synopses of Cerambycidæ* (*Entom. Amer.*, i, p. 32).

The largest and most striking tree in the "hammock" is the Gumbo Limbo tree (*Bursera gummifera*), but no Coleoptera or Lepidoptera were found to feed on the leaves. The only Scolytid which burrows in the trunk proved to be the common and widely-distributed *Xyleborus fuscatus*, while big holes often seen in the trunk prove that the tree has been inhabited by a gigantic Cerambycid (*Stenodontes maxillosus*). Under bark of decaying trees numerous specimens of the genera *Ditoma*, *Silvanus*, *Lœmophlœus*, *Smicrips*, *Bactridium*, *Cossonus*, etc., are met with, among them several undescribed species, or, more correctly speaking, West Indian species, hitherto not known from the United States.

The fig-trees on Key West are, owing to their stunted, shrub-like growth, much less inhabited by insects than they are on Biscayne Bay or the larger Keys; but, under the bark of a species of *Ficus* (probably *pedunculata*), which I saw only on Key West, I found great numbers of a remarkable new *Thysanoës*. *Spalacopsis stolata*, *Methia pusilla*, various *Elaphid-*

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* I take this opportunity to correct a *lapsus calami* of mine in a hastily written postal card, which has unfortunately been published by Mr. Smith. (*Entomol. Amer.*, iii, p. 39). In this card *Chrysobothris impressa* should be substituted for *Ch. chalcophoroides*.

ion, and *Leptostylus* bore in the smaller branches of *Ficus*, but were much more common in the Biscayne Bay country.

The Poison Wood (*Rhus metopium*) is greatly subject to the attacks of *Tetrapriocera longicornis*, but the tree vigorously defends itself by exuding from the wounded places quantities of a resinous gum which drowns the boring beetles. Trees weakened by fire or other causes are usually riddled with the holes of the *Tetrapriocera* which seems to attack the tree for feeding purposes only and not for oviposition. At least I never found the larva in the Poison Wood, though I discovered it later at Biscayne Bay under quite different conditions. An undescribed species of *Teretriosoma* preys upon the *Tetrapriocera* and may frequently be found by cutting into the burrows of the latter. The tree further harbors a peculiar Scolytid (a new *Pityophthorus*), which constructs very neat galleries under the bark, and several other interesting species, *e. g.*, *Scalidia linearis* and *Dysmerus basalis.*

The Cocoa-plum (*Chrysobalanus icaco*) is also among the more common trees and appears to be the only food-plant of *Pseudomus inflatus*, a remarkable new *Xyleborus* allied to *pyri*, and a large species of *Caryoborus*. The genera *Lembodes* and *Erodiscus* are also not rare on this tree, but do not seem to be confined thereto.

Mr. Schwarz added a short account of the insects annoying and molesting man on Key West. There is no want of the various in-door pests, such as ants, roaches, fleas and bed-bugs. Out-doors, mosquitoes, *Chrysops*, *Tabanus*, *Ceratopogon* are not unusually troublesome, while ticks and red-bugs (*Leptus irritans*) appear to be entirely absent. The most interesting species is the jigger (*Rhynchoprion penetrans*), which is quite abundant in the outskirts of the city, and which is said to occur also at Lake Worth, some 250 miles farther north.

Mr. Schwarz also exhibited larva and imago of *Oligotoma Hubbardi* (family *Embidæ*). The larva is not uncommonly met with in southern Florida, occurring singly in the old galleries of wood-boring insects. It is quite active, and no spinning habits were observed. Only a few imagos, apparently all males, were observed occurring in company with the larvæ. The species was never seen on the wing.

SEPTEMBER 1, 1887.

Seven persons present. President Howard in the chair.

Mr. Smith reported on the entomological papers read before the American Association for the Advancement of Science during the recent meeting in New York.*

Mr. Howard, as an instance of true, although somewhat misdirected, entomological enthusiasm, told the adventures of J. K——, a member of a New Jersey scientific society, as recently related to him by a member of the same society.

It seems that K——, a young man, uneducated and poor, a collector of macrolepidoptera, had obtained possession of some work descriptive of some of the British Museum collections. He thought of those entomological treasures all day; he dreamed of them by night until he was fairly daft for a sight of them. He gave up his job (he was a day-laborer) and went, almost penniless, to New York, where, after long striving, he secured a chance to work his passage to Liverpool as cook's assistant on a sailing vessel. He arrived at Liverpool without a cent, tramped across to London, subsisting almost entirely on charity, and at last arrived before the Museum, only to find that the insect collections were closed up for some months during repairs or transfers. Completely disheartened, he sat down on the curb and cried. Policeman investigates cause of tears, crowd gathers, and, among others, fortunately, one of the assistant curators hears the doleful story, takes pity on the poor man, and enables him to get a sight at the collections. This was all he wanted. After feasting his eyes he sought work, and finally found his way back to New Jersey, a happy and contented man.

Mr. Howard mentioned the recent rearing by Mr. Scudder of an Ichneumonid parasite (*Ichneumon instabilis*) from an adult of the White Mountain Butterfly (*Chionobas semidea*), and stated that he knew of no recorded instance of the rearing of a Hymenopterous parasite from an adult Lepidopteron.

Mr. Schwarz exhibited specimens of both sexes of *Dysmerus basalis* from southern Florida. The female is in every respect a *Læmophlœus*, and even in the male the antennal structure does not seem to warrant a generic separation of *Læmophlœus*.

Mr. Ulke exhibited an apparently undescribed Calandrid beetle, allied to *Phlœophagus*, which he had recently found in the District of Columbia.

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* This Report has been published in *Entomol. Amer.*, iii, pp. 101–108 and pp. 121–123.

OCTOBER 6, 1887.

Nine persons present. President Howard in the chair.

Mr. Ashmead read the following paper:

A PROPOSED NATURAL ARRANGEMENT OF THE HYMENOPTEROUS FAMILIES.

BY WM. H. ASHMEAD.

A natural arrangement of the divisions and families of the Hymenoptera, according to my views, differs so materially from that proposed by Mr. E. T. Cresson in his recent excellent work, "Synopsis of the Families and Genera of the N. A. Hymenoptera," that this early opportunity is taken to draw attention to them while that work is fresh before the entomological world.

The division of the order into two sections—*Hymen. ditrocha* and *Hymen. monotrocha*—is, I think, a natural one; but the arrangement of the families by Mr. Cresson is, in some respects, very unnatural, and fails to show their relationship.

The section *monotrocha* I consider to contain the highest types of the order, and hold with Dr. A. S. Packard that, among the family *Apidæ*, are found the most highly specialized forms.

Beginning therefore with this family, I think a very natural sequence of the families can be shown leading into the *Hymenoptera ditrocha* as follows:

HYMEN. MONOTROCHA.

ANTHOPHILA.	Apidæ Andrenidæ
DIPLOPTERYGIA.	Masaridæ Eumenidæ Vespidæ
FOSSORES.	Crabronidæ Pemphredonidæ Mellinidæ Philanthidæ Nyssonidæ Bembecidæ Larridæ Ampulicidæ Pompilidæ Pelecinidæ Sphecidæ Scoliidæ Sapygidæ Mutillidæ

HETEROGYNA.	Myrmicidæ Odontomachidæ Poneridæ Formicidæ
TUBULIFERA.	Chrysididæ

It will be seen that the anomalous family, *Pelecinidæ*, is assigned a position between the *Pompilidæ* and the *Sphecidæ*.

Mr. Cresson placed it temporarily near *Ichneumonidæ*, but it cannot belong there, the trochanters being one-jointed, a fact to which Mr. Cresson calls special attention. It seems to me to be allied to the long-bodied Sphecids, *Ammophilæ*, and a position is assigned the family near them.

Prof. Packard has, somewhere, called attention to the fact that the male *Pelecinus* resembles the genus *Trypoxylon* in the family Crabronidæ. That this anomalous family belongs somewhere in this section, I think cannot be questioned.

The families *Mutillidæ* and *Chrysididæ* lead naturally into the *Hymen. ditrocha*, through closely allied forms in the family *Proctotrupidæ*, and for which reason that family is placed at the head of that section.

For the section *Hymen. ditrocha* the divisions first proposed by St. Fargeau are preferred to those made use of by Mr. Cresson, for they enable the presentation of a much more natural sequence of the families than could otherwise be given.

They are as follows:

HYMEN. DITROCHA.

Ovipositor consisting of a single horny piece issuing from the tip of the abdomen, ... CANALIFERA.
Ovipositor spiral or semi-spiral, retractile when at rest, . . SPIRIFERA.
Ovipositor of two horny, saw-like pieces, ... SERRIFERA.
Ovipositor partly lodged at rest in an external sheath from beneath some distance from apex of abdomen, ... TEREBELLIFERA.

According to these divisions the families in this section would be arranged as follows:

CANALIFERA.	Proctotrupidæ Helorinæ Dryininæ Emboleminæ Bethylinæ Ceraphroninæ	Proctotrupinæ Sceleoninæ Platygasterinæ Belytinæ Diapriinæ
SPIRIFERA.	Cynipidæ SEC. 1: Cryptogastri Eucoilinæ Figitinæ Allotriinæ	SEC. 2: Gymnogastri Inquilinæ Cynipinæ Ibaliinæ Oryssidæ

SERRIFERA. { Cephidæ
Tenthredinidæ

TEREBELLIFERA. {

Siricidæ
Braconidæ
Ichneumonidæ
Trigonalidæ
Stephanidæ
Evaniidæ
Chalcididæ
SEC. 1: Macrocentri
*
Eucharinæ
Perilampinæ
Eurytominæ
Aximinæ
Chalcidinæ
Leucospidinæ
Toryminæ
Eupelminæ
Encyrtinæ

Aphelininæ
* *
Pireninæ
Tridyminæ
Spalanginæ
Blastophaginæ
Pteromalinæ

SEC. 2: Microcentri
Tetracampinæ
Elachistinæ
Elasminæ
Eulophinæ
Entedoninæ
Tetrastichinæ
*
Trichogramminæ

Mymaridæ *m.*

It will be seen that the *Mymarinæ* have been removed from the family *Proctotrupidæ;* the ovipositor does not issue from the apex of the abdomen, and they have other characters that exclude them from that group. The English hymenopterist, A. H. Haliday, many years ago, recognized this fact and placed them among the *Chalcididæ;* but his views, apparently, were not accepted, for all late systematists let them remain undisturbed among the *Proctotrupidæ.* From a study of several of the genera I feel convinced Mr. Haliday was nearly right in placing them with the Chalcididæ.

Among them are the smallest and most degraded hymenopters known, and, while allied in habits to the Chalcididæ, in structure they offer characters that seem to me to entitle them to family rank.

In venation and the fore wings of some of them there is a remarkable resemblance to certain forms among the *Trichogramminæ*, the lowest group of the *Chalcididæ*, and I have therefore assigned them a position after that group.

The following table may be used to separate these three families:

Hind wings linear, ... 2
Hind wings not linear;
  ovipositor issuing from the extreme tip of abdomen, PROCTOTRUPIDÆ.
  ovipositor issuing from the middle of venter, . . . CHALCIDIDÆ.
2. Ovipositor issuing subapically, ... MYMARIDÆ, *m.*

With the *Mymarinæ* removed the *Proctotrupidæ* form a natural group closely connected with the parasitic *Cynipidæ* through the *Diapriinæ* and *Eucoilinæ.*

The *Cynipidæ* through the *Ibaliinæ* and *Oryssidæ* connect with the *Tenthredinidæn*, and a natural sequence of the other families follows, as is shown in the arrangement of the families above given.

The *Braconidæ* seem to me to be more closely allied to certain saw-flies, and in consequence are placed above the *Ichneumonidæ*.

Both of these families need revision, and no effort is made to arrange the subfamilies.

The *Ichneumonidæ* connect naturally then through the *Trigonalidæ* and *Stephanidæ* with the *Evaniidæ*, and the latter lead naturally into the *Chalcididæ* through the genus *Hyptia* and the Eucharid genus *Lophyrocera* Cameron, a species of which I have taken in Florida and named in MS. *L. floridana*.

The sequence of the subfamilies in the *Chalcididæ* as arranged above seems to be a very natural one, so gradually do they merge the one into the other.

The *Eucharinæ*, *Perilampinæ* and *Eurytominæ* are very closely allied, and the last through *Aximinæ* form a very close connection with the *Chalcidinæ*, *Toryminæ* and the following groups.

I am by no means satisfied that *Axima* is entitled to subfamily rank; it seems to me to belong to the Eurytomid group.

The *Blastophagæ*, or fig insects, Francis Walker placed in the *Proctotrupidæ;* according to Sir Sidney Saunders, they form a section in the *Cynipidæ;* while Prof. J. O. Westwood says they belong to the *Chalcididæ*. At present engaged in preparing a monograph of the N. A. Cynipidæ, I was very desirous of satisfying myself on this point, and fortunately have been able to do so, from a study of possibly an undescribed species, now in the U. S. Department of Agriculture, recently collected by Mr. E. A. Schwarz, on *Ficus aurea* in South Florida.

The species studied evidently belongs to Saunders' genus *Kradibia*, which Dr. Mayr, in his "Feigen-insecten," says is identical with *Blastophaga* Grav.; at any rate it is no Cynips, and I agree with Prof. Westwood in considering the *Blastophagæ* as a group in the *Chalcididæ*.

They seem most closely allied to the *Spalanginæ* and a position is assigned them next to that subfamily.

In conclusion, I beg to say that the views herein set forth are based upon a tolerably close study of most of the families mentioned, all being known to me in nature but two—*Mellinidæ* and *Ampulicidæ*.

In discussing this paper Mr. Howard stated that it appeared to him that Mr. Ashmead's arrangement was, in the main, a one-character classification, and that no natural classification should be attempted without a thorough review of many characters. The ovipositor is an important organ, and its variations should have much weight, but an arrangement of the families according to such variations will clear up but a single factor in the problem.

Mr. Howard also took strong exception to the placing of the subfamily *Mymarinæ* among the *Chalcididæ*, calling attention to the pronotal characters as having great weight in retaining it with the *Proctotrupidæ*. The resemblance of the venational characters to those of the *Trichogramminæ* he considered of little value, and cited the resemblance in the venation with certain *Scelioninæ* to that of many *Chalcididæ* as much more striking. He also stated that while, under the microscope, the ovipositor with the Mymarinæ apparently arises near the base of the abdomen, this appearance may be due to the great transparency of the abdomen with this group, and that on careful study it may possibly be found to *issue* from the tip, as with other *Proctotrupidæ*.

Dr. Fox related the following observation:

Note on a New Parasite of Camponotus Pennsylvanicus.

By W. H. Fox, M. D.

During the past summer it was my good fortune to meet with the larval form of an interesting and peculiar parasite of the common black ant (*Camponotus pennsylvanicus*).

About the middle of July, while sitting on the front steps of a house in Hollis, New Hampshire, I noticed several decapitated bodies of the black ant which still retained the power of motion. Being curious to know what had become of the heads, I instituted a search, and was rewarded by finding several of them. To my surprise, the heads also seemed to have the power of motion; but this was easily explained on a little closer scrutiny. Each head was found to be inhabited by a white grub, which completely filled the cranial cavity. The articulation of the mouth parts had been destroyed, and the appendages had fallen off, leaving an opening through which the larva could protrude its anterior extremity. So completely had the contents of the head been destroyed that, upon the removal of the larva, the eyes of the ant were seen to be transparent, and the articulations of the antennæ showed as two light spots. The mode of motion of the larva was simple but interesting. The head of the ant was kept on its flat, or posterior, surface, and the larva took a firm hold on the wood of the steps, close to the mouth opening; then, by elongating itself, it pushed its domicile in the opposite direction as far as possible; then, loosening its hold, contracted, and began again. The rate of travel was very slow, for I have left one for over half an hour and found it again, on my return, within a couple of feet of the spot where it was left. As to the mature form of this insect I know nothing, not even the order to which it belongs. A few of the larvæ are presented for examination, and several have been kept in some earth, in the hope that I can get the imago from them next summer. I would say that I have also found this parasite in the head before the latter had become detached from the body of the ant, showing that the egg had been deposited in the living host. Hoping to be able to clear this subject up more fully at some future time, I must leave it as it stands for the present.*

Mr. Lugger read the following paper:

A New Method of Preserving Transparent Aquatic Insects for the Microscope.

By O. Lugger.

The study of transparent aquatic larvæ of the various orders of insects is both amusing and instructive. For the former purpose a common life-cell is all that is required, and many a pleasant hour can be spent with the microscope in contemplating the beauties of these delicate objects. The whole of the internal anatomy and the workings of the various organs can be studied with ease. But for the more serious work the life-cell alone is not sufficient. The object to be studied will soon die under these unnatural conditions for lack of air, and it is often difficult, if not impossible, to substitute a second specimen for the dead and now opaque object. Even if careful drawings have been prepared of the still transparent larva, it is all-important to preserve the object in such a manner that it can always be consulted at any future time.

Various, more or less successful, methods have been invented, but all have proven futile after a short time; the preserved specimens either shrink out of all proportions or they become opaque and useless.

Some time ago I received by exchange a slide prepared by Mr. Dunker, of Berlin. He succeeded in inventing a method of preparing the lower animals and plants found in standing water in a perfectly natural condition. Infusoria, small Algæ, Rhizopods, Flagellates, Ciliates, Chlorophyllaceæ, Desmids, Diatoms, Daphnia, and Cyclops species were thus prepared by him and sold in large numbers. However, Mr. Dunker has shown very little liberality in this matter, and keeps his method a secret. When I received the slide I concluded to sacrifice it, hoping to be able to discover his method. I broke the cover-glass, and immediately I perceived the odor of something familiar, and related to the cheap alcohol made of wood. The substance is Rectified Wood-vinegar (Acetum pyrolignosum rectificatum). Many experiments during the last three months convinced me that this is the preserving material long desired. Of course, I do not know whether Mr. Dunker uses the same simple material or a compound in which it occurs.

A neat and very useful cell for mounting aquatic specimens was shown

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* Mr. Howard, in a paper read before the Biological Society of Washington, October 22, 1887, stated that this parasitic larva probably belongs to the Dipterous family *Conopidæ*, the larvæ of one or more species of which have been found in Europe to be parasitic in the abdomen of *Bombus*, *Osmia*, *Odynerus*, and *Pompilus*.

me some time ago by Dr. Thos. Taylor, of the Department of Agriculture. This cell is very easily made, and can be built up very quickly to any desired height The substance used for this purpose is common beeswax. To make the cell harder, and to raise the melting-point, a slight amount of powdered resin is added. Both materials are heated together in a small porcelain dish, so as to thoroughly combine them into a homogeneous mass. If required for use, the dish is simply heated, and the cell is made in the usual way upon a turn-table. Since both turn-table and slide are colder than the wax, the cell becomes visible at once, and, by repeated applications with the brush, it can be made of any required depth. If too high, or if too sloping towards the centre, the wax can be readily removed upon the turn-table by the application of a knife; a groove for the reception of the cover-glass is also very readily made. The cell is now ready for most purposes, and is an excellent one for mounting with glycerine jelly and Canada balsam. If another material—oil, for instance—is to be used which would dissolve the wax, the inside of the cell should first be coated with any of the usual varnishes, such as Brunswick black. The same varnish should also be used from the outside to seal the completed and filled cell. I have found such cells of great utility in enclosing aquatic larvæ. To do so satisfactorily, I make with a knife a shallow cut across the cell and fill the latter with water in which the larva to be preserved has been placed. By gently pressing down with a cover-glass I can secure the still living specimen in any desired position. Now I remove with a piece of blotting-paper a very small quantity of the water through one of the cuts previously made and allow at the other cut the Pyroligneous Acid to enter. As soon as this acid has reached the larva this dies at once in the position occupied at the time. The cell is now sealed in the usual way; but previous to doing so the sides of the two cuts are pressed together.

Specimens thus treated remain unchanged for a long time; for how long I do not know as yet, but possibly for an indefinite time, if not exposed to the sunlight.

With this method of preserving transparent aquatic larvæ can be combined the staining of them at the same time. For this purpose Aniline-blue or Fuchsine should be used, which are soluble in water. One part of the color, dissolved in 200 parts distilled water, is mixed with 800 parts of the rectified pyroligneous acid. The *modus operandi* is the same. In the course of several hours the object has become uniformly stained, and can be sealed after the addition of another drop of the acid. If stained too dark, a current of the diluted acid will soon remedy this fault.

Mr. Lugger also showed some very peculiar Dipterous larvæ, received by him from the vicinity of Wood's Holl, Mass. They were found in tide pools, fastened to some of the long-leaved species of *Ulva*. The larvæ belong to a species of *Ephydra*.

Mr. Smith said that, on the occasion of a recent visit to Philadelphia, he had an opportunity of looking over carefully the Sphingidæ of the collection of the Am. Ent. Soc. Many of these are determined by Mr. Grote, and the types of his papers on Cuban Sphingidæ are there. In the genus *Diludia*, Mr. Grote has three species, *jasminearum*, *brontes* and *leucophæata*. The species are not at all congeneric. *Brontes* is the type of the genus and has a large, prominent head, armed fore tarsi and produced thorax. He pointed out the difference between the species referred to here, and claims that neither *brontes* nor *leucophæata* are properly members of our fauna, but must be dropped from our lists. *Jasminearum* is entirely different generically from the others.*

Mr. Howard spoke at some length of a recent trip to Cambridge, Ithaca, and Philadelphia. He praised the extensive biological collection of insects in the Agassiz Museum, and exhibited a case of a Caddis Worm (*Aspatherium picicorne*), given him by Dr. Hagen, and which had been infested by an Ichneumonid, *Agriotypus armatus*. The same parasite is known to infest *Spathidopteryx* (*Phryganeidæ*). He mentioned the fact that the collection of *Braconidæ*, presented by Dr. Foerster to the Peabody Academy, is now in the Agassiz Museum, and prior to its removal it had become badly damaged, and that now less than half of the species are in condition for comparison. He then described the systematic collection which Prof. Comstock has brought together at the Cornell University, Ithaca, N. Y. This is already a most excellent reference collection. The Lepidoptera have been determined by Grote, Morrison, and Mrs. Fernald; the Hemiptera by Uhler; the Diptera by Williston; the Orthoptera by Scudder and Pierce, and the Hymenoptera by Cresson. He also described several ingenious contrivances invented by Prof. Comstock, and in use in his laboratory. Among them the block-system for the arrangement of a permanent collection, his darkened glass tubes for the observation of pith-inhabiting Hymenoptera, his automatic apparatus for the inflation of several larvæ at once, his cabinet with insulated drawers for colonies of ants, and his cartridge belt for collecting purposes. He did not dwell upon the collection of

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* Further particulars on the subject were published by Mr. Smith, in *Entomol. Amer.* iii, p. 154.

the Philadelphia Academy, for the reason that it was familiar to most of the members present.

Mr. Howard also presented the following table, showing the recorded rearings of Hymenopterous parasites, in the principal European lists, and drew particular attention to the preponderance of the Lepidoptera over other orders, and stated that this was probably not so much due to the fact that the Lepidoptera were more extensively parasitized, as to the obvious fact that their early stages had been more extensively studied, and that more species had been reared in vivaria:

Hosts.	*Hymen. parasites.*
1. Orthoptera	4
2. Unplaced insects	4
3. Thysanura	4
4. Neuroptera	12
5. Arachnida	42
6. Miscellaneous	62
7. Hemiptera	203
8. Diptera	301
9. Coleoptera	359
10. Hymenoptera	748
11. Lepidoptera	1578
Total (distinct records)	3317

November 3, 1887.

Nine persons present. President Howard in the chair.

Messrs. W. B. Alwood, C. H. T. Townsend, and Dr. Wm. H. Fox were elected members of the society.

Mr. Schwarz read the following paper:

On the Insects found on Uniola Paniculata in Southeastern Florida.

By E A. Schwarz.

Uniola paniculata is an ornamental grass commonly known as "Sea-oats," and very abundant at the ocean beach in Florida, where the plant reaches a height of from five to seven feet. Toward the beginning of June of this year I had the good fortune to visit several times the beach opposite Lake Worth, in southeastern Florida and my attention was then attracted by several insect depredators on this Uniola disfiguring and thinning out the beautiful ears of the grass so that I had difficulty in finding perfect specimens of the plant. This fact induced me to look a little more carefully into the insects living on *Uniola* with the following result:

A species of *Oxacis* is extremely abundant on the ears of the plant and most injurious thereto. Many ears are entirely denuded by the hundreds of specimens found upon a single large plant. They are very active and wary, and many specimens fly off on the approach of a person. At this season I failed to find the larva in the old roots of the plant, but the same, or an allied, species has been bred before by Mr. Hubbard from larvæ living in decaying wood buried in the sand along the beach. The particular species to which this *Oxacis* belongs cannot yet be ascertained, owing to the confusion into which this genus has fallen by the accumulation of more abundant material, which shows an extraordinary degree of variability in coloration and sculpture.

This Oxacis is vigorously assisted in its destructive work by numerous specimens of *Hymenorus densus*, the earlier stages of which still remain unknown to me. It is true that a large number of larvæ are met with among the old roots of Uniola as well as other plants growing on the bank of the beach, but if the larvæ of *Hymenorus* were among them I have been unable to distinguish them from what I took to be the larvæ of *Blapstinus* or *Phaleria*. At any rate, the larvæ of *Hymenorus* and *Oxacis* live in decaying vegetable matter, and are not injurious to the living plant.

A third species not infrequently seen on the ears is *Mordellistena splendens*. It was observed by me to feed upon the pollen, and of its natural history I shall speak further on.

A fourth abundantly-occurring species is *Collops nigriceps*, which is seen actively running up and down the plant. I could not find out whether it feeds on the pollen or on the larva of the insect presently to be mentioned, viz:

The common Chinch Bug (*Blissus leucopterus*), which occurs in large number on the upper parts of the Uniola, and which, in this southern latitude, develops some peculiar traits. In regard to geographical distribution, it may be of interest to state that the Chinch Bug extends along the Atlantic coast as far south as Cape Florida, being absent on the shores of Biscayne Bay and on the chain of the Keys, but reappearing on the coast of Cuba, and probably also on other islands of the West Indies. The same distribution is participated in by *Uniola paniculata* and many other insects and plants. The Chinch Bug further occurs in this southern latitude only in the brachypterous form, as I never, among thousands of specimens, saw a single macropterous specimen, and it appears that the warm climate of semi-tropical Florida, which ought to be rather favorable to the development of the macropterous form, is more than counterbalanced by the tough and coarse nature of the food-plant. *Uniola paniculata* appears to be the only food-plant of the Chinch Bug at Lake Worth and Cape Florida, as I found only a few scattered imagos on the few other grasses growing on the bank of the beach, and on these the bugs may have been blown down from the *Uniola*. Contrary to the habits shown by this insect in our more northern cultivated fields, the Chinch Bug is to be found on *Uniola* only on the upper portion of the plant, the imagos and larger specimens among the ears, the younger between the upper blades. The reason for this habit is, in my opinion, easily explained by the very woody and tough nature of the lower part of this storm-beaten plant, and further by the fact that the constantly drifting sand would make life rather uncomfortable for the Chinch Bug close to the ground. Finally, I would state that in all my travels in central and southern Florida I do not remember having found the Chinch Bug in considerable number in the interior of the country; in fact, I never found a single specimen in the valley of the St. John's River.

A very small species of *Phlœothrips* occurred at the base of the younger blades, but is hardly numerous enough to affect the plant in any way.

Of special interest to me among the insects just enumerated was *Mordellistena splendens*, which I had never found before, and its constant occurrence on *Uniola* suggested to me the probability of finding its earlier stages within the stem of the plant. Upon cutting open the dead and dying plants I was soon rewarded with finding the insect in the larva, pupa, and imago states. Most of the specimens were imagos ready to issue from the stems, many were still in the pupa stage, while the larvæ were already tolerably scarce. From the numerous specimens thus found by me the natural history of *Mordellistena splendens* may be summed up as follows: The female beetle inserts a single egg in the stem just beneath the ear, and the young larva commences to hollow out the interior of the stem (or rather to widen the naturally hollow inside), making its way downward. The duration of the larval state is unknown to me, but when full-grown the larva has hollowed out a distance of from one and a half to two feet. The stem of the plant increases in width downwards, and the larva, when it has arrived at the lower end of its burrow, is thus enabled to turn around. It then reascends within the stem until it has reached the place where the diameter of the hollowed interior is just large enough to prevent the larva or pupa from sliding downwards. Here it changes to pupa, but before doing so it gnaws a round hole in the side wall until only the thin outer skin is left. The change to pupa then takes place, and the perfect insect, after casting the pupa skin, finds itself with its head just opposite the nearly completed opening. It breaks, or rather eats its way through the outer skin and escapes. I cannot tell whether there are two or more annual generations in this species, but it appears that the plant is killed by the working of the larva. Of parasites, I failed to discover any; but in some of the plants, evidently hollowed out by the Mordellistena larva, I found a solitary ant which has kindly been determined by Mr. Pergande as *Colobopsis impressa*. Wherever the stem was inhabited by the ant I failed to find any trace of the *Mordellistena* larva; nor was there the usual exit hole which would prove that the larva had passed through its transformation and that the ant had entered the stem through the exit hole of the beetle. I presume, therefore, that the ant enters the stem from the root and eats the larva.

To complete this short review of the insects found on Uniola, it still remains to be mentioned that the stems deserted by the *Mordellistena* frequently become the abode of numerous specimens of a Ptinid beetle of the genus *Hemiptychus*, the larvæ of which feed upon the *débris* left by the *Mordellistena* larva.

Mr. Schwarz made a communication regarding the correlation in the increase of the number of mosquitoes on the one side and certain species of dragon-flies on the other side, as observed by him in the months of May and June, at Biscayne Bay, in southeastern Florida.

The following is an abstract from his remarks:

Mosquitoes abound in that section of the country at all seasons, but whenever the regular trade wind ceases to blow they enormously increase in numbers and become a most serious pest, which greatly interferes with all out-door occupations, especially in the hammock lands. During such mosquito spells there is an equally sudden and great increase in numbers of certain dragon-flies, and this is the more interesting because there is a great scarcity of fresh water in the country south of Miami River. It may be presumed, however, that most of the dragon-flies come from the Everglades to the shore of Biscayne Bay, a distance of about 7 or 8 miles. Three species of dragon-flies, *Celithemis eporina*, *Libellula auripennis*, and *Anax ingens*, were thus incredibly abundant at times, while two or three others did not participate in this increase.

Mr. Schwarz also mentioned a peculiar habit in *Danais berenice* observed by him at Biscayne Bay, Fla. Whenever the cut weeds and shrubbery were burned on the cleared patches, these butterflies congregated in great numbers on the heated rocks close to the line of the fire.

Mr. Smith exhibited a specimen of *Cicindela Belfragei*, which shows a curious abnormity in the shape of an acute tubercle on the left side of the prothorax.

Mr. Smith also called attention to some modifications of tarsal structure among the *Arctiidæ*. He finds that some genera, as *Leucarctia* and *Ecpantheria*, have the claws cleft to the base—others, like *Phragmatobia* and *Pyrrharctia*, have them dentate at the tip, while in *Spilosoma* and *Antarctia* there is a distinct long tooth at the middle of the claw. The claws are not always alike on all feet. Sometimes the claws of fore tarsi only are toothed, and sometimes all are so—in any case the anterior claws are the ones modified. What value this character should have is yet uncertain.

Two distinct series are indicated by the venation, according to the position of vein 10. In one series it arises from the subcostal before the end of the cell, in the other it arises from a stalk with 7, 8, and 9.

In discussing this paper, Dr. Marx remarked that in *Arachnida* the formation of the claw is no good character for classification, the character varying according to the species.

Mr. Howard exhibited drawings of some new and remarkable genera of *Chalcididæ* from southern Florida and California.

Informally, various subjects were then discussed: The seat of the poison gland in scorpions; the poisonous or harmless nature of the larger centipedes; the decrease in size of the latter after being placed in alcohol; on *Julus* and *Chauliodes* being attracted by sugaring trees.

December 8, 1887.

Thirteen persons present. Vice-President Morris in the chair.

Dr. Marx read the following paper:

On the Morphology of Scorpionidæ.

By Dr. George Marx.

In studying the morphology of the Scorpions, as far as the limited number of species at my disposal allows me, I have noted a few points which seemed to me to be of general interest.

Allow me first to draw your attention to a peculiar and remarkable condition in the organization of the Scorpion, viz., that of an intense concentration and aggregation in the anterior region of the body, in opposition to an exaggerated extension or elongation in the posterior part.

We know that the Arachnids are acephal, that early in their embryonic evolution the development of the head was interrupted, that it was, so to speak, swallowed up by the more intensified development of the thorax; in contradistinction to the formation of the cephalothorax of the crustaceans, where the head, in the course of its development, became simply blended or coalesced with the chest: the absence of the two principal attributes of the head, the antennæ and the true eyes, in the Arachnids, is sufficient proof of this. But, in addition to this, we find in the anterior part a state of aggregation, which seems so much the stranger if we compare it with the extravagant and lavish state of extension in the posterior. We need only to examine the sternal side of the cephalothorax to notice at once the crowded condition of the joints of insertion of the appendages. We see that some parts, which are in allied orders, well developed and occupy their natural position, are here pushed into other places, or overlap, or are abbreviated, atrophied, or altered to such a degree that their true character can only, with difficulty, be rightly determined. And, if we now examine the posterior region, it contains *internally* no organ which could not be, and is not in the closely allied forms, abbreviated to half its length; it bears *externally* no other important part, except the sole defensor, the poisonous sting, and probably the body was so elongated that this weapon might be able to protect the animal from an attack upon any part of its body.

The whole body of the Scorpion is covered by a tough, coriaceous membrane, which is prone to develop into plate-like structures, *sclerites*, of a hard chitinous consistence. These sclerites cover the dorsal and ventral parts of the body and the appendages and only the pleural sides of the cephalothorax and the abdomen, and the articulations of the latter are free and enveloped by the athrodial membrane. These sclerites form the external skeleton of the Scorpion.

Viewing the body from a general morphological standpoint, we find it naturally divided into three distinct regions: the cephalothorax or prosoma, the abdomen or mesosoma, and the tail or metasoma. Each of these regions consisted originally of six segments, but the condition of concentration in the prosoma has obliterated these articulations, and they are only indicated by the six pairs of appendages which it bears. The meso- and metasoma consist of apparently thirteen segments, but the terminal joint of the tail, the vesica, with the long and sharp sting, cannot be counted with the abdominal segments on account of its post-anal position; it is an abdominal appendage.

The cephalothorax is covered dorsally by a solitary chitinous plate, the *Carapace*, into which the organs of vision are inserted. They consist of three groups of simple eyes, corresponding with the ocelli of the insects. A large pair is situated in the median line of the carapax, either at, or before, or behind the centre of the longitudinal axis; on each side, at the latero-anterior-angle of the carapace is a group of two or three ocelli, with sometimes one or two accessory ones, like those of *Thelyphonus* which I mentioned on a former occasion. I have here to withdraw a statement made at a previous meeting, that these accessory eyes are not provided with a separate branch of the optic nerve, and are, consequently, mere granular integumentary formations—an opinion which other naturalists also entertain—but in *Androctonus*, which generally possesses two accessory ocelli, I have found a distinct branch to both. This fact, however, has been long known, and in 1843 Newport, of England, described, in his excellent paper, the lateral ocular branches of the optic nerve.

The six pairs of appendages of the prosoma are: the mandibles, the maxillæ, and the four pairs of legs. The mandibles are three-jointed, and the two joints form a chela or forceps. Let me here mention that a very important point in the present classification is based on the tooth armature of both of the mandibular fingers; indeed, the existence of subfamilies depends upon the presence of one or two minute teeth on the inferior margin of the immovable finger.

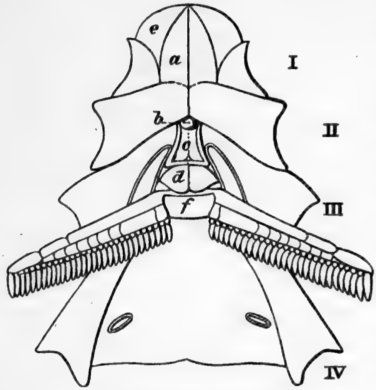

FIG. 1.—Underside of *Centrurus biaculeatus*; I, II, III, IV, the coxæ; *a*, prosternum; *b*, mesosternum; *c*, metasternum; *d*, genital operculum; *e*, labium covered in the median region by the prosternum; *f*, jugum with the combs.

The maxillæ are situated below the mandibles, in close proximity. They are broad and square and of a hard chitinous consistence; they are upholstered on their inner surface with a fleshy and softly-pubescent cushion, which rubs against the one on the other side, thus producing a vacuum which assists in sucking the prey; a sharp and powerful process at the anterior end of the maxillæ helps the other trophi to tear asunder the body of the victim. The maxillæ bear the large, five-jointed, maxillary palpus, originally an ambulatory organ, in which the three tarsal joints are developed into a powerful prehensile organ of large dimensions. The hand, the former first metatarsal joint, with the immovable finger (2d metatarsal segment) and the movable finger (the former tarsus), forms thus a part constructed like the mandibles. It may be of some interest to you that the chela of the Arachnids differs from that part in the Crustaceans in that here the outer finger is movable while in the latter class it is the inner finger that moves.

In the posterior area of the narrow free space between the maxillæ, we notice a fleshy and softly pubescent piece, the *ligula*, which serves here as a palate; at its base is the minute œsophageal opening.

Below the maxillæ, and forming the floor of the oral cavity, is situated the *labium*, a thin and flat plate-like organ, divided in the centre longitudinally, thus forming two lobes. The structural character of this part has been hitherto strangely misunderstood on account of its external appearance from the underside; for here it appears to be four-lobed, as the long and narrow, two-lobed prosternum is, in consequence of the condition of aggregation in the prosoma, pushed over the median area of the labium, leaving visible at each side only a small part of the external area (Fig. 1, *a*, the prosternum; *e*, the labium). But in examining the labium from the

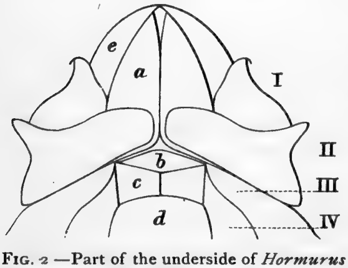

FIG. 2.—Part of the underside of *Hormurus* n. sp., showing distinctly the insertion of the coxæ II (those of the first pair of true legs) into the prosternum; *b*, mesosternum; *c*, metasternum.

inside of the mouth, we may easily see the true structure (Fig. 3, *e*, the labium).

In no other order of Arachnids is the fact so nicely, so distinctly demonstrated, *ad oculos*, that the first pair of legs will soon (in a higher class) develop into labial palpi, as in the Scorpions; for here we see clearly the insertion of these appendages into the sides of the labium (Figs. 1 and 2).

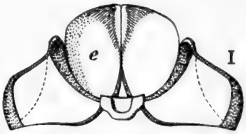

FIG. 3.—*Hormurus* n. sp.; *e*, labium seen from the inside of the mouth; I, coxæ of the first pair of legs.

That the part which occupies the median area of the labium is the prosternum, is proven by the insertion of the second coxæ, that is, the coxæ of the first true legs, which insertion is clearly illustrated in some genera of the family *Pandinoidæ*, in which the labial border surrounds the basal part of the coxæ (Fig. 2, sternal side of *Hormurus Underwoodii* n. sp.) The mesosternum is not always visible, at least not at the external surface; and where it is distinctly present it has been hitherto overlooked by observers. In the family *Androctonoidæ* we distinctly see in many genera a small tubercular process right at the anterior border of the "sternum"—the metasternum (Fig. 1, *b*). In the family *Pandinoidæ*, where the metasternum is less reduced in size than in the former, the mesosternum is blended with the metasternum, and is indicated visibly in many genera by a distinct line and a difference in the angular position of these two areas (Fig. 2, *b*, mesosternum).

The metasternum is the great criterion for the families into which the order of the Scorpions is divided. Is it long and very narrow, or sub-triangular, the animal belongs to the family *Androctonoidæ;* if it is pentagonal, the family *Pandinoidæ* is indicated; while those scorpions without a metasternum, or in which it is only represented by two transverse linear structures, are included in the third family, *Bothriuroidæ.*

The second general region of the body, the mesosoma or abdomen, with its seven segments at the dorsal surface (some naturalists consider the last segment as belonging to the tail), has ventrally apparently only five sclerites. But we notice in the narrow space between the last pair of coxæ and immediately behind the metasternum two peculiar structures, the anterior of which represents the genital operculum (Fig. 1, *d*), and below which lies the sexual apparatus. As this operculum is of the same form in both sexes, the scorpion cannot be sexually differentiated by this organ. Behind the operculum, which is generally of an oval, plate-like form, are situated those peculiar organs which are original to the Scorpion, the combs (Fig. 1, *f*). Of the functions of these organs we know absolutely nothing.

By the concentration of the cephalothorax the space for the two anterior ventral sclerites becomes so scarce and narrow that only the genital tubercle of the first ventral segment and the jugum with the combs of the second segment are retained, while the rest of the space is occupied by the third and fourth coxæ.

Each of the following ventral sclerites, with the exception of the last, bears a pair of stigmatic openings which lead to the lung-books, and which are considered the invaginated external respiratory organs of an inferior class of Arthropods. I will state here my opinion in regard to the lung-books and the combs, without going into detail or endeavoring to prove it: The respiratory organs, which are now concealed in the abdomen, were in a prototype originally outside of the body, and much larger in size and in *five pairs;* that the first pair, by being situated nearer the genital apparatus, became gradually stimulated, and, consequently, hypertrophied, with an increased blood and nerve supply, until they became so large that they were retained either as a necessary or important accessory to copulation, or a pleasant excitor in the voluptuous play of love-making.

The last great region, the metasoma or tail, is by rights not a tail but a part of the abdomen, that is, it contains internally the proctodæum or colon, the large caudal artery and the spinal cord with its four caudal ganglia—organs which are not found in a tail *sensu proprio* It is only its form that distinguishes this region from the mesosoma. This part is always much longer and more slender in the male than in the female.

The legs of the Arachnids are generally composed of seven principal joints, as follows: coxa, trochanter, femur, patella, tibia, metatarsus, and tarsus. We see that here a knee-joint, patella, is inserted between the femur and the tibia. This knee-joint distinguishes the leg of the Arachnids from that of the insects, in which the tibia immediately follows the femur. In the Scorpion we find that the joint which follows the femur cannot be a knee-joint on account of its form, size, and articulation, but that it corresponds exactly with the tibia of the insect leg. In other words, in the structure of the leg of the scorpion we find a proof of the closer relationship of that highly organized Arachnid with the next higher developed class of insects.

Mr. Schwarz exhibited the following species and made remarks upon them:

1. The species of insects referred to by Mr. J. B. Smith in his article, "Ants' nests and their inhabitants" (*Amer. Natur.*, 1886, p. 686), viz., *Tapinoma sessile* (family *Formicidæ*), an unnamed Heteropterous larva, an undescribed *Anthicus* (family *Anthicidæ*), and the two species of *Temnopsophus* (family *Malachiidæ*). All these species occur under the same conditions on low plants in the prairie regions of southern Florida and, although belonging to three different orders, exhibit a remarkable resemblance in general appearance. This holds especially true of the three first-named species. As another curious example of accidental resemblance, Mr. Schwarz exhibited specimens of *Olibrus princeps* (family *Phalacridæ*), *Exochomus marginipennis* (family *Coccinellidæ*), and *Argopistes scyrtoides* (family *Chrysomelidæ*), which occur promiscuously on shrubbery in the semitropical portion of Florida.

2. Specimens of *Pityophthorus minutissimus* and its galleries, under bark of red oak branches, found at Washington the past month. The primary galleries closely resemble those of *P. querciperda*, exhibited at a former meeting (see p. 56), *i. e.*, they consist of a very short longitudinal gallery which is crossed at its upper end by an extremely long transverse gallery. It seems that the larvæ do not make any galleries of their own.

3. Specimens of *Otidocephalus Poeyi*. This species, hitherto known only from Cuba, occurs also on Key West. The Floridian specimens are much smaller and darker colored than the Cuban specimens, but are specifically not distinct. Gyllönhal, in his description, briefly mentions a remarkable character in this species, viz., the presence of a large fovea on the upper side of the beak; but Suffrian, in his list of the Rhynchophora of Cuba, entirely misinterprets this description and considers the fovea as an abnormity. The fact is that this spoon-shaped fovea is a secondary male character not recurring in any other described species of the genus.

4. Specimens of a new *Bonvouloiria* recently found at Biscayne Bay, Fla., the genus being hitherto known only from California and Texas. Larvæ, pupæ, and imagos were found amongst a blackish mould growing under the bark of freshly-burned stumps. The species, when fully matured, has the thorax and one spot on each elytron covered with a snow-white, mould-like efflorescence. When just hatched the beetle is without this efflorescence and remains so for about two days. Then the efflorescence on the thorax rather suddenly makes its appearance and shortly afterwards the elytral spots.

5. Specimens of the Scolytids *Phlœotribus liminaris* and *Hylesinus opaculus*. Dr. Harris, in his description of the former species (Ins. Inj. to Veg., 3d ed., p. 84), states that it occurs also under elm bark. Mr. Schwarz said that in his experience *Phlœotribus liminaris* does not occur under elm bark, but that *Hylesinus opaculus* is rather common under such conditions. Both species resemble each other closely, so that, without examination of the structural character in the antennæ, they can hardly be distinguished, and it appears probable, therefore, that Dr. Harris had confounded the two species.

Mr. Smith read the following paper:

Some Observations on Museum Pests.

By John B. Smith.

One of the primary duties of a person in charge of a large collection of insects is keeping out Museum pests—as the various species that feed on the dried insects are generically termed. In a large collection, like that of the National Museum, no inconsiderable time is required for that purpose, as it takes at least two weeks to go through all of the boxes carefully.

It has been the fashion to recommend as a certain preventative tight boxes, and quarantining all specimens before putting into the collection, and undoubtedly this is an excellent precaution, saving much future labor.

It is however by no means the certain remedy which it has been claimed to be. The boxes and cabinets in use in the Museum are as perfect, so far as safety is concerned, as it is possible to get them at present, yet withal constant care is required. *Psocidiæ* will find their way into the tightest boxes, and though they do little damage ordinarily, yet in a collection of *Tineidæ*, or minute *Diptera*, they can do quite considerable damage. For these pests I have found naphthaline a perfect remedy. A single case of the size made by Mr. Akhurst is a perfect protection, and lasts about three months ordinarily.

Tineid larvæ are rather rarely found in the collections as the larger moths and are not always easily discovered, since they make no dust as do the *Anthreni*. On one occasion, I found that one pair of wings of a *C. regalis* suddenly collapsed without apparent cause. Close examination showed a Tineid larva that had been feeding on the dense long vestiture, making galleries in all directions, in such a way, that when I took hold of one end of the gallery the vestiture of the underside came off in large sheets, leaving the wings almost clean, the veins broken here and there, which produced the collapse. They rarely burrow into the specimen—never in my experience. *Ptinidæ* are sometimes found, but are exceedingly rare in our collection. One box, lined with corn pith, was riddled with them, and a very few specimens were attacked.

But by all odds the most dangerous enemies are the larvæ of the *Dermestidæ*, which are pests, pure and simple. The principal enemy in our collection is *Anthrenus varius*, though *Trogoderma* is not uncommon. My experience with these is, that in the uniformly high temperature preserved in the laboratory they breed all the year around, and have no definite broods—a few larvæ appear at all times, though during the summer, when the beetles come in from the grounds and other parts of the museum, exposed specimens are attacked at more regular intervals. The rule is to keep naphthaline in all boxes at all times, but like all rules it is not always possible to adhere strictly to it. The boxes not so protected are usually first attacked. In a cabinet not quite tight I coned a number of drawers and left the others unprotected. In the course of the summer the unprotected drawers nearly all became infested, while as a rule the others were free. The naphthaline seems to act as a repellant. I have found, however, that it does not annoy the larvæ to any very great extent, and Mr. Lugger has shown me a naphthaline cone in a hollow of which a larva had pupated! I have reason to believe, however, that it does retard the development of young larva. A large number of boxes—nearly a hundred—were received from North Carolina, containing a collection, principally Coleoptera. They were overhauled and found to be pretty generally infested with *Trogoderma*, this being the only species found. No *Anthrenus* larvæ were noticed. Bisulphide of carbon was freely used, and naphthaline cones were placed in all the boxes. For a while the boxes were frequently examined and no larvæ developed. Throughout the summer the boxes were examined at intervals and remained free. With the approach of cold weather they were left for a longer period, and the cones pretty generally evaporated. In December this was noticed and the boxes were again overhauled, and it was found that a very general development of larvæ had begun—all of them *Trogoderma* and none of them more than 2-3 mm. in length—most of them apparently just hatched. The entire collection was then overhauled and an occasional *Anthrenus* larva was found, but no other *Trogoderma*, even in the most exposed boxes.

I conclude from this that the collection when received was pretty generally infested, and that there were eggs everywhere, ready to develop; some had begun to develop, and these were destroyed by the use of the Bisulphide of Carbon, which also served to check development of the eggs. The boxes were quite large, and two large cones were put in each; they were also quite secure, and the atmosphere in them was fully impregnated with the odor of naphthaline. Throughout the summer, when under ordinary circumstances they would have developed, the eggs remained dormant, but after the naphthaline had evaporated completely, development began. I might add here that *Trogoderma* is an exceedingly rare pest in New York, and not common in Washington,—further south it seems to replace *Anthrenus*. For all these pests, when out of the egg, Bisulphide of Carbon is a sovereign remedy, except where they are burrowing in large Coleoptera and Lepidoptera. I have repeatedly soaked large Bombycids with chloroform or bisulphide, and a week later found them still infested. I worked for a month over some large Lucanids (*Proculejus*) and finally separated the parts so that I could fill the body cavity with chloroform. In one case, which was somewhat exposed and contained odd material or little value, I found a specimen destroyed by *Microgaster*—a rare parasite for *Anthrenus*. How they got at this box it is rather difficult to explain, since it was tight enough to prevent the entrance of the insect.

As a rule *Anthrenus* can hardly be considered fastidious, but occasionally they manifest color preferences. In one specimen of *Grapta interrogationis* the black spots bordering on the costa were neatly cut out, no other portion of the wing being touched. Its career was suddenly cut short before it had quite finished one wing, and I now regret that I did not allow it to continue its work to note whether it would have attacked the other wing in the same manner.

I have noticed also that boxes on the lower tier of shelves are very much more liable to attack than those on upper tiers, and this leads me to believe that the parent beetle will deposit eggs outside of the boxes or on the floor of the cases, and the young larvæ will work their way into the smallest crevices. It seems difficult otherwise to account for isolated larvæ in boxes containing only old insects.

Finally I find the danger of infection comparatively greater at Washington than in New York—principally because the warm season begins earlier and lasts longer, increasing the chances of infection. I find, too, that the only real chance of safety consists in constant examination, tight boxes and a free use of chloroform or Bisulphide of Carbon.

As to naphthaline, I consider that it is a good general preventative. I know it to keep out *Psocids* and Ants. It enhances the tendency to grease and to verdigris, and in tight boxes it seems to exercise a relaxing tendency, causing the wings to droop.

Dr. Marx presented for publication the following description of a new spider of the family *Theraphosoidæ:*

Eurypelma Rileyi, Marx n. sp.—Cephalothorax with a dense, fine, and somewhat curly pubescence of a pale, brownish yellow color. Mandibles, abdomen, and legs with a similar, but slightly darker, pubescence, which is sparsely interspersed with long hairs. These appear to be set in rows on the legs, and are at their base of a blackish brown color, getting gradually lighter toward the tip, which is nearly white. On the mandibles these long hairs have a reddish color. The eye eminence with a bunch of such long hair over the vertex. Tarsi and scopula somewhat darker. Underside of cepha'x, trophi, sternum and coxæ, deep purplish red; maxillæ fringed with brick red long hair. Abdomen unicolored without any markings, underside somewhat darker.

Cepha'x only very little longer than broad. Clypeus truncate, posterior border deeply emarginate. Pars cephalica high, rounded, and more than half as long as cepha'x; dorsal depression deep, broad, and slightly procurved. Eye eminence rather high. Eyes amber-colored and oval except the anterior middle eyes, which are placed further apart than their diameter; anterior lateral eyes longer than the diameter of the A. M. E. and placed as far from them as their width; the posterior lateral eyes as long as the diameter of the A. M. E.; the posterior middle eyes not half as large as the A. M. E. The four lateral eyes form a rectangle with parallel sides and nearly twice as broad as its length. Sternum slightly narrower than long.

Mandibles very strong, porrect, as long as pars cephalica, and half as broad as their length; mandibular claws powerful, half as long as the length of cepha'x.

Abdomen slightly longer than cepha'x; external spinerets comparatively short and stout, 4-jointed, last joint only slightly longer than penultimate.

Legs short and rather stout, 4, 1, 2, 3, fourth leg not quite 3 times as long as cepha'x; the pubescence parted in longitudinal stripes; Scopula very broad and dense on all four pairs. Fourth pair exceeds the length of the first pair, by the length of its tarsus. Tarsal claws with 3 minute teeth, which are very far apart.

Spine armature:

Leg I. Femur dorsal innerside near apex 1; Patella none; Tibia, innerside 1, i; underside, near apex i. Metatarsus and tarsus none.

Leg II. As in leg I.

Leg III. Femur none; Patella none; Tibia, innerside 1, i; outside 1, underside, near apex i; Metatarsus, outside 1.

Leg IV. Femur none; Patella none; Tibia, innerside 1; underside, near apex 2. Metatarsus, underside, near base 2; dorsal innerside 1, i.

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Address Tyler Townsend, Department of Agriculture, Washington, D. C.

One female from Santa Barbara, Cal., in collection of Prof. C. V. Riley.

Eurypelma Hentzii Girard=E. mordax Auss., one of the common "Tarantulas" of the Southwestern States, differs from this new species by the longer legs, the higher eye eminence, the broader mandibles, the spinnerets, of which the basal joint is here the longest, and by the spinous armature of the legs.

Eurypelma Steindachnerii Auss., a species which occurs frequently in California can be readily recognized by the large velvety-brown spot on the otherwise light-colored abdomen.

Eurypelma californica Dol. Distinguished from our species by the smaller mandibles, the narrower sternum, and the blackish-brown color of the underside of the abdomen.

Mr. Howard read a paper, of which he has submitted the following abstract:

A Misconception regarding the LeConte Edition of Say.—The title-page of the two-volume LeConte edition of Say reads: "The complete writings of Thomas Say on the Entomology of North America," and from this wording of the title-page I have reason to believe that the impression is very general that in this edition LeConte included all of the entomological papers written by the father of North American descriptive entomology. Such, at least, was my own impression.

In 1884 I found in the Journal of the Academy of Sciences, of Philadelphia, for August, 1817, vol. i, page 63, an interesting note by Say, which I have republished with comments in *Psyche*, vol. iv, page 206, August and September, 1884. I have recently found two other articles in the Memoirs of the Philadelphia Society for promoting Agriculture, vol. iv, 1818, the one a letter dated September 28, 1817, published upon page 224, and the other a letter dated October 30, 1817, published upon page 236. The finding of these three articles lead me to the conclusion that the editor intended simply to bring together *descriptive* papers of Say, and this conclusion is verified by a paragraph in Dr. LeConte's preface. The title page is therefore very misleading, and the cause of a general misconception as to the scope of the work on the part of entomologists. After the preparation of this note I discovered that the two letters of Say referred to have been mentioned by Dr. Hagen in *Psyche* for March, 1884. The U. S. Department of Agriculture possesses a copy of the now rather rare Memoirs of the Philadelphia Society above mentioned.

January 5, 1888.

Fifteen persons present. President Howard in the chair.

The Treasurer and the Secretaries presented their annual reports, which were duly referred.

The election of officers then took place, resulting as follows:

President, Mr. E. A. Schwarz; 1st Vice-President, Dr. C. V. Riley; 2d Vice-President, Dr. George Marx; Recording Secretary, Mr. John B. Smith; Corresponding Secretary, Mr. O. Lugger; Treasurer, Mr. B. P. Mann; Members of Executive Committee, Mr. L. O. Howard, Mr. Theo. Pergande, Dr. W. H. Fox.

The retiring President then read his Annual Address, as follows:

ANNUAL ADDRESS OF THE PRESIDENT.

A Commencement of a Study of the Parasites of Cosmopolitan Insects.

By L. O. HOWARD.

The desirability of a general compilation of the parasitic relations of all parasitic Hymenoptera has been forced upon me in my study of these forms, and I have for some time been engaged in recording in spare moments such relations wherever published, with a view of bringing out in two great tables the parasites and the insects from which they have been reared, arranged, first, according to the classification of the parasites, and, second, according to classification of the insects parasitized. Whenever, in making these records, the insect playing the part of host (victim seems a better word) has chanced, to my knowledge, to be a cosmopolite, or at least to occur in both Europe and North America, I have considered its parasites with greater interest, and the idea which I had long since conceived, and which I have not seen formulated elsewhere, that the comparative study of the parasites of such species would be followed with results of considerable interest, and possibly of some practical value, has occurred to me with added force. This recording has advanced so far at the present time that I have been able to accumulate sufficient facts for a preliminary paper on this subject, which, it strikes me, is so broad in its interest and so well calculated to appeal to entomologists of all specialties that it is well adapted to an address of this kind.

In advance of a consideration of the actual records it is obvious that a plain tabulated statement, such as I shall give, will be of use in the following ways: It will be a slight help in determination of parasites; it will be an indication of possible synonymy where names differ; it will bring before the eye in comparison species which are vicarious, which represent each other in different countries, although specifically distinct; it will assist us towards a clearer idea as to the general habits (whether uniform or variable) of genera and other groups of parasites. These points, however, will of course be brought out in a much stronger manner by the tabulation of the entire records, although this present tabulation will assist in these directions. The table which follows, however, will form a record upon which to base the collection and importation of the parasites of a destructive species—an attractive idea which has been often discussed in entomological writings, but seldom carried out with much practical success. Other uses for such a list will unquestionably arise, and, indeed, since writing the introductory lines of this paper a most striking and interesting instance of the value of just such knowledge, in a way the possibility of which never even occurred to me, has been brought out by our fellow-member, Dr. Riley. The Hessian Fly has been very destructive for two years past in England, and the question has been, and it is an important one, whence did it come? Two important wheat-growing districts furnish England with much of this grain, *viz.*, North America and Russia. Now it happens that within a few months of each other Dr. Riley monographed the North American parasites of this insect, and Dr. Lindemann the Russian parasites. No accurate way of fixing the source of the English supply was found until Dr. Riley on his recent trip to England discovered that the parasites there were identical with the Russian forms, and, with one exception, specifically distinct from the American forms, the exception belonging to the Russian fauna as well as to the American. America is thus relieved of the onus which falls upon Russian shoulders.

This paper will therefore subserve several objects, and if it were only tolerably complete its value would be considerable. The record is, however, incomplete and necessarily more or less inaccurate.

The European records fail in many instances to record the species of the host, which often, and especially in case of *Aphididæ* and *Coccidæ*, usually having wide-spread species, debars us from much interesting information. There, such information is usually recorded in connnection with treatises on the structure and habits of the parasites, in which the specific determination of the host is of less importance. Here in America, however, owing to the fact that little has been written upon the habits or classification of parasites, such records occur almost entirely in works on the habits of the hosts, which are usually injurious insects, or at least showy ones well known to the popular eye, and in this case the specific determination of the parasite becomes the less important. Thus in Europe we have twenty or more parasites recorded from "bark-lice on oak," and these bark-lice may or may not be identical with species in this country, and, *per contra*, in this country we all know how often occurs the phrase, "a hymenopterous parasite lives in this insect," or "an ichneumonid parasite has been bred." From these two facts, tendencies, or necessities it will be readily seen that it is almost too early for generalizations.

In the present state of our knowledge in America, perhaps no better can be done. In Europe there is less excuse; specialists abound, the insect fauna is well known, and nothing but the intentness of the individual upon his own restricted group, and his carelessness as to others, and even to the close relations in life which they bear to other groups, prevents us from having much fuller records. Few lepidopterists, for instance, save the parasites which issue from larvæ in which they are interested. The parasites are to them such unmitigated nuisances, and their appearance is such a grievous disappointment, that, unless they chance to belong to some brilliant or striking species, they are thrown aside in disgust. Here, however, I must pay my respects to Messrs. Bridgman and Fitch, who have brought about a revival in England of late years in the direction of a reform of this abuse. At the present day there are many English lepidopterists who religiously save and record the parasites which they rear.

This leads us naturally to the mention of the other entomologists whose records have been of assistance, and who have done the most in the study of the lives of parasites.

Messrs. Bridgman and Fitch are well towards the top, and they have recorded a great many rearings in *The Entomologist* during the last eight years.

Ratzeburg, in his great work on the Ichneumons of Forest Insects, recorded some eighteen hundred parasites and their hosts. It is difficult to use his observations, however, on account of the complicated synonymy, a large proportion of the species described by him as new having been described before.

Kirchner, in his catalogue of the Hymenoptera of Europe, has brought together a great number of records of rearing of parasites, and repeats nearly all of Ratzeburg, but this part of his work was hurriedly done.

Edouard Perris, in his various papers, has recorded many parasites. These records have been brought together and published with the observations of Giraud, who was also a most industrious observer of the habits of parasites, under the caption "Liste d'éclosions d'Insectes," by Giraud and Laboulbène, in the Annals of the French Society for 1877.

Rheinhard and Hartig and Pastor Kawall in the Entomological Journal of Stettin, Westwood in the Transactions of the London Society, Snellen van Vollenhoven in his Pinacographia, Curtis in his Farm Insects, Kaltenbach in his Enemies of Plants, Mayr in his short monographs published by the Imperial Zoölogical-Botanical Society of Vienna, Brischke in his various papers published by the Königsberg Society, Buckton in his monograph of the Aphids, Wachtl in his short papers in the Vienna Entomological Journal, Cameron in recent papers published by the Glasgow Natural History Society, Lindemann of Moscow, André of Beaune, A. Dours in his Catalogue of the Hymenoptera of France, Marshall in his Monograph of the British Braconidæ, Möller in the Entom. Tidskr., and G. C. Bignell in one of the Ray Society publications, have been the principal contributors to this branch of the subject in Europe, and the principal sources of the information which I have brought together.

In this country the only attempt at a list or table is the short one prepared by myself and published in Bulletin 5 of the Division of Entomology. Nearly all of our records occur in isolated form in the writings of our economic entomologists. Riley has recorded more rearings than any other American author, in his Reports on the Insects of Missouri, in the American Entomologist, in his reports as entomologist to the U. S. Department of Agriculture, in the reports to the U. S. Entomological Commission, and in the Trans. St. L. Acad. Sci., and in the Proc. Nat. Mus. Fitch, Harris, Walsh, Le Baron, Shimer, Norton, Emily A. Smith, French, Forbes, Lintner, Comstock, Packard, Ashmead, Cook, Weed, Hubbard, Patton, Provancher have all published a greater or lesser number of such records. Mr. Ashmead has sent me a manuscript list of over two hundred observations made by himself in Florida, many of which are as yet unpublished. Mr. Schwarz has kindly looked over my records of parasites of Coleoptera, and advised me concerning the cosmopolitan beetles, and Dr. Williston has assisted me in the same way with the Diptera.

Lepidoptera.

Host.	European Parasites.	American Parasites.
Rhopalocera.		
Pieris rapæ	Hemiteles fulvipes Gr. (hyper.)	
	Apanteles rubecula Marsh.	
	Mesochorus aciculatus. All Bignell's list.	
	Pteromalus puparum L. (many authors).	Pteromalus puparum L. (many authors.)
	Apanteles glomeratus L. (many authors).	Apanteles glomeratus L. Riley, D. of A. 1883.
	Monodontomerus æreus Walk. (Mayr, Eur. Tor. 62).	Apanteles congregatus var. pieridivora. Pack. (Pack. Ichn. Pars.)
	Monodontomerus dentipes Boh. (Mayr, loc. cit.)	
Pyrameis cardui	Pimpla diluta Ratz. (Ratz. Ichn. d. F. I.)	Apanteles carduicola (Pack.) (Pack. Ichn. Pars.)
	Limneria exareolata Rtz.	
	Bracon variator Nees.	
	Apanteles emarginatus Mes. All Bignell's list.	Ichneumon rufiventris Br. (Scudd. Am. Nat. x, 610)
Pyrameis atalanta	Limneria cursitans Holmgr. (Fitch, Ent. xvi, 66).	
	Hoplismenus pica Wesm. (G. et L. 399).	
	Microgaster spurius Wesm. (G. et L. 413).	Microgaster carinata Pack. (Pack. Ichn. Pars.)
	Microgaster subcompletus Nees. = annulipes Curt. (Fitch, Ent. xiv, 142).	Apanteles congregatus var. atalantæ (Pack.) (Pack. Ichn. Pars.)
	Apanteles sp. (Fitch, Ent. xiii).	Apanteles edwardsii Riley MS. (Howard, Scudd. But.)

LEPIDOPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Pyrameis atalanta . . . *Cont'd.*	Hemiteles fulvipes Gr. (Fitch, Ent. xiv, 139) "probably hyperparasitic." Mesochorus sylvarum Hal. (Fitch, Ent. xiv, 141, undoubtedly hyperpar. on the Apanteles). Amblyteles armatorius Först. Bignell's list.	Trichogramma minutissimum Pack. (Pack. Ichn. Pars.)
Vanessa antiopa	Hoplismenus terrificus Wsm. (G. et L. 399). Pteromalus puparum Linn. (Kirch. 174). Ichneumon fossorius Grv. (Kalt. 72).	Hoplismenus morulus (Say.) (Howard, Scud. But.) Pteromalus puparum L. (Ashm. MS. list.) Derostenus antiopæ (Pack.) (Pack. Ichn. Pars.) Pteromalus vanessæ Harr. (Harr. Cat. Ins. Mass.)
Heterocera.		
Attacus cynthia	. . . .	Spilochalcis mariæ (Riley). (Howard, Bull. 5. D. E.)
Attacus cecropia . . .	Ophion undulatus Gr. (Brdg. Ent. xvii, 180). Henicospilus merdarius Gr. (Brdg. Ent. xvii, 180).	Ophion macrurum L. (Riley, iv, Ins. Mo.) Cryptus extrematis Cress. (Riley, iv, Ins. Mo.) Spilochalcis mariæ (Riley). (Riley, iv, Ins. Mo.)
Orgyia antiqua	Pimpla stercorator Gr. (Kirch. 106). Limneria obscurella Holmgr. (Fitch, Ent. xiv, 140). Campoplex carbonarius Rtz. (Kalt. 158). Campoplex unicinctus Grv. (Kalt. 158). Apanteles solitarius Rtz. (Fitch, Ent. xiv. 142). Telenomus dalmani Ratz. (Mayr. Schl. Gat. Tel. 709).	

LEPIDOPTERA—*Heterocera.*—Continued.

Host.	European Parasites.	American Parasites.
Plusia brassicæ	. . . .	Limneria obscura Cress. (Ashm. MS. list.) Apanteles congregatus Say. (Riley, Rept. Ent. 1883, 121.) Copidosoma truncatellum (Dalm.) (Riley, ibid.) Trichogramma pretiosa Riley. (Ashm. MS. list.)
Leucania unipuncta. .	. . . .	Ichneumon leucaniæ Fitch. = suturalis Cress. (Riley, ii, Ins. Mo. 53.) Ichneumon flavizonatus Cress. (Riley, iii, U. S. E. C., 128). Ophion purgatus Say. (Riley, ii, Ins. Mo. 53.) Mesochorus vitreus Walsh. (Riley, ii, Ins. Mo. 52.) (Hyperparasitic.) Pezomachus minimus Walsh. (Riley, ii, Ins. Mo. 52.) Apanteles congregatus Say. (Riley, iii, U. S. E. C. 127.) Microplitis sp. (Riley, iii, U. S. E C. 127.)
Heliothis armigera . .	. . . .	Trichogramma pretiosa Riley. (Riley, iv, U. S. E. C. 377.)
Abraxas grossulariæ .	Ichneumon albosignatus Gr. (Kirch. 39). Ichneumon brischkei Rtz. (Kirch. 39). Ichneumon bilineatus Gr. (Snellen, Pin. 32). Ichneumon trilineatus Gmél. (Fitch, Ent. xiii, xiv, 138). Ichneumon scutellator Gr. Kawall, '55, 230.	

LEPIDOPTERA—*Heterocera.*—Continued.

Host.	European Parasites.	American Parasites.
Abraxas grossulariæ. *Cont'd.*	Pimpla examinator Fabr. (Kirch. 105). Pimpla rufata Gr. (Kirch. 106). Casinaria vidua Gr. (Fitch, Ent. xiv, 140). Campoplex orbitalis Gr. (Fitch, Ent. xix, 140). Campoplex tricolor Hart. (Kirch. 92). Mesochorus sp. (Fitch, Ent. xiv, 141). Mesochorus sericans Curt.? (Fitch, Ent. xiv, 141). Microgaster reconditus Nees. (G. et L. 413). Apanteles sp. (Fitch, Ent. xiii).	
Platyhypena scabra	. . . .	Euplectrus platyhypenæ How. (Howard, Bull. 5, E D.)
Carpocapsa pomonella	Phygadeuon brevis Gr. (Kirch. 58). Campoplex pomorum Rtz. (Kirch. 91). Pristomerus vulnerator. Panz. (Kalt. 193).	Pimpla annulipes Br. (Riley, v, Ins. Mo. 49.) Macrocentrus delicatus Cress. (Riley, v, Ins. Mo. 50.)
Gelechia cerealella	Unnamed parasite mentioned by Reaumur (Curt. F. I).	Pteromalus gelechiæ Webster. (Webster, Rept. Ent. Ills.)
Tinea granella	Chremylus rubiginosus N. S. (Fitch, Ent. xiv, 141).	
Laverna sarcitella	Bracon variegator Spin. (Curt. F. I. 370).	
Plutella cruciferarum	Campoplex majalis Grv. (Kalt. 24).	Limneria annulipes Cress. (Riley, Rept. Ent. '83, 130.) Limneria obscura Cress. (Ashm. MS. list.)

HYMENOPTERA.

Vespa germanica	Mesoleius vesparum Ratz. (G. et L. 407).	
Vespa vulgaris	Mesoleius vesparum Ratz. (G. et L. 407).	

HYMENOPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Formica rufa	Pezomachus vulpinus Gr. (Kirch. 63).	
	Elasmosoma berolinense Ruthe. (G. et L. 415).	
Limneria vulgaris, (ex Gonepteryx rhamni)	Mesochorus gracilentus Brischke. (Fitch, Ent. xvi, 67).	
Apanteles glomeratus .	Hemiteles fulvipes Gr. (Brdg. Ent. xvi, 107)	
	Hemiteles imbecillus Gr. (Brdg. Ent. xvi, 106).	
	Pteromalus microgastri Bouché. (Curt. F. I. 98).	
Trionyx rapæ	Asaphes vulgaris Walk. (Curt. F. I. 74).	
	Ceraphron carpenteri Curt. (Curt. F. I. 74).	
	Coruna clavata Curt. (Curt. F. I. 75).	
Diastrophus rubi . . .	Eupelmus annulicornis Gir. (G. et L. 420).	
	Eurytoma diastrophi Gir. (G. et L. 425).	
	Decatoma quercicola Först. (G. et L. 425).	
	Callimome rubi Schrank. (G. et L. 425).	
	Callimome cynipoides Gir. (Mayr, Eur. Tor. 58).	
	Torymus macropterus Walk. (Mayr, Eur. Tor. 58).	
Rhodites rosæ	Porizon harpurus Schrank. (Kirch. 98).	
	Orthopelma luteolator Gr. (hyper?) (Kirch. 68).	
	Microgaster ensiformis Rtz. (Kirch. 120).	
	Eupelmus degeeri Dalm. (G. et L. 420).	
	Eupelmus bedeguaris Rtz. (G. et L. 420).	
	Glyphomerus stigma Fabr. (Kirch. 154).	
	Oligosthenus stigma Fabr. (G. et L. 423).	Oligosthenus stigma Fabr. (Ashm. MS.)
	Torymus bedeguaris L. (Mayr, Eur. Tor. 57).	Torymus bedeguaris L. (Ashm. MS.)

HYMENOPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Rhodites rosæ . . . . . *Cont'd.*	Torymus dresdensis Rtz. (Kirch. 152). Torymus försteri Rtz. (Kirch. 152). Torymus metallicus Rtz. (Kirch. 152). Torymus macropterus Walk. (Mayr, Eur. Tor. 57). Torymus ater Nees, longicaudis, Rtz. and purpurascens Fb. (Kalt. 223). Callimome rosarum Gir. (G. et L. 425). Eurytoma pubicornis Möller in Entom. Tidskr. Eurytoma rosæ Nees. (G. et L. 426). Eurytoma abrotani, Rtz. E. æthiops Rtz. (Kalt. 223). Pteromalus complanatus Rtz. (Kirch. 169). Pteromalus eminens Först. (G. et L. 428). Pteromalus fuscipalpis Först. (G. et L. 429). Pteromalus inflexus Först. (G. et L. 429). Pteromalus pilosus Rtz. (G. et L. 430). Pteromalus varius K. (Kalt. 223). Tetrastichus longicaudatus Först. (Kirch. 187). Tetrastichus obtusatus Gir. (G. et L. 433).	
Nematus erichsonii . .	Pteromalus klugi Rtz. (Kirch. 171).	Pteromalus nematicidus Pack. (Rept. Ent. 1883, 146.)
Nematus grossulariæ .	Cleptes nitidula Fabr. (Kirch. 206). Tryphon grossulariæ Hart. (Kirch. 76).	
Nematus ventricosus .	Perilissus limitaris Gr. (Snellen, Pin. 92).	Hemiteles nemativorus Walsh. (Riley, ix, Ins. Mo. 17.)

HYMENOPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Nematus ventricosus . *Cont'd.*	. . . .	Trichogramma pretiosa Riley. (Lintner, ii, N. Y. 220.) Brachypterus micropterus Say. (Riley, ix, Ins. Mo. 17.)

COLEOPTERA.

Host.	European Parasites.	American Parasites.
Hylotrupes bajulus . .	Cryptus minator Gr. (Kirch. 55).	
Anthrenus sp.	Hemiteles areator Panz. (Brdg. Ent. xvi, 108).	
Coccinella 9-notata . .	Homalotylus flaminius Dalm. (Kirch. 147).	
Galeruca xanthomelæna.	Homalotylus flaminius Dalm. (Mayr. Eur. Enc., 681).	
Crioceris 12-punctata .	Porizon microcephalus Gr. (Kirch. 98).	
Gastrophysa raphani .	Pteromalus mandibularis Först. (Kirch. 172).	
Cryptorhynchus lapathi.	Ichneumon hassicus Rtz. (Kirch. 42).	
	Pimpla cicatricosa Rtz. (Rtz. W. S.)	
	Ephialtes tuberculatus Fourc. (Kirch. 108).	Ephialtes irritator Fabr. (Jülich, Ent. Am. Oct.'87.)
	Limneria ruficeps Holm. (Kirch. 95).	
	Rogas marginata Nees. (Ratz., W. S.)	
	Rogas sp. (Rtz., W. S.)	
	Bracon immutator Mes. (Kirch. 111).	
	Diapria melanocorypha Rtz. (Kirch. 404).	
Gymnetron teter . . .	Pimpla gymnetri Rtz. (Kirch. 105).	
Calandra oryzæ	Meraporus graminicola (Walk. ?) (Curt. F. I. 323).	Pteromalus calandræ How. (Howard, Rept. Ent. 1880.)
Bruchus granarius . .	Chremylus rubiginosus Mes. (Curt. F. I. 365).	
	Sigalphus pallipes Nees. (Curt. F. I. 364).	
Bruchus rufimanus . .	Sigalphus thoracicus Curt. (Curt. F. I. 365).	

COLEOPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Scolytus rugulosus	Eucoila minuta Gir. (G. et L. 416). Bracon eccoptogastri Rtz. (Kirch. 111). Bracon minutissimus Rtz. (Kirch. 111). Euspathius brevicaudis Rtz. (Kirch. 113). Brachistes longicaudis Rtz. (Kirch. 113). Doryctes pomarius Reinh. (Kirch. 115). Eurytoma eccoptogastri Rtz. (Rtz. W. S.) Elachistus leucogramma Rtz. (Rtz. W. S).	
	Pteromalus bimaculatus Spin. (Rtz. W. S.) Storthygocerus subulifer Ratz. (Rtz. W. S.)	Cheiropachys colon Linn. (Div. Ent. Notes.) Raphitelus maculatus Walk. (Div. Ent. Notes.)
	Diapria nigra Mes. (G. et L. 434). Teleas punctatus Gir. (G. et L. 434).	

HEMIPTERA.

Anasa tristis	. . . .	Telenomus anasæ Ashm. (Ashm. MS. list.) Encyrtus anasæ Ashm. (Ashm. MS. list.) Eupelmus reduvii Howard. (Ashm MS. list.)
Zelus longipes	. . . .	Eupelmus zeli Ashm. (Ashm. MS. list.)
Siphonophora avenæ	Ephedrus plagiator Nees. (Curt. F. I. 292). Aphidius avenæ Hal. (Curt. F. I. 291).	Aphidius sp. (Unpub. notes, Div. Ent.)
Aphis brassicæ	Allotria fulviceps Curt. (Curt. F. I. 75) Allotria quercus-infernus Curt. (Curt. F. I. 75).	Allotria brassicæ Ashm. (Ashm. MS. list.)
	Trionyx rapæ Curt. (Curt. F. I. 73).	Trioxys rapæ (Curt.) (Riley, Rept. Ent. 1884.)

HEMIPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Aphis brassicæ . . . . *Cont'd.*	. . . .	Pachyneuron aphidivora Ashm. (Ashm. MS. list.) Encyrtus aphidiphagus Ashm.
Aphis pini	Allotria circumscriptus Htg. (Kirch. 30).	
Aphis rumicis (viciæ).	Allotria erythrocephalus Hart. (Kirch. 31). Allotria heterocerus Hart. (Kirch. 31). Allotria melanogaster Hart. (Kirch. 31). Agonioneurus varipes Först. (Kirch. 143).	
Aphis rumicis (chenopodii).	Allotria testaceus Hart. (Kirch. 31). Agonioneurus tibialis (Nees). (Kirch 143).	
Aphis rumicis (aparines).	Allotria posticus Hart. (Kirch. 31).	
Aphis rumicis (papaveris).	Agonioneurus flavicornis Först. (Kirch. 143). Lygocerus rosarum Först. (Kirch. 193).	
Aphis ribis	Allotria circumscriptus Hart. (Kirch. 30). Trichosteresis clandestinus Nees. (Kirch. 193).	
Schizoneura lanigera .	. . . .	Aphelinus mali (Hald.) (Howard, Bull. 5, Ent. Div.)
Mytilaspis pomorum .	. . . .	Aphelinus mytilaspidis Le B. (Riley, v, Ins. Mo. 88.) Anaphes gracilis Howard. (Howard, Rept. Ent. 1879, 370).
Mytilaspis citricola . .	. . . .	Aphycus flavus Howard. (ibid, 365.) Signiphora flavopalliata Ashm. (Ashm. MS. list.)
Mytilaspis gloverii . .	. . . .	Limacis aspidioticola Ashm. (Ashm. MS. list.)
Diaspis rosæ	. . . .	Aphycus brunneus Howard. (Howard, Bull. 5, Ent. Div).

HEMIPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Diaspis rosæ . . . . . *Cont'd.*	. . . .	Aphelinus diaspidis Howard. (Howard, Rept. Ent. 1879, 355).
Diaspis carueli	. . . .	Aphelinus mytilaspidis Le B. (ibid, 354.)
Lecanium oleæ	. . . .	Dilophogaster californica Howard. (ibid, 368.)
Lecanium hesperidum.	. . . .	Comys bicolor Howard. (ibid, 362.) Encyrtus flavus Howard. (ibid, 367.) Coccophagus lecanii (Fitch). (ibid, 358.) Coccophagus cognatus Howard. (ibid, 359.) Coccophagus vividus Howard. (Howard, Bull. 5, Ent. Div). Coccophagus flavoscutellum Ashm. (Ashm. MS. list.) Trichogramma flavum Ashm. (Ashm. MS. list.)
Lecanium persicæ . . .	. . . .	Coccophagus fraternus Howard. (Howard, Rept. Ent. 1879, 359). Astichus (?) minutus Howard. (ibid, 370.)
Dactylopius citri . . .	. . . .	Encyrtus inquisitor Howard. (ibid, 367.) Chiloneurus dactylopii Howard. (Howard, Bull. 5, Ent. Div). Leptomastix dactylopii Howard. (ibid.) Comys albicoxa Ashm. (Ashm. MS. list.)
Pseudococcus aceris . .	. . . .	Rhopus coccois (E. A. Smith). (Howard, Rept. Ent. 1879, 362.)

DIPTERA.

Cecidomyia destructor.	Merisus destructor (Say) (Riley unpub. MS.)	Merisus destructor (Say). (Riley, H. F. Pars.)

DIPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Cecidomyia destructor *Cont'd.*	Merisus intermedius Lind. (Lind. H. F. Pars.)	Merisus subapterus Riley. (Riley, H. F. Pars.)
	Eupelmus De Geeri Dalm. (Lind. H. F. Pars.)	Eupelmus allynii (French). (Riley, H. F. Pars.)
	Chrysocharis nigripes (Lind.) (Lind. H. F. Pars.)	
	Tetrastichus sp. Lind. (Lind. H. F. Pars.)	Tetrastichus productus Riley. (Riley, H. F. Pars.)
	Platygaster Rileyi Lind. (Lind. H. F. Pars.)	Platygaster herrickii Pack. (Riley, H. F. Pars.)
Diplosis tritici	Macroglenes penetrans Westw. (Curt. F. I. 283).	
	Isostasius punctiger Nees. (Kirch. 198).	
	Platygaster tipulæ Kirby. (Curt. F. I. 280).	
	Platygaster inserens Kirby. (Curt. F. I. 281).	
	Platygaster scutellaris Nees. (Kirch. 200).	
Anthomyia ceparum .	Bothriothorax altensteini (Rtz.) (Kirch. 145).	
	Bothriothorax clavicornis (Dalm.) (Mayr, Eur. Enc. 682).	
Anthomyia radicum. .	Alysia manducator Pz. (Curt. F. I. 143).	
	Alysia ruficeps Nees. (Snellen, Pin. 24).	
	Pteromalus papaveris Först. (G. et. L. 429).	
Hydrobæa dentipes . .	Alysia manducator Pz. (Snellen, Pin. 24).	
Catabomba pinastri . .	Bassus lætatorius Fabr. (Snellen, Pin. 3).	
Syrphus ribesii	Chrysolampus syrphi Rtz. (Kirch. 160).	
Musca domestica . . .	Eucoila emarginata Hart. (Kirch. 34).	
	Figites striolatus Hart. (G. et. L. 416).	
	Spalangia nigra Latr. (G. et. L. 422).	

DIPTERA—*Continued.*

Host.	European Parasites.	American Parasites.
Musca domestica . . . *Cont'd.*	Spilogaster striolatus (= Figites?) (Kirch. 34).	
Cyrtoneura stabulans .	Alysia manducator Pz. (Snellen, Pin. 24).	
Lucilia cæsar	Alysia manducator Latr. (G. et. L. 415).	
Piophila casei	Alysia ruficeps Nees. (Snellen, Pin. 24).	
Eristalis tenax	Eucoila codrinus Hart. (Kirch. 34).	
	Diapria conica Nus. (Kirch. 204).	
Mycetophila punctata.	Proctotrupes ligatus Nees. (Kirch. 194).	
Drosophila flava . . .	Ceraphon niger Curt. (Curt. F. I. 85).	
	Miscogaster cinctipes Walk. (Curt. F. I. 85).	

ORTHOPTERA.

Host.	European Parasites.	American Parasites.
Blatta orientalis	Entedon hagenowi Rtz. (Kirch 185).	
	Evania laevigata (many authors).	Evania laevigata (many authors).

NEUROPTERA.

Host.	European Parasites.	American Parasites.
Chrysopa perla	Porizon perlæ Gir. (G. et L. 403).	Telenomus sp. (in eggs). (Howard unpublished MS.)
	Microgaster sp. (Brdg. Ent. xvi, 107).	
	Hemiteles æstivalis Gr. (Brdg. Ent. xvi, 107). [Hyperparasitic! Primary parasite of the Microgaster].	

ARANEIDÆ.

Host.	European Parasites.	American Parasites.
Epeira diademata . . .	Pimpla oculatoria Gr. (G. et L. 409).	
	Polysphincta carbonator.	
	" rufipes.	

ARANEIDÆ—*Continued.*

Host.	European Parasites.	American Parasites.
Epeira diademata . . . *Cont'd.*	Polysphincta boops. (Fitch, Ent. xv.)	
	Hemiteles similis Gr. (Brdg. Int. xvi, 106).	
	Hemiteles tristator Gr. (ibid, 107).	
Agelena brunnea . . .	Pezomachus corruptor Först. (G. et L. 402).	
	Pezomachus fasciatus Gr. (Kirch. 61).	
	Pezomachus proximus Först. (G. et L. 302).	
	Pezomachus zonatus Först. (G. et L. 403).	
	Hemiteles aranearum Gir. (G. et L. 401).	
	Hemiteles formosus Desv. (Brdg. Ent. xvi, 107).	
	Hemiteles tenerinus Gr. (Brdg. Ent. xvi, 108).	

EXPLANATION OF ABBREVIATIONS USED.

European Authors.

Bignell.—G. C. Bignell in "The Larvæ of the British Butterflies and Moths," by (the late) William Buckler, edited by H. T. Stainton. London, Ray Society, 1886.

Brdg. Ent.—J. B. Bridgman in The Entomologist, London. (Vol. and page indicated in each case).

Curt. F. I.—John Curtis, Farm Insects, etc., London, 1860.

Fitch Ent.—E. A. Fitch in The Entomologist, London. (Vol. and page indicated in each case).

G. et L.—J. E. Giraud and A. Laboulbène, "Liste des Eclosions d'Insectes," etc., Annales de la Société Entomologique de France, 1887, 5th series, vol. vii.

Kalt.—J. H. Kaltenbach, "Die Pflanzenfeinde aus der Klasse der Insekten," Stuttgart, 1874.

Kirch.—Leopold Kirchner, "Catalogus Hymenopterorum Europæ." Vindob., 1867.

Lind. H. F. Pars.—K. Lindemann, "Die Pteromalinen der Hessenfliege," Moscow, 1887.

Mayr, Eur. Enc.—Gustav Mayr, "Die Europæischen Encyrtiden," Verhandl. d. k.-k. Zool.-Bot. Ges. Wien, 1875.

Mayr, Schl. Gat. Tel.—Gustav Mayr, "Die Schlupfwespengattung Telenomus," Verh. d. k.-k. Zool.-Bot. Ges. Wien, 1879.

Möller, Ent. Tidskr.—G. Fr. Möller, "Bidrag till kännedomen om parasitilifvet i galläpplen och dylika bildninger," Entom. Tidskr., 1882. Translated, with some change, by B. P. Mann, in Psyche, vol. 4, No. 113–114, Sept.-Oct., 1883.

Ratz. W. S.—J. T. C. Ratzeburg, Wirths system in "Die Ichneumonen der Forstinsekten" etc., Berlin, vol. iii, 1852.

Snellen, Pin.—G. C. Snellen van Vollenhoven, "Pinacographia" etc. S'Gravenhage, 1880.

American Authors.

Ashm. MS. list.—W. H. Ashmead, a manuscript list of observations made in Florida.

Div. Ent. Notes.—Notes made in the Division of Entomology, U. S. Department of Agriculture.

Harr. Cat. Ins. Mass.—T. W. Harris, Catalogue of the Insects of Massachusetts, Amherst, 1835.

Howard, Rept. Ent. 1880.—L. O. Howard in Report of the Entomologist, Annual Report U. S. Department of Agriculture for 1880.

Howard, Bull. 5, D. E.—L. O. Howard in Bulletin No. 5, Division of Entomology, U. S. Department of Agriculture, Washington, 1885.

Howard Scudd. But.—L. O. Howard in "The Butterflies of the Eastern United States and Canada" by S. H. Scudder, Cambridge, 1888, and subs.

Jülich Ent. Am.—Wm. Jülich in Entomologica Americana, October, 1887.

Lintner, N. Y.—J. A. Lintner in Second Report State Entomologist of N. Y., Albany, 1885.

Packard, Ichn. Pars.—A. S. Packard, "On the Ichneumon Parasites of some New England Butterflies," Proc. Bost. Soc. Nat. Hist. 1880.

Rept. Ent. 1883.—Report of the Entomologist, Annual Report Department of Agriculture for 1883.

Riley, Ins. Mo.—C. V. Riley, Reports on the Insects of Missouri, i–ix, Jefferson City, 1868–1876.

Riley, iii, U. S. E. C.—C. V. Riley in Third Report, U. S. Entomological Commission, Washington, 1883.

Riley, iv, U. S. E. C.—C. V. Riley in Fourth Report, U. S. Entomological Commission, Washington, 1885.

Riley, Rept. Ent. 1883.—C. V. Riley, Report of the Entomologist, Annual Report U. S. Department of Agriculture, for 1883.

Riley, Rept. Ent. 1884.—C. V. Riley, Report of the Entomologist, Annual Report U. S. Department of Agriculture, for 1884.

Riley, H. F. Pars.—C. V. Riley, "On the Parasites of the Hessian Fly," Proceedings of U S. National Museum, Sept., 1885.

Scudd., Am. Nat.—S. H. Scudder in American Naturalist, vol. x.

Webster Rept. Ent. Ills.—F. M. Webster in Twelfth Report State Entomologist of Illinois, Springfield, 1883.

Remarks on the address were made by Dr. Riley, Mr. Schwarz, and Mr. Smith. The unanimous thanks of the Society were then tendered Mr. Howard for his excellent paper.

FEBRUARY 2, 1888.

Seven persons present. President Schwarz in the chair.

Mr. R. Godeffroy was elected a member of the Society.

Dr. Fox read a paper "On Certain Genera of the *Lycosidæ*," discussing more particularly the genera *Dolomedes* and *Ocyale*. Attention was called to the conflicting descriptions of the genera as given by the standard authors, and particularly to the fact that no mention is made by any of them of the relative heighth of the cephalic portion of the cephalothorax. A comparative table was given showing in what respects the authors differed and in what they agreed in their generic descriptions or characters used.

Mr. Smith mentioned that, while there was but a single named *Dolomedes* in the Museum collection, there were probably some species in the lot collected for the National Museum by Prof. Underwood last summer. That Prof. Underwood's intention was, if possible, to cover the old Hentz collecting grounds in Georgia and Alabama, and to get material to identify the Hentz species—with what success remains to be seen.

In response to a question by Mr. Schwarz, Dr. Fox gave the geographical distribution of the genus, and of some species, showing a very extended range. This subject was briefly discussed by Messrs. Schwarz, Howard, and Fox.

Mr. Howard asked whether, where a European genus was there well marked and constant, the definition should be enlarged to include American forms which showed some one particular character not present in the European species.

Mr. Schwarz replied affirmatively, and cited the differences in the genus *Pterostichus* as an example of what had been done in Coleoptera. Mr. Smith cited the Noctuid genus *Perigrapha*, the European species of which have pectinated antennæ in the female, while in the American forms the antennæ are simple; the genus, however, being the same in other respects, the American forms were included under the same generic term. Mr. Howard said this agreed with his ideas on the subject.

Mr. Heidemann made the following—

Remarks on the Hemiptera collected by Mr. Schwarz in Dade Co., Florida.

By O. Heidemann.

The material collected by Mr. Schwarz is now in the hands of Prof. Uhler, in Baltimore, who has promised to determine it and to make a list of the species.

I recently spent an afternoon in looking over Prof. Uhler's large collections, and also obtained from him considerable information about these interesting insects. There appear to be about 95 species altogether, every one of which belongs to the fauna of Cuba, San Domingo, or some other part of the West Indies. All but four or five obscure little *Aradidæ* and *Capsidæ* and a few *Pentatomidæ* are well known and described.

Among the *Pentatomidæ* were *Euschistus variolaris* Pal. Beauv., and a *Nezara*, which I made out to be Say's *Pentatoma abrupta*, now ranked as a synonym of *Nezara pennsylvanica* De Geer. Prof. Uhler said that the insect was a typical specimen of *N. pennsylvanica*. *N. hilaris*, which is quite common in the vicinity of Washington, differs in having the hind angles of the pronotum triangular instead of rounded.

It would be interesting to know more certainly the geographical distribution of these species—how far they may extend beyond southern Florida.

As soon as I receive a list of the species I hope to be able to give more and better information concerning them.

Mr. Smith, referring to the character of this fauna, stated that among the Lepidoptera, so far as they had been studied, the West Indian fauna predominates, and in his opinion they really belong to this fauna, and not to that of temperate North America. He would not add them to our catalogues for that reason.

Mr. Schwarz said that this fauna extends much further north than is generally supposed. He finds considerable difficulty in determining the species, but gradually, as he succeeds in working them up, he finds that they all belong to the West Indian or Central American fauna.

Mr. Howard mentioned that among the specimens brought home by Mr. Schwarz are some short-winged chinch bugs, peculiar in having quite sharply-pointed elytra. He has seen the same form from other localities, always from the sea-shore, and he believes that it is a sea-coast form.

Mr. Schwarz read the following paper:

On Xyleborus Pyri and an Undescribed Allied Species.

By E. A. Schwarz.

The galleries made by Scolytid beetles are divided into such as are more or less between the bark and the outermost layers of wood, and such as enter the solid wood. Those of the former class are readily investigated and described, and the burrows of quite a number of our native species have been made known, although only a small proportion have been illustrated by figures. The Scolytids of the second class that bore into the solid wood are much less numerous, and their galleries much more difficult to investigate. To fully illustrate their work two figures are necessary, viz., a transverse section of the branch or trunk containing the galleries, and a longitudinal section through the burrows. Only very few of these species have hitherto been described by American authors, *e. g.*, *Gnathotrichus materiarius* and *Monarthrum mali*, by Dr. A. Fitch; *Corthylus punctatissimus*, by Dr. C. H. Merriam, while two or three other species have been briefly referred to. The most frequently mentioned example of this class is the Pear-blight beetle, *Xyleborus pyri*, of which W. D. Peck published an account as early as 1817 (*Mass. Agric. Jour.*, iv, no. iii, pp. 205–207). His account is quoted, in abstract, by Dr. Harris (Treat. Ins. Inj. to Vegt., Flint ed., p. 91), and has been faithfully copied by every subsequent writer whenever there was an opportunity to refer to the Pear-blight beetle. In view of the knowledge we now possess of the life-history of Scolytids, through the investigations of Ratzeburg, Perris, Altum, Eichhoff, and others, it seems strange that no one has ever pointed out the errors in Peck's account. He starts with the statement that the female beetle deposits the egg in the bark, a statement which is erroneous, since all Scolytids, without exception, oviposit within their galleries. Then he proceeds to describe the gallery as consisting of a somewhat winding passage leading through the bark into the wood, and turning around the core of the twig concentric with the bark. This description is imperfect, and shows that Peck made only a transverse section of the twig. Had he made a longitudinal section he would have noticed that this long gallery is intersected vertically by a number of shorter galleries. That these vertical galleries exist is evident from remarks by Dr. Harris, which he adds, without further comment, to his quotation of Peck's account.

The galleries of *Xyleborus pyri* when completed must be very similar to or identical with those of the allied European *X. dispar* as figured by Eichhoff (Europ. Borkenk., p. 280), and I have myself on a former occasion expressed the belief that these two species are specifically identical; in other words, that our pear-blight beetle would prove to be an old importation from the Old World. The burrows of all Scolytids which enter the solid wood are constructed after the same principle, at least so far as known to us. Only a single species is known to form a notable exception, viz., the European *X. Saxeseni*, which, without making any galleries whatever, hollows out a large chamber, wherein the eggs are deposited and the larvæ mature. Another very similar exception I was fortunate to discover last year in southern Florida. While in Key West I found about the middle of April on the cocoa plum (*Chrysobalanus icaco*) a single specimen of an undescribed *Xyleborus* belonging to the *pyri* group. Two weeks later, while staying at Cocoanut Grove, Biscayne Bay, I found on the same tree another much smaller and otherwise quite distinct specimen in which I recognized the male of the species found at Key West. I began now a careful investigation of the dead branch (from a tree cut down some weeks previously) upon which the specimen was found, and which was about 12 mm. in diameter. Holes of the requisite size and leading straight into the wood I found plenty, but they were either empty or occupied by a specimen of the polyphagous *Hypothenemus eruditus*, which seems to construct these holes only for feeding purposes, as I never found any egg chamber or larvæ. Finally I found an entrance-hole which for nearly two millimetres went straight into the wood, then there came a short elbow downward, and then it was rather suddenly enlarged into a capacious chamber of irregular oval shape, which reached to within the core of the branch. In this chamber there was one pair of the *Xyleborus*, and on its lower innermost corner another smaller chamber opened of more elongate shape, and being entirely within the core. This smaller chamber proved to be the "nursery," as on its bottom I found a number of eggs laid in a heap and some recently hatched larvæ. I hope to describe the species at a future opportunity and propose to name it after its food plant.

MARCH 1, 1888.

Thirteen persons present. President Schwarz in the chair.

The chairman of the Publication Committee presented a copy of the Proceedings, No. 2.

Prof. Riley presented a paper entitled "A Contribution to the Literature of Fatal Spider Bites."* He mentioned the common impression that such cases are of frequent occurrence, on the one hand, and the disbelief, as common among Arachnologists, on the other, and then gave details of a case that had recently come to his attention from Greensboro, N. C., where a specimen of *Latrodectus mactans* caused the death of a farm hand. He concluded with a review of the literature of the subject.

Mr. Lugger mentioned a case of poisoning by a spider which happened some four years since in his own family. In very early spring, before vegetation had become very active, his little

* See Insect Life i, pp. 204–211, 1888.

daughter was amusing herself by spinning the wheel of an old toy wheelbarrow which had been lying about since the preceding fall. Suddenly she cried out in great pain that a spider had bitten her. Soon afterward she fainted and was convulsed with pain. The spider, which was caught and proved to be *Phydippus tripunctatus L.*, had bitten one of her fingers, which showed very plainly two little holes close together. The space in the immediate vicinity was white, but a bright red color surrounded it and gradually extended over the entire arm. The bitten spot was frequently washed with diluted liquid ammonia. After passing through a number of convulsions with intense symptoms of fever, headache, swollen eyes, and great pain in the pit of the bitten arm, the girl gradually grew better, and after about three days all inflammation had disappeared.

Dr. Marx commented on the case, and the importance of thoroughly investigating all the circumstances, before deciding that death really occurred from the spider's bite. It has been contended that it was almost impossible for *Latrodectus* to kill; the mandibles are so minute and soft that, even if they could pierce, it would seem as if they could hold scarcely venom enough to do any harm. He hoped, with Dr. Fox, to carry on some experiments on this point. He would not be too hasty in applying ammonia as an antidote, since it was really not settled whether the venom was an acid or an alkali.

Mr. Lugger said it turned blue litmus paper red. Continuing, Dr. Marx said that in homœopathy some spiders were used medicinally. He described the habits of a *Latrodectus mactans* kept by him in captivity, describing the method of enveloping its victim in a viscid fluid which rapidly hardens into a gauzy texture. This he had removed on one occasion, and swallowed, with the effect of increasing the pulse from 72 to 120; a second experiment produced the same results.

Mr. Lugger said that he had been bitten by *Lycosa* on several occasions without unpleasant results. He had taken many *Latrodectus mactans*, but had never been bitten.

Mr. Schwarz, commenting on the case described by Prof. Riley, does not consider it conclusive by any means. No one had seen the spider which bit the man, and the specimen sent was supposed to be like that which bit another man.

Mr. Dodge said that Dr. Palmer was bitten on one occasion on the hand, and three months after, when he saw it, the hand was very much puffed up and inflamed, and in a very ugly condition, though Dr. Palmer said it was then very much better, and was healing.

Mr. Schwarz suggested permanganate of potash as a remedy.

Judge Johnson said that he had once upon a time investigated a number of spider-bite cases, but without ever getting any positive proof, so he had never published the result.

Dr. Marx said that he had investigated one case of a supposed death from spider bite in Washington, D. C., which resulted in showing that the victim had gone to sleep at night and had awakened in the morning with a pustule on the neck, which rapidly inflamed and enlarged, and eventually caused death. No one had seen any spider, and the assumption that there had been one was utterly unfounded, yet the case was published everywhere as an undoubted one.

Dr. Fox thinks there is probably some basis for some of the accounts, and thinks that under some physical conditions the bite might become dangerous.

Mr. C. R. Dodge exhibited impressions from some of Glover's early plates, and gave an account of Glover's experiments in various methods of engraving on stone and metal, and of his manner and system of work.

There was some discussion on the drawings shown, and on the relative value of the various processes in producing good entomological results. In this Messrs. Marx, Schwarz, Smith and Lugger took part.

Mr. Howard presented a note describing an external parasite on a spider found by Dr. Fox about the middle of February.*

Mr. Schwarz said that to him the most interesting point was the season at which this parasite was found. It was so early in the spring that it seemed scarcely likely that it had attained its present development from an egg deposited this season. The inference was that it had hibernated with its host.

There was considerable general discussion on external parasitism, and the possibility of molting in the larva so infested. Mr.

* This paper is published in Insect Life, vol. i, no. 2 (Aug., 1888), pp. 42–43.

Lugger described more fully the way in which the parasite was attached to the spider. Dr. Marx described the ways in which spiders molt, and Dr. Fox detailed the circumstances under which the specimen was found.

Prof. Uhler presented a paper entitled :

Observations upon the Heteroptera collected in Southern Florida by Mr. E. A. Schwarz.

By P. R. Uhler.

Through the kindness of Mr. Otto Heidemann I have been permitted to examine the interesting collection of Hemiptera made in the extreme southern part of Florida by that ardent student and acute collector of Coleoptera, Mr. E. A. Schwarz.

This collection throws much additional light upon the insect fauna of that peculiar portion of our southern territory, and enables us to perceive with greater distinctness the West Indian and Neotropical characteristics of that country. South of Indian River, more particularly, the types of this fauna appear, and upon the border land most influenced by heat and moisture they form a decidedly distinct feature of the insect assemblage. Genera such as *Diolcus*, *Loxa*, *Vulsirea*, *Edessa*, *Spartocera*, *Catorhintha*, *Hyalymenus*, *Pthia*, *Jadera*, *Lasiochila*, *Zelus*, and *Mononyx* are here represented by conspicuous examples, and species of other genera which are common in San Domingo, Cuba, Mexico, and Central America are not less numerous in this region.

Certain Nearctic and widely distributed genera, such as *Homæmus*, *Pangæus*, *Euschistus*, *Mormidea*, *Œdancala*, *Ligyrocoris*, *Emblethis*, *Nysius*, *Pygolampis*, *Aradus*, *Aneurus*, *Galgulus*, etc., are also present in the ordinary numbers, and show that the North American continental forms of Hemiptera, although having had the usual struggle with widely varying climatic conditions, have been able to hold their place in spite of competition with the new comers from more southern lands. From the abundance, variety, and instability of the assemblage of species now known to inhabit the region extending from Central America to Southern Colorado, we are induced to believe that the principal part of our United States Hemipterous fauna has been derived from that quarter. Nearly all the genera and species, excepting only the high-mountain and cold weather forms, thus far found in the country between the Great Lakes of Canada and the alluvial belt south of Tennessee occur quite abundantly in Mexico and the adjoining countries.

The time at the disposal of Mr. Schwarz was too short to allow full collections of the species of this region to be secured ; but the 95 species which were taken, together with those brought together by the industry of former collectors, enable a fairly correct estimate to be made of the character and peculiarities of the Hemipterous fauna of the region. A singular absence of *Capsidæ* is to be noticed in this collection, and there are also no specimens of the common *Cyrtomenus*, *Stiretrus*, and other conspicuous forms. Among the *Tingitidæ* is a representative of the South American genus *Acanthochila*, heretofore not discovered in North America, which we consider important enough to describe in this place.

ACANTHOCHILA Stål.

A. exquisita. New sp.—Form similar to that of *Gargaphia;* ovate, the wing-covers transparent throughout, excepting the clavus and adjoining field of the corium; abdomen and pectus black, the former polished, the latter opaque; head rounded, impunctate, set with rows of minute bristles, unarmed; vertex grooved, having a white carina each side at the suture bounding the inner side of the eyes; eyes round, brown; antennæ testaceous, moderately slender, rather longer than the head and thorax combined; clavate, the basal joint very thick, shorter than the head, armed with stout, strong bristles; the second joint almost as thick, bristly, subconical; third, very long, slender, set with slender erect hairs; fourth, fusiform, not as thick as the basal ones, but longer than both conjoined, bristly, with the apical half blackish; bucculæ testaceous or ochreous; rostrum and tylus ochreous, the former extending behind the middle coxæ; thorax either ochreous or blackish, with ochreous lateral network, the surface with remote sunken punctures, and short, sparse setæ; lateral margins slightly expanded into curved lobes, with a series of five quadrangular cells each side, and having the outer edge armed with six or seven long acute spines tipped with black; anterior lobe small, deeply indented, bearing a slender pale carina along the middle, which is less distinctly carried back on the posterior lobe; the posterior lobe dull, trapezoidal, sub-acutely deltoid behind, white at tip; pectoral pieces more or less margined with testaceous; the ante-pectoral flaps remotely granulated; legs testaceous, clothed with slender bristles; scutellum minute, black, covered at base by the truncated tip of the produced pronotum; hemelytra coriaceous throughout, an oval area at base, which includes the clavus; this portion is coarsely sunken—punctate; exterior to this the sagenæ have two, or at most three, series of net-work areoles, which increase in size posteriorly, so that six series of irregular rhomboidal cells form the whole width of the corium behind the middle; the costal margin has a series of about seventeen gradually diminishing spines, extending from the contracted base to beyond the middle; the veins of the surface generally set with minute bristles throughout; length to tip of abdomen $2\frac{1}{4}$, to end of hemelytra $3-3\frac{1}{2}$ millims.; width across the pronotum scarcely 1 millim.

Only four specimens of this interesting insect were present in this collection, three of which were females and the fourth a male. The male is more transparent, and has more clean cut black markings than any of the females.

The specimens were found near Cape Florida in the month of May.

Mr. Schwarz stated that as to the Coleoptera the derivation of the United States fauna is different and the South Floridian is no part of it, as he would show later.

Mr. Smith made some remarks on the characters of the family *Heterogynidæ* and the species recently placed in it by Mr. Edwards. He does not believe it really occurs with us.

APRIL 5, 1888.

Twelve persons present. President Schwarz in the chair.

Mr. Schwarz, from the Publication Committee, reported that by an error in proof-reading the record of the election of Mr. Ashmead, on August 4, 1887, was omitted.

Dr. G. H. Horn made some remarks on the genus *Pleocoma* and its place in the Lamellicorn system.* He exhibited a slide showing the location of the stigmata on the connecting membrane, and proving that Dr. LeConte was correct in his location of the genus. He criticises Gerstaecker's paper, recently translated by Mr. Smith,† and shows that, convincing as it seems, it is based on a positive error of observation. He also believes now that the larva described by Osten-Sacken really belongs to this genus.

Dr. Horn further exhibited a larva of *Platypsyllus* mounted in balsam. This, he stated, was of extreme interest, since it positively proved the coleopterous nature of the insect. The larva is truly coleopterous, with well developed mandibles, which are shed in the imago stage, and this is the only known instance of the loss of the mandibles in a coleopteron. In a paper now in press,‡ he describes and figures the larva, and speaks more at length of its structure.

Prof. Riley said he had been extremely interested in Dr. Horn's last communication, as he had had the larva of *Platypsyllus* on his desk for some eighteen months, intending, as soon as he could get to it, to publish the discovery. They had been collected for him by Mr. Bruner, near West Point, Nebraska, and from the examination made by him upon their receipt he had concluded

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* See Ent. Amer., iii, pp. 233–235; also Trans. Am. Ent. Soc., xv., pp. 1–18.

† Ent. Amer., iii, p, 202.

‡ See Trans. Am. Ent. Soc., xv, pp. 23–26.

them coleopterous beyond a doubt. He had never questioned in his own mind the accuracy of Dr. LeConte's conclusions, but the discovery of the larva definitely confirmed them.

Mr. Lugger asked whether the pupa had been found. Dr. Horn said he had not received it. Prof. Riley was not certain whether or not it was among his material.

Mr. Schwarz read a paper on the semi-tropical insect fauna of Florida, with special reference to the Coleoptera, of which the following is an abstract:*

While the insect fauna of the southwestern extremity of North America has been tolerably well studied, very little has hitherto been known of the insect fauna of southern Florida. That there existed in south Florida a small colony of West Indian forms has long been known, but quite a number of species have also been described as being peculiar to that section. From a study of a collection of Coleoptera made last year in southeastern Florida Mr. Schwarz has come to the conclusion that this section has no peculiar fauna and that the West Indian colony is much richer in species than has hitherto been supposed. Besides this semi-tropical colony southern Florida harbors a large number of widely distributed species, while the true Floridian fauna is but poorly represented. The presence of this West Indian colony is solely due to the influence of the Gulf Stream, which favors the importation of West Indian plants and insects into the southern extremity of Florida, but prevents the extension of the fauna and flora of the North American continent into the West Indies. This immigration of West Indian forms not only takes place from Cuba, the nearest of the West Indian islands, but from all parts of Central America which are brought under the influence of the Gulf stream, namely, all of the islands and the coast of the Central American continent south of the peninsula of Yucatan. To the same agency is due the fact that the West Indian colony in Florida is composed only of such species as, in the imago or preparatory stages, are capable of sustaining the transportation by sea from the West Indies. Hence the total or almost total absence of many families among the West Indian colony, *e. g.*, Carabidæ, rhypophagous Clavicornia, Scarabæidæ, Lampyridæ and Chrysomelidæ, and the predominance of such forms as live under bark or within the wood, *e. g.*, the Rhynchophora, Cerambycidæ, Ptinidæ, etc. All these semi-tropical species have founded a permanent colony in Florida, because their original food plants which form the semi-tropical hammock of southern Florida have also firmly and permanently established themselves on the North American continent. It is evident, therefore, that the extent of this West In-

* Read again before the Entomological Club of the A. A. A. S. at the Cleveland meeting, Aug. 17, 1888, and published in Entom. Amer., iv, pp. 165–175.

dian colony is coincident with that of the semi-tropical forest, and Mr. Schwarz pointed out that in southeastern Florida this forest occupies the chain of the Keys, and small, more or less widely separated spots on the mainland as far north as the head of Biscayne Bay. It is northwardly continued, however, immediately along the shore in island-like, usually very small, spots as far as Cape Malabar. According to the botanists the same conditions prevail on the southwestern coast, where the semi-tropical forest extends—always immediately along the coast—as far north as Tampa Bay. In the interior there is no semi-tropical forest except on the few Keys in the Everglades. This character of the semi-tropical fauna of Florida and its peculiar distribution is in marked contrast with the extension of the semi-tropical fauna into the southwestern extremity of North America.

The immigration of West Indian forms into Florida took place at a quite recent geological period and is, in fact, still going on, but must not be confounded with that immigration from the south which took place at the end of the glacial period and which shaped the character of the present fauna of North America.

Mr. Schwarz finally argued the point whether or not it would be advisable to include these semi-tropical species in the catalogues and monographs of North American insects. An inclusion of the whole Central American fauna is evidently impracticable, but a complete exclusion is also most inconvenient. Mr. Schwarz agrees with Mr. Smith that only those species should be included which are found breeding in our territory; but this would practically include the whole of the semi-tropical Coleopterous fauna occurring in Florida, and it would seem advisable to add still another restriction, viz., to exclude all those forms which in their character strongly contrast with the nearest representatives of the North American fauna and which would occupy a more or less isolated place in our monographs and synopses.

Dr. Horn, commenting on Mr. Schwarz's paper, said he agreed with him in his ideas of the derivation of this fauna. He had been watching it for some time, and had often been in doubt whether the species should or should not be included in our lists. He thinks not, when they introduce confusing material into our fauna, though species in truly temperate genera might easily be included. On the question of distribution he cites the fauna of Guadalupe Island. Here a current runs south from Alaska along the Pacific coast to Point Concepcion, is here deflected, and finally strikes Guadalupe off South California. Along the whole region the fauna is similar, and he believes is largely governed by this current. He also showed why the political boundary between the United States and Mexico was also nearly a natural one for two distinct faunas, and showed how by a series of deserts, mountain chains and wedge-shaped valleys the Coleopterous fauna of the two countries was well separated.

Prof. Riley thinks that Mr. Schwarz omits an important factor in distribution, viz., the wind. He cited a number of species picked up far from land, and evidently carried by the wind. As a curiosity in distribution he cited the case of *Hornia minutipennis*, which he received from Fresno Co., Cal., living with an undescribed species of *Anthophora*.

Dr. Horn has no idea how this species could become so widespread unless it followed the distribution of a particular bee.

Prof. Riley thinks this the remnant of an ancient type, which by reason of its parasitic habits has undergone little or no change.

Mr. Schwarz said this is the only Meloid occurring on both sides of the Continent.

May 3, 1888.

Eleven members present. President Schwarz in the chair.

Mr. Tyler Townsend was elected Corresponding Secretary of the Society, vice Mr. O. Lugger, resigned.

The discussion of Mr. Schwarz's paper was then in order, and the Secretary read the preceding abstract to inform members.

Mr. Mann thinks that Mr. Schwarz's proposed restrictions to the admission of this fauna into our lists good and necessary.

Dr. Fox thinks that the rule as to spiders would be too strict, and suggests that it may be necessary to make special rules for each order.

Mr. Smith gave a review of some portions of the Lepidopterous fauna of this region, which in general is limited much as described by Mr. Schwarz for Coleoptera. A few of the species have spread into Northern Florida, and Southern Georgia. Unfortunately the fauna is not so well known in the Lepidoptera, and many of the species from Florida have no definite locality. As a whole, he agrees thoroughly with Mr. Schwarz in his ideas.

Mr. Schwarz said he omitted from his remarks all reference to those strong flyers whose occasional presence in more remote localities is due to this power. Dr. Merriam had informed him that the sub-tropical avifauna had precisely the same distribution which he had found for Coleoptera.

Judge Johnson stated that the West Indian flora, so far as he had observed it, did not extend far into the interior of Florida, but extends north on the west coast as far as Tampa Bay.

Dr. Marx reviewed the spiders collected by Mr. Schwarz, and finds that of the 26 species collected by him one only is tropical, 7 are common throughout the United States, and 18 are like the usual Southern United States forms. In fact, this collection is peculiar for the large proportion of Northern forms. *Centrurus biaculeatus*, a scorpion found by Mr. Schwarz, is found also in South America and Africa.

Mr. Schwarz said that he estimated the number of semi-tropical Coleoptera in Florida at from 250 to 300 species. He does not believe that the wind has much to do with the distribution, because it is prevailingly east and west at the seasons when the insects might possibly be carried there.

Mr. Smith gave the characters and affinities of the genus *Cydosia*,* which he finds a true *Arctiid*, allied to *Cerathosia*. He also gave some notes on the habits of *Lachnosterna*, as observed by him, and stated that the species are unusually abundant this year.

Dr. Marx showed the figure of an abnormal Scorpion, having only a single joint to the metatarsus; also a figure of a *Lycosa* in which the middle row of eyes has disappeared.

Mr. Howard showed two plates of genitalia drawings from Mr. Scudder's forthcoming work on the Butterflies of New England.

Mr. Smith stated that he had looked over these with great interest; he was well acquainted with the forms of these organs as found in the Macro-Heterocera, but had never carefully examined the Rhopalocera. Some of the figures—none were named—bear a striking resemblance to the form usual in the *Sphingidæ*.

Mr. Howard read some interesting passages out of G. H. Six's translation of Snellen von Vollenhoven.

Mr. Schwarz read the following note:

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* See Proc. U. S. N. Mus., 1889.

On the Types of Tomicus liminaris, Harris.

By E. A. Schwarz.

At our meeting held in December, 1887 (p. 113), I expressed my suspicion that Dr. Harris had probably confounded *Phlœotribus liminaris* and *Hylesinus opaculus* in his description and account of the former species. I came to this conclusion from the fact that Harris mentions Peach and Elm as the food-plants of his species, whereas, in my experience, the species under Elm bark is *Hylesinus opaculus*. I was, of course, unable then to assert positively that Harris had confounded these two species which so closely resemble each other, but, through the kindness of Mr. Samuel Henshaw, I had lately the opportunity to examine Harris' type of *P. liminaris*, and I also received through him a transcript of Harris' notes to the numbers in his cabinet. Harris had three specimens under the name of *Tomicus liminaris*, and his notes thereto read as follows:

"No. 521. Miss Morris finds it in bark of Peach trees, and thinks it the cause of Yellows; imago in August and September.

"No. 821. Mr. Leonard, 2 [February?], 31, Dublin, N. H., No. 307.

"No. 1007. Under bark of Elm, Milton [Mass.]"

Specimen No. 521 is the true *Phlœotribus liminaris;* No. 821 is *Polygraphus rufipennis*. How Dr. Harris came to place this among his *Tomicus liminaris* is more than I can explain. No. 1007 is undoubtedly *Hylesinus opaculus*, and proves that my suspicion was well founded.

It may be of some interest to append here Dr. Harris' notes on the other species of *Scolytidæ* in his collection, a copy of which I owe to Mr. Henshaw:

"*Platypus compositus* Say.—No. 1278. North Carolina, Mr. Hentz, No. 521, March and April.

"*Tomicus pini* Say.—No. 742. October 1, 1823, on White and Pitch Pine under bark; August 5–30, 1832.

"*Xyleborus xylographus* Say.—No. 744. May 30, 1822, and North Carolina, Mr. Hentz, No. 511, September.

"*Xyloterus politus* Say.—No. 1008. Milton, May 1, 1829; Cambridge, May 1, 1833; Ohio, Mr. Ward, No. 361.

"*Hylesinus aculeatus* Say.—No. 1387. Cambridge, August 28, 1832, and Randall; Alabama, February, Hentz. Prof. Haldeman found it in May in bark of *Fraxinus acuminata*."

June 5, 1888.

Nine members present. President Schwarz in the chair.

Prof. Riley read the following paper:

Notes on Pronuba and Yucca Pollination.*

By Prof. C. V. Riley.

Partly because of more pressing duties, partly because of a desire to make some special experiments, but chiefly in the hope that (after the fruiting season of the dehiscent Yuccas was over, and Mr. Hulst had been able to make more careful observations) he would himself gracefully amend his opinions to accord with the facts, I have deferred answering till now the remarks by Mr. Hulst on pp. 236–238 of vol. ii, *Ent. Amer.* The matter is too important to drop, and I have too much regard for my critic personally, and hope for his future entomologically, not to do what little I can to check an unfortunate tendency to hasty work and conclusion, noticeable in this as in some other of his late writings.

Mr. Hulst "confesses the corn" in reference to my first complaint, and is inclined to blame the report for his misrepresentations—an inclination which would have more of my sympathy were he not editor of the paper.

It is, however, far more important, from the scientific side, that he confess to the justness of my second indictment, and it is to this end that I return to the subject.

Mr. Hulst adheres to his belief "that there must be very extensive fertilization of the dehiscent species of Yucca by the agencies of bees and other insects." He does not bring forth a single definite fact or observation of actual pollination to prove or sustain the belief, but rests it on the following grounds:

1st. That Meehan found that the mere application of pollen to the papillose apex of the stigma is sufficient for fertilization.

2d. That he (Hulst) has seen honey-bees within the open as well as the partly open flowers, as also other insects, Aphides and Coccinellidæ being particularly mentioned.

3d. That not one in ten of the capsules subsequently examined by him showed the larva.

4th. That he is informed that dehiscent species of Yucca do ripen seeds in Europe.

Such are the negative arguments upon which he rests his belief in the face of all the *facts* I have put on record. Let us consider the former briefly in their order.

1st. My good friend Meehan has written much on the fertilization of

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* In explanation of the controversial nature of this communication, it becomes necessary to refer to a dispute on this subject between the Rev. G. D. Hulst and myself in the columns of *Entomologica Americana* during the summer of 1887. The communication is a reply to Mr. Hulst's last publication on the subject, and is presented *verbatim et literatim* as written on my way to Europe in August of that year, and as mailed to him from England. Mr. Hulst is editor of the aforesaid journal, and exercised his editorial prerogative in declining to publish the communication. I have, therefore, concluded to present the paper to the Society, since it discusses matters of considerable scientific interest.

Yucca—much, too, that has not shown the keenest penetration nor the strictest accuracy. But, in candidly admitting his errors when shown to be wrong (as he has done to the writer and, I have reason to believe, to Mr. Hulst, who sought his support in the belief here combated), he has proved himself to be the true naturalist. I am familiar with his experiments, having witnessed the results, and can best express my own opinion by quoting from a letter from the late Dr. G. Englemann (written Jan. 10, 1881), in which among other things he says: * * * "As to Meehan's operations I have seen myself the fine, large, well-filled pods of *Yucca angustifolia* raised by him by his artificial method. He says he punches an anther into the stigmatic cavity. Whether he or anybody else could distinguish whether the pollen adheres only to the papillose (not stigmatose) apex or gets into the liquor that fills the cavity when the stigma is ready to conceive, is a question (or no question)!" Meehan's experiments were made on a species in which, as I have elsewhere shown, the stigma is shorter and the stigmatic liquor more abundant than in *Yucca filamentosa*, and it may be that for these or other reasons it is more easily pollinized by hand or by other means than by Pronuba. But I have followed up his experiments and made many others during the past seven years, on *filamentosa* and *aloifolia*, with results that convince me that application of the pollen to the papillose apices only is not sufficient to insure fructification, at least in those species. My experiments have been made in the afternoon, evening, and morning; with flowers one day, two days, and three days after opening; with pollen from the same flower or from other flowers either on the same or other racemes; by touching the mere apices with anther or brush, and by forcing the pollen by either conveyance into the stigmatic tube. In these experiments, which have not yet been published, and which it is unnecessary to detail here, I have endeavored to guard against all influences, such as the condition of the plant and the weather, which might affect or vitiate the results. These may be summed up thus:

(1) Dr. Engelmann's limit of time during which fertilization may take place must be extended so as to include the second evening, and even the second morning, after the opening of the flower.

(2) No seed has been produced by merely touching the apices of the stigma with the pollen, though partial fertilization may take place and cause the growth of the fruit for a varying period, generally only three or four days. When the pollen is thrust into the tube (the mode of conveyance making little difference) fertilization is much more certain, but even here is rarely sufficient to produce ripe seed, the upper part of the pod often filling well, but the basal part not filling, and at last withering so that the fruit ultimately falls off before ripening.

The conclusion is inevitable that *angustifolia* is more susceptible to artificial pollination than the species which I experimented with, and that Pronuba far excels man in the perfection with which she performs the act. She has the power of fertilizing all the ovules, at which no one will wonder who has carefully watched her, because the act of pollination is normally repeated several times, first from one of the angles between the apices, then from another, and, as Prof. Wm. Trelease has shown, the tongue is used, in addition to the tentacles, to push the pollen down to the bottom of the tube.

2d. I have made careful search the past summer, and have had my associates, Messrs. Howard, Pergande, and Lugger, assist in the search for honey-bees in or about the Yucca flowers in Washington. There were over 200 stalks under observation, most of them of easy access on the grounds of the Department of Agriculture. Neither of the three gentlemen mentioned detected any bees, but I succeeded on two occasions, and each time between 9 and 10 a. m., in finding a single bee flying about the flowers. In neither case did the bee make any attempt to enter, but in each it probed around the outer base of the flower in search for nectar, and soon left evidently without being able to get much. These facts I record, not in any way to cast discredit on Mr. Hulst's statement, but rather to show how very different from his own has been my experience in this direction, both in St. Louis and Washington. Not that I place much faith in the constancy of bees, which are known to be somewhat fickle in their tastes according to season or colony, a fact that may account for the difference in our experience, as may also the presumption that *Apis mellifica* is more abundant in Brooklyn than in Washington, or, again, the known fact that *Yucca angustifolia* is less scant in nectar than its filamentose congener. Be that as it may, our *Apis* has plainly, so far as observed, been after nectar, and has shown no disposition whatever to go near the stigma, and this fact is, as I have learned, corroborated by Professors Cook and Beal, of the Michigan State Agricultural College, where, for the first time this year, they have observed honey-bees about the Yucca flowers. It is further corroborated by experiment which I made this summer of confining bees to the flowers within a gauze enclosure.

As for pollination by other insects, *Chauliognathus pennsylvanicus*, which feeds on both pollen and the nectar, is the most common species found in the flowers, and by virtue of these habits and its peculiarly modified mouth-parts, is most to be suspected; yet I have carefully watched it for years, only to be convinced that it never either assists or competes with Pronuba in the act of pollination.

3d. This argument has already been disposed of in my previous communication (vol. ii, p. 238, summary iv), and it is only necessary to add, that until Mr. Hulst is more exact, and will tell us what proportion of his pods containing no larvæ also showed no signs of oviposition (*i. e.*, how many were perfect without sign of puncture or constriction or irregularity about the middle), we shall not even know how many the little moth pollinized without getting a chance to perform the other (to her) important act.

4th. This is contrary to my own experience in Europe, and to all authoritative record familiar to me, and until Mr. Hulst gives us his authority and the evidence, it were shere waste of time to further discuss the point.

I have thus disposed of all the valid arguments brought forward by Mr.

Hulst to sustain his position on this matter. I may briefly notice, however, a little satire which he indulges in at my expense, and a quite irrelevant assertion which happens also to be incorrect.

As one deeply interested in apiculture and a practical bee-keeper twenty-seven years ago, it was, perhaps, unpardonable in me not to qualify the statement about bees not being attracted to white flowers. Both Müller, in his "Alpenblumen," and Lubbock, in "Ants, Bees, Wasps," etc., have shown that bees prefer blue and purple to white flowers, and this is what was meant on the face of my language, so to speak; but Mr. Hulst has naturally made the most of the *lapsus*, and scored a point where every other point is against him.

The assertion which I would call attention to, and which is entirely beside the question at issue, is that "we are indebted to Dr. Engelmann for the discovery of the fact that Pronuba is an agent in the fertilization of Yucca."

Whatever may have led Mr. Hulst to make this assertion, it is simply untrue, and the facts, which I may as well put on record here, are these: In June, 1872, Dr. Engelmann, who then knew full well that Yucca needed extraneous aid in fertilization, called my attention to this fact, and to the further fact that insects, especially white moths and soldier-beetles (*Chauliognathus*), were common in the flowers. He made no observations whatever upon insect pollination, but wished me to study the question. The discovery that Pronuba was the agent was my own, as were all the subsequent discoveries in reference to the insect made that year; but they were always communicated to him, and often shared with and witnessed by him. My first paper on the subject was read in August, 1872, before the A. A. A. S., at its Dubuque (Iowa) meeting, and presented to the Academy of Sciences of St. Louis at the meeting for September 2, 1872. Dr. Engelmann's "Notes on the genus Yucca" were presented to the same Academy September 16, 1872. Both papers are printed in vol. iii of the Transactions of the Academy, Dr. Engelmann's preceding, because leading up to mine. In his paper Dr. E. says: "The *suspected* insects were handed over to my friend Mr. C. V. Riley, who thereupon took up the zoölogical part of the investigation, the surprisingly interesting results of which are detailed by him in the succeeding paper" (Trans., etc., iii, p. 19), and I distinctly express my indebtedness to him "for drawing my attention to the fact that the plants of this genus must rely on some insect or other for fertilization." It is quite probable that but for Dr. Engelmann's suggestion I should never have made the investigations, and he should share with me whatever honor attaches to the discovery. If this is what Mr. Hulst means his language is unfortunate. Dr. Engelmann was, during my residence in St. Louis, at once my friend, companion, and master in natural history matters, and I have too much reverence for his memory to allow to pass unchallenged what he himself would repudiate were he still among us. As soon as I had learned that Pronuba was the agent he sent a brief announcement to the Bulletin of the Torrey Botanical Club (vol. iii, No. 7, July, 1872, p. 33) rather hastily referring to the insect as "a white moth of the genus Tortrix," and in a subsequent communication (*ibid.*, August, 1872, p. 37) he corrected the error and recorded some further facts in the life-history of the insect. In neither case was there any claim of individual discovery of the entomological facts, and these announcements must be read in the light of his subsequent more deliberate language which I have quoted.

In conclusion, having already devoted more time to Mr. Hulst's opinions than they justify, let me add that another year's study of Yucca fertilization has not only served to confirm all that I have hitherto written, but still further to enhance the importance of Pronuba to the plant and the intelligent nature of her unique performances. Prof. Wm. Trelease, who has made the only other careful observations on the subject which have come to my notice, has demonstrated (Bull. Torrey Bot. Club, Aug., 1886, pp. 135–141) that the stigmatic liquor is not nectariferous, but that the slight amount of nectar associated with the flowers is secreted in thin pockets formed by the partitions that separate the three cells of the pistil, and which open externally by a contracted pore from which the nectar is poured through a capillary tube (enclosed by the closely applied, but not outwardly united, lobes of the ovary) to the base of the pistil, so that nectar-feeding insects seek it not about the stigma, but at the base of the pistil or of the petals, whether within or without. I have fully verified Trelease's statements by dissection and study of the insects seeking this scant nectar, and endorse his conclusion that while the observations serve to disprove any positive value of their nectar in the pollination of Yucca flowers, they add to the importance of Pronuba by showing that the acts of collecting the pollen and transferring it to the stigma are performed voluntarily and without food compensation as I was at first inclined to believe.

I have lately had the pleasure of studying *Yucca whipplei* in California and the remarkable tree-yucca (*Y. brevifolia*) in the Mojave desert. The former is pollinized by *Pronuba maculata* Riley, and the latter by a most remarkably modified and adapted species which I expect to describe as *Pronuba paradoxa.*

Thus everywhere in the United States where Yucca nominally fruits we find it associated with its Pronuba.

I await with interest and curiosity any new discoveries in this connection, but, so far as present knowledge justifies anticipation, I should expect, where neither Pronuba nor Pronuba-like insect exists, to find the plant modified to more readily permit self-fertilization sooner than to find *Apis mellifica* the pollinizing agent, the opinion of Mr. E. L. Layard, of New Caledonia (who first expressed it in 1880; *Nature*, vol. xxii, p. 606), and of Mr. Hulst, to the contrary notwithstanding.

On board the "City of Rome," Aug. 22, 1887.

Mr. Schwarz said, commenting on Müller's statement that bees do not visit white flowers, that Müller was not speaking of food flowers at the time, but what he calls bee flowers.

Mr. Howard thought that Prof. Riley's experiments, confining bees with Yucca which they did not touch, were conclusive.

Mr. Smith said that the habits of an insect in one locality are not necessarily the same as in another. Both Mr. Hulst and Prof. Cook had seen bees on Yucca. On Long Island he had found *Lachnosterna* in great abundance on blackberry blossoms. Mr. Townsend had found them in Michigan with similar habits. He had this season failed to find a single specimen on the flowers near Washington, though there were plenty of beetles all around.

Prof. Riley reasserted the similar fact regarding bees, which were often very capricious, but showed that, where they do visit the Yucca flowers, they have nothing to do with fertilizing them, and, even in artificial pollination by man, perfect fruit can only be obtained when the pollination is done as fully and carefully as it is done by *Pronuba*.

Prof. Riley read the following paper:

Two Brilliant and Interesting Micro-Lepidoptera New to Our Fauna.

By C. V Riley.

I have had for some time, as a part of the material which I have turned over to the National Museum, two small moths of exceptional brilliancy and beauty, which are new to our fauna and which I took occasion to study while in Europe last autumn. As a rule, I do not care to present isolated descriptions of species, but in both these instances there are special reasons for departing from this rule, as the first is one of the largest and prettiest of the Tineina, having a superficial Tortricid habitus, and the second is interesting as belonging to a small group essentially exotic, which has been placed by authors both in the Tineidæ and the Tortricidæ, and which virtually is a somewhat interesting form belonging rather to the lower Noctuidæ. I name them in honor of two of our most capable and most worthy micro-lepidopterists, and in each case with permission.

Setiostoma fernaldella n. sp.—Expanse, 12–13 mm. General colors, vivid pea-green, yellow, and metallic bronze. *Head*, vivid pea-green, approaching in some instances to olivaceous; face and palpi paler, more yellowish. *Thorax* of the same vivid green, somewhat more yellowish on the borders, but especially on the collar, which is separated from the mesothorax by a fine black suture. Primaries of the same vivid green at basal third, posteriorly limited by a straight line which slightly obliques outwardly toward the inner border; along the costa is a dark, somewhat lunate dash or streak, reaching the base of the wing, but not the posterior limit of the green space; on the inner base there is also more or less black; along the margins of the black the green becomes more yellowish, and in some instances is bright sulphur-yellow; beyond this basal green space the ornamentation is difficult to describe, consisting of dark metallic hues, changing from bronze to violet in varying lights. A perfect unspread specimen, screened from side lights, appears bright metallic bronze, with a purplish gloss interrupted by two sinuate transverse bands of a darker shade of brown, almost black: the first of these consists of two patches or tufts of raised scales, truncate posteriorly; the second band is sinuate, the scales are less raised, and form no distinct tufts: a dusky spot at apex, and another at anal angle; between the dark bands there is an almost white costal spot, shading imperceptibly into the bronze of the rest of the space. In a reflected light the ordinary appearance of the wings shows, between these dark bands and the dark posterior border, three distinct coincident bands of the most brilliant metallic gold and lilac; the first corresponding to the posterior limit of the green; the second more irregular, and across the second third of wing; and the third elbowing near apex and coincident with hind border. In most specimens, along the median of these metallic bands, the wing is more or less whitish, particularly at costa, while there is also more or less white on the costa just inside the third or posterior metallic band. Secondaries bronzy-black, with less lustre than the primaries, and with distinct whitish fringe. Beneath both wings are brownish-black, glistening, the primaries with an indefinite and incomplete whitish line along posterior border, and two paler costal spots, corresponding to those on upper surface, more or less fully indicated; the secondaries with tips of fringes only, whitish. Legs bronzy-black, the front coxæ white or yellowish; front tarsi ringed with white; spurs of middle tibiæ white, with a few dusky scales, and middle tarsi ringed with white; posterior tibiæ with white annulus and white tip, and with the spurs white, with two white annuli. *Abdomen* bronzy-black, with metallic iridescence; the ovipositor of the female pale, lance-shaped, and usually extruded beyond the tip; the basal segment above with the margins usually flaked with white, and tending to form a distinct white annulus.

Described from 12 specimens.

Hab., Los Angeles Co., Cal.

Differs at once from *S. xanthobasis* Zeller by the fine green color of the basal space, the maculation of the remainder of the wing being lighter and more distinct throughout.

From *chlorobasis* Zeller it differs in the costal maculation of the green basal space, as well as in the whitish costal spots, which seem to be entirely wanting in the Brazilian species. From both the prominent raised scales will serve as a distinguishing feature.

I first met with this interesting little species upon my trip to Los Angeles in the spring of 1887, Mr. Coquillett having obtained a number of specimens, and Mr. Koebele having reared it from larvæ feeding between the leaves of *Quercus agrifolia*.

This genus was described by Zeller in 1875 (Verh. z. b. Ges., Wien., vol. xxv, p. 324), and referred to the *Choreutinæ* as a close ally of *Simæthis*, but only two species were described, those with which I have compared it. His generic characterization is imperfect from lack of material, but I will give a more full characterization at some future time.

Named after our well-known micro-lepidopterist, Prof. C. H. Fernald.

WALSINGHAMIA, Gen. nov.—*Head* distinct, somewhat protuberant between the eyes, but not tuberculate or mucronate; ocelli distinct, large; palpi slender, reaching to about the middle of front; terminal joint scarcely more than half as long as second, slender, with a pointed tip; no maxillary palpi; tongue moderate; antennæ for about half their length thickly clothed with scales above; beyond this the joints are well marked, and mobility seems practically confined to this part of the antenna; a broad white ring just above the thickened part, otherwise black, basally marked with ferruginous scales above. *Thorax* smooth and well rounded at shoulders; legs stout, rather short, densely clothed with scales, the tarsi most distinctly so, the segmentation so obscured that they seem four-jointed; tarsal claws very minute and simple; median tibia two-spurred, posterior with both median and terminal spurs of good length, the former rather more, the latter less, than one-third the length of the tibia. *Wings* rather large; primaries with costa distinctly arched toward apex, which is somewhat acute; posterior border oblique to the obtusely rounded anal angle; 12-veined; dorsal vein furcate basally; costal vein (12) strong, from base to costa beyond the middle; 11 from subcostal about one-third from base to costa; subcostal from base to end of cell, and continued thence unbroken to costa—rather within half its entire length it forms a slight angle, giving rise to a faint vein running to the cross-vein and forming a large accessory cell; cross-vein distinct between veins 9 and 10 (which are widely separated); 9 to costa near apex, forming a series of faint curves between veins 4 and 9; 5 to 8, inclusive, decidedly weaker than the other veins; 8 from cross-vein to apex, equidistant between 7 and 9, which are not farther apart at base than 5 and 6; 7 continuing from the faint vein closing the accessory cell to the hind margin below apex; 5 from cross-vein, nearly midway between 4 and 6—nearer the former—to the hind margin; 3 and 4 from the end of the median, and rather close together; 2 from the median, about $\frac{2}{3}$ from base, to outer margin; 1 (dorsal vein) from base to anal angle. Secondaries with veins 5 to 7, as well as the subcostal, much weaker than the others; costal vein free from base to costa near apex; three dorsal veins, the intermediate (1 *b*) distinctly furcate basally; median giving off 2 close to the end of the cell and continuing beyond, giving off 3 and 4 on a stalk, half way to the hind margin; 5 from the cross-vein about midway between 4 and 6; 6 from the cross-vein nearer to 7 than 5; 7 continuing the subcostal from the end of cell to the apex; a faint longitudinal vein divides the cell and terminates on the cross-vein between 5 and 6. *Abdomen* with no unusual character. No secondary sexual differences of importance, the antennæ only being somewhat more thickly clothed in the male.

Named after Thomas, Lord Walsingham.

This genus finds its nearest ally in *Choregia* Zeller (Felder); referred to the Tineidæ by Felder. The venation and other structure seem to agree more nearly with the Tortricidæ, both in this genus and in *Choregia*, the vein 1 *b* of secondaries being furcate at base, though the forks are indistinct, the vein becoming well marked only below the forks. The weakness of the sub-costal and its derivatives is very well marked in both genera, and there is a very faint branch between the subcostal and costal near the base.

The habitus of this genus would place it nearer to *Mictopsychia*, but that genus has but two internal veins to secondaries, while the distribution of the veins of primaries indicates a location much higher in the scale, and is hardly Tortricid.

Choregia has similar antennæ, but in the male they are ciliated beneath; the front is not produced or conic, but is flat, and the head therefore shorter; the palpi are longer, much stouter, not curved upward; the legs are longer and more slender, the tarsal joints distinctly marked; the primaries are narrower, subequal, and longer, the posterior border less oblique. The venation, while of the same type, presents several differences of generic importance: veins 7 to 10 are from the rounded apex of the cell, 10 not as the continuation of the subcostal, and much nearer to 9 than in the new genus. There is no accessory cell, and veins 3–5 are equidistant instead of 5 almost equidistant between 4 and 6.

Walsinghamia belongs to a distinctively South American type, and will probably be associated, having similar antennæ, with *Gauris* Walker and *Rhobonda* Walker—the species being principally from Brazil.

WALSINGHAMIA DIVA n. sp.—Expanse 16 mm. General colors, brilliant metallic blue and purple, and non-metallic orange-red. *Head*, bright rusty-red above; front yellow; palpi pale yellow, tipped with blackish. *Thorax* a leaden, somewhat metallic blackish-gray, with yellow scales at sides of scutellum. Primaries metallic purple at basal third, to a distinct transverse golden-yellow band which obliques posteriorly but very little, and is narrowly margined each side by a row of black scales: beyond this the purple assumes deeper violet and steel-blue hues through the middle portion of the wing, giving way to a metallic, deep greenish gloss, which extends to a strongly curved cream-yellow streak, which starts broadly and obliquely from the costa at $\frac{3}{5}$ from base, is suddenly narrowed and posteriorly bent on the cell, then runs nearly to the apex, where it again curves almost at right angles and runs parallel to the posterior margin, rapidly narrowing, and lost about $\frac{1}{4}$ from anal angle: beyond this yellow streak a deep rust-red band runs as a margin around the apex and along hind border to anal angle; between the two streaks the deep violet-purple scales form a narrow band, widest along costa: fringes leaden-black, with a black line at base. Secondaries deep orange-red, with a blackish submarginal cloud near apex; fringes as on primaries: beneath, secondaries as above; primaries leaden-gray, with marginal reddish streak reproduced, but in paler shade; the yellow streak of upper side also indicated on costa in the same color, and a central, longitudinal reddish cloud. Legs with the femora and tibiæ pale beneath, dark above, the hind tibiæ with golden-yellow scales above, and with a dark terminal annulus; tarsi inclining to golden-yellow, with one dark annulus about basal third, and tips also dark. *Abdomen* of the same leaden black, banded with rather a dull gamboge or golden yellow; anal tuftings more distinctly marked with this last color.

Described from 3 specimens collected by Mr. E. A. Schwarz at Cocoanut Grove, Fla., in May, 1887. The larva skeletonizes the leaves of a wild species of Ficus, presumably *F. pedunculata*, and makes an even, fine web.

Prof. Riley read a short note calling attention to an error in the published Minutes of the Am. Philos. Soc. regarding the date of the first appearance of the "Hessian Fly." He found on hunting up the Minutes that the term "Hessian Fly" does not occur in them at all until 1791, long after the Revolution; that the passages relied on by Dr. Hagen to prove its presence in America before the Hessians arrived mention the "Fly in Wheat," "the Fly," or "the Fly-weavil," which refer to *Sitophilus oryzæ S. granarius*, or *Gelechia cereallela*. Dr. Hagen's argument based on the erroneous quotations therefore fails.*

Messrs. Howard, Schwarz, and Smith made some remarks on this subject.

Mr. Howard read a description of an interesting new parasite which he proposed to call *Rileya splendens*.†

Prof. Riley thinks that many of the Chalcids use the antennæ as tactile organs.

Mr. Schwarz described the methods of attack of a *Tachina*, pursuing like a hawk a specimen of *Ammophila*.

Prof. Riley described the methods of attack of Tachinids on locusts, and the efforts of the locusts to get away.

Mr. Howard told how Chalcids attack leaf-mining larvæ.

Mr. Schwarz read a paper on the oviposition of *Eumæus atala* as observed by him during the month of May at Biscayne Bay, Fla.‡

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* See *Can. Ent.*, vol xx, No. 7, 1888, pp. 121–127.

† This paper has since been published in full in *Canadian Entomologist*, vol. xx, No. 10 (Oct., 1888), pp. 192–195.

‡ See "Insect Life," vol. i, No. 2, 1888, pp. 37–40.

Prof. Riley asked whether the larva has a perceptible odor?

Mr. Schwarz said it had not.

Mr. Schwarz read the following paper:

Termitophilous Coleoptera found in North America.

By E. A. Schwarz.

Dr. Horn has quite recently (Trans. Amer. Ent. Soc., vol. xv, 1888) described and figured the very interesting larva of *Glyptus*, a genus of *Carabidæ*, which occurs in tropical Africa in the nests of white ants, and this reminded me that I had long since promised to put on record a list of such of our North American Coleoptera as are known to live exclusively among termites. The paleotropical region seems to abound in such Coleoptera; in South America some extraordinary forms have been discovered among termites, and two of these genera, *Corotoca* and *Spirachtha*, have been described and figured by the late Prof. Schiœdte. In North America only a few termitophilous species have hitherto been observed, but I feel quite confident that future investigations, especially in the southwestern portion of the country, will greatly swell their number. Our field coleopterists pay too little attention to the subject, and then it must be remembered that termitophilous Coleoptera, with the only exception of the genus *Philotermes*, are much more difficult to find than myrmecophilous species. As is the case with this latter class of Coleoptera, we are quite ignorant regarding the earlier stages of termitophilous species, nor do we know anything of their relations to their hosts.

The list of species, so far as I am able to make it out from the few observations on record and from the experience of my friends and myself, is as follows:

1. *Myrmecochara pictipennis*. According to Dr. G. Kraatz (Linnæa Entomologica, vol. ii, p. 41) this has been found by Prof. Schaum in the nests of termites in Louisiana. I found this little-known species at various points in the Southern States, but always among ants (*Solenopsis geminata*), and a second undescribed species, in all probability referable to the same genus, occurs near Washington, D. C., also among ants (*Pheidole debilis*). Thus I catalogue this species with some doubt among the termitophilous Coleoptera.

2. *Philotermes pilosus*, found in Mass., Pa., D. C. and Tenn.

3. *Ph. pennsylvanicus*, found in Mass., Pa., D. C. and Florida (Crescent City).

4. *Ph. Fuchsii*, found in Tenn. and Fla. (Crescent City).

5. *Microcyptus testaceus*, found in Ga. (Athens) and Fla. (New Smyrna and Crescent City).

6. *Trichopsenius depressus*, found in Texas (Columbus), La., and Fla. (Crescent City). I was quite surprised to learn from Mr. Fred. Blanchard that he found it also near Lowell, Mass.

7. *Xenistusa cavernosa*.

8. *Xenistusa fossata.*
9. " *pressa.*

The three last-named species have hitherto been found only at Columbus, Tex. They occurred in a prostrate, but not decayed, trunk of *Celtis texana*, which was honeycombed by a large colony of Termes. Specimens were quite abundant in the galleries of the white ants, but since the wood was very hard they had to be cut out with an axe and on account of this awkward mode of investigation only a few could be secured. When alive, and when examined shortly after being killed, they seemed to represent three species; they were sent so to Dr. Leconte and accordingly described by him as three different species. However, from the descriptions and the dried specimens in our collections, it is difficult to distinguish the species, and quite impossible to conceive a correct idea of the peculiar appearance of these insects when alive. With their cylindrical body, their greatly extended abdomen, and their peculiar mode of locomotion, they resemble much more the wingless white ants than we would suspect from the dried specimens. They are by far the most remarkable termitophilous Coleoptera hitherto discovered in North America. If they should be found again they ought to be put in weak alcohol so as to preserve their original shape and to enable a more careful description of their structural characters, and more especially the secondary sexual characters on the last ventral segment.

Next to this genus in resemblance to their hosts are the species of *Philotermes.* This is the only genus which, in my experience, wanders about with the White ants in their subterraneous foraging expeditions, and which may be found among them in early spring under stones, old bark, etc. But the specimens are more abundant in the nests of the white ants, and the other genera are only found within the true nests of their hosts, or very rarely in their immediate vicinity. The genera *Myrmecochara*, *Microcyptus*, and *Trichopsenius* have little or no resemblance to Termes, but they all have that peculiar appearance at once suggestive of an inquilinous or parasitic mode of life such as we are accustomed to see in most myrmecophilous and parasitic Coleoptera. The general similarity in appearance and superficial structural characters between *Microcyptus* and *Limulodes*, a myrmecophilous genus of the family *Trichopterygidæ*, have already been pointed out by Dr. Horn (Trans. Am. Ent. Soc., vi, 1877, p. 87), and no one can deny a certain superficial resemblance, though not in any structural details, between *Trichopsenius* and the beaver parasite, *Platypsyllus castoris.*

All species in the above list were found among *Termes flavipes*, and it will be noticed that, except in the Southern States, they have hitherto been observed only east of the Alleghanies.

Specimens of the species mentioned were shown by Mr. Schwarz.

Some discussion on the place of these insects in the economy of *Termes* took place between Mr. Schwarz and Prof. Riley.

Mr. Howard remarked that no Hymenopterous parasites of *Termes* were known, unless *Caratomus* should prove such.

Mr. Schwarz said he had seen *Caratomus* only on the walls of the Department of Agriculture where there are *Termes*.

SEPTEMBER 6, 1888.

Seven members present. President Schwarz in the chair.

The following paper was read by the Secretary:

NOTES ON COLEOPTERA OF PEEKSKILL, N. Y., FOR 1887.

BY JOHN D. SHERMAN, JR.

Helops æreus and *micans*, the former in the greater numbers, occur together under stones at the bases of trees.

Haltica ignita is common on the leaves of *Kalmia* early in May. *Prionochæta opaca* is common both in carrion and fungi.

I found some sixty or seventy specimens of *Pityophthorus querciperda* under bark of a felled oak tree.

Xantholinus fulgidus was found among rubbish, such as dried sticks, ashes of a bonfire, old leaves and soil, late in April and early in May; about 35 specimens.

Throughout April *Oxytelus rugosus* is very common under small stones in the garden, some 30 having been found under each stone. The beetle also flies about on warm afternoons.

Oxyomus porcatus and *Rhyssemus scaber* also fly around heaps of rubbish on warm afternoons in the early part of May.

A pair of *Hister planipes* was found in an ants' nest under a stone on April 21.

Coptocycla aurichalcea frequents the flowers of *Ranunculus*, with which it closely assimilates in color.

Prasocuris varipes is also found on *Ranunculus* in the latter part of May.

Valgus canaliculatus flies on warm days in May, and is also found in the dirt under bark of old stumps.

On May 7, a chilly, showery day, nearly 160 specimens of *Megilla maculata* were found huddled together under one stone.

Aphodius fossor was quite common in May and June.

Diabrotica vittata, *D. 12-punctata*, and *Bolboceras lazarus*, one specimen each, and several specimens of *Aphodius stercorosus* were attracted by a light at night July 15.

Pseudebæus oblitus was common in the latter part of May amongst the lichens on rocks.

Otiorhynchus ovatus was common in July, as usual, on fences, old wood, around houses, etc.

Disonycha limbicollis, 30 specimens, *Limonius auripilis*, 8 specimens, and *Lixus concavus*, 8 specimens, were found on June 8 and 13 on a species of *Rumex*.

Batyle suturalis and *Centrinus scutellum-album* are common on Ox-eye Daisy (*Leucanthemum vulgare*); the latter species and *Rhipiphorus dimidiatus* and *cruentatus* occur on *Nepeta cataria*.

The flowers of *Viburnum prunifolium* yield *Molorchus*, *Sericosomus*, *Agriotes*, *Attalus scincetus*, *Anaspis flavipennis*, and species of many other genera.

Mr. Smith, referring to the note on *Helops*, said that he had never found them except under the bark of trees. *Valgus* he has found very local on Long Island; a single patch of woods only yielding any number of specimens. He described their location in the stumps of trees, and the season at which they were found.

Mr. Schwarz said that his experience agreed with that of Mr. Sherman regarding *Helops;* he has found them under stones near the base of trees. He added that it is strange that no one has succeeded in finding the larva of *Helops* in our country, common as it must be.

Mr. Schwarz read the following:

Notes on the Food Habits of some North American Scolytidæ and their Coleopterous Enemies.

By E. A. Schwarz.

Pityophthorus concentralis Eichhoff, originally described from Cuba, must be added to our fauna, since it occurs abundantly throughout the semi-tropical region of Florida on the Poison wood (*Rhus metopium.*) It is closely allied to *P. consimilis*, but at once distinguished by the sharply raised concentric lines on the anterior part of the thorax. Its work may be briefly described as follows: By the co-operation of several parent beetles a large central chamber of irregular outline is excavated under the thin bark of the trunk or larger branches of the tree. Several (from two to five), more or less, undulating primary galleries, of not great length, radiate from this chamber, and the eggs are deposited singly in little indentations either on one side or on both sides of these galleries during the process of excavation. The larval galleries are short, either diverging in the usual way or frequently intersecting each other, or even reverting to the central chamber. The pupal chamber is not sunk into the wood.

In the middle of June, 1887, I found on Mr. Hubbard's Prairie Farm, near Hawk Creek, Volusia Co., Fla., a prostrate tree of Black Gum (*Liquidambar styraciflua*), which had been felled in October the previous year. Upon beating the branches into my umbrella I found numerous specimens of two Scolytids, *Pityophthorus pulicarius* and another species of the same genus, which, upon subsequent comparison, I fail to distinguish from *P. annectens*.* The former of these is an easily recognized species known to infest Pine trees, and its occurrence on Liquidambar could not fail to attract my attention. Wishing to ascertain the life-history of this, as well as of *P. annectens*, I carried some infested branches with me to Washington for further investigation. I did not breed a single specimen of *P. pulicarius*, nor did I find any trace of its galleries under the bark, and feel confident, therefore, that this species does not breed on Liquidambar, and that the specimens only visited the tree for feeding purposes. Of *P. annectens* I obtained, in the course of the subsequent month, several hundred specimens from the branches. Its work closely resembles that of *P. concentralis*, but the primary and larval galleries are longer, owing, no doubt, to the softer nature of the wood.

In July of the present year an immense colony of *Pityophthorus consimilis* was found near Washington, D. C., infesting the dead and dying branches of a large specimen of *Rhus toxicodendron*, which had been torn down by a storm in August, 1887. That this species infests *Rhus glabra* has been pointed out by me on a previous occasion (see p. 17), but I had not before known it to live in the Poison Ivy. Its primary galleries also start from a central chamber, but usually follow, more or less, the longitudinal axis of the vine, rarely going around the twig. The species is evidently very prolific, and the larval galleries crowd and intersect each other so often that the whole bark in the vicinity of the central chamber is completely undermined, and the individual larval galleries cannot longer be distinguished When full-grown the larvæ enter a little more the solid wood to undergo their transformation. Pieces of infested vines were, for several months, under my observation, and thousands of beetles emerged, and some are still emerging up to the present day.

Although I had twigs of Liquidambar and vines of Poison Ivy infested with Pityophthorus for several months in my room I never obtained a single hymenopterous parasite therefrom, but I had occasion to observe some coleopterous enemies of these Scolytids. *Læmophlœus* (*Dysmerus*) *basalis* occurred occasionally in the galleries of *P. concentralis* in southern Florida. I obtained it also in some numbers from Liquidambar twigs infested by *P. annectens*, and in great numbers from the vines of *Rhus toxi-*

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*The species was described by Dr. LeConte from specimens found by me many years ago at Tampa, Fla., on the Yellow Pine (*Pinus palustris*). The specimens were only beaten from the trees, which does not indicate that they breed under pine bark. From what we know at present of the life-history of our Pityophthorus, it seems hardly probable that the same species infests Conifers and, at the same time, deciduous trees. It is possible that we have to do here with two different species. From a letter by Dr. LeConte, published in Bull. No. 7 of the U. S. Entom. Comm., pp. 260-261, it appears that Dr. Packard also obtained *P. annectens* from a deciduous tree, but, unfortunately, the name of the tree is not mentioned.

codendron infested by *P. consimilis*. Here I succeeded also in finding its larva within the galleries of the Scolytid. From the Liquidambar twigs I obtained further a small number of the rare *Narthecius grandiceps*, and from the vines of *Rhus toxicodendron* a few specimens of *Læmophlæus angustulus*, which species was also bred some years since by Mr. H. G. Hubbard from twigs of *Rhus glabra* infested by *P. consimilis*. The three Cucujids just mentioned have a rather cylindrical form of body, and I am inclined to believe that their larvæ will only be found within the galleries of bark-boring Scolytids, whereas most of the species of *Læmophlæus* with flattened body, *e. g.*, *L. testaceus*, *biguttatus*, etc., are not enemies of Scolytids, but probably prey upon dipterous and other coleopterous larvæ living under loosened bark. A single specimen of *Scalidia linearis*, found dead in the galleries of *P. concentralis* in southeastern Florida, might indicate that the larva of this species is preying on those of Scolytid. The larva of *Nemosoma cylindricum* was frequently found in the galleries of *P. consimilis*, and is a very efficient enemy of this, and no doubt also of other Scolytids infesting deciduous trees. No *Histeridæ* were found in the galleries of the three *Pityophthorus* mentioned above, though our species of *Cylistix*, and the more cylindrical species of *Platysoma* and their larvæ, are common enough in the galleries of pine-infesting Scolytids. Our species of *Hypophlæus* seem also to prey only on Scolytids infesting Conifers. Some genera of *Cleridæ*, both in the imago and larval states, are well known as enemies of Scolytidæ; the pretty *Clerus ichneumoneus* could frequently be seen on the trunks of *Rhus metopium* watching for the *Pityophthorus* and snapping them off as soon as they emerged from their holes, and a large Clerid larva found in the galleries probably belongs to that species. From the twigs infested by *P. annectens* and *consimilis* I bred numerous specimens of *Phyllobænus dislocatus*, but did not observe the larva.

An accidental, but nevertheless very efficient, enemy of *P. annectens* proved to be a Cerambycid larva, viz., that of *Leptostylus aculifer*, which was quite common in the Liquidambar branches. The burrows of this *Leptostylus* are very broad when compared with the diameter of the larva, and are preferably constructed right through the colonies of the Scolytids, completely obliterating their galleries and crushing the Scolytid larvæ and pupæ. I have since observed that the larvæ of allied Cerambycids (*Leptostylus macula* and *Hyperplatys aspersus*), which I found in Hickory twigs inhabited by *Thysanoës fimbricornis*, have also the habit of running their galleries over those of the Scolytid, for the reason, I suppose, that on such places the bark has become somewhat loosened from the wood, thus facilitating the burrowing on the part of the Cerambycid larva.

Dr. Marx gave an account of a "List of the families Theridiidæ, Thomisidæ, and Agalenidæ, found in the District of Columbia."

He gave the number of genera and species of each thus far collected, and compared the fauna as to its wealth of species with the fauna of some European countries.

Mr. Mann stated that he had recently noticed a small Scarabæid, *Bolbocerus farctus*, stridulate.

Messrs. Smith, Schwarz, Alwood, and Townsend discussed stridulation in Coleoptera, and incidentally the nature of the attraction of light on Insects.

Mr. Smith gave some further notes on the sexual characters of the species of Lachnosterna. He suggested that the asymmetry may be useful in facilitating copulation, and retaining hold under all circumstances, recounting his experience in this direction with *L. hirticula*.

Mr. Schwarz gave some examples of asymmetry of secondary sexual characters in Coleoptera.

October 4, 1888.

Seven members present. President Schwarz in the chair.

Dr. Marx read the following paper:

On a New and Interesting Spider from the United States.

By George Marx, M. D.

Allow me to draw your attention to a new and very remarkable spider from the United States, which is so singular and strange in its structural characters that nothing like it has been hitherto known to arachnologists; so peculiar that it cannot be placed in our present system; so anomalous that it appears like the representative of a prototype, in which characters were united in one individual which are now distributed into widely differing genera.

It was found by my friend Dr. Fox, of this city, in the neighborhood of Lookout Mountain, Tenn., where it lives in the forests of that mountainous region. It constructs at the underside of projecting cliffs or rocks a white, dense web that resembles a saucer or the shade of a student's lamp, the narrow part being attached to the surface of the stone, the broader and lower margin hanging face downward, being held in place by some stronger guy threads and a loose reticulum which surrounds the whole structure. In this the spider dwells in an inverted position, and it shakes the web like some other species (especially Pholcus) when one approaches it.

When I received this spider it appeared at the first glance, by its general aspect, the long, slender legs, the shape of the body, the pale color, as a member of the family Pholcidæ, but a closer examination soon revealed its true, wonderful characters and the great importance of its discovery.

The principal and most important characters are as follows:

1. It has four true lung sacs or lamellar tracheæ.
2. It has a cribellum and calamistrum.
3. The mandibular claws are inserted nearly vertically.
4. The maxillæ stand upon the broad and short labium (instead of the labium being placed between the two maxillæ, as is the common case).
5. It has the general appearance of a Pholcus.

The four lungs present would place it into the Tribe *Territelariæ* but for the calamistrum and cribellum, which organs no member of that group hitherto known possesses, and for the fact that this spider constructs a web above the ground. Besides these points, the whole aspect of our animal speaks against its being placed in that Tribe, for it resembles and shows evident affinity to certain families of the Tribe Tubitelariæ and Retilelariæ, and it would find a more natural place amongst these groups were it not for the number of lung-sacs, which excludes it at once from them.

I sent some specimens to Prof. T. Thorell in Italy, acknowledged to be one of our best Arachnologists, and he was equally surprised at it. "This wonderful spider is the most curious one discovered in this century," he wrote.

At his suggestion I named it *Hypochilus* (from the position of the maxillæ above the lip), and in appreciation of this distinguished naturalist and my friend, *Hypochilus Thorellii*, and the new family which it constitutes, *Hypochilidæ*.*

This paper was discussed by Messrs. Schwarz, Smith, Mann, and Drs. Marx and Fox. In the course of this discussion Dr. Fox described more in detail the web-making habits of the species, and Dr. Marx gave a review of the different families of spiders and their mode of web-making.

Mr. Townsend read some notes on—

Twelve Species of Coleoptera taken from Stomachs of Toads in Michigan, with Remarks on the Food-habits of Toads.

By Tyler Townsend.

At the time that Professor S. A. Forbes made known his observations relative to the food-habits of birds, it occurred to me, as it doubtless also did to others, that toads, and, indeed, all animals with an appetite for insects in a general way, where no particular discrimination is shown, were likewise injurious by destroying beneficial insects, which if left to live

* The full description is published in *Entomol. Amer.*, vol. iv, pp. 160–162.

would make away with many more noxious individuals than the toads themselves consumed.

On the 7th of August, 1883, while examining the stomach of a toad caught in some woods near Constantine, I found therein an ichneumon fly and a single lepidopterous larva. The former was either *Ophion* or a nearly allied genus. Here was a decidedly injurious toad to begin with, as one ichneumon fly of this genus will parasitize quite a number of caterpillars, and in the case of some genera of parasitic hymenoptera the numerous progeny that follow would in turn parasitize an immensely larger number. I have also seen a record of one *Calosoma frigidum*, parts of *Cicindela repanda*, and several *Platynus placidus* being found in the stomach of a single very harmful toad. Many rarities are encountered in this way by enthusiastic collectors.

The dozen species of Coleoptera which I give here were taken from the stomachs of toads caught in the vicinity of Constantine, Michigan. In all of the cases but three I make a record in connection with each species of the nature of the locality in which the toad was found, also the time of day and the state of the weather, as these items would naturally have some bearing on the subject. Not more than a half-dozen toads were consulted to gain the material herewith presented, which, although fragmentary, I have thought it well to record. They all belonged to the common species, *Bufo americanus*.

The twelve species of Coleoptera are:

Pterostichus stygicus. Several taken from one toad found in woods under one of the species of fungi commonly known as "toad-stools," where it had been preying upon Coleoptera which had congregated about the decaying fungus. Aug. 26, 1885. Afternoon. Day half cloudy.

Calathus opaculus. One specimen. No record.

Cymindis pilosa. One taken from toad caught in a back door-yard. Sept. 7, 1884. 9.30 P. M. Clear night.

Philonthus microphthalmus. Three specimens. No record.

Languria mozardi. One taken from toad found in a door-yard. Sept. 7, 1884. 10 A. M. Day cloudy.

Melanotus americanus. One specimen. No record.

Chœridium histeroides. One specimen, with *Pt. stygicus*.

Geotrupes splendidus. One specimen, with *Pt. stygicus*.

Doryphora 10-lineata. One specimen, with *Lan. mozardi*.

Anametis grisea. Two specimens, which I took to be ♂ and ♀, taken from a toad found in a flower bed partially buried in soft earth raised by a mole. Sept. 29, 1884. 9.30 A. M. Day clear.

Sitones flavescens. One specimen with *Lan. mozardi*, and one with *An. grisea*.

Conotrachelus nenuphar. One taken, with *Lan. mozardi*.

This paper was discussed by Messrs. Smith and Schwarz. Mr. Smith said that he had examined the stomachs of many frogs, but never of toads. He had, however, observed them, and they are, in his opinion, decidedly more beneficial than otherwise. Mr. Schwarz said toads eat May-beetles, one toad examined having no less than eight Lachnosternas in its stomach. In the wilder parts of the Lake Superior region the best method of finding rare species is in the stomachs of toads. He had reason to believe that some of the harder weevils pass through the toads without being in any way injured thereby.

Mr. Schwarz then read the following note:

On a Collection of Coleoptera from St. Augustine, Florida.

By E. A. Schwarz.

Through the kindness of Dr. John Hamilton, of Pittsburg, Pa., I received lately a list of nearly six hundred species of Coleoptera, collected by the Rev. Charles Johnston in the vicinity of St. Augustine, Fla. The species have been named by Dr. Hamilton, and since he is known as a careful and experienced Coleopterist the determinations are no doubt reliable.

As I never collected in northern Florida, and since our knowledge of the Coleoptera of that part of the State is still very defective, the list is an important contribution to the knowledge of the fauna of Florida, and this the more so because an exact locality is given, whereas, in most other species coming from other sources, but presumably collected in northern Florida, no precise locality is given, the species being simply labeled or recorded from "Florida." Moreover, this list comprises such a large number of species—being defective only in the smaller and less conspicuous forms—that the character of the fauna of that locality may be fairly recognized therefrom. Finally, the collection is of special interest to me because it comes from a part of the coast not so verv far remote from the line which, at a former occasion, I have designated as the northern limit of the semi-tropical fauna, and this collection is, therefore, able to prove ordisp rove the correctness of my statement. In scanning the list I find only five species which belong to the West Indian colony in Florida, viz., *Leptostylus terræcolor*, *Ischnocerus infuscatus*, *Artipus floridanus*, *Pachnæus opalus*, *Rhodobænus pustulosus*. The first named two belong to those species of the West Indian colony which have already acquired the power of changing their food-habits and to extend their geographical range northward. They are now quite common anywhere in the peninsula of Florida. The third species, *Artipus floridanus*, is unquestionably also an immigrant from the West Indies, but does not seem to have been previously described from that locality. It is by far the commonest beetle in semi-tropical Florida, and, economically, of great importance. Its injury to lime trees has already been referred to by Mr. William H. Ashmead in his work on Orange Insects, but I found its destructive powers much more serious than told by Mr. Ashmead. It is a polyphagous species (at least in the imago state) and evidently spreading northward. As early as 1875 I found it commonly at Haulover Canal, feeding on leaves of oak and juniper, and in 1876 at New Smyrna. Both places being already north of the semi-tropical boundary line, the occurrence of the species at St. Augustine is not surprising. The fourth species, *Pachnæus opalus*, originally described from Cuba, is also very abundant in semi-tropical Florida, and Mr. Ashmead mentions it as being injurious to lime trees on the Florida Keys. I found it under the same conditions, though not nearly as destructive as the foregoing species. It occurs more commonly on the various fig trees, so characteristic of semi-tropical Florida, and most abundantly on all sorts of succulent weeds. In view of this diversity in food-habit it is not astonishing to see this species extend its range northward, but still, since I never found this weevil outside of semi-tropical Florida, I was quite surprised at seeing it on the St Augustine list. The occurrence at St. Augustine of the fifth species, *Rhodobænus pustulosus*, is of great interest and quite new to me, since it was previously known only from southern Arizona and Mexico. It adds another instance to that curious geographical distribution to which I referred in my paper on the insect fauna of semi-tropical Florida, viz., the simultaneous occurrence of certain species in the extreme southwestern and southeastern parts of North America. Of the food-habits of this *Rhodobænus* I know nothing, but suspect from its general appearance that it belongs to the Yucca or Opuntia insects. At any rate it will be found also at other points of the Florida coast further south, and also in parts of Central America south of Mexico.

Of the five semi-tropical species on the St. Augustine list, the occurrence of three is in accordance with the previously known distribution, that of the fourth is not surprising, and only that of the fifth is a novel and interesting fact. Of the maritime semi-tropical fauna not a single species appears in the St. Augustine list. Thus, taking in account that the semi-tropical Coleopterous fauna of Florida amounts to several hundred species, it may safely be said that St. Augustine is well outside of the limits of this fauna.

Turning now to the bulk of the species in the list we find that they consist of the usual admixture of more or less widely-distributed species and true Floridian forms, the proportion being but little different from that of other localities, *e. g.*, Crescent City, Enterprise, Tampa. Among the true Floridian species on the St. Augustine list I am glad to see but few additions to the list published by me in 1878, including the manuscript additions since that time. I say I am glad thereof because it proves that our knowledge of the Florida fauna is already tolerably complete. But the St. Augustine list contains another element, viz., species belonging to the faunal region lying directly north of eastern Florida and comprising lower Georgia, the lower Carolinas, and eastern Virginia. This is an ill-defined region with very few, or no, peculiar species, and only characterized by a certain combination of a number of southern species. The existence of this faunal region will become evident to any one who, on a summer day, goes from here down to Fortress Monroe, Va. The difference between the Washington fauna and that of Fortress Monroe will then be found quite striking. Of this fauna I noticed about twenty species in the St. Augustine list not previously known from Florida.

In conclusion, I would say that since the publication of my Florida list of Coleoptera I have carefully noted down in manuscript all additional species found afterwards in or recorded from Florida. These additions from all available sources swell the total of Coleoptera known to occur in Florida to about 2,400 species. A republication of this list is, however, not contemplated at present.

Mr. Smith made some remarks on *Lachnosterna*, indicating the result obtained by an examination of the genital structure of some of the more common species.

November 1, 1888.

Ten members present. President Schwarz in the chair.
The following paper was read by Mr. Schwarz:

Entomology in Garcilasso's "Conquest of Florida."

By E. A. Schwarz.

Ynca Garcilasso de la Vega is not the oldest, but by far the fullest, of the three original historians of the famous expedition of Hernando de Soto through North America. The author is best known by his "History of Peru," his native country, and in this work he has paid a great deal of attention to natural history, and especially to zoölogy. Although he had never been himself in North America, I hoped to find in his account of De Soto's expedition at least some allusion to the insects of Florida,* and this the more so, since the author during the preparation of his work (completed, according to his own statement, in 1591, but not published before 1605) was able to get direct information from several survivors of the expedition. But I was disappointed; the book contains not the slightest allusion to insects, in fact, hardly any to zoölogy, and only a single passage which in any way is related to entomology. The only thought of the Spaniards being to find precious metals, they paid of course no attention to anything else, and least to the zoölogy of the countries they traversed. The book teems with lengthy narrations of many unimportant incidents

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* It must be remembered that the Florida of Garcilasso's time comprised the whole of North America south of Canada and east of New Mexico.

during the expedition, but no allusion is made to the various insect pests which annoy man and horses, and with which the Spaniards must have become acquainted here for the first time. That they were accustomed to the various lice, the fleas, and the bed-bugs there can be no doubt; in fact, some of these parasites were perhaps introduced then into North America by this expedition. But there is no mention of Sand-flies (*Ceratopogon*), Red Bugs (*Leptus irritans*), and Mosquitoes. The absence of any reference to mosquitoes appears to be especially strange, since these insects were undoubtedly just as numerous then in our swamps as they are now, and since the Spaniards in their camps must have occasionally suffered terribly from their attacks. The absence of any reference to Horse-flies is also remarkable, since the horses were the most valuable property of the Spanish invaders. To them alone they owed their superiority in the constant fights with the Indians, and the death of a horse, either in battle or by drowning, is always carefully recorded by Garcilasso. I think, however, that at that time the various species of *Tabanus* were by far less numerous in specimens than they are at present. The Indians had no domestic animals; there were no buffaloes in the southeastern part of the country, and deer and other large warm-blooded animals weie probably then not much more numerous than they were up to a comparatively recent period. The introduction of domestic animals by the Europeans is no doubt the cause of the increase in the number of Horse-flies, which in some portions of the South are now a rather serious drawback to successful agriculture.

The only passage having any connection with entomology occurs toward the end of Garcilasso's work, when the situation is as follows: In 1543 the remnants of De Soto's expedition sail down the Mississippi river to its mouth, thence westward along the coast. After infinite hardship they reach the mouth of a river, which proved to be the Panuco river, on the coast of Mexico, and ascending the same they come to the capital of that section, where they meet their countrymen, the City of Mexico being only 60 leagues distant. Garcilasso now says as follows, the translation being *verbatim*:* "The Spaniards praised God for this luck, and remained 10 or 12 days at Panuco. But since the majority found out that the inhabitants subsisted only on such things as the land produced; that several occupied themselves only with planting Spanish mulberry trees in the hope of having silk; that those which were best off raised only a few horses to sell them to the foreign merchants; that all of them were entirely poor, poorly housed, and the land miserable,"—then they regretted having left the rich Florida, etc.

This passage, which has evidently slipped into Garcilasso's book by mere accident, does not convey any new information, for we know from other independent sources that silk industry was introduced into Mexico at a very early date, when Cortez was still viceroy of that country; but I fail to find in several histories of silk-culture which I consulted any reference to

*I translate from the French edition, Leyden, 1731, p. 544.

this passage in Garcilasso, and for this reason I thought it worth while to call attention thereto. Long before the end of the 16th century every trace of silk-culture in Mexico had disappeared, and its breakdown is clearly foreshadowed in Garcilasso's words just quoted. They show that as early as 1543 there "was no money" in silk industry, and that this was held in contempt by the average Spaniard. The omission in the passage, no doubt by accident, of any mention of raising silk-worms, only stating that the people planted mulberry trees, is nevertheless very significant, and reminds one forcibly of that period in the history of silk industry in North America known as the Multicaulis fever, when silk-culture was carried on, not by raising silk-worms, but by planting mulberry trees of the *multicaulis* variety with a view of selling them at exorbitant prices under the pretext that there was an enormous profit in that business. As every one knows, this fever terminated suddenly and disastrously in the year 1839.

Dr. Fox gave some notes on the spiders collected by him during the summer of 1888, at Lookout Mountain, Tenn. He gave some notes on the habits of the species of Lycosa found by him and on their distribution. Two species of Dolomedes were found around an old vat, long since disused, and only supplied by a very small mountain brook. The habits of the species were described and the manner of formation of the little colony here found was suggested. He also called attention to the habits of *Lycosa nidifex* Marx, which, as observed by him, are somewhat different than described by Dr. Marx. The nest, as he observed it, has a chamber near the bottom.

He also stated that he found a species of *Argyrodes* in one corner of the web of *Hypochilus*.

Dr. Marx said as to *Lycosa nidifex* his observations were correctly described, but he is quite ready to believe that the habits of the spider differ somewhat in different localities. As to *Argyrodes* this observation is in accord with the known habits of the genus, which builds no webs of its own, but lives cuckoo-like in the nests of other species. He added that this is the season when gossamer spiders can be best observed, and that he has already seen them in large numbers.

Mr. Howard suggested that it would be also a good season to collect egg-bags of spiders with the view of raising parasites, as in this country but few such were known. Prof. Riley suggested that larvæ of Mantispa might also be obtained.

Prof. Riley also spoke of the habits of a species of *Agalena* which he finds in some abundance on his grounds. This species pulls off leaves and small twigs and makes large nests.

He has never been able to get at the reason for these large structures, since they do not seem to be required for the purpose of obtaining food. He asked whether any of the species might possibly be herbivorous. Drs. Marx and Fox said there was no record of an herbivorous habit for any spider.

Prof. Riley also made some remarks on the habits of Atypus, describing the method by which the spider gets rid of the debris after exhausting its prey. Dr. Marx said that the spider is in the habit of taking its prey through the tube, remaining on the watch inside, and grasping any fly or other insect that may be unfortunate enough to alight on it, so that in many cases the prey is never taken into the tube at all.

Mr. Smith, commenting on the statement in the last number of "Insect Life" regarding the habits of *Stomoxys*, says, that the fly is very abundant at his house; that he has not been able to observe any increase in numbers in rainy weather, but on the contrary he has found them gradually becoming more abundant until at this time they have almost replaced the common *Musca domestica*, which is being rapidly killed off by the fungus that attacks this species at this season. *Stomoxys* is not attacked by this fungus in his experience. He also said that common as the species is at his place, neither he nor any member of his family has ever been bitten or stung by it either in wet or dry weather. Mr. Mann said the species was very common at Cambridge and bit severely. Mr. Schwarz says that he has been bitten through pants and stockings very severely.

Prof. Riley thinks that Mr. Smith's experience is rather unusual, but said that where it so nearly replaced the common species its habits might be different.

This subject was further discussed by Messrs. Schwarz, Howard, and Alwood.

Mr. Schwarz read a series of—

Coleopterological Notes.

By E. A. Schwarz.

A New Herbarium Pest.—In the spring of this year I received from Mr. L. E. Ricksecker a little Ptinid beetle with the note that it infested the herbarium of the California Academy of Sciences at San Francisco, the plants, and especially the papers, being badly perforated by both the larvæ and the beetles. The species was determined as *Trigonogenius farctus*, but upon examination it proved to be quite distinct.* Although I have not yet been able to compare specimens I feel quite confident that this herbarium pest is identical with *Sphæricus gibbiodes* Boield., which is reported from Italy, Corsica, and Algeria. It does not appear to be common in European collections, and I fail to find any reference to its life-history and food-habits. At any rate it has never been known as an injurious insect, and its appearance in California is certainly interesting enough to be placed on record. Mr. Ricksecker was kind enough to send me some living larvæ, but before they reached me they had changed to pupæ within delicate silken cocoons spun among the dried plants in which they were sent. When and how this insect was introduced into California I am unable to tell, and I may only add that Mr. Ricksecker found a few specimens in San Francisco as early as 1880.

SCOLYTIDÆ ATTACKING TAMARAC TREES.—Up to the year 1884 the only knowledge we had on the subject was a short notice by Dr. Fitch, in his 4th Report, p. 65, stating that *Tomicus pini* attacks not only pines but also tamaracs. In the Report of the Annual Meeting of the Ent. Soc. of Ontario for 1884 (Canad. Ent., xiv, 1884, p. 218)), Mr. W. H. Harrington speaks of a grove of tamarac trees in various stages of health and decay, "the cause of the latter seeming to be a Scolytid beetle of the genus Dendroctonus, which was found in immense number under bark of sickly and dying trees. The bark was completely undermined and riddled by its galleries, and swarmed with larvæ, pupæ, and beetles." There is no subsequent reference to this Dendroctonus, and the species remains therefore unnamed, but I think I am able to supply the determination. In 1881 or '82, Mr. Hubbard and myself visited a tamarac swamp near Grand Ledge, Mich., and we found under bark of dying tamaracs numerous specimens of a *Dendroctonus*, which, no doubt, is identical with that referred to by Mr. Harrington, and which I determined as *D. simplex*.† In July of the present year I found again at Marquette, Mich., some tamaracs which had been infested by this species. The inner side of the bark was so completely honey-combed with the galleries of the larvæ and the beetles that I did

*At the time this note was read before the Society I considered this species as undescribed, since it greatly differs from *Trigonogenius farctus*, the only species in our fauna with which it can be compared. A subsequent search in the European literature induced me to change my view and to alter my manuscript accordingly. The genus *Trigonogenius* is now restricted to a few species from the west coast of America (Chili, Peru, and Lower California), the corresponding species of the Old World being referred to *Sphæricus* Woll. (*Tipnus* J. DuV.) The differences between the two genera are clearly set forth by J. DuVal (Genera des Col., iii, pp. 210-211).

†I consider this merely a small race of *D. rufipennis*.

not succeed in finding a piece of bark which would show the nature of the galleries. The beetles had long since deserted the trees, and all I could find were several dead specimens which served for identification. I am inclined to doubt that this Scolytid is the first cause of the decay of the tamarac, since I partake of the opinion of those who believe that in a country without forest cultivation Scolytids attack only diseased or otherwise injured trees, and healthy trees only when they are cultivated in our gardens and parks. The gradual drying up of the tamarac swamps, in consequence of the improved drainage of the country, is, I think, the first and main cause of the decay of tamarac trees in Michigan and elsewhere.

Mr. Harrington continues: "Associated with them [the Dendroctonus] were large numbers of a smaller bark-borer, *Hylesinus opaculus*, with one or two other species, which would not be likely from their habits or numbers to do much injury." What the "one or two other species" may be I am unable to say, but it is certain that Mr. Harrington's *Hylesinus opaculus* is simply a wrong determination. This species lives on certain deciduous trees, viz., elm and ash, but never attacks Conifers. Mr. Harrington's species is either *Polygraphus rufipennis* or *Phlœosinus serratus*, or possibly also a species yet unknown to me. The food-habits of most *Scolytidæ* are so particular that a mere knowledge of them enables us to control the correct determination of the species.

MALE CHARACTERS IN PISSODES AFFINIS.—The male of this species can be distinguished by the following characters: Hind tibiæ curved at apical half, their inner edge flattened, smooth and shining, and furnished at the apical third with a brush of long black hair. This character can be observed even without the aid of a lens, and at once distinguishes *P. affinis* from the other eastern species in which the tibiæ are alike in both sexes. The few specimens of our western Pissodes which I was able to examine show also no distinguishing sexual characters.

THE FEMALE OF PHOTINUS COLLUSTRANS.— Only one species (*Ph. scintillans*) of this genus was hitherto known to differ strikingly from the male by being wingless and having short elytra, but from a specimen found by Mr. H. G. Hubbard at Crescent City, Fla., it appears that the female of *Ph. collustrans* possesses the same characters. The head and thorax in the female of this species are much smaller than in the male; the eyes are also much smaller, and the antennæ shorter and stouter; thorax and elytra are colored and sculptured as in the male, but the elytra, which are a little narrowed posteriorly, do not quite reach to the posterior margin of the second dorsal abdominal segment; wings entirely absent; abdomen twice as long as the combined length of thorax and elytra, but not inflated in the single specimen before me, and of a nearly uniform yellow color, so that nothing can be said regarding the extent of the light-organs. The abdomen has, however, the appearance of being luminous throughout. The last segment has a smooth longitudinal impression at the middle of the base, and the stigma-like impressions at the sides of the segments are absent. I feel quite confident now that the female of *Ph. punctulatus*, which is still unknown, will prove also to be wingless and provided with short elytra.

NOTES ON SINOXYLON.—The number of antennal joints in certain genera of *Ptinidæ* is known to be subject to individual variation, and the irregularities mentioned by Dr. LeConte (Proc. Amer. Philos Soc., xvii, 1878, p. 612) in *Hadrobregmus linearis* can also be observed in other species of this and allied genera of the sub-family *Anobiinæ*. In the sub-family *Bostrychinæ* the number of antennal joints appears to be much more constant, and Dr. Horn has successfully used this character for grouping the species of some of our genera. I had this year the opportunity of examining a large number of *Sinoxylon basilare*, found in dead branches of Persimmon (*Diospyros caroliniana*), and only one specimen showed an irregularity in the number of antennal joints. The specimen has but 9 joints in both antennæ; no joint of the funicle is missing, but instead of a three-jointed club the specimen has a well-formed two-jointed club alike in both antennæ. The first joint of the club, formed by the coalescence of the first and second joints in normally developed specimens, is oblong, as long as the six preceding joints together, and with the inner apical angle somewhat produced; the last joint of the club does not show any deviation. Moreover, in the right antenna of the specimen the sixth and seventh joints show a decided tendency to coalesce. The specimen is plainly an abnormity, and otherwise not distinguishable from the normal type; but any one not acquainted with our *S. basilare* might be tempted to establish a new genus on such specimens.

S. texanum closely resembles the smaller specimens of *S. basilare* in coloration and appearance. I found several specimens last year near Washington, D. C., but failed to make notes on their food-plants since I mistook them at first for *S. basilare*, which lives in all sorts of dead branches.

S. floridanum belongs to the colony of West Indian species in semi-tropical Florida. Specimens from Jamaica, which I received from Dr. John Hamilton, cannot be distinguished from those found in Florida.

A discussion arose between Messrs. Riley, Howard, Schwarz, and Smith on the constancy of the number of antennal joints in insects, and their value in classification.

DECEMBER 6, 1888.

Nine persons present. President Schwarz in the chair.

The following amendment to the Constitution was adopted:

Article VII, so as to read as follows:

SECTION 1. The initiation fee of active members shall be one dollar; the annual fee two dollars, payable at each annual meeting after election. Any active member in arrears for one year may, after one month's notification, be dropped from the rolls. No member in arrears shall be entitled to vote.

SECTION 2. Corresponding members shall pay no initiation fee, but shall pay an annual fee of one dollar, payable at election and at each annual meeting thereafter. Any corresponding member in arrears for one year may, after notification, be dropped from the rolls.

SECTION 3. Members elected within three months previous to an annual meeting shall not be required to pay an annual fee for the year in which they are elected.

Upon recommendation of the Executive Committee, Mr. S. L. Elliot, of Brooklyn, N. Y., was elected a corresponding member of the Society.

Dr. Marx read the following paper—

ON THE IMPORTANCE OF THE STRUCTURAL CHARACTERS OF HYPOCHILUS IN THE CLASSIFICATION OF SPIDERS.

BY GEO. MARX, M. D.

The first great subdivision of the order *Araneæ*, based upon the structural characters alone, is that into the two sub-orders: *Dipneumones*, or spiders which possess two lamellar tracheæ or lung-sacs, and *Tetrapneumones*, or those with four lungs.*

The species of these two sub-orders are distinguished not only by the number of their lung-sacs, but by other structural differences, as the shape of the cephalothorax and abdomen, the size of the legs, the form of the trophi, male palpus and spinnerets; in short, by their entire morphological appearance.

But there is in the *Dipneumones* a small group of families which present in one respect or another certain affinities with the *Tetrapneumones*. This relationship manifests itself, however, not so much in the general appearance of these animals as in a more or less distinctly expressed similarity

* We have also a division of this order into seven tribes (somewhat like sub-orders), which are founded upon biological facts: (1) In regard to the kind of web or net they spin, as *Orbitelariæ*, making a round, geometrical net; *Retitelariæ*, making a snare or loose reticulum; *Tubitelariæ*, those which attach to their flat, horizontal catch-web a tube in which they dwell and watch; and the *Territelariæ*, which make a weaving in or on the ground (Trap-door spiders and others); and (2) in regard to the mode of running, as *Citigradæ*, or swift runners; *Laterigradæ*, or side runners; and *Saltigradæ*, or jumping spiders. The Territelariæ alone represent the Tetrapneumones, while the six other tribes constitute the Dipneumones.

of certain parts or organs, the family *Filistatidæ* having four external stigmata, the posterior pair, however, aborted, showing also their affinity by the shape of the cephalothorax, by the stoutness of the legs, and the pubescence and color. *Dysderidæ*, belonging also to this group, possess also four external stigmata, but the posterior pair lead not to lamellar, but to common tubular tracheæ; they also have the mandibular claws inserted much as in the four-lungers; that is, nearly vertical, instead of horizontal, as is the case of all other Dipneumonic spiders.

Without these exceptions or transition-forms the two sub-orders seemed to be well separated, to be two natural groups, well defined in their structural characters. They seemed so until *Hypochilus* was discovered.*

Hypochilus is a Tetrapneumonic spider as well as a Dipneumonic one, for it has four lung-sacs, the vertical insertion of the mandibular claws, and the form and position of the labium proper to the former sub-order (the labium at least of some of the *Territelariæ*), while it corresponds in the following characters with the two-lungers, especially with those expressed in the above-mentioned group of transition forms.

With the *Filistatidæ* it has the cribellum and calamistrum and the arrangement of the eight eyes, and with the *Dysderidæ* the insertion of the mandibular claws, the four external stigmata, and the form of the male palpus; but it is also closely related to the *Scytodidæ*, not only by some external features, but (as Prof. Bertkau, of Bonn, informs me) by anatomical homologies, and even with the *Pholcidæ*—with these principally by the extremely long and slender legs, the shape of the body, and the similarity in the arrangement of the eyes.

The *Dysderidæ* and *Filistatidæ* have already by our arachnologists been placed at the end of the line of Dipneumonic families, opposite the *Tetrapneumones*, and Prof. Simon, of France, has added to this group the *Scytodidæ* (sub-order *Gnaphosæ*). Now comes Hypochilus, standing directly in the gap that separates the two sub orders, leaning on one side upon the *Filistatidæ*, on the other on *Territelariæ*, connecting thus both divisions and obliterating their differentiating characters.

The line of families would now, according to the order of their natural development, be formed as follows:

Liphistatidæ, *Theraphosidæ*, *Katadysidæ* (?), *Hypochilidæ*, *Filistatidæ*, *Dysderidæ*, *Scytodidæ*, *Pholcidæ*, *Drassidæ*, and so forth, to the *Epeiridæ* as the most highly developed family.

Prof. Bertkau proposed, in 1882, a new classification, and divided the order *Araneæ* into two sub-orders, according to the presence or absence of those peculiar organs, the cribellum and calamistrum.

The *Cribellata* are those provided with these organs. This sub-order, however, contains the most heterogeneous families in spite of the great endeavor the author made to demonstrate a certain natural relationship existing between them. For Prof. Bertkau now to arrange matters with

* See my previous article on this interesting spider, pp. 166-167.

Hypochilus, so as to admit it into the camp of the *Cribellata*, would be a mighty difficult task.

Blackwall, of England, united three genera, which all were provided with a cribellum and calamistrum, into one family, the *Ciniflonidæ*. Since then, as more species were found possessing these organs, but which could not be brought into the scope of a *family*, the family *Ciniflonidæ* became abandoned.

Now, unfortunately, Mr. J. H. Emerton lately revived that obsolete family, and described the New England members, in all five genera, under the old head. Had he not confined himself to that limited region he would have had to add two prominent genera from the United States, *Filistata* and *Dinops*, and it would have been extremely difficult for him at that time to admit into the defined compass of a family these two heterogeneous genera. The difficulty is now enhanced by the appearance of *Hypochilus*, and the fallacy in forming a family upon such grounds is obvious.

In the discussion upon this communication, Prof. Riley said he thought the existing classification of spiders might yet be of use, although apparently upset by the discovery of connecting forms. He also urged upon Dr. Marx the importance of a study of the species of Theraphosidæ. Dr. Marx stated that as yet the classification of the Theraphosidæ was in such an unsatisfactory condition that a determination of species could not well be made. Ausserer's table of the genera of the family was not made with the fauna of this country in view, and the generic distinctions were too finely drawn and not applicable to our fauna. The family is divided naturally into three sub-families, Atypinæ, Eriodoninæ, and Theraphosinæ, with the great bulk of the family in the last.

Mr. Howard remarked that he had recently read in the Transactions of the New Zealand Institute for 1869 an account of the "katipo," or poisonous spider of New Zealand, which appears to be a species of Latrodectus. This is found on the sea beach among sedges. It is stated that this spider is not feared by the natives at the distance of half the throw of a stone from the beach.

Mr. Ashmead said that in a peach orchard planted by Col. Redman near Jacksonville, Fla., the trees had been defoliated by a spider. Mr. Ashmead stated positively he had seen the spiders at work on the leaves.

Prof. Riley made a communication upon the larvæ of Leptinus and Leptinillus. Larvæ and imagos of the former, but no pupæ,

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Address Tyler Townsend, Department of Agriculture, Washington, D. C.

had been found about Washington, and larvæ and imagos of the latter had been found by Mr. Kœbele in California on beaver skins received from Alaska. The relations of these larvæ to those of *Platypsyllus* were pointed out.

Prof. Riley also made a communication on the manner of oviposition in *Thalessa*. *Thalessa* is proved to be an external parasite of *Tremex*. In laying its eggs it usually inserts its ovipositor into a hole made by some insect which has emerged from the infested tree, but it is able to penetrate solid wood. The jaws of the larva of *Thalessa* are not adapted to boring in wood. J. A. Lintner and J. S. Woodward have stated that *Thalessa* also deposits its eggs in larvæ of *Datana*, but Prof. Riley believes this to be an erroneous statement, and as *Heteropelma* resembles *Thalessa*, and has been reared from *Datana integerrima* and *D. ministra*, it is probable that these authors have mistaken *Heteropelma* for *Thalessa*.*

Mr. Schwarz exhibited a *Telamona* having a globular sac projecting equally above and below the surface of its carapace. He supposes this sac to be formed by a parasite, in a manner similar to that in which *Gonatopus*, a Proctotrupid, forms a sac on certain Rhynchota.

JANUARY 3, 1889.

Fourteen persons present. President Schwarz in the chair.

Mr. C. L. Marlatt was elected a member of the Society.

The election of officers for 1889 then took place and resulted as follows:

President, E. A. Schwarz; 1st Vice-President, Dr. C. V. Riley; 2d Vice-President, Dr. George Marx; Recording Secretary, Dr. Wm. H. Fox; Corresponding Secretary, Tyler Townsend; Treasurer, B. P. Mann; Members of Executive Committee, L. O. Howard, Theo. Pergande, C. L. Marlatt.

The retiring President then delivered his Annual Address:

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* See *Insect Life*, vol. i, pp. 168–179 (Dec., 1888).

ANNUAL ADDRESS OF THE PRESIDENT.

On the Coleoptera common to North America and other Countries.

By E. A. SCHWARZ.

As the subject of my address I beg leave to present a partial classification of those numerous species of Coleoptera, which are more or less widely distributed over the great faunal regions of the globe. As a basis for such classification I have attempted to compile lists of those species of the Nearctic fauna which occur also in other continents. These lists, if complete, ought to include not only a comparison of our own fauna with the other faunal regions of the New World and with that of the boreal and temperate zones of the Old World, but also with the Ethiopian, the Oriental, and the Polynesian faunas. The connection between our own and the last-named faunal regions is, however, so small as to be hardly worth while to be taken into consideration here, since it is reduced to a certain class of species which are common to all faunal regions of the world, viz., the Cosmopolitan species, and to a very few other species which, though widely distributed within the tropical or semi-tropical zones, have not acquired the faculty of spreading into the temperate zone.

A compilation of the list of species common to North and South America proved to be beyond my ability, owing to various circumstances. There is not a single good collection of South American Coleoptera in the United States which would serve as base for comparison; there is an almost complete absence of catalogues of South American Coleoptera, and the literature is enormously scattered and, to a large proportion, inaccessible to me. Thus my list has remained a mere fragment.

There is but little difficulty in compiling a list of the species common to North America and the Palæarctic fauna. Careful comparisons of most species belonging to both faunas have been made by various authors; there is no want of catalogues, and even partial lists of the species common to both regions have been published. Among our own authors, Dr. LeConte was very fond of referring to this subject in his writings and gave on several occasions more or less extended lists, which; however, are mere fragments, because they served only to illustrate certain special features. It is certainly strange that hitherto a complete list of such species has not been published.* In following up the history of many of these species it is interesting to see how much difficulty has been and is still experienced by entomologists in coming to an understanding regarding the identity or non-identity of species from widely-separated regions, difficulties that illustrate the powerful influence of difference in habitat upon our conception of the term species. Usually the species were first described independently under different names, then, either by comparison of specimens or descriptions, they were declared to be identical; then there came a period when more or less minute differences were pointed out between such species; then a reaction set in in the opposite direction, and this state of uncertainty regarding many species will no doubt continue for an indefinite time. A complete list of the Coleoptera common to both continents can also not be given as long as certain smaller or larger portions of our fauna are not more fully studied or, at any rate, not yet compared with the Old World's species. Here belong the whole family of *Cryptophagidæ*, the subfamily *Aleocharinæ* of the *Staphylinidæ* with an almost endless number of species, and some other genera of various families. Incomplete as it is, my list comprises 440 species.† It is, however, by no means my intention to read this list, or any portions thereof, but as the cause of the simultaneous occurrence in different regions is not the same for all species, I propose to offer a few general remarks on the various phases which this subject assumes.

The simultaneous occurrence of identical species in regions separated by wide stretches of ocean, or other great natural boundaries, can only be explained, 1st, by NATURAL DISPERSION;

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* Since this was written a very carefully elaborated list of the Coleoptera common to North America and Europe has been published by Dr. John Hamilton in Trans. Amer. Ent. Soc., v. 16, 1889, pp. 88-162, which has been reprinted, with additions and corrections, by an equally competent European Entomologist, Mr. Albert Fauvel, in Revue d'Entomologie, v. 8, 1889, pp. 92-174.

† Fauvel enumerates 495 species.

or, 2d, by the AGENCY OF MAN. A third mode of explanation, viz., that specifically identical specimens occurring in widely separated places could be the descendants of two specifically different ancestors, is not longer admissible in the present state of Natural Science.

As a further subdivision, the following scheme is proposed:

I.—NATURAL DISPERSION.

a. The Circumpolar fauna.

b. Species not belonging to the circumpolar fauna, probably of intratropical origin, which have spread into the temperate zone.

c. Migratory species.

II.—DISPERSION BY THE AGENCY OF MAN.

d. Intentional introductions.

e. Non-intentional introductions.

f. Non-intentional importations.*

* Another subdivision quite different in character from those mentioned is, *Importation by Coleopterists, or the Introduction of pinned specimens.* This is, of course, a ridiculous division, but nevertheless it occupies quite a space in our descriptive literature and has occasionally assumed a rather serious aspect. It results from the carelessness with which exotic specimens, exchanged or purchased, are labelled and get mixed up with North American species, and are then either described or referred to as North American species. Some of our older authors made some such blunders and even our best recent authorities, here and abroad, have been fooled by such specimens, and this mostly without any fault of their own. If a big South American Dynastid beetle is offered for sale in this country as a North American species, as can be seen from the advertising columns of one of our periodicals, no one, of course, can be deceived; but when it comes to an obscure species of a widely-distributed genus, the case is quite different. Most of these spurious species have now been detected and eliminated from our fauna, and, as a rule, it does not make much difference whether or not a number of them still linger in our list. In the course of time they all will be found out, but one or the other of them is liable to cause some inconvenience. As an example I mention the clover-leaf-weevil (*Phytonomus punctatus*). Nearly ten years ago Dr. C. V. Riley called attention to and described the sudden appearance of this species in the State of New York. It turned out afterwards that Dr. LeConte had redescribed this European species under a different name from two old specimens in his collection, one coming from the Melsheimer collection, in

The Circumpolar Fauna.—There has been so much said and written on the circumpolar animals and plants, their origin, their movement southward during the Ice period, their retrograde movement at the end of that geological epoch, and the formation during this retrocession of more or less isolated colonies on very high mountain ranges; so many ingenious generalizations and speculations have been published by prominent botanists and zoölogists, that I am unable to add anything new on this subject. As to the Coleoptera of that region we have an admirable paper by Prof. Mäklin, which, although written more than 30 years ago, is by no means antiquated, and a perusal of which is to be recommended to all interested in the matter. The southern limits of this fauna were laid down by Dr. LeConte, as early as 1859, on the map accompanying his paper on the Coleoptera of Kansas, and subsequent experience has found nothing to make great alterations. This limit is, of course, not a sharply defined line. The Arctic fauna gradually fades away, and south of this line many species occur of undoubted circumpolar origin, but which, in the course of time and under changed climatic conditions, have become specifically differentiated, either both in the New and Old Worlds or only in one of the two continents. These are what Mäklin called the "representative species," and they form a large proportion of the fauna of our Middle and Western States. Other species have in their southward extent preserved their specific identity, and can then often not, or with difficulty, be distinguished from the imported species. Some of these have no doubt been reintroduced by the agency of man.

In comparing the ranges of the circumpolar species in the Old and New World a striking difference is, in some instances, noticeable, which deserves especial mention and which is best explained by some examples: *Lina lapponica* of the family *Chrysomelidæ*, a variable but easily recognizable species which feeds on willow, occurs in all Arctic regions. In the Old World it occurs only in the high north and on high mountain ranges, whereas in North

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which exotic and American species were mixed and often without locality labels, the other specimen being still more doubtful regarding locality. These two specimens may or may not be from North America, but the interesting question regarding the time of introduction can never be answered with certainty.

America it extends to the extreme southern portion of the country. Another equally easily recognized species, *Adoxus vitis*, occurs throughout the Palæarctic region and lives upon a wild plant (*Galium*) and upon grape-vine, doing so much damage thereto that, in France, it has received a popular name, "le griburier." In our country the species is strictly arctic or alpine, feeds upon the same wild plant, but has never shown any disposition to feed upon grape-vine or to extend its range. *Silpha lapponica* occurs all over North America (except in the southeast), being still common as far south as San Diego, Cal. In Europe it is strictly arctic, and does not even occur in the Alpine regions. On the other hand, *Silpha opaca* is common all over Europe, and has even acquired there some economic importance; whereas the identical species is strictly arctic in North America (a single specimen in the LeConte cabinet is from the high Sierras of California). The following are examples of remarkable distribution of which I am unable to offer a satisfactory explanation: *Nomius pygmæus*, a neat-looking Carabid beetle, but justly dreaded by all those who had an opportunity of finding it, on account of its overpowering, fœtid odor, occurs in Washington Territory, Oregon, at Lake Superior, and on the high mountains of North Carolina, a distribution participated in by several species of distinctly arctic origin. The same species occurs as an extreme rarity in southern Europe, specimens being occasionally found in southern France, Hungary, and Greece. An importation of this species, which is by no means common even in North America, by the agency of man is utterly inconceivable. *Aphodius rufipes*, a species common all over Europe and Siberia, and in all probability belonging to the circumpolar fauna, occurs in North America only in the Alleghany Mountains, but not in the Arctic region. *Hypocoprus lathridioides*, a myrmecophilous species, is widely distributed in Europe, but has in North America been found only in the Subalpine region of Colorado.

The mountain ranges in America run in the direction from north to south, and the colonies of circumpolar insects upon their summits have thus been able to preserve their connection and specific identity with the arctic forms; whereas in Europe, where the mountain ranges run from east to west, the alpine colonies have generally undergone changes and, by isolation, lost their specific identity with the arctic species. There is, therefore, in the Old World an abundance of distinct alpine forms, none of which are identical with North American species; while we, on our high mountains, have but few, if any, alpine, but more arctic forms.

Our knowledge of the distributions of the circumpolar Coleoptera has in recent years greatly increased, and we are now enabled in most instances to distinguish those which are strictly circumpolar, *i. e.*, which occur in the Arctic or Boreal regions of the whole northern hemisphere, from those which are only partially circumpolar, *i. e.*, which are either common to the boreal portions of Europe and eastern North America or to western North America (Alaska, British Columbia), and a larger or smaller portion of northern Asia. Among the strictly circumpolar Coleoptera the predaceous families predominate over the phytophagous families; the *Carabidæ*, *Dytiscidæ*, *Staphylinidæ* and *Coccinellidæ* are well represented, the *Chrysomelidæ* and *Rhynchophora* are tolerably well, and the *Cerambycidæ* and *Elateridæ* are poorly represented. The *Buprestidæ* are absent although this family contains numerous boreal species in every region. The phytophagous *Scarabæidæ* do not, or barely extend into the arctic regions; the coprophagous *Scarabæidæ* (*Aphodius*) are well represented there, still none of them (with the exception of *Aphodius rufipes*, which doubtfully belongs here) is on the list of circumpolar Coleoptera. This fact is the more remarkable since, if we go further south, we find a decided ability and disposition on the part of the Old World *Aphodii* to extend their range by introduction or natural spread from one faunal region to another.

Species not Belonging to the Circumpolar Fauna.—This division comprises endemic species of probably intratropical origin, which have spread, by natural dispersion, into the temperate zone of North America. I have already spoken of my inability to compile, with the means at my command, a satisfactory list of these species, and I am unwilling to offer any further remarks thereon beyond stating that from this list all those numerous species ought to be excluded which belong to the semitropical fauna of Central America and which extend into the extreme southern part of North America, forming a sharply-defined colony in a narrow coast strip of southern Florida and an apparently less defined zone along the Mexican boundary.

MIGRATORY SPECIES.—There are very few migratory insects anyhow, and none among the Coleoptera, and I may therefore dismiss the subject with the remark that the occasional movements reported among Coleoptera—I refer more particularly to certain apparently migratory swarms of Carabidæ observed in temperate South America—are always on a comparatively small scale, never extending from one faunal region to another, and that they are not comparable to the real migrations among certain species of Lepidoptera and Orthoptera.

DISPERSION BY THE AGENCY OF MAN.—The second class of species common to our own and other faunal regions comprises those which have been or are being carried from one continent to another by the agency of man—a vast number of species which were not distributed over portions of the New and Old World before the discovery of America, now nearly 400 years ago. At the first glance the subject appears to be a very simple one. We should expect that, with the increase of our marine intercourse, with the shortening of the steamer trips between all ports of the whole world, there should be going on an ever-increasing interchange of the faunas and floras of the continents. We should further expect this intercourse to be most marked between those continents which lie under the same degrees of latitude of the same hemisphere and enjoy the same or nearly the same climate—*e. g.*, between Europe and North America; this interchange to be less marked between countries which, although situated under the same latitude, show differences in climatic conditions—*e. g.*, between our Pacific coast, more especially California, and Japan or China; this interchange to be much smaller if importation involve a decided change of climate, as between any intratropical country and North America, or between the temperate zone of the southern hemisphere, through the tropics, into the temperate zone of the northern hemisphere. All this is supported by facts, but a glance at the list of species at once shows that there does not exist an interchange between the faunas of the Old and New World, but only an introduction of Old World forms into North America, while North America has, with very few exceptions, never exported any of her native species. This phenomenon has long since attracted attention, and various explanations are offered for it. It has been said that there is some ancient and obscure natural law according to which the dispersion of animals and plants in the northern hemisphere takes place in the direction of from east to west. Others restrict the working of this law to the continents adjacent to the Atlantic ocean, supporting their theory by the geographical configuration of the continents—Europe, with its unparalleled development of coast line, being naturally the country of exportation. Another apparently more plausible explanation is that the fauna and flora of the so-called New World (which is in reality the oldest continent) are so weak and degenerated that they cannot compete with the younger and more vigorous flora and fauna of the so-called Old World. Others have added that after all there is a climatic difference between Europe and North America which favors only the introduction of Old World species into North America. I must confess that I have not become convinced of the force of these explanations when applied to the introduction of insects. Some of our native dung-beetles of the genus *Atænius* occur all over the continent, from Canada to Patagonia, and exhibit, therefore, a considerable power of adaptation as to climate. Moreover, these species live in all stages, not only in dung but also in rich soil—in other words, under conditions most favorable for exportation. How these species can be considered as less vigorous than the Old World species is difficult to understand. Still they have never been introduced into Europe. Our Stelidotas, certain Epuræas, etc., which are so frequently found on apples and other fruits packed in barrels or boxes, have never been found in Europe. *Trogoderma tarsale*, of the family *Dermestidæ*, is only too well known to most of us as the most annoying museum pest. It not only infests dried insects, but also skins of stuffed animals, and with such objects it *must* have been transported to Europe, not only once but frequently, and must have been *found* at least at many places in Europe. Still, one can hunt through the whole coleopterological literature of Europe without finding any notice of its occurrence in that country. This instance appears to be quite inexplicable, unless it turns out from comparison of specimens that *Trogoderma tarsale* is identical with a European species (*T. ornatum*).

Still, our American fauna has furnished at least a few contributions to the list of cosmopolitan species. The Archippus butterfly (*Danais archippus*), an undoubted endemic American species, though probably not a native of the North American fauna; the grape phylloxera (*Phylloxera vastatrix*), undoubtedly of North American origin, are familiar examples. Among the cosmopolitan Coleoptera, *Trogosita mauritanica*, *Silvanus cassiæ*, and perhaps other species of the same genus, *Lasioderma serricorne*, *Aræocerus fasciculatus*, and some others, may with a greater or smaller degree of probability be claimed as natives of America. The notorious Colorado potato beetle (*Doryphora 10-lineata*) may also be adduced here as an example. It has, on several occasions, migrated across the Atlantic, and would no doubt have become acclimatized in Europe but for the energetic and successful measures for its extermination.

INTENTIONAL INTRODUCTIONS.—These include our domestic insects (honey-bee, silk-worm), but there are no Coleoptera among them. The only species which may claim to be considered here are certain species of meal beetles, *Tenebrio molitor*, *obscurus* and *opacus*, the larvæ of which, used as food for insectivorous song-birds, have been carried intentionally all over the world. But since these beetles and their larvæ flourish in old flour, corn, cheese, etc., I suppose that, even without the assistance of man, they would have become cosmopolitan long ago. No attempts have been made hitherto intentionally to introduce beneficial predaceous Coleoptera—such as *Carabidæ* and *Coccinellidæ*; but I see the time is fast approaching when such attempts will be made in this country.* Some queer and unexpected experience will then be made, as I shall point out presently.

NON-INTENTIONAL IMPORTATIONS AND NON-INTENTIONAL INTRODUCTIONS.—There is an important difference between these two topics, but as this difference can be explained best by contrasting them they are considered at the same time.

With our fast steamers, our lightning trains, our refrigerators, with our increased and increasing knowledge of the food habits and general natural history of insects, I assert that man is able to transport safely almost any species of insect from any part of the

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* Since this address was delivered, Dr. C. V. Riley has succeeded in introducing and acclimatizing several Australian species of *Coccinellidæ* in southern California.

temperate zone of the Old World to any other part of the temperate zone of the New World, the difficulties only arising and increasing if a change of climate is involved in this introduction. I remember here the introduction of the humble-bee from England to New Zealand, which was successful after repeated failures. Almost the same may be said of the unintentional mode of importation. With the almost endless list of objects of modern commerce and international intercourse, numerous species of insects of all Orders, and more especially Coleoptera, are imported by every steamer arriving at New York or at any other great port of this country from any part of the world, and can, in the warmer season, be found alive about the wharves. I remind you here of a communication by our fellow-member, Mr. Lugger, before this Society, on the large number of species of exotic Coleoptera found in Baltimore near the landing places of steamers. Now if only the tenth part, or even a much smaller proportion, of such imported species should become introduced species, it is safe to say that within a couple of years the fauna of the vicinity of Boston, New York, Baltimore, and San Francisco would be so changed as to be utterly strange to us North American Coleopterists. Enough has been said to point out that there is an essential difference between importation and introduction, which is expressed by the single word "acclimatization." This at once changes the aspect of things. In spite of the constant importation of hundreds of species the faunas of New York, San Francisco, etc., have not been perceptibly altered in the course of nearly 400 years. The recorded number of introduced Coleoptera during the past three years amounts to only four or five, and I am by no means satisfied that all these cases are really introductions. Some may be imported species, and they were captured and recorded before anything could be known regarding their ability to become thoroughly acclimatized in this country. The terms successful importation and successful introduction are even now sometimes considered tantamount, and a successful introduction announced when it could be only an importation. It is, of course, important for various reasons to record any importations; but we must watch and wait several seasons before we can judge about introduction.

We stand here before some great unknown factor—viz., the individual nature and inmost character of the species, which governs the introduction or non-introduction of each species—a factor which is variable according to each species and over which man has no control and is likely never to have any. Look at the recorded introduction of European species which, as stated before, are so readily transported into North America. There are many examples where the introduction of very common species has not taken place at all, or where it suddenly takes place after 400 years of non-introduction, or where introduction has taken place under the most improbable circumstances. There is a common European fly, *Eristalis tenax*, which in the larva state lives in all sorts of dirty and slimy places, so as to present the most readily available species for transportation and introduction into North America. Still it has taken nearly 400 years to accomplish this introduction, and when it was finally accomplished the species spread with incredible rapidity all over the United States. I mention this sample of the Order Diptera, because Baron Osten Sacken has given us a most interesting paper on the intricacy of this subject, published in the Transactions of the London Entomological Society for 1884. There is in Europe a common ladybird, *Coccinella 7-punctata*, in habit very much alike to *C. bipunctata*, which has long since been introduced here. Still the former has never shown any disposition to become Americanized, although it has probably more than once been brought in ships to our shores. This instance is paralleled in the European *Sarcophaga carnaria*. Numerous examples may be brought forth to show that successful introduction has taken place under rather improbable conditions—*e. g.*, in *Phlœotrya Vaudoueri*. This is a rare species, apparently not belonging to the circumpolar fauna, and which occurs in southern France, its larva probably living in the decaying wood of forest trees. Still, it must have been imported at some time, and is now to be found in many widely separated localities in the United States. Many European species of the genus *Philonthus* and other large genera have found their way to North America. Many other equally common species have hitherto refused to be transported and introduced. Many of the introduced species have spread with great rapidity—*e. g.*, *Scolytus rugulosus*, which, being evidently a recent importation, occurs now from Georgia to Ohio and northern New York. *Hylesinus trifolii*, also recently introduced, extends now from

New York to Canada and Michigan. Others, on the contrary, seem to be entirely unable to extend their range from the spot where they had established themselves in this country—*e. g.*, *Malachius æneus*, which, since many years, is found in the vicinity of Boston and nowhere else. *Nacerdes melanura* is now one of the commonest species in our eastern cities, and lives under conditions apparently most favorable for its further spread, viz., in the decaying wood of stables and outhouses. Nevertheless it is unknown west of the Alleghanies. The well-known *Anthrenus scrophulariæ* is common on the Pacific coast, where it has probably been introduced from Asia; but no complaint has ever been made of injuries committed by the beetle in California and Oregon. It was recently reintroduced from Europe into the State of New York or Massachusetts, and proceeded at once to destroy, at an alarming rate, the carpets in our houses and stores. A very common European dung-beetle, *Aphodius lividus*, has long since found its way to the West Indies, thence to South America, and also to our Southern States. Instead of continuing its spread northward along the Atlantic coast, it went westward through the Gulf States to Texas and Arizona and then northward through California to Oregon.

There has never been any serious attempt made properly to collect and record the merely imported species. In fact, such collection could only be made by the co-operation of many Coleopterists who live in our great seaports and who would be willing and able to spend much time on this work. Mr. Lugger is, so far as I know, the only entomologist who has paid some attention thereto and who has in his cabinet a good collection of Coleoptera imported in Baltimore, mostly, however, South American species, which, of course, have no chance of getting acclimatized in North America. A good, though isolated, effort in this direction was made in 1876, when a committee, consisting of Drs. Horn, LeConte, and Leidy, prepared and published a report on insects imported at the Centennial Exhibition in Philadelphia. Dr. C. V. Riley published independently another report on the same subject, but the list of imported species which were discovered on that occasion is not a large one, and I venture to say that an equal number of species could be found in the cargo of any steamer arriving at our ports.

From the multitude of introduced species the cosmopolitan Coleoptera can be isolated as a tolerably well circumscribed group. Owing to the increased facility for obtaining and comparing specimens of the various faunal regions our knowledge of these cosmopolitan species has in recent years been greatly advanced. Among them the coprophagous *Staphylinidæ*, various families of Clavicorn beetles (notably *Cucujidæ*, *Cryptophagidæ*, and *Lathridiidæ*), and the *Ptinidæ* predominate over all others. The *Carabidæ* are represented by two species, and the large phytophagous families, viz., the phytophagous *Scarabæidæ*, *Buprestidæ*, *Elateridæ* (if these may be called phytophagous Coleoptera), *Cerambycidæ*, and *Chrysomelidæ* are absent, only the *Bruchidæ* and *Rhynchophora* being represented by a few species. The Palæarctic fauna furnished, no doubt, a large proportion of the cosmopolitan species. Other species may be assigned, with more or less probability, to the faunal regions, while the origin of some remains uncertain.

The remaining portion of the introduced species I have in vain attempted to arrange in various groups. I tried to arrange them according to the probable method of introduction—*e.g.*, with domestic animals, with hay, straw, layers or cuttings of living plants, and other articles of commerce, etc.; but here I had to make so many divisions and subdivisions and so many species remained unprovided for that I had to abandon my scheme. I also attempted to arrange them according to the probable place of importation from which they had spread over a larger or smaller area; but while quite a number of species can clearly be assigned to certain ports, it was found that in many species, and more especially those which are now widely distributed, the original place of importation could no longer be ascertained.*

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* Postscript.—It had been the intention of the writer to append classified lists of the species common to North America and other countries; but the plan has been abandoned in view of the fact that since the reading of this address two such lists have appeared in print, to which the reader is now referred, and more especially to Mr. Fauvel's list, which is the later and more complete of the two. I cannot refrain, however, from transcrib-

February 7, 1889.

Thirteen persons present. President Schwarz in the chair.

Mr. Howard read the following paper:

Note on the Hairy Eyes of Some Hymenoptera.

By L. O Howard.

Presence of hairs on the eyes of Hymenopterous insects, and indeed of insects of other Orders, has been seldom noticed in general works. Recent papers on the compound eye by Lowne, Graber, Greinacher, Mark, and others make no mention of these hairs. Siebold (Anatomy of the Invertebrata) says: "With some Hymenoptera and Diptera they are pilose, the hairs being inserted at the angles of the facets." The instances given in the foot-note are *Apis*, *Tabanus*, *Anthomyia*, *Eristalis*, *Volucella*, and other Diptera.

Burmeister says, after Joh. Müller: "Upon the superior surface we occasionally observe, particularly with bees and flies, fine hairs projecting, which may be considered as analogous to the eyelashes, as they doubtless prevent the approach of external bodies, but at the same time limit the visual circle of each facet to the space itself occupies."

Lashes, or so-called "hairy" eyes, occur with Lepidoptera and with certain Coleoptera. In case of the Coleopterous genus *Xenos* the facets are subpentangular, and are separated by narrow spaces filled with dense minute ciliæ.

With the Hymenoptera these hairy eyes do not seem to occur with the horn-tails, saw-flies, or any of the wasps, nor with the true ants, Mutillidæ or Chrysididæ. With true bees, however, they occur in *Apis* and *Cœlioxys*. Among the Crabronidæ they are found in the genus *Ento-*

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ing here Mr. Fauvel's arrangement of this material, and it will be seen that he approaches the subject from a standpoint somewhat differing from that taken by the writer of this address:

I. Endemic Species common to Europe and North America.
  1. Species of the boreal, alpine, or subalpine regions.
  2. Species of the lower, temperate region.

II. Imported Species.
  1. Species imported from temperate Europe.
  2. Cosmopolitan or sub-cosmopolitan species.
    a. Species originating in the temperate Europeo-Siberian fauna.
    b. Species originating in the Oriental fauna.
    c. Species originating in the Ethiopian fauna.
    d. Species originating in the Neotropical fauna.
    e. Species of uncertain origin.
    f. Species of unknown origin.

mognathus. With the parasitic Hymenoptera they are comparatively abundant. They are recorded among the Ichneumonidæ, in *Trichomma*, and *Cymodusa;* among the Braconidæ in *Chænusa* and *Chorebus;* among Chalcididæ in *Brasema*, *Lutnes*, *Aseirba*, *Cleonymus*, *Micradelus*, *Isocyrtus*, *Halizous*, and *Trichoglenes;* among the Proctotrupidæ in a number of genera, among which may be mentioned *Oxylabis*, *Belyta*, *Synacra*, *Pantolyta*, *Zygota*, *Aclista*, *Acropiesta*, *Anectata*, *Pantoclis*, *Macrohynnis*, *Xenotoma*, *Leptorhaptus*, and *Cinetus*.

Recent examination of other genera shows that these hairy eyes are much more abundant than has been heretofore noticed. In the common honey bee the hairs are plainly visible to the naked eye. They are fine, silky, yellowish in color, very closely set, but not interfering with a direct view of the facets, and do not occur at every angle. Some of the hairs are 0.2^{mm} long. In *Melissodes* I have been able to observe them, although they are very short and fine and barely perceptible with a one-quarter-inch lens. Among the Encyrtinæ I have found them in some species of *Encyrtus* and in all species of *Copidosoma* examined. I have also found them in the Entedonid genus *Chrysocharis*, and in the Scelionid genus *Telenomus*. All of the species of the genus *Coccophagus* which I have described have hairy eyes, the hairs plainly seen under 140 diameters.

None of the *yellow* species of *Aphelinus* have these eyes, but the only *black* species—*A. mali*—has the hairs as plainly as in *Coccophagus*, although in antennal structure and wing characters it plainly belongs to the former genus. In all of these Chalcids there is no question of *degree* of hairiness, for in the smallest species of *Coccophagus* the hairs can be seen quite plainly with a power of 55 diameters, becoming more and more distinct, with higher powers, until at 140 diameters they are very distinct. With the non-hairy-eyed species, however, a power of 700 diameters fails to show any but a plain surface. As nearly as can be seen in these smaller Chalcids the hairs are situated one at each angle of a facet. Their length in *Coccophagus californicus* is $.0057^{mm}$.

From the intimate connection of these hairs with so important an organ as that of sight it would seem at first glance that their presence or absence should form an important classificational character; but after a careful review of the ground, and taking into consideration that they occur in almost isolated genera scattered through different families, and not related in habits in any way, we must come to the conclusion that they are functionless or of slight use to the species, and probably of no more value as classificatory characters than pilose growths upon any other part of the epidermis.

Mr. Smith said that among the Lepidoptera three variations were found in the eyes, viz., the naked, the lashed, and the hairy. The term "lashed" was used when the eyes had a fringe of hair around the margin. The question of having hairy or naked eyes was not one of degree. The eyes were always either distinctly hairy or naked. In the *Noctuidæ* this was used as a generic character.

Prof. Riley agreed with Mr. Howard. He did not think that this variation can be used as a generic character, and even questioned its specific importance.

Mr. Smith said that it was always of generic value in Lepidoptera.

Mr. Schwarz said that in Coleoptera this character occurred in various families and had always specific value.

Prof. Riley stated that, so far as known, there were no species of Hemiptera that had hairy eyes. He asked if this character had ever been used alone.

Mr. Smith replied that it had been so used in *Noctuidæ*.

Mr. Schwarz asked if there was not in other Orders some correlation between the granulation of the eyes and their being hairy or naked. Were not the coarsely granulated eyes always naked and only the finely granulated ones sometimes hairy?

Mr. Coville addressed the Society on the following subject:

NOTES ON BUMBLE-BEES.*

BY FREDERICK V. COVILLE, Assistant Botanist, U. S. Department of Agriculture.

In the summer of 1885 the writer was a member of the Summer School of Entomology of Cornell University, under the direction of Professor J. H. Comstock; and a portion of the work selected by him and assigned to him was a series of observations upon the bumble-bees of the vicinity of Ithaca, N. Y. Specimens were collected, determined, an analytical key to the species prepared, a series of notes made upon their specific characters, methods of capture and rearing devised and carried out, and their habits studied. At the end of the season a mass of more or less heterogeneous notes had accumulated containing several new and interesting facts, but not in condition for publication without additional work. The writer hoped that within a few years at most an opportunity of completing his observations and publishing an entire account of them would be presented; but as the course of events has rendered this impossible, and for the future improbable, the original plan of publication must be given up and only a few of the seemingly more important facts published.

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* Delivered in the form of an extempore talk to the Entomological Society of Washington, February 7, 1889, and prepared from the manuscript notes made by the author in 1885.

I.

The Habits of Bumble-Bees.

It was found impracticable to find the nests of the bees by the method of "lining" used in the case of the honey-bees. It was difficult to get the bees to feed in a box. When liberated they did not fly in straight lines, and never did one return. It may aid some future student, however, if it is stated here that the writer has frequently seen bees when laden fly from a field of clover in a straight line in the direction of a nest, the location of which he already knew.

The neighboring farmers usually knew the localities of several nests, and were glad enough to point them out. Just before dark, after all the bees were in, the writer, provided with a cigar-box, a bottle of chloroform, a pair of forceps, and a gauze-covered wide-mouthed bottle, would quietly approach the nest, pour a little chloroform over it, wait until the humming had ceased, open the top of the nest, pick out the bees with the forceps and put them in the bottle, the nest, with the "comb," being placed in the cigar-box. The bees soon revive, and the chloroform, if used moderately, does not kill the larvæ.

A box about three inches deep and large enough to contain the nest had been previously provided with a glass cover, and a small hole had been cut in the side. In this box the nest and revived bees were placed, and the aperture closed for a day. The box was then fitted in below a window sash, so that the bees could come and go on the outside without annoying the observer. The nest, if a thin one, was blocked up, so that the uppermost cells of the "comb" touched the glass, and the whole box covered with an opaque mat. The nest, originally that of a mouse, was made of dead grass and lined with wax, and as there was little room between the comb and the glass, the upper part of the nest could not be rebuilt, and the wax lining was made fast on all sides to the glass. Thus, when the darkening mat was removed, the whole interior of the nest could be seen. The bees entered the nest through an opening near the bottom. They soon became reconciled to their new quarters, although for a few days many of them would return to the place from which their nest had been taken. It was not ascertained whether these bees perished or learned afterward the new location of the nest.

All the nests that were reared were captured in July, and the one on which the following observations were made was that of a colony of *Bombus borealis*.

A general account of the habits of some of our American bumble-bees was published by F. W. Putnam* many years ago, and the observations there recorded agree, so far as they go, with the few exceptions noted below, with those of the writer, and some additional facts are here presented,

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*Proc. Essex Institute, iv, 98–104 (1864–5).

with a sufficient number of well-known facts to give them intelligible connection.

The nest contained when captured the queen and a large number of workers of various sizes, as well as eggs, and larvæ in various stages of development. The precise functions of the different-sized workers were not evident, but in general the larger ones attended to the mending of the grass covering of the nest and to the bringing in of honey, while the smaller ones for the most part did the inside "house-work," the wax patching, and the nursing, described below. The nursing, indeed, was never done, so far as was observed, by a large or even a medium-sized bee.

The eggs are laid, several together,* in cavities in a mass of wax. This is in direct opposition to the statements of Putnam (l. c.), and of various English writers consulted by me, they stating that the eggs are laid in a mass of pollen, upon which the larvæ, when hatched, feed. The substance was tested first by the application of heat, when it melted precisely like beeswax. It would not dissolve in water, while pollen and an artificial mixture of pollen and honey readily did so. A microscopic examination of the wax showed, however, that it contained a great number of pollen grains; but this would be expected when it is considered how much pollen is used about the nest. The larvæ, after hatching, remain incased in a shell of wax, and soon become separated by a wall of the same substance each from its neighbor.

Their method of obtaining nourishment—instead of by eating away the pollen walls, in which they are supposed to be incased, the workers constantly adding more to the outside—is strikingly different. They are fed by a mixture of pollen and honey supplied to them by a worker. The operation will be described later.

The larvæ, when grown, spin a silken cocoon, and at the end of the nymphal stage, the duration of which was unfortunately not noted,† emerge by gnawing about the apex of the cocoon so as to form a lid. When the adults first come out their subsequently yellow hairs are pale, almost white. As soon as the bee has left its nymphal quarters the other workers cut away about the upper half of the cell and remove the *débris*. The part which is left furnishes a receptacle for the raw honey and pollen as it is brought into the nest.

When returning from the field the bees settled down upon the alighting-block at the entrance of their box, when full laden, with a low, abruptly-ceasing hum, always distinguishable from that of a bee without honey or pollen. The bees went directly, in a most business-like way, to the pots, deposited their loads, and went away again or busied themselves about the nest. If honey-laden, the bee perched herself on the margin of a honey-

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*The writer has observed in *B. vagans* as few as three and in *B. terricola* as many as twenty.

† The writer estimates this time, from memory, at from two to three weeks.

pot, lowered her head into it, and then drew her abdomen far in, thus forcing the honey from her mouth. If pollen-laden, the bee balanced herself, with her middle and cephalic pairs of legs, on the edge of a pollen-pot, head outward, spread her wings, and then scraped the pollen-masses from her corbiculæ by rubbing the posterior legs together.

The mode of feeding the larvæ is as follows. One of the smaller workers, which may be called a nurse-bee, goes to a honey-pot, from which she presumably draws a small amount of honey, and proceeds next to a pollen-pot. She remains here, with her head in the pot, undoubtedly preparing a mixture of pollen and honey, for ordinarily about ten minutes. Then going to one of the larvæ, which lie in circular form in their chambers, she injects into the cell, through a small opening previously made, usually by another worker, a brownish fluid of the consistency of honey. This is greedily eaten by the larva. Whether the larvæ of both females and workers are fed in the same manner and with the same mixture could not be decided. But, from the analogous case of the honey-bee, it is to be expected that the kind of food does influence the size and function of the bee. The males, it may be added, are commonly supposed to have come from eggs laid by the sterile females (workers).

In early August females (queens) and males began to emerge. Both left the nest within a few days, and did not return, nor were they seen to copulate.

In the first chilly afternoon of autumn the workers become stiffened with cold, and do not return; and after a few freezing days the old queen, too, succumbs. The males also perish, and only the young queens survive the winter.

The bees were greatly troubled with inquilines. In the grass covering of the nest there were always present the larva of a small moth, a small beetle, in its various stages, and frequently cockroaches. Within the wax lining a minute insect was frequently seen.* The larvæ of the bees were, too, sometimes killed by what was probably a fungus of the genus *Entomophthora*. These dead larvæ were always carried out by the bees and dropped.

The bees were very cleanly in their habits. Their fæces, for example, were always deposited in a particular place outside the nest, in a corner of the box. The bee approached the spot, turned about so as to face away from it, then backed still nearer, and forciby ejected the fæces.

II.

The True Relationship of the So-called Apathus elatus.

When the colony of bees on which most of the preceding observations were made was captured, the species was supposed to be *Bombus fervidus;* and as it is of this species that *Apathus elatus* is supposed to be an inqui-

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* None of these inquilines were determined.

line, a careful watch was kept to detect, if possible, the breeding of the inquiline. But all the bees that emerged were either workers, queens, or drones. No *Apathus* was developed. It was noticed, however, that the workers and queens differed somewhat from others collected in the field, and a reconsideration of the characters of the two forms showed that the colony in captivity was not *B. fervidus*, but *B. borealis*—a species previously overlooked by the writer, but well described (the female only, however), and distinguished by Kirby.* All the ♀ ♀ and ☿ ☿ of these two species in the collection were accordingly easily separated, but among the ♂ ♂ only one form could be found—that with precisely the coloration of *B. borealis*, and identical with those bred from the captive colony of that species. Not a ♂ specimen was found that showed any probability of belonging to *B. fervidus*.

Meanwhile two bumble-bees had been captured in copulation by Mr. O. E. Pearce.† These were examined, and proved to be a ♀ *Bombus fervidus* and a ♂ *Apathus elatus!*

An examination of the structural characters of *A. elatus* with a view toward finding therein the warrant for placing the species in *Apathus* instead of *Bombus* was next made. The males of *Apathus* are said to differ from those of *Bombus* by having the outer side of the tibia of the posterior leg rounded and covered with hair, and by having no corbicula. *Bombus* has a flat naked tibia and a corbicula. *Apathus elatus* has, it is found, a corbicula, rudimentary it is true, and the hairs on the outer surface of the tibia are shorter and scantier than in any other species of *Apathus*. So far as these structures are concerned, therefore, *A. elatus*, while apparently clearly an *Apathus*, is really intermediate between the two genera.

Next, several colonies of genuine *B. fervidus* were taken, in the autumn of 1886, at the season of producing males, and in every case the so-called *A. elatus* emerged from the nymph-cells in abundance, and no other form.

A female *A. elatus* has never been described.

The writer, therefore, considers *Apathus elatus* to be the male of *Bombus fervidus*, the evidence being summed up as follows: The female of *Apathus elatus* is unknown. The male of *Bombus fervidus* is unknown. The coloring of the two is alike. The structural characters of *A. elatus* do not unequivocally keep it out of *Bombus*. *A. elatus* has been bred in colonies of *B. fervidus*, and in the colonies of no other species. No male bee,

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*In *B. fervidus* the hairs of the head are entirely black, and those of the pleura yellow. In *B. borealis* the hairs of the head, on the vertex and on the face cephalad of the antennæ, and sometimes caudad of the antennæ, are partly yellow, and those of the pleura black. The yellow hairs of *B. borealis* on all parts of the body have a tawny shade, quite different from the lemon-yellow of *B. fervidus*.

†A similar case has been recorded by Mr. Benjamin D. Walsh (Proc. Ent. Soc. Phil., iii, 247, foot-note [1864]).

except *A. elatus*, has been bred in colonies of *B. fervidus*. *A. elatus* and *B. fervidus* have been taken in copulation.

One additional case, in connection with this matter, needs to be inquired into. Mr. E. T. Cresson records * the taking, in the State of New Jersey, of a colony of *B. pennsylvanicus*, which contained six females, thirty-four workers, and twenty-one males of "*A. elatus*." Mr. C. L. Marlatt has frequently collected these males in Kansas, which were doubtfully so determined by Mr. Cresson, in the nests of the same species. It is to be remarked that in these instances males of *B. pennsylvanicus* are never found. It has been impossible for the writer to give these specimens of so-called *A. elatus* a critical examination. But he is confident that they will be found to differ from the *A. elatus* referred to *B. fervidus*, and to be the males of the species with which they are found.†

There remain four North American species of true *Apathus*, two of which the males only are described, and two of which females only are known, and which respectively resemble the other species in coloration. Their breeding habits are entirely unknown.

Prof. Riley opened the discussion, saying that he did not doubt the accuracy of the above conclusions in the least. He had found great difficulty in separating the species in these two genera.

Mr. Marlatt stated that he had examined the nest of *Bombus pennsylvanicus* in the fall and had found the workers and queens, also male specimens, which were doubtfully identified as *Apathus elatus*, but which he now considers must have been the males of *B. pennsylvanicus*. In other species of Bombus he had found the males abundant.

Mr. Ashmead would hardly be willing to accept these conclusions as final until the insects had been reared from the egg.

Mr. Schwarz stated that he had seen the male of *B. pennsylvanicus*, and that Mr. Pergande had called his attention to the difference in flight in the two sexes of this species.

Prof. Riley said that he now recalled having taken a female *Bombus* and male *Apathus* in copulation.

Mr. Coville further stated, in answer to a question, that there were a number of queens hatched together, and that they all left

* Proc. Ent. Soc. Phil., ii, p. 164 (1863).

† While correcting the proof of this paper, an article by Mr. C. Robertson in *Entomological News*, i, pp. 39–41 (1890), has been brought to my notice, in which the statement just made is entirely corroborated by independent observations. Mr. Robertson's article should by all means be read in connection with the present one.

the nest at the same time, leaving the old queen in possession. The young queens did not start colonies until the following spring.

Mr. Ashmead offered some remarks on the genus *Tetracnemus*. He called attention to the fact that Westwood first described a species with five tarsal joints. Then Walker described one with only four, considering the five of Westwood a mistake. Mr. Ashmead showed specimens of two distinct genera, both agreeing nearly with Westwood's description, but the one with four, the other with five, tarsal joints, showing that Westwood was right in placing his genera in the *Encyrtinæ*, while the form described by Walker belongs to the *Eulophinæ*. He collected both in Florida.

March 7, 1889.

Eight persons present. President Schwarz in the chair.

The death of a Corresponding member, Mr. S. Lowell Elliott, was announced as occurring in Brooklyn, N. Y., February 12, 1889.

The following communication by Judge Johnson, referring to specimens of a flea which he had previously sent to the Society,* was then read:

The Jigger Flea of Florida.

By Lawrence C. Johnson.

Probably our fair land of orange groves and alligators possesses as many varieties of the flea family as any other in the same latitude, but one of them seems to be peculiar. The "Crackers"—as the native-born English-speaking folks are called—know it by the name of the "jigger flea," which is a translation, or, strictly speaking, a transference, of the local colonial Spanish title, the "Chigo flea," which means, it seems, that to the popular understanding it is not the "Chigo" of the West Indies, nor their old acquaintance from Spain, the flea, but something compounded of both.

Observation of the habits of this insect verify the appropriateness of the designation. All its habits—all its life-history, are not yet known; but from such as are actually known, a few others may be inferred.

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*See page 159.

Like all fleas, it abounds mostly in shady places; under old houses, on earthen floors, and in all dusty, untidy spots. Hence from analogy when some years ago my attention was called to the subject by poultry breeders, I advised to have all such places closed up, and to deprive their fowls of all shade except such places as could be rained upon. Those who acted on this advice were rewarded. Losses from this cause were reduced to a minimum. It was also seen that animals frequenting wet spots in summer were exempt from the pests.

The life-history of this flea is yet to be written. So far as facts go, they are too few and obscure to base satisfactory conclusions upon.

First observed to infest young animals—such as chickens, turkeys, kittens, puppies, and even calves and colts and children—I proposed for it the name *Pulex pullulorum;* but whilst it is true the young suffer most, because possibly less able to defend themselves, it is by no means confined to them.

In general appearance, size, color, and form greatly resembling a flea, popular observation notices one considerable difference—it does not hop. Closely examined, we find the femoral portion of the third pair of legs but slightly developed. Hence its motions resemble more the crawling of a wingless fly than of our well-known active jumper.

In its habits of feeding it differs from the ordinary flea. Instead of making an incision at which to lap blood, and from which it may quickly remove to another spot, our Florida variety plants itself where it intends to stay, like a tick. As to the males, I cannot say. Much of my information is second-hand. The notion that these do not bite, which prevails with some persons, or at least that they do not *stick*, may be an error. Of the females, however, it is certain they bury themselves in the skin of their victims. From the first, they hold on with such tenacity that no ordinary brushing will remove them. It seems to be at this stage in their existence that impregnation takes place. The males now are often seen in copula with them, and so remain apparently for days, or until the tumefaction of the skin excited by the imbedded female closes around her so as to shove him off.

Here ends about all actually known of this history.

From analogy, we may infer that, the period of gestation being completed, the gravid female lays her eggs in this well-prepared *nidus*, or, more particularly, that they remain and are hatched in her distended stomach, after which the larvæ crawl out and drop to the ground. If in a dry, shady spot they undergo transformation to the perfect form; if in a wet spot or in the sun they perish.

Upon man, I have never heard of the process continuing to the end. The itching caused by it generally attracts attention sufficiently to have the intruder hunted out. With the lower animals it is different—most notedly with chickens. Spots bare of feathers, or nearly so, are selected in preference. A small knot resembling a wart grows over the insect, and so numerous and large at times as to spread over the eyes and into the jaws;

and, blind and famished, the victim dies. In cases not fatal, after a month or two, these knots or warts drop off, leaving a scar resembling a burn. With very young chickens or puppies, death generally comes in the first stage, when every portion of their bodies is covered with innumerable enemies.

Mr. Schwarz said that he had only met with the true flea and the Chigo (*Rhynchoprion penetrans*) in Florida, and that he is inclined to think that Judge Johnson is dealing with the latter. The specimens formerly sent by Judge Johnson were a true *Pulex*.

Prof. Riley mentioned that the larvæ of several mites produce an effect as described on chickens, but the true Chigo does not.

Prof. Riley spoke on some "Microgasters affecting Rhopalocera." He called attention to the great variability of these species, and said that their specific distinction was more or less dependent upon individual opinion, and that this held in relation to the cocoons as weli as to the imagos. He stated that it was almost as easy to make a continuous series as to make well-marked divisions. He also said that *M. pieridis* Packard was the same as *Apanteles glomeratus* Linn., although the American form shows some slight differences from the European in the coloration of the legs. Extreme examples are easily separated, but there is a perfect series of intergrades. He could find no entomophagic effects. Different hosts might make some difference in the cocoons, but not in the imago. There were many excellent structural characters that could be used, as the sculpture on various parts, that of the scutellum being particularly valuable.

Dr. Marx remarked that he was glad to find that others had found this difficulty in separating species. In spiders it was exceptionally difficult, as there was much individual variation. There was always some slight difference between American and European spiders of the same species.

Mr. Smith said that according to the Darwinian theory many of the structural characters must vary. In many groups he has had cause to doubt the existence of any species. Many times, however, the true characters have been overlooked, and closer study will bring out the species. He cited the genus *Lachnosterna*, which he had recently worked out. He asked if the males of *Microgaster* had not some characters that could be utilized.

In several groups of insects only the males could be separated, the females being indistinguishable.

Prof. Riley replied that in *Microgaster* the females were generally the better characterized, but in a few it was the males. The male antennæ and the female ovipositor often gave the best characters.

Mr. Marlatt read the following:

Swarming of Lycæna Comyntas, Godt.

By C. L. Marlatt.

About the middle of July, 1888, the writer's attention was drawn to the large numbers of small butterflies, of the species above named, flitting with irregular but rapid flight back and forth at a height of 25 to 30 feet from the ground, above some elm trees which grew alongside a large field of red clover. Occasionally one would rest for a second or two on the upper part of an elm, only to quickly resume its place in the swarming mass above.

No easy explanation of the peculiar congregating of these butterflies presents itself. So far as observed, it was not a nuptial flight—no union of the sexes occurring. There was no general movement in any direction, but their actions seemed rather of a playful or frolicsome nature. They had evidently come together from the clover-field mentioned, in which they had been breeding abundantly.

A threatening storm of wind and rain coming on at the time may have had something to do with their collecting into swarms.

An additional instance may be given, which indicates still further a semi-gregarious habit with these insects. The writer has observed them in later summer covering moist patches of ground in such numbers that a single sweep of a net would capture 50 or more of them. Their object in this instance was evidently to suck up the moisture, the extremely dry weather having doubtless greatly reduced the supply of nectar in the clover-blossoms.

Mr. Smith said that it could hardly be a nuptial flight, for this species copulates over its feeding-grounds in the fields.

Mr. Schwarz said that Benton had lately recorded an instance of a "flock" of butterflies in New Guinea, which covered a couple of acres of ground where there were no flowers for food.

Prof. Riley thought this note very interesting, and said that whenever, from whatever cause, a species of insect becomes extremely abundant it almost invariably swarms and has some peculiar flight. He mentioned an instance, which came under his own notice, of extreme abundance of *Colias* and *Vanessa* in France. When the food-plant grows scarce a tendency to migrate is generally shown. He has noticed large migrations of *Anosia plexippus*, leaving Manitoba in the fall and returning in the spring.

Mr. Schwarz suggested that the swarm noticed by Mr. Marlatt might correspond to the swarms of gnats which are so often seen.

Dr. Fox mentioned seeing a large number of the *Anosia* crossing a large pond northward, early in September. They were evidently flying *with* the wind.

Prof. Riley mentioned having seen several specimens at the seacoast attempting to fly inland against high winds for many hours at a time, with but short rests.

Mr. Schwarz said that the swarming in Coleoptera always occurred on sultry evenings, and the beetles usually let themselves go with the wind.

As an instance of migratory instinct, Prof. Riley called attention to the spring migration of the earth-worm as showing the same trait.

Mr. Smith mentioned having noticed in an entomological journal the capture in England of *Mamestra chenopodii*, an American variety. He thought this was an error, and that a continental variety closely resembling the American form was that to which it should be referred.*

Prof. Riley had seen specimens in the British Museum corresponding to the variety referred to.

April 4, 1889.

Ten persons present. President Schwarz in the chair.

The Publication Committee reported that Vol. I, No. 3, of the Proceedings had been issued, and the first copies distributed on March 30, 1889.

Mr. M. L. Linell was elected as an active member of the Society. The following communication was then read:

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*See Ent. Mo. Mag., v. 25, 1889, p. 228.

Correction to: Monographs of the Diptera of North America. Vol. I, Washington, 1862.

By C. R. Osten Sacken.

It is never too late to mend. It is now nearly 30 years since I published, in the above-named volume, a paper : On the North American Cecidomyidæ (l. c., pp. 172–205); and it is only now that a passage in Fred. A. A. Skuse's : Diptera of Australia, Part 1, Cecidomyidæ (Proc. Lin. Soc. of N. S. Wales, Vol. iii, p. 45, Jan. 1888), draws my attention to an egregious blunder that I committed on pages 177 and 178 of that volume. Mr. Skuse is right of course, and in consequence the three last lines of page 177 should read thus :

The upper branch of the fork forms a single smooth curve; ♂ antennæ 16-jointed, verticillate, joints pedicelled.

Antennæ of the ♀ 10-jointed, pilose, joints moniliform; wings like fig. 10.

Catocha Halid.

Antennæ of the ♀ 11–12 jointed, joints sessile; wings like fig. 12.

Lestremia Macq.

On page 178, line 8 should be struck out: (Antennæ 16-jointed, etc. Lestremia Macq.)

Dr. Marx read a paper on "Some Spiders from the Galapagos Islands." These spiders were taken by the U. S. Fish Commission steamer "Albatross" between April 1 and 15, 1888. Of the ten species collected four were new to science.*

In the discussion of this paper Mr. Schwarz said that he fully agreed with a statement by Dr. Sharp, to the effect that the insect fauna of the Galapagos Islands was altogether too little known to define its character. No expert entomologist had, to his knowledge, ever visited these islands.

Mr. Mann stated that according to his information one of the most distinct lines of demarkation between floræ is that which is drawn between the floræ of the west coast of South America and those of the Pacific islands.

Mr. Schwarz then read the following paper :

Notes on the Comparative Vitality of Insects in Cold Water.

By E. A. Schwarz.

The following fragmentary notes on the vitality of the different orders of insects when immersed in cold water are not based upon experimenta-

*See Proc. U. S. National Museum, v. 12, 1889, pp. 209–210.

tion, but upon observation in the field, and require some preliminary explanation regarding the circumstances under which the observations were made.

The occasional accumulation of large masses of insects of all Orders washed ashore on the sandy beaches of our great lakes or along the ocean has often been mentioned in print and otherwise; but since, so far as I am aware, nothing definite has ever been published concerning this phenomenon I take this opportunity to place on record the results of observations carried on through several years along the Upper Lakes, and more especially Lake Superior. To the latter locality I refer more especially because here my friends and myself have been at several points all around the lake in different years, and also because the insect fauna of the Lake Superior region is infinitely richer than that of the Lower Lakes. Moreover, in the boreal climate of Lake Superior the appearance of the entire insect fauna is a nearly simultaneous one, whereas on the Lower Lakes the various species appear successively from early spring throughout the whole summer. At Lake Superior the time of appearance and swarming of most insects is compressed into the short time from the beginning of June till the middle of July. During these few weeks untold millions of insects fall into the lake, but whether attracted by the glittering surface of the water or from exhaustion, having flown too far out into the lake, cannot be ascertained. Under certain conditions these specimens are washed upon the beach, reaching the same either alive or drowned, and form, on a favorable day, intermixed with the various débris, a windrow sometimes several inches in height and width, and continuing for miles along the shore until the direction of the beach changes.

This accumulation of specimens, observed by many entomologists, is usually said to occur during or after a storm; but this is quite incorrect, at least so far as the Lake Superior region is concerned. If the lake is angry, the waves break long before reaching the shore, the sand is stirred up by them, and all insects that are washed ashore are at once buried in the sand, whence they are unable to extricate themselves, and where they cannot be seen. Only the strongest among them—*e. g.*, the genus *Sphenophorus* of the Coleoptera—survive the general slaughter. To produce a large accumulation of specimens on the beach, a gentle but steady breeze must prevail, for at least several hours, directly toward the shore, and must be preceded by warm weather. If the breeze is offshore, or even obliquely toward the shore, or changeable, or if the weather has been cold a day or two before, no accumulation of specimens takes place.* Such favorable combination of meteorological conditions does not often occur at a given place of the lake shore, and one can spend a whole season at the

*Th. v. Siebold (Beitræge zur Fauna Preussens, 1849, p. 6) refers to this phenomenon as observed by him at the Baltic Sea, near Danzig, Prussia, after the first days of spring, and states that the insects are washed ashore by a light breeze blowing inshore.

lake without once witnessing the phenomenon I speak about. If, however, luck is favorable, the number of species and specimens of all orders that can thus be found is simply incredible to any one who has not been on the spot himself. It suffices to say here that in 1877 Mr. H. G. Hubbard and myself collected, or rather picked up, within four days, upwards of 1,100 species of Coleoptera alone, and this not under quite favorable conditions.

This is of course an excellent opportunity of filling the collecting-boxes with large series of the choicest and rarest species; but this mode of collecting is a most unsatisfactory one, for nothing can be learned regarding the food-habits or mode of life, or earlier stages, of all the thousands of species found on the beach. In fact, it is most aggravating to the entomologist to see on the beach hundreds of specimens of a showy species of which he is entirely unable to find a single specimen in the woods or wherever the species may be supposed to live.

When during the past year I had again the opportunity of spending a few days in July on the south shore of Lake Superior, and of witnessing the washing ashore of multitudes of insects, I had the idea that this vast mass of material could possibly be utilized to point out, within a reasonable degree of certainty or probability, the power exhibited by the various species of insects of retaining their vitality when immersed in cold water. I went to work accordingly and began to note down those species or genera which appeared to me to have reached the shore in good—*i. e.*, living—condition, in contradistinction to those which I found drowned, at least as far as the greatest majority of specimens would justify such statement; but very soon I found out that the immense material before me was too much for my task, and I had to confine myself to the commonest species, which aggregate more than 800 species, distributed most unevenly among the various orders.

At the first glance it would appear that such comparison based upon this material was impossible, for we have no means to ascertain how long these insects have been immersed in the water. But the following considerations induced me to continue my notes and to complete them after my return to Detroit from the collections made in former years at the same locality.

Among the thousands of specimens of a common species found on the beach a certain proportion must have been exposed to the water for a short time, another number for a longer period, and still another portion for a very long period. If all these specimens, or by far the greatest portion of them, reach the shore in living condition, it is evident that we can enumerate this species among those that can endure, without injury and for a long time, exposure in cold water; and if, on the other hand, all or most specimens of another common species are found drowned on the beach, we may correctly infer that even those specimens which have been in the water for a short period were killed by the immersion, and that we can enumerate this species among those which cannot bear a long exposure in water. A difficulty is experienced with those species which are about equally divided in regard to living and drowned specimens. Here it appears probable that the living specimens have been in the water for a short time and the dead specimens for a longer or very long period. Such species naturally occupy an uncertain, or at least intermediate, place on my list.

That all terrestrial or semi-terrestrial, and, I may add, also most of the truly aquatic insects in the imago state get finally drowned in water, admits of no doubt, but how long they are able to sustain immersion can only be ascertained by experiment with each species. It is evident, however, that this time varies according to the adaptability of the species and to a multitude of circumstances, such as temperature and condition of the water. If insects happen to cling to pieces of wood or other floating objects they will be able to sustain the exposure much longer than those which simply float on the surface of the water. Insects with exposed stigmata are evidently less fit for long immersion than those with protected stigmata, and those with a nervous temperament and which exhaust themselves by violent movements succumb, no doubt, sooner than those with a more phlegmatic temperament. Among the Lake Superior insects washed ashore we notice many strictly nocturnal species, and if these are washed ashore, say, at noon of a certain day, it is evident that they must have been in the water at least since the previous night, and probably since the earlier hours of that night, since most nocturnal insects fly soon after dark and not often after midnight. But we have no means of ascertaining whether such insects have been in the water for one day or two, or even longer. With the diurnal insects this uncertainty is still greater. The washed-up specimens may have been only a few minutes in the water, or for some hours, or for one or two days, or still longer. That there is a great diversity in this respect is evident from the immense multitude of specimens found on a single point. They cannot have possibly dropped in the water at a single spot and at the same time. Some, no doubt, dropped into the lake a short distance from the shore; some farther out, and still others very far—perhaps many miles—from the shore. In the summer of 1874, Mr. H. G. Hubbard and myself passed on a raft of logs through Lake Sinclair. This raft was more than a hundred feet wide in front, and it acted like a great collecting machine, fishing up everything that came in its way. The raft was covered with specimens of all Orders, and this happened at a distance of at least five miles from the nearest land. How long it would take these insects to be driven ashore by a favorable breeze is not possible to tell without special observation; but from what we saw at Lake Superior this process is accomplished more rapidly than one is inclined to suppose.

With all these drawbacks and uncertainties I present herewith, for what it is worth, the following table of Orders, condensed from my notes and arranged according to their smaller or greater ability to withstand immersion in the icy water of Lake Superior. If this table should be arranged according to single families the same sequence of Orders could not be maintained, since even among those Orders lowest on my scale we find families which are well adapted to stand the exposure:

1st Group—Insects ill fitted to stand immersion:
Diptera, *Neuroptera*.

2d Group—Orders that occupy an intermediate place, arranged in an ascending series from those that are less to those that are better able to withstand immersion:
Orthoptera, *Hemiptera*, *Lepidoptera*.

3d Group—Orders that are eminently fitted to endure immersion:
Hymenoptera, *Coleoptera*.

Diptera.—These are rather poorly represented among the insects washed ashore. There are not many *Tipulidæ*, and among them a still living specimen is rarely to be seen. There are numerous *Muscidæ*, *Syrphidæ*, *Asilidæ*, *Conopidæ*, *Anthracidæ*, and *Bombyliidæ*, but few living specimens among them. A notable exception is found in the *Bibionidæ*, which, as a rule, are found in excellent condition. In this Order, as well as in the others, we meet also with another striking phenomenon, viz., there are lots of the most delicate forms, *e. g.*, *Cecidomyidæ*, *Sciaridæ*, *Mycetophilidæ*, being washed ashore unharmed; whereas the larger and more robust species are apparently much less capable of enduring immersion. But this may be explained in the following way: First, small and delicate insects are poorer flyers than larger insects. This does of course not imply that *all* large insects are good flyers, but only means that the best flyers are to be found only among the large forms. These delicate Diptera certainly fly only a short distance out into the lake, and have then a good chance of being driven ashore within a short time. Moreover, they are so light that when they drop in the water they are but little immersed, and are then washed ashore dry and unharmed. Second, while it is easy to see living and moving specimens of even very small insects, the eye of the observer is not attracted to the dead specimens which cling to the various objects—*e. g.*, pieces of bark, other insects, etc.

The absence of Black-flies (*Simuliidæ*) among the insects found on the beach is also noticeable. These abound near the woods, as is only too well known to the visitors of that region, and breed in the numerous rivers and creeks some distance from the lake where the water is still rapid. They often fly great distances from the breeding places, but dislike to come near the open shore, and do not allow themselves to be driven by the wind out into the lake.

Neuroptera (including Pseudoneuroptera).—Although for the largest portion water-born, these insects are ill-fitted to sustain, in the imago state, immersion in water, and the remarkable thing is that those families which are terrestrial in the earlier stages seem to have a superior resisting power. Thus among the *Psocidæ* and *Hemerobiidæ*, which are numerously represented, the greater portion of the specimens washed ashore are alive and in very good state of preservation, while in the *Perlidæ* and *Ephemeridæ* most specimens are found drowned. In the *Odonata*, which are well represented in the Lake Superior region, it is difficult to find living specimens on the beach except in the family *Agrionidæ*. These are generally alive and in good condition, owing no doubt to the fact that they are poor flyers, and have not been long exposed to the water. The remaining families of *Odonata* are among the best flyers. They fly for many miles out over the water, and many are no doubt able to fly across the lake at its widest part. But many specimens fall into the water, and are finally driven ashore in a badly decayed condition, thus showing that they must have been in the water for a long time, but even among those not decayed it is hard to find a living specimen. The *Trichoptera* are by far the most numerous insects in the Lake Superior region, and they are also best represented among the insects cast ashore, constituting about one-half of the whole mass. On account of this multitude of specimens, it becomes a difficult thing to estimate the proportion of the living to the dead specimens. There are millions of dead specimens, decayed or not decayed, millions of half-dead specimens, and other millions which are in excellent condition and as lively as ever.

ORTHOPTERA.—These can hardly be taken into consideration here, since they are so poorly represented among the insects on the beach. All I found were a few specimens of a Locustid (*Microcentrus*), which were alive and in excellent condition, and a few species of *Acridiidæ* (*Caloptenus bivittatus*, *atlanis*, *femur-rubrum*, and perhaps two other species); but these in great number of specimens, and here the living specimens by far outnumbered the drowned specimens.

HEMIPTERA.—These offer but little occasion for remarks. As a whole, they are well represented on the beach and tolerably well fitted to sustain immersion. Of the *Gymnocerata* only a few specimens of *Corymelæna* were found, all drowned. The *Pentatomidæ* and *Capsidæ* are the best represented families, the latter in most cases alive, in spite of their delicate appearance and soft covering. Among the *Pentatomidæ* more drowned specimens are met with than one should expect. *Coreidæ* and *Reduviidæ* are not well represented, and many specimens are dead. *Saldidæ* are common on the beach and as lively as ever, but probably most of them have not been washed up by the waves. *Tingitidæ* abound in specimens, though representing only a few species, and are in excellent condition. Of the aquatic families, occasionally a specimen is brought in by the waves, always in living condition. Of the *Homoptera*, numerous Cicadas (two species) were found, all of them dead. The smaller Leaf-hoppers occur in enormous number of specimens (but not many species), most of them alive. *Psyllidæ*, *Aleurodidæ*, and winged *Coccidæ* were not seen. *Aphididæ* are there in large number, and more especially certain *Pemphiginæ*, and of these the same may be said as of the small Diptera, viz., the living specimens are easily seen, but the drowned overlooked.

LEPIDOPTERA.—I was surprised that whatever species are washed ashore these are, in the average, in much better condition than one would suppose. The most striking feature in this Order is the complete absence of *Rhopalocera* and *Sphingidæ*, which both abound in the Lake Superior region in specimens, but which are, no doubt, altogether too good flyers to be caught by the lake. Some *Sesiidæ* are found on the beach, mostly dead and badly decayed. *Bombycidæ* and *Noctuidæ* are well represented in species and specimens, and most of them alive and in good condition, except that many *Noctuidæ* are minus the abdomen. I presume this is bitten off by the minnows. *Tortricidæ*, *Pyralidæ*, and *Tineidæ* are not very numerous, and most specimens found on the beach are badly used up, though still living. However, if the specimens are fished up from the surface of the water they are found to be in an excellent state of preservation. The trouble with these delicate Lepidoptera is that when the waves cast them ashore they get entangled with their wings among the wet mass of other insects and other objects, whence they cannot free themselves.

HYMENOPTERA AND COLEOPTERA.—Very little remains to be said concerning these two Orders. Both can sustain immersion much better than the other insects, although, of course, drowned specimens of almost every species are met with. Both are extremely well represented in most families, and if any one is desirous of making a collection of these Orders the sandy beaches of Lake Superior in the early part of July are the best collecting-ground. In *Hymenoptera* the *Tenthredinidæ* predominate in species and specimens. *Uroceridæ* are also numerous. The *Apidæ* are the only family in which many drowned specimens can be found, especially in *Bombus* and other very hairy genera. The families *Ichneumonidæ*, *Braconidæ*, and *Chalcididæ* are very well represented and in good condition. Male specimens of *Mutillidæ* were not observed. Ants are but poorly represented, but the winged specimens of a few species are exceedingly abundant on certain days. There are many dead specimens among them, but the majority are alive.

The *Coleoptera* have the stigmata better protected than any other Order, and, for this reason, are best fitted to withstand immersion. They are extremely well represented on the beach, and of all families occurring in the Lake Superior region there are only two which are not washed ashore, viz., the *Cicindelidæ* and *Gyrinidæ*. The former abound on the sand of the beach, but it seems that they never fly into the lake, nor did I ever succeed in driving them into the water. The *Gyrinidæ* are the only Coleoptera which inhabit the open lake. Their home is on the surface of the water, but even in the heaviest storm they do not allow themselves to be cast ashore by the waves. *Dytiscidæ* are very numerous among the washed-up insects, and it seems strange that we find here also drowned specimens. It must be remembered, however, that they do not live in the open lake, and when they are in the water far from the shore they cannot rest, and seem to be unable to renew the supply of air necessary for respiration. Among the *Chrysomelidæ* the nearly subaquatic genus *Donacia* abounds on the beach in species and specimens. They are always washed ashore in perfect condition, which is not remarkable, since they are the only ones among the Coleoptera—in fact, among all insects of any considerable size—which are not immersed in the water. They ride on the surface of the water with outspread legs, and they are also the only Coleoptera, excepting the *Gyrinidæ*, which, in my experience, are able to take wing directly from the surface of the water.

Mr. Howard agreed with Mr. Schwarz in the idea that the structure and covering of the stigmata have a great deal to do with their relative power to withstand the water. He also called attention to the fact that those insects that passed the larval state in the water were among the easiest to drown in the imago.

Dr. Marx thought that the presence or absence of hairs around the stigmata was of great importance in this connection. In the aquatic spiders the stigmata are protected by a thick pubescence. He also described their process of spinning under water.

Mr. Schwarz said, in answer to a question of what became of these insects after being washed ashore, that those that were dead were soon covered by the sand, and that there were two results among the living. Those that tried to crawl away over the sands were invariably killed by the hot dry sand before going very far, but that those that could fly away generally reached the woods in safety.

Mr. Howard said that in Ireland the cut-worm that was so destructive to linen when laid on the ground had been found to be able to withstand immersion in a weak solution of chloride of lime for a whole day.

Mr. Mann said that in the Neuroptera the bodies were so frail that they would readily take up water. He thought, however, that many of the insects washed ashore were only in a state of suspended animation, and that they would ultimately revive, and called attention to the case of a fly reported by Dr. Franklin, which was said to have travelled from Virginia to London immersed in a bottle of wine and then to have moved!

Dr: Fox stated that among some of the Neuroptera the habit of immersing themselves in water for a number of minutes was common when the female wishes to lay her eggs.

Mr. Marlatt read the following note:

An Ingenious Method of Collecting Bombus and Apathus.

By C. L. Marlatt.

Some years ago, while living on a Kansas farm, the writer, in company with neighbor boys, was in the habit (reprehensible it now seems) of robbing the nests of wild bees, *Bombus* sp., which were always found abundantly during the haying season in the early fall. We were led to do this more from the excitement caused by the danger of being stung than to secure the honey, which, in fact, is not only rank and unpalatable, but at this season of the year very little in quantity.

The method usually followed was to take a one or two gallon jug, such as is commonly used to carry water to hay-makers, fill it partly with water, and place it, with cork removed, within two or three feet of the nest. The bees were then thoroughly aroused by beating the nest, immediately after which the operator, it is needless to add, removed himself hurriedly to a safe distance. The enraged bees would swarm out and begin flying about in widening circles to discover the enemy. The jug would at once attract their attention, and numbers would fly about it and over its open mouth, which, by reason of the air set in motion by their wings, would give an answering roar to their angry humming. Excited beyond measure by this noise, the bees would fly at the mouth of the jug, and one after another would pop into it—the noise produced by those within still further attracting those without—until all had entered. A second disturbance of the nest would serve to draw out and dispose of any of the remaining fighting worker-bees, after which the robbing of the nest was easy, as it would still contain only young bees, drones, the sluggish winter females, and *Apathus* sp.

After robbing the nest, the water and bees in the jug were emptied on the ground, and the bees, though apparently drowned, would soon recover.

Later, when interested in the collection and study of insects, the method outlined above was employed with unvarying success in the examination of *Bombus* nests, particularly for *Apathus* sp., and also for Coleoptera, Diptera, and moths.

The ordinary use of such water-jugs in hay-fields affords an easy explanation of the discovery of this method of trapping bees. It is a common custom of farmers to "stamp out" the nests of wild bees to prevent their attacking teams, and we have only to suppose a jug placed over a nest and an unsuccessful attempt made to stamp it out, and the discovery of the curious attraction of a jug for angry bees is accounted for.

Mr. Howard read the following paper:

Note on the Mouth-parts of the American Cockroach.

By L. O. Howard.

The cockroach is a very cleanly insect, though living in dirty places. Any one who watches it carefully under favorable circumstances cannot fail to be interested in observing the industrious manner in which it cleans its limbs, thoroughly mouthing first one tibia and tarsus and then another, then stretching out one front leg over an antenna and drawing it between its maxillæ, gradually passing it forward to the tip.

For such cleansing work the mouth-parts are well adapted. The tip of the labium is slightly bristly and is furnished with a groove, into which the antenna fits in passing through. The labium is prehensile and fills the part of a lip better than any more solidly chitinous labium would. It plays freely on its clypeal hinge and bends readily on itself, being capable of partly rolling, in fact. The mandibles proper, which are very large and strong, perform no part in this process. The maxillæ are the important agents, and the base of their inner lobe—the lacinia—is fitted with a broad cushion, thickly studded with bristles, well fitted to remove all dust particles from the limb passing between them. The *lacinia* presents one or two very interesting points. It is strong and mandible-like and furnished with a strong, acute, sickle-shaped tooth at tip. At the base of this tooth is a most peculiarly shaped *digitus*, differing widely from the corresponding organ in any Coleopterous insect and from any Orthopterous insect, the mouth-parts of which I have seen figured, and even from the corresponding part in *Blatta orientalis*, as figured by Messrs. Miall and Denny in their work upon this species. It is straight, bent at tip, and furnished on the inner edge near its tip with three equidistant comb-like teeth. The *galea* is narrow at base, but towards tip broadens and rolls laterally on itself, making an almost perfect hood, which surrounds the tip of the lacinia when not in use. It shows plainly the propriety of its name. The tips of the *paraglossæ* are also cushion-like and furnished with an abundance of soft bristles, and, undoubtedly the antenna, in being drawn through the mouth, held in place by the hooked tips of the *laciniæ*, is brushed below by the *paraglossæ* as well as by the *labium*, and on the sides by the cushioned bases of the *laciniæ*.

The *labium* as a whole is very highly developed, greatly more so than in Hymenoptera, Coleoptera, and other mandibulate insects, including such Orthoptera as have been figured. As pointed out by Comstock, who seems to have studied only this one organ in the cockroach mouth and who does not mention the maxillar peculiarities just mentioned, it is bifid quite to the mentum; but, as I have observed by the dissection of an individual just killed and not stiff, although the suture through the hard chitine extends to the ligulo-mental suture the two halves of the ligula cannot be separated except at tip, for a short distance only below the paraglossæ, a strong hypodermal membrane holding them firmly together. The *paraglossæ* are very large, articulating with the two halves of the ligula with considerable play and fitting closely together at their inner borders when at rest. They are stout, broadly oval (seen from below), and furnished with many soft bristles. Each bears, moreover, at its inner tip a little articulated bristled knob, which has received no name. At the inner tip of each half of the ligula, mesiad of the paraglossæ, is another unnamed sclerite, triangular in shape and also bristly. The homology between this bifid labium and the maxillæ is very plain, providing only that one imagine the median suture extending through mentum and submentum. The half of the submentum will then homologize with *cardo*, the half of the *mentum* with *stipes*, the half of the trunk of the *ligula* with *subgalea*, the outer portion of the trunk of the *ligula* with the *palpifer*, the *paraglossa* with the *galea*, and the triangular unnamed sclerites, just mentioned, with the *lacinia*, the palpi of the two organs of course homologizing also.

I have dissected away the *hypopharynx* also, but fail to see a differentiated *epipharynx* in this insect.

Mr. Schwarz remarked that not all *Blattidæ* lived in dirty or dark places. On the island of Key West he had frequently seen a species of the West Indian genus *Plectroptera* (probably *porcellana*), which lives on the tops of shrubs and trees. The agility of this curious Blattid, which resembles in appearance a small Dytiscid beetle, is really wonderful. The few specimens procured by him were donated to the National Museum.

May 2, 1889.

Nine persons present. President Schwarz in the chair.

Mr. Ashmead read the following paper:

Some Remarks on South American Chalcididæ.

By Wm. H. Ashmead.

Mr. Herbert H. Smith, an indefatigable collector and the well-known collector for Messrs. Godman and Salvin, the originators of that great work on the fauna of Central America, "Biologia Centrali-Americana," has transmitted to me, to work up, quite an extensive series of *Chalcididæ*, collected by him in South America, principally along the Amazon, among which are some remarkable forms in genera unknown to our fauna, and that throw so much light on the classification of this perplexing Family that I think some remarks on the more striking forms may not be unacceptable to-night.

In the collection are representatives of most of the groups of this family, as defined by recent writers, only a few of which, however, have been studied, and I shall therefore confine my remarks to the more peculiar and striking forms.

The sub-family *Eucharinæ* is represented by several of the genera as defined by Mr. Kirby. I have recognized *Thoracantha*, *Schizaspidia*, *Uromelia*, *Kapala*, *Lirata*, *Tetramelia*, *Stilbura*, *Psilogaster*, *Chalcura*, and *Orasema*, mostly by forms already described.

The next sub-family, or the *Perilampinæ*, is represented by several forms, possibly undescribed.

The *Eurytominæ* are well represented, and I find species agreeing with our North American genera *Isosoma*, *Eurytoma*, *Decatoma*, *Rileya*, &c.; but of the greatest importance is the discovery of a form closely allied to *Axima* Walker, and that convinces me that this genus, separated by recent writers as the type of a sub-family, *Aximinæ*, is in reality nothing but an abnormally developed form belonging to this group.

This new form has the thorax, abdomen, and wings of a *Eurytoma*, a head similar to *Axima*, only the frontal spines are not so prominent and less acute; the head is deeply emarginated for the reception of the antennal scape, with sharp ridges or carinæ between it and the eyes.

In this group I believe should also be placed the genus *Chryseida* Spinola, although Prof. Westwood has placed it with the *Perilampinæ*.

The next sub-family, or the *Chalcidinæ*, is most abundant, South America apparently being the home of this group. Such genera as *Dirrhinus*, *Thaumatelia*, *Spilochalcis*, *Smicra*, *Chalcis*, *Haltichella*, *Podagrion*, &c., have been recognized.

Dirrhinus has not before been reported from South America, the known species being from the south of Europe and Asia. Its discovery on the Amazon is therefore interesting.

One of the species of *Podagrion*, a genus parasitic in the eggs of *Mantis*, is remarkable for its abnormally swollen antennal club.

The *Leucospinæ* are poorly represented, but three species being in the collection. One of these, however, is *Leucospis tomentosa* Kirby, a rare species up to the present time, but a single specimen being known, Mr. Kirby's type in the British Museum.

I consider the *Leucospinæ* closely allied to the *Toryminæ*, through certain exotic genera, and through the *Toryminæ* we reach the *Eupelminæ*.

Eupelminæ in South America spread out into many wonderful and remarkable genera, showing strong affinities with different groups, most perplexing to the systematist, and suggesting a closer affinity between this group and certain Pteromalids, such as the *Cleonymides*, *Chiropachides*, *Miscogastrides*, &c. Their *tout ensemble* is the same, and undoubtedly a close relationship exists between these groups, difficult to define at present, but when the forms of different countries are more abundantly collected and carefully studied a much more satisfactory and natural arrangement of these groups than that now in vogue can be devised.

In the *Eupelminæ*, besides the genera defined in Mr. Cresson's "Synopsis," I would place *Pelecinella* Westw., *Prionopelma* Westw., *Oodera* Westw., *Metapelma* Westw., *Epistenia* Westw., *Cleptimorpha* Walker, *Thaumasura* Westw., and *Solenura* Westw.

Phlebopenes Perty I do not know; but it probably belongs in this group.

Westwood says *Pelecinella* is allied to *Callimome*, a Torymid genus;

but to me it seems but a remarkable form in the *Eupelminæ*. It has all the characters of the group, and falls in it naturally.

I have recognized *Pelecinella phantasma* Westw. in Mr. Smith's collection, and have brought specimens with me to-night to ascertain whether Mr. Howard does not coincide with me as to its position. I also exhibit a new species in this genus, which I propose to call *Pelecinella Westwoodii*, in honor of this venerable and distinguished master of our science.

Among other rarities in the collection, I was much delighted to recognize Westwood's genus *Polychroma* and one of his species *Polychroma histrionicum*.

It is one of the most remarkable of Chalcids, with the brilliant metallic colors of the *Toryminæ* and *Pteromalinæ*, the swollen toothed posterior femora of the *Chalcidinæ* and *Leucospinæ*, the front legs of the *Chiropachides*, the eyes and thorax of *Cleonymus*, antennæ similar to *Eupelmus*, and an abdomen peculiarly its own, although similar to certain Pteromalids.

This genus, with the genus *Chalcodectus* Walker, I propose to separate as a distinct sub-family, *Polychrominæ*. Types of the genus *Polychroma* are exhibited to-night.

Mr. Westwood's *Lycisca ignicaudata* has also been determined. The genus *Lycisca* belongs properly to the tribe *Chiropachides* in the *Pteromalinæ*, and bears some resemblance to my genus *Dasyglenes*, a genus parasitic on bees, *Osmia* sp.

Of the other groups I can at present say but little, not having had the time to study them.

The *Encyrtinæ*, *Aphelininæ*, *Pteromalinæ*, *Entedoninæ*, and *Tetrastichinæ* are all represented.

Before closing, I would like to draw special attention to a remarkable form in the *Encyrtinæ*, allied to *Tetracnemus*, a genus which I had the pleasure of exhibiting to you at a previous meeting. This form has, however, six-branched antennæ, and is probably the type of a new genus.

You will see, on examination, that excepting in its antennal characters it agrees with many forms in the *Encyrtinæ*—thorax, venation, legs, &c. The antennæ are similar to those of some of the *Eulophinæ*.

Mr. Howard, in discussing this paper, said that he agreed with Mr. Ashmead in placing *Axima* in the sub-family *Eurytominæ*, and he also thought Mr. Ashmead correct in his additional genera in the *Eupelminæ*.

Mr. Schwarz thought it somewhat remarkable that there were almost no new genera; but Mr. Ashmead, in reply, stated that this fauna had been very thoroughly worked out in various papers.

Mr. Howard then read the following note:

AUTHORSHIP OF THE FAMILY MYMARIDÆ.

BY L. O. HOWARD.

Without expressing further my views of the rank and position of the group of parasitic Hymenoptera of which Curtis's genus *Mymar* is the type, I wish to call attention to the fact that Haliday (Hym. Brit., London, 1839) is the original proposer of the group name Mymaridæ (see Agassiz, Nomen. Zoöl., Hym., 22), and that therefore the symbol "*m.*" placed after this work in Mr. Ashmead's "Proposed Natural Arrangement of the Hymenopterous Families" (Proc. Entom. Soc. Wash., vol. i, p. 98), is probably due to an oversight, and should be replaced by the word "Haliday." From the context it will be seen that Mr. Ashmead was familiar with Haliday's views as to the position of this group, but he overlooks the important "idæ" ending used by the older author.

The Agassiz reference would fix the authority for the use of "Mymaridæ" *as a word*, and although I do not possess a copy of the Haliday paper I had concluded that he considered the group as of family rank, for the reason that in a review of No. 1 of the Monograph, in Isis, 1840, page 407, I notice that the Diapridæ, the Ceraphronidæ, the Dryinidæ, and the Bethylidæ are considered as families, of equal rank with the Pelecinidæ and the Proctotrupidæ, all coming under the Tribe Oxyura, while from Haliday's other writings it was easily seen that he retained "idæ" ending for groups of family rank.

Through the kindness of Mr. Cresson, however, I have received a copy of a portion of this monograph, in which I see that Haliday calls Mymaridæ "Fam. 17" of his tribe 4—Halticoptera, the families Chalcididæ and Leucospidæ forming families 16 and 15 respectively. The family Mymaridæ should therefore be considered as belonging to Haliday.

Mr. Ashmead said that he now agreed with Mr. Howard, but at the time of writing his paper on the Hymenoptera (see ante, p. 98) he considered that Haliday had used the name more as a group than a family.

Mr. Schwarz read the following:

STRAY NOTES ON INJURIOUS INSECTS IN SEMITROPICAL FLORIDA.

BY E. A. SCHWARZ.

For any one desirous of making observations on insects injurious to cultivated plants, semitropical Florida is not the right place to go to, for the reason that there is very little agriculture or horticulture carried on on the Keys and the narrow coast strip of more than 500 miles in length, comprising the semitropical region of Florida. The settlement of Lake Worth is the southernmost point where fruit trees and garden vegetables are raised on a somewhat extended scale. Here some very interesting observations on injurious insects can, no doubt, be made; but on my trip I merely passed through Lake Worth, and at a season (in June) when the crops had long been harvested. In the region south of Lake Worth only occasionally a few garden vegetables and fruit trees are raised for the own use of the settlers, and are always planted in extremely small and isolated patches. As everyone knows, this mode of cultivation is the best protection against injurious insects, and thus the few cultivated plants in southern Florida are, as a rule, remarkably free from injurious insects.

Most settlers along Biscayne Bay and on the mainland farther south do not plant anything save perhaps a few cocoanut or orange trees, but subsist by manufacturing starch from the roots of *Zamia integrifolia*. This wild-growing plant is therefore of the greatest economic importance for southern Florida. The insects infesting this plant are the larvæ of *Eumæus atala*, a Coccid of the genus *Diaspis*, and the larva of a large Scarabæid beetle, probably *Strategus antæus*. The first-named species has been the subject of a former communication.* It suffices to repeat here that in spite of its great abundance it is not injurious to the plant. The Coccid is too rare to be taken into consideration here; but the Scarabæid larva is very injurious. It infests the roots, or rather the subterranean stems, of the plant and renders them altogether unfit for use. Fortunately it is tolerably rare.

In the process of making starch two other insects acquire a certain importance, viz., the larva of an *Eristalis* and that of a large species of the family *Muscidæ*.† Both larvæ live in the greatest abundance in the refuse "coontie," the *Eristalis* larva in the fluid or semi-fluid portions thereof and the Muscid larva in the drier portion. The latter larva occasionally gets into the starch which is laid out for drying, and fouls the same, but the *Eristalis* larva becomes especially a great nuisance by crawling into the well if the refuse coontie gets too dry. The construction of a well is the essential and most troublesome work in the manufacture of starch, since there is no fresh water wherever the coontie plant grows, and the well has to be cut through the solid coral rock to a depth of from 15 to 20 feet. The *Eristalis* larvæ get into the well by the myriad, and unless often and carefully cleaned out the well is soon changed into a cesspool full of decayed and decaying larvæ and the water unfit for use.

The most important cultivated plant in semi-tropical Florida is the Pineapple, which is raised on quite a large scale on the more northern and larger Keys. I failed to find any destructive insects thereon; in fact, no insect whatever seems to feed on the leaves or the uninjured fruit. But the plant has a great enemy in the rats, and any fruit which has been injured by these rodents becomes at once infested by a multitude of insects (Nitidulid beetles and various Diptera). Another plant of considerable economic importance, at least in the opinion of the settlers, is the Cocoa-

*Published in *Insect Life*, v. 1, No. 2, 1888, pp. 37–40.

† Larvæ and imagos of both species are now in the collection of the U. S. National Museum, but have not yet been determined.

nut. Rabbits and rats are greatly destructive to the sprouting nuts, but no insects injurious to the young or old trees were observed by me. I even failed to get any evidence that *Rhynchophorus cruentatus*, which is said to injure young trees in other parts of Florida, ever attacks the Cocoanut on the Keys or the shores of Biscayne Bay.

The Oranges, Limes, and allied fruit trees have the same enemies in semi-tropical Florida as in the true Orange region of the State. Orange dogs (larvæ of *Papilio cresphontes*) are greatly injurious everywhere, but the various scale insects appear to be much less troublesome in the south than farther north, owing no doubt to the fact that no large groves are planted in the semi-tropical region. The few trees at Cocoanut Grove on the shores of Biscayne Bay were remarkably free from scales, but along the Miami River and at Lake Worth they were quite abundant. The Lime trees, and to some extent also the young Orange trees, have a most formidable enemy in a moderate-sized weevil, *Artipus floridanus*, of the family *Otiorhynchidæ*. The injury is done by this pest in the imago state, and consists in gnawing off the edges of the leaves of older trees, but more especially in devouring the young buds. During my stay at Cocoanut Grove a row of young Lime trees was set out, and every morning from 40 to 70 beetles were found on each tree. After knocking these off into an umbrella and killing them, an equal number of beetles was found on each tree three or four hours later. Only a persistent and often-repeated jarring gave the young buds an opportunity to start. The earlier stages of this pest are still unknown, but from analogy with the other species of the family *Otiorhynchidæ* we may infer that the larva lives underground on the roots of plants. Whether it is polyphagous as the imago or confined to a single plant we do not know.*

A few West Indian and South American fruit trees, such as Mango, Guava, Alligator Pear, etc., are planted on almost every settlement, and seem to enjoy a perfect immunity from injurious insects.

Of Sweet Potatoes I saw only at Cocoanut Grove a few patches, and was surprised to see not a single specimen of *Cylas formicarius*, which was found by Mr. Ashmead in great abundance on Metacumbe Key, less than 50 miles distant from my headquarters. The larvæ and imagos of

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* The larval habits of many *Otiorhynchidæ* have been made known in Europe, all of them being root-feeders; but only two of our North American species have been studied in the earlier stages, viz., *Aramigus Fulleri* and *Otiorhynchus ovatus*, the latter being common to Europe and North America. In contradistinction with the unity in larval habits in this family, Dr. Harris, while speaking of our most common species, *Pandeletejus hilaris*, says (Treatise, etc., p. 70:) "The larva lives in the trunks of White Oak, on which the beetle may be found about the last of May and the beginning of June." This account has frequently been quoted, but never verified or corroborated by any subsequent observation, and I am strongly inclined to doubt its correctness.

Coptocycla aurichalcea were, however, tolerably abundant, but I do not think that the plants suffered seriously thereby.

Cucumbers, beans, beets, Irish potatoes, etc., I did not see along Biscayne Bay; a few watermelon vines at Miami harbored some *Diabrotica vittata*.

A small patch of Egg-plants, the only one along the shores of Biscayne Bay, which was planted at the slope of the rocky pine-land toward the "prairie" (a narrow strip of swampy land formed by the accumulation of decayed sea-weeds), presented a curious aspect when I first visited the spot in the first days of May. The plants were literally covered with the larvæ of a Noctuid, *Cloantha derupta*, which had not only almost entirely defoliated the egg-plants, but were also at work on some plants of *Chenopodium* near by. A week later not a single leaf was left on the plants and the worms had eaten into and hollowed out every one of the fruits of the egg-plant. The ground beneath the plants was full of pupæ. I bred many specimens without obtaining a single parasite.

Some Tomatoes are raised on several settlements on Biscayne Bay, and I observed here, in the month of May, the young larva of a Heteropterous insect puncturing the ripening fruit. I mistook it at first for the larva of the common Squash-bug (*Anasa tristis*), but later in the season I saw it at Lake Worth in great numbers, and also in the pupa and imago states. It proved to be *Phthia picta* (determined by Prof. Uhler), family *Coreidæ*, a West Indian species hitherto not recorded from the United States. The tomato is extremely sensitive to the "sting" of this bug, and drops off and decays quickly. At Lake Worth this insect worked in company with an allied species, *Spartocera diffusa*. The latter was somewhat less numerous than the former, but in both species the puncturing of the tomato was done—at least so far as my experience goes—only in the larva and pupa stages. The only wild food-plant of both species appear to be *Solanum nigrum*, a common weed in semi-tropical Florida, and which is to be found near every human habitation throughout that region. It is no doubt by means of this plant that the two Heteroptera just mentioned have been enabled to gain a foothold in Florida and to spread from place to place. *Phthia picta* is capable of doing most serious damage to the tomato, and the danger is imminent that with the increase of the cultivated area in southern Florida it may reach the larger and more important tomato fields in the northern part of the State. The advance of the insect immigrants from the West Indies into Florida appears to be an extremely slow one when compared with the rapid spread of insects imported from Europe; nevertheless some Central American insect pests have, within quite recent times, spread over a considerable area of the Southern States. The common *Murgantia histrionica* is now widely distributed with us, although it found its way through Mexico and not through the West Indies and Florida. The Cotton Stainer, *Dysdercus suturellus*, gradually spreads northward through Florida, and occurs already in northern Florida and Alabama, while another most unpleasant immigrant, *Conorhinus sanguisuga*, is also slowly, but surely, spreading through Florida, although its spread from Mexico through the southwestern portion of the United States has been a much more rapid one.

In conclusion, I would remark that in the vicinity of the settlements along Miami River and the shores of Biscayne Bay occasionally some wild growing and perennial cotton plants may be found. I carefully examined every one I came across, and although I found many other insects feeding thereon I never saw a single specimen of the Cotton Worm (*Aletia xylina*).

Mr. Howard said that *Murgantia histrionica* (the Cabbage bug) had reached Maryland.

Mr. Ashmead said that he had first taken *Phthia picta* on Metacumbe Key, and that they were extremely abundant there, but not found on the other Keys. The faunæ of the different Keys were very dissimilar. Around Jacksonville he had found the larvæ of a Noctuid feeding on a wild *Solanum*, probably *S. nigrum*.

Mr. Schwarz also read some notes on the Tobacco beetle, of which he furnished the following abstract:

NOTES ON THE TOBACCO BEETLE (LASIODERMA SERRICORNE).—Since for many years I have used various brands of smoking tobacco, and found the same often infested with *Lasioderma serricorne*, I collected in the course of time some notes on the food-habits of this beetle, which I shortly present herewith:

First, it is my experience that the beetle and its larva are not found in tobaccos coming from northern factories and sold in northern cities. Thus, in the New York and Detroit tobaccos, which I bought at those places, I do not remember having ever seen living larvæ or beetles, though occasionally dead beetles are met with, which I presume have been brought North with the leaves. If, however, a northern tobacco is brought South and kept in the stores for a longer period it becomes liable to be infested. Most southern factories are more or less infested with this pest, and more especially the Richmond tobaccos sometimes swarm with the insect in all stages. It is evidently a more southern species.

It is further my experience that the insect has a decided preference for the long-cut tobaccos, and for such brands thereof as are not flavored. I do not know what material is used for flavoring, but presume it to be some etheric oil, which is distasteful or injurious to the beetle. Block-tobacco (the so-called natural-leaf tobacco) and allied brands compressed into the form of cakes or plates are occasionally, though not often, infested, and I presume only when such brands are very old. Short-cut tobaccos are not liked by the beetle, and even the Durham tobacco, which is by far the most widely-used brand in the South—it is sold in little sacks—is rarely found infested.

The brand I have most frequently used is a long-cut, the "Richmond Gem Curly Cut tobacco," which I found to be pure and not flavored, but frequently infested by the beetle. It is sold either in tin boxes containing one or one-half pound each, or in paper packages containing four ounces each, both kinds of packages being by no means tight enough to keep out the beetles. It is now at once apparent that the paper packages are much less and more rarely infested than the tobacco kept in tin boxes. After watching the habits of the larva, I think the explanation of this difference is as follows: The paper packages are always as loosely packed as possible, so as to increase their size, whereas the tobacco in tin boxes is very tightly packed. It is just in the most compressed places of a box where the larvæ prefer to live, and they dislike to be among the loosely packed particles. It would, in my opinion. be a preventive against the continuous breeding of the beetle if the tobacco were packed as loosely as possible.

The damage done by this species to smoking tobacco is in reality a small one, since the larva is not a rapacious feeder,* and, moreover, a little experience will show that, unless very numerous, the larvæ do not feed so much on the finely-cut tobacco leaves as on the hard pieces of leaf stems which are usually found in most brands and sold as tobacco leaves. On such pieces of leaf stems the eggs are also preferably laid, and in them the larvæ excavate a kind of cradle wherein to change to chrysalids. A really carefully prepared long-cut tobacco, consisting only of finely-cut leaves, *e. g.*, the Turkish tobacco and similar expensive brands, will never be found to be badly infested.

The larvæ usually live in the midst or at the bottom of the box, and they are not so readily observed, since they do not move. and are always covered with a brownish dust; the beetles are, however, very active, and, unless in the act of ovipositing, have the habit of congregating on the top of the tobacco.

Mr. Howard said that Mr. Lugger had proposed to cover the tobacco at night as a prevention.

Mr. Schwarz said that the beetles fly both by day and by night.

June 6, 1889.

Eight persons present. President Schwarz in the chair.

Mr. Ashmead read a letter which he had recently received from Col. D. Redmond, of St. Nicholas, Fla., describing the appear-

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* With cigars and cigarettes the damage is not done so much by the feeding of the larva as by the boring of the beetle from one cigar or cigarette into another.

ance and habits of a small spider, which, some years since, webbed and defoliated a peach orchard. Col. Redmond wrote (in confirmation of Mr. Ashmead's statements of the leaf-feeding habit of this spider at the meeting of the Society in December last) as follows:

* * * "I can only make a very plain and unscientific statement in regard to the insects that injured and destroyed my Peach trees at 'Hollywood,' near this city, some years since.

"These insects made their appearance in great numbers in spring and early summer, and I soon began to notice their depredations on my young Peen-To and Honey peach trees just after they came into leaf. On examination, I saw that the insects were small *spiders* of a reddish brown or yellow color. They preyed upon and destroyed the young leaves very rapidly; built nests or hatching-places in the leaves; gummed these together and filled them full of eggs; hatched out thousands of young, and continued their depredations. When an attempt was made to catch and destroy the old spider, she dropped off the tree and immediately secreted herself in the loose earth and grass near the base of the tree. This spider was very small, and shy, and quick in her movements. It was extremely difficult even to get a sight of her, unless you approached the tree with extreme caution. The destruction of the tree seemed to be effected by eating all the thick portion of the leaf, as a silk-worm eats the mulberry, and also by gumming up and sticking the leaves together by means of some adhesive secretion.

"I used Paris Green, sprinkled over the trees, as a remedy; but unfortunately I used this deadly substance too freely and killed most of my trees as well as the spiders.

"I much regret my inability to give you a regular and correct scientific description of this little 'free lance;' and I believe I have recited to you all his more salient and striking points. I feel quite positive that the insect was one of the spider family, though I cannot name nor give a more accurate description of it."

In the discussion of this communication, Dr. Marx stated that while spiders may cut off leaves and web them together, a study of their mouth parts renders it questionable whether any spider is phytophagous, which opinion was also held by Mr. W. M. Wheeler. Mr. Howard thought that Tortricid larvæ, probably formerly abundant and overlooked, had attracted the spiders. Dr. Marx mentioned seeing a plant in the Smithsonian Grounds similarly covered with spiders some years since, and that the plant died in the following year.

Mr. Schwarz read and commented upon portions of a letter by Henry Stanley, the famous explorer of Africa, and furnished the following abstract of his remarks:

Poisonous Insects in Central Africa.—Mr. Henry Stanley's first letters on the progress of the Emin Pasha relief expedition have been extensively quoted in scientific journals and newspapers; but one of his later letters, dated September 1, 1888, and addressed to the Secretary of the Royal Geographical Society of England, where it was read at the April, 1889, meeting, is less generally known; at least I have not seen a full copy in the more accessible literature, and I may be allowed to quote herewith (in re-translation from "Das Ausland," 1889, p. 352) a passage which has some connection with entomology. The incident referred to by Stanley occurred during his memorable march through the immense equatorial forest along the Aruwimi River, between the Congo and the Albert Nyanza. Of this dense and nearly impassable forest Stanley gives a most gloomy account; but it seems by no means to be destitute of insect life, for he says: "From July 5th till the middle of October the expedition moved along the banks of the river. * * * What a country for flies, bugs, and butterflies! While I write this the butterflies are in swarms about me, and flap with their wings in confirmation of my assertion. Large clouds of butterflies are daily for hours sailing up stream and across the same."

A little further on he says: "In Avisibba the natives attacked our camp in a most determinate way. They thought that with their large provision of poisoned arrows they had the advantage of us, for as long as the poison is fresh it is most fatal. Lieutenant Stairs and five of our men were wounded by these arrows. Mr. Stairs' wound was from an arrow the poison of which was dry, and therefore several days old. He recuperated only after three weeks' suffering; but the wound did not heal for several months. One man received a very light wound on the head and died five days later of lockjaw; another received a wound in the muscles of the upper arm near the shoulder, and died about six hours after the first man, also of lockjaw. Another, slightly wounded on the throat, died on the seventh day, and one wounded in the side, as I believe, died during the following night. All wounded men died of lockjaw.

"We were of course very anxious to learn where this deadly poison is obtained from. On our return from the Albert Nyanza we stopped in Avisibba, and while looking through the huts of the natives we found several packages of dried red ants or pismires, and only then we were informed that the finely-powdered dried bodies of these insects, when boiled in palm oil, constitute the deadly poison by which we lost so many brave men after such terrible sufferings.

"Now we wondered why we could have been ignorant so long regarding the nature of this poison, for we could have prepared all sorts of poisons from the many insects we had seen; for example, the big black ant, the bite of which causes a bad blister, would if prepared in the same way produce a by far more terrible poison; the small gray caterpillars would furnish an irritating material, which if brought in contact with the blood would torture to death any man; the fat spiders, several inches long and covered with spiny hairs which cause a painful itching on the skin, would produce another frightful mixture, the effect of which can only be imagined with a shudder.

"The poison is prepared in the woods. In the depths of the forest the native lights his fire and prepares the terrible poison, to which even the mighty elephant succumbs. It is forbidden to prepare the poison in the vicinity of a village. In the forest the native applies the poison to the points of his arrows and covers the same with fresh leaves, so that he cannot be poisoned himself, and is then ready for war."

If we deduct from this account what is due to the probable amount of lying on the part of the natives or of Stanley's own men, the following facts remain: The natives have arrows provided with a powerful poison; secondly, Stanley found in the dwellings of the natives quantities of dried ants, and was informed by the natives or his men that the bodies of these ants, when powdered or cooked in palm oil, furnish this poison. Conceded the truth of the latter point, I think it is a novel fact that formic acid is utilized for poisoning arrows, and for this reason I deemed it worth while to quote the above passage. I leave it to the medical members of our Society to decide what is the effect of formic acid when brought in contact with the human blood, and, further, whether or not the effect of the poison is destroyed or altered by the process of preparation as described by Stanley.

In regard to the other poisonous insects mentioned by Stanley there is of course a great deal of exaggeration and imagination in Stanley's account, which is no doubt largely due to trying circumstances under which he penned his letters. The "small gray caterpillar" belongs evidently to the so-called stinging caterpillars, and represent the Lagoas and allied genera of the New World. It is a well-known fact that the poisonous quality resides in their hair covering, and that it is of a chemical and not of a mechanical nature. Some of the very large South American species of *Lagoa* are justly dreaded by every one, as testified by many travellers, and along the Everglades in southern Florida nothing is more feared by the Indians than a species of this genus which is said to reside in the pine woods.

The large spider mentioned by Stanley appears to be one of the *Theraphosidæ*. His statement that the hairs of these spiders are poisonous is no doubt correct, and is corroborated by reliable authority. G. H. von Langsdorf, in his "Bemerkungen auf einer Reise um die Welt," v. 1, p. 63 (as quoted in Germar's Magazin d. Ent., v. 1, 1813, pp. 183–184), says: "The bite of the *Aranea avicularia* is neither dangerous nor deadly, but is liable to cause severe inflammation. The hairs with which the body is everywhere covered are detached upon the slightest touch, and cause upon the skin a most unbearable, painful itching and burning, which in preparing and stuffing these spiders I several times had occasion to experience." In more recent times the poisonous nature of the hairs of *Theraphosidæ* has been utterly lost sight of, and the latest accounts of poisonous insects only refer to the bite of these large spiders. Whether the poisonous quality is due to some acid contained in the hollowed hairs or solely to mechanical irritation caused by the barbed nature of the hairs I have to leave undecided.

In the discussion following, Dr. Marx stated that poisons are not soluble in oil, but are so in water and alcohol. He also believed that the hairs were not poisonous, but merely irritative, or perhaps in some cases barbed.

Mr. Schwarz also read the following note:

Notes on Cicada Septendecim in 1889.

By E. A. Schwarz.

Our knowledge of the extent of Riley's Brood VIII of the Periodical Cicada (1855–'72–'89) is practically based upon Dr. Fitch's observations in 1855; and its expected reappearance in 1872 has apparently not attracted any attention, since I fail to find in the more accessible literature any allusions thereto. From this year's observations I am able to add three new localities to those already on record, viz: Maryland Heights, opposite Harper's Ferry, Va., where six specimens of *Cicada septendecim* were found by Mr. Heidemann and myself on May 19th; the District of Columbia, where, in the Smithsonian grounds, one pupa shell was found by myself on May 21st, two pupæ on May 24th, and two others the following day; and Alexandria county, Va., where, on May 17th and 24th, two pupa cases were found by Mr. Ashmead, and three other pupa shells and the wing of an imago on June 2d by myself.

The Cicadas observed at Harper's Ferry were all freshly matured specimens; their pupa shells were in most instances found near the imago, and they were evidently the first to appear in that particular locality. They were all found on a very small clearing nearly surrounded by wood, and from which the trees had been cut down apparently in the winter of 1887–'88. None were found or seen within the woods themselves, and it is to this particular occurrence that I wish to call attention. There are several instances on record where *Cicada septendecim* emerged in hot-houses weeks, or even months, earlier than outdoors. In such places the ground is warmed by artificial heat, and the development of the Cicada larvæ or pupæ had thus been accelerated. Now, a clearing made in the midst of a dense forest forms a natural hot-house, the soil receiving much more warmth on such places than in the shady woods. We should thus not wonder to see the Cicadas appear earlier on such cleared spaces than in the woods. I am even inclined to believe that under favorable circumstances the Cicadas develop on such cleared places one or several years earlier than the time of their regular appearance, and that these precursors, if numerous enough, would then be able to form a new brood.

The appearance of the Cicadas in the District of Columbia and in Alexandria county, Va., is remarkable on account of the excessive rarity of the specimens. No one who does not particularly search for specimens, and who remembers the vast swarms of Cicadas in 1885 (Riley's Brood XXII), would suspect that we have this year a visitation of the Periodical Cicada. These few specimens can hardly be called a "brood," and it is much to be regretted that we have no records of previous appearances around Washington either in 1872 or 1855, so that we would be able to make comparisons. If the Cicadas were rare only within the city I would say that the sparrows had destroyed them in 1872, but since they are equally rare in the open country, I am at a loss to explain this scarcity. Moreover, the sparrows were in 1872 not nearly as numerous in Washington as they are now. I cannot see how the few specimens that have appeared here this season can be able to perpetuate their race, and in 1906 there will, in all probability, not a single specimen be seen in Washington and its surroundings.

In the general discussion of this note by Messrs. Howard, Townsend, and others, the appearance of the Cicada this year in considerable numbers in parts of North Carolina and West Virginia was mentioned—localities heretofore doubtful; and also in less numbers in the District of Columbia, Maryland, and New Jersey.

Mr. Schwarz presented for publication the following paper:

Food-Plants and Food-Habits of some North American Coleoptera.

By E. A. Schwarz.

Ino immunda. Larva and imago under bark of dead branches of *Pinus tæda* and *P. palustris*, which are infested with *Pityophthorus pulicarius*. The larva probably preys on those of the latter species. It is a widely distributed species, and I found it in southern Georgia (in April), Virginia (in July), and Maryland (in August), always near the coast.

Epuræa avara. Larvæ, pupæ, and imagos were found near Washington, D. C., on April 24th, within a beautiful orange-colored fungus growing around the branches and trunks of *Pinus inops*, and which has received the very appropriate name *Peridendron cerebrum*. The beetle is much more widely distributed than the fungus, and lives no doubt in several other fungi.

Myrmechixenus latridioides is found plentifully by Mr. Ulke around Washington, D. C., in old stable-manure.

Oxycnemus histrinus. This has been found by Mr. Hubbard at Baraboo, Wis., in October, on a subterranean fungus of the genus *Phallus*.

Canthon viridis appears to live quite differently from its congeners, which are so well known as "tumble-bugs." It occurs, in my experience, only under decaying leaves, and the larva probably subsists on such leaves, and not on dung.

Aphodius serval is also not a dung-feeder, but occurs under old leaves. It appears late in the season, and rarely a hibernated specimen is found in spring, whereas the allied *A. inquinatus* is common in early spring and very rare in autumn.

Cryptocephalus schreibersi. This is one of the few *Chrysomelidæ* which live exclusively upon pine trees, and is also one of the few species of this genus which hibernate in the imago state.

Pachybrachys M-nigrum. Larva and imago in my experience only on *Rhus toxicodendron.*

Adimonia rufosanguinea. Larva and imago on *Azalea nudiflora*, the imago in May and June, the larva in August.

Pachyonychus paradoxus. The imago is common during the summer months around Washington on *Smilax*, where it eats very regular, oblong holes in the leaves. The larva is certainly not found on the same plant above ground, and is either a root-feeder or infests some other plant.

Haltica nana. Common in semi-tropical Florida, where the imago skeletonizes the leaves of *Croton glandulosum.*

Haltica fuscoænea. Larva and imago abundant on *Œnothera biennis* in July and August.

Chætocnema quadricollis. Imago skeletonizes the leaves of *Verbena urticifolia* in southern Florida.

Glyptina cyanipennis. The imago devours the epidermis of the leaves of *Euphorbia cyatophora* in southern Florida, and is very destructive to that plant, which, however, is an obnoxious weed. The larva was not observed, and feeds probably on the roots.

Phyllotreta chalybeipennis. The food-plant of this species is *Cakile americana*, the larva mining in the leaves of this maritime plant.

Octotoma plicatula. The larva makes a tentiform mine in the leaves of *Tecoma radicans;* the imago eats oblong holes in the leaves. This is a common and widely distributed species, but generally overlooked by collectors. The plant has a wider distribution than the beetle, which I failed to find in Michigan and in central and southern Florida.

Cassida callosa feeds upon *Solanum nigrum* in southern Florida (Crescent City and Lake Worth).

Anthonomus profundus develops within the fruit of *Cratægus crus-galli*, the imago appearing in July.

Conotrachelus similis is peculiar to the "Gum-Elastic tree," *Bumelia lanuginosa.* The imago appears in great numbers when the tree is in bloom (in the month of June, at Crescent City, Florida), and no doubt oviposits in the forming fruit. The larva has, however, not yet been observed.

Conotrachelus ventralis. This is a species hitherto known only from

Florida. I found it quite abundantly in May along Biscayne Bay, exclusively on *Persea carolinensis*, and have strong evidence that the larva is inquilinous in the galls of a Psyllid, *Trioza magnoliæ*. Within these galls I found frequently either a large egg or a young larva of a Curculionid, and I do not hesitate to consider these as belonging to this *Conotrachelus*, since the larva of another species of the genus *(C. posticatus)* has been observed to live within Homopterous (Phylloxera) galls.

Cryptorhynchus obliquus breeds in Hickory branches which are broken by the wind or otherwise injured. The larva makes a tolerably straight gallery several inches long through the solid wood of the twig.

Cryptorhynchus brachialis breeds in twigs of *Bumelia lanuginosa*.

Cryptorhynchus ferratus. This is a common species, which, near Washington, can be obtained from Oak, Chestnut, and various other trees. It extends to the semi-tropical region of Florida, but infests there only the branches of *Persea carolinensis*, and is never met with on the Oak.

Cryptorhynchus tristis develops under the bark of the trunk of *Quercus coccinea*. The imago feeds on the leaves, but is strictly nocturnal, hiding during day time in the ground at the base of the tree.

Chalcodermus æneus occurred in great number in semi-tropical Florida on a species of *Dolichos* (probably the common Cow-pea run wild), the larva infesting the pods of the plants.

Acamptus rigidus. This resembles in breeding habits certain Calandrid genera (*Phlœophagus*, *Stenoscelis*, *Wollastonia*). On the trunks of various trees we frequently see larger or smaller spaces deprived of bark. The bark has not been chopped or taken off by force, but I think these decorticated places are caused by the influence of frost. The wood on such exposed places is always dead for some distance inward, and often very hard. In this case it attracts certain Ptinid beetles to bore and oviposit therein, but frequently the dead wood becomes affected by a kind of rot, which causes it to be soft, moist, and of a reddish color. It is in such cases that the *Calandridæ* above mentioned and *Acamptus rigidus* undergo their development in the rotting wood.

Copturus binotatus. This rare species is, in Mr. Ulke's and my own experience, confined to *Gleditschia triacanthus*, but I cannot tell whether it develops in the thorns or in the branches.

Plocamus hispidulus was bred by me in June from dead branches of *Robinia pseudacacia* infested with *Agrilus* larvæ.

Himatium errans occurred abundantly at Tallahassee, Fla., in April, in the deserted galleries of *Tomicus cacographus* under bark of *Pinus palustris*.

Himatium conicum breeds within the bark of *Liriodendron tulipiferum*, numerous specimens having been thus found by me near Washington, D. C., in autumn. The two North American species of this genus can be distinguished only with difficulty.

Dr. Marx called attention to a new organ in the female of *Fili-*

stata capitata Hentz, which consists of a pair of straight rows of rather long, flattened, and blunt, closely-set bristles or rods, 25 to 28 in number, situate at each side upon the inner surface and at the base of the first joints of the inferior spinnerets, closely over the underlying cribellum. From its structure and position, the speaker infers that these two peculiar comb-like organs might act as an accessory calamistrum. These organs have heretofore been overlooked by arachnologists, which is the more remarkable as they appear also in the common European species, *Filistata testacea*, as the speaker is informed by Prof. Thorell.

JUNE 27, 1889.

Nine persons present. President Schwarz in the chair.

Mr. G. W. J. Angell, of New York City, was elected a corresponding member of the Society.

In a note on May beetles, Dr. Marx stated that in the forests of Tuchel, near Graudenz, Prussia, comprising 16 forestry districts, 30,000 litres of beetles (*Melolontha vulgaris*) had been collected this season in each district, or in all 480,000 litres of beetles. One litre will contain 450 beetles, thus making a total of 216 millions destroyed.

Referring to the appearance of the Periodical Cicada in the District of Columbia, Prof. J. B. Smith said that on June 22d he had heard the Cicadas singing on the old oak trees on the 7th street road, not far from Soldiers' Home.

Mr. Ashmead read the following paper:

AN ANOMALOUS CHALCID.

BY WM. H. ASHMEAD.

The little Chalcid, the subject of my remarks, and which I shall have the pleasure of showing you to-night, is not only one of the most anomalous of forms in the family *Chalcididæ*, but, on account of the peculiarity of the wings, one of the most remarkable insects in the order Hymenoptera.

It was captured at large by my lamented friend Dr. R. S. Turner, at Fort George, Florida, and was only recently discovered among a quantity of unexamined material in this family that, for want of time, I have left unstudied.

In nearly all of the hymenopterous families are forms that present marked structural peculiarities, spines or horns on the head, scutellum, metathorax, coxæ, femora, or abdomen; but none have yet been described with spines on the wings, as is the case with our little Chalcid.

This Chalcid belongs to the sub-family *Eulophinæ*, but the cephalic, scutellar and wing characters are too anomalous for it to be placed in any of the known genera, and it will therefore require the erection of a new genus for its reception.

The head is very broad, much broader than the thorax, the occiput deeply concave, and the vertex very thin antero-posteriorly, while the lower portion, about the region of the mouth, is abnormally thickened or swollen, the mandibles being remarkably small– almost obsolete—and when viewed from the side a deep incision is seen between them and the clypeus, giving it a very peculiar appearance.

The antennæ are normal, agreeing with many other forms in this group, and the thorax does not differ greatly from many forms both in the sub-family *Eulophinæ* and *Elachistinæ*, except that the shoulders are much more prominent than usual.

The scutellum differs decidedly in that the grooves diverge posteriorly, and then curve and meet, forming a perfect frenum.

The abdomen is remarkable only for its long petiole, this being longer than in any other form yet discovered.

But what renders this Chalcid the most anomalous of hymenopters is the wings, the superior pair having a distinct conical spine covered with dense bristles (or it may be a dense tuft of bristles) on the superior margin, at about where the submarginal nervure runs into the marginal, the character and use of which cannot be imagined, nor can one imagine the cause that induced the development of so remarkable an appendage.

If such an anomalous appendage had been developed in a male, we should have at once attributed it to sexual development, either as an adornment to please the fancy of the females, or as an armament development in the battles of the males for their favors.

It is to be hoped that the male will soon be discovered, so we can see just what remarkable structural peculiarities he will present, and in what respect he differs from the female.

For the reception of this chalcid, I have erected a new genus under the name *Hoplocrepis*, and the species may be known as *Hoplocrepis albiclavus*, the descriptions of which are as follows:

Hoplocrepis, n. g.

Head very wide, much wider than the widest part of the thorax; the occiput deeply concave, leaving the vertex very thin antero-posteriorly, the 3 ocelli arranged in a row on the sharp edge thus formed; the face subconvex and the lower portion abnormally thickened through from throat to frons; the mandibles are extremely small, nearly obsolete, and between them and the swollen face, when viewed from the side, is seen a peculiar deep incision.

Eyes large, oval, occupying more than two-thirds of the side of the head, leaving quite a wide space between them and the base of the mandibles.

Antennæ 8-jointed, inserted just above the clypeus; the scape very long and slender, about as long as the flagellum, excluding the club; and when drawn close to the face extends slightly beyond the ocelli; pedicel cyathiform; joints of funicle 4, compressed about as in *Sympiesis* Först., the first joint a little longer than the second, considerably longer than wide, the last two being about as long as wide; club 2-jointed, about half the width of the funicular joints.

Thorax smooth, parapsides distinct, the shoulders very prominent, convex; collar conical, the length of the mesonotum, and arranged along its posterior margin are six black bristles; *scutellum* convex, with two grooves, the grooves diverging posteriorily and then curving around and meeting, forming a complete frenum, and two black bristles at base.

Legs moderately long, slender, the posterior pair much the longest; coxæ conical, the middle and posterior pairs contiguous, the last pair being the longest; all tibiæ with one weak apical spur; tarsi 4-jointed, basal and second joint about equal, two following short.

Abdomen ovate, depressed, longly petiolated, the petiole longer than posterior coxæ, slender, cylindrical, attached to the metathorax on a line above the posterior coxæ; ovipositor slightly exserted.

Wings with venation similar to *Sympiesis*, with two conical spines densely covered with black bristles, in appearance similar to the tuft on the scutellum in the Encyrtid genera *Comys* and *Chiloneurus*, and situated on the upper margin at about one-third the length of the wing.

The head, scutellum, attachment of the abdomen to metathorax, and the wing characters at once distinguish this genus from any other in the subfamilies *Eulophinæ* and *Elachistinæ*, the only groups in which the genus could be placed.

Hoplocrepis albiclavus, n. sp.

♀. Length 1.5 mm. Pale brownish-yellow. Eyes black. Antennal scape long, slender, yellowish; flagellum brown; club white. Coxæ and petiole white; basal portion of abdomen and three or four ventral segments beneath pale yellowish, the rest of the abdomen dark brown. Wings hyaline, with two transverse brown bands extending entirely across the wings, the first narrow at about one-third the length of the wing, and including the abnormal spines or tufts; the second is about three times the width of the first, with only a small clear space between it and the first band; the whole apex of the wings clear.

Described from a single specimen captured by the late Dr. R. S. Turner, at Fort George, Florida.

Mr. Howard said that the spines on the forewings were probably bunches of bristles, and that the collection of the Department of Agriculture contained a species having similar bristles on the forewings. Mr. Schwarz spoke of the occurrence, in Coleoptera, of spines on the elytra, mentioning genera in several families.

Mr. Howard called the attention of the Society to some enlarged figures of the mouth-parts of *Periplaneta orientalis* in Miall and Denny's work on the Cockroach, in which no indication is given of a *digitus* proceeding from near the tip of the *lacinia* corresponding to the one described by Mr. Howard at a recent meeting of this Society.*

Mr. Howard then briefly reviewed Miss Ormerod's recent book on South African Insects, and pointed out the striking similarity or correspondence in genus, if not in species, of the pests of the farm and garden of South Africa to those of this country. Among the insects especially noted were a Cetoniid enemy to figs and peaches (*Rhabdotis semipunctata*); *Papilio demoleus*, represented here by the Orange Dog, *P. cresphontes;* the little cabbage moth (*Plutella cruciferarum*), widely distributed over the world; an Orange fly (*Ceratitis citriperda*), having a habit similar to our *Trypeta ludens*, *Icerya purchasi*, etc.

Mr. Howard also read Mr. H. Edward's paper on "Noises made by Lepidoptera," prepared for "Insect Life."†

This very interesting paper called forth a considerable discussion by various members relative to the noises produced by Lepidoptera and other insects.

Mr. Schwarz read the following paper:

MYRMECOPHILOUS COLEOPTERA FOUND IN TEMPERATE NORTH AMERICA.

By E. A. SCHWARZ.

Toward the close of the last century it was already known to the entomologists of that early date that certain insects could be found in the nests of ants, but no further attention was paid to the subject until, in 1813, the Rev. P. W. J. Müller published, in Germar's *Magazin der Entomologie*, a remarkable paper on the Coleopterous genus *Claviger*, in which he proved that the species of this genus occur exclusively among certain species of ants; that the beetles were for their living entirely dependent on the ants, which feed and take care of the beetles in order to enjoy the licking of a secretion which exudes on the tufts of hair on the first abdominal segment of the beetle. Müller succeeded also in finding the pupa skin of *Claviger* in the ants' nest, thus proving that its larva also lives among ants. His paper attracted a great deal of attention; but, although we know now many species of *Claviger* and many allied genera, our

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* See p. 217.

† Published in the July, 1889, number of that Journal, v. ii, pp. 11–15.

knowledge of the biology of this genus has not advanced a single step beyond the results obtained by Müller. In fact, no one has hitherto been able to rediscover the pupa skin.

For nearly thirty years afterwards only the captures of various insects among ants were recorded by various authors, but in 1841 and 1844 Mr. Fred. Mærkel, of Saxony, published (Germar's Zeitschr. f Ent., vols. iii and v) the first comprehensive work on myrmecophilous insects. He raised the number of these insects to 284, distributed as follows among the different orders: Coleoptera, 274; Orthoptera, 1; Heteroptera, 3; Hymenoptera, 2; Diptera, 4 (among them a then unknown larva, which afterwards proved to be that of *Merodon*). In the same year (1844) Schioedte added quite a number of species belonging to various orders, and numerous additions in Coleoptera were made in 1846 by Prof. Mæklin. In the latest catalogue of myrmecophilous insects, Mr. E. André (Revue et Mag. Zool., 1874) enumerates no less than 584 species, among them 542 Coleoptera, but of these more than 250 must be considered as more or less accidental visitors of ants' nests.

Mærkel proposed to arrange myrmecophilous insects in three groups: 1st, species which live among ants only in the larva and pupa stages, but which, as imagos, leave the company of ants (*e. g.*, *Euryomia*, *Coscinoptera*, etc.); 2d, species which in the imago state are often met with among ants, but often also at other places not in company of ants (the numerous accidental visitors); 3d, species which in the imago state (and presumably also as larva) are exclusively found in the nests of ants, and the existence of which appears to depend upon the ants (the true myrmecophilous insects).

He excludes certain *Membracidæ* and *Aphididæ* which, properly speaking, do not live among ants of their free will, but are carried into the nests by the ants and held in captivity. These would constitute a fourth class, and later discoveries added thereto certain species of *Formicidæ*, which are kept as slaves by other species of ants. A fifth class would be formed by the true parasites of ants, viz., certain Diptera (probably *Conopidæ*), Hymenoptera (*Chalcididæ* and *Proctotrupidæ*), and Coleoptera (*Stylopidæ*).

In more recent times important contributions have been made to our knowledge of the biology of myrmecophilous insects and their relations to the ants mainly by the investigations of von Hagens, Lespès, Sir John Lubbock, A. Forel, E. André, and E. Wasmann. These investigations are, of course, connected with great difficulties. If we uncover from beneath a stone or a log a colony of ants, or if we dig into a large ant-hill, the inhabitants are at once put into the greatest uproar, and no observations can be made. To closely observe the domestic life of the ants and their inquilines it is necessary to construct artificial formicaries in suitable glass jars, as described by Sir John Lubbock. Among the authors just mentioned, Mr. Wasmann has, since the year 1886, reviewed the previous records and augmented the same by a long series of the most interesting original observations (published in the Tijdschrift v. Entom., 1887; Deutsche Ent. Zeit., 1886 and 1887; Wiener Ent. Zeit., 1889). He not only discovered the earlier stages of some myrmecophilous Coleoptera, but to him we owe also a great deal of information regarding the life-habits of myrmecophilous insects and their relations to the ants.

As a result of his observations, Mr. Wasmann has been able to subdivide the genuine myrmecophilous insects (Mærkel's group 3) as follows:

1st. Species which are fed by the ants and from which these derive a benefit in licking up a certain secretion. To this group belong, of the Coleoptera, the genus *Claviger*, and, no doubt, all allied genera and, further, the species of *Lomechusa*.

2d. Species which are treated with indifference by the ants and which live off the bodies of dead ants and other animal and vegetable débris to be found in the colonies of ants. The ants evidently derive some benefit from this class of inquilines, and their behavior toward them is certainly not hostile. To this class belong most of the *Staphylinidæ* (excepting *Lomechusa* and *Myrmedonia*), most of the other Clavicorn beetles (excepting, perhaps, the genus *Hetærius* and other *Histeridæ*), and most species of the other Orders; in short, by far the largest majority of the insects recognized as myrmecophilous.

3d. Species found only among ants, but which are by no means "myrmecophilous" in the usual sense of the word; they like the ants as the wolf does the sheep, *i. e.*, they kill and devour the ants and steal their eggs, larvæ, or pupæ, wherever they have a chance of doing so. To this class belong the numerous species of *Myrmedonia*, *Quedius brevis*, and in all probability the genus *Hetærius* and other *Histeridæ*. The ants are decidedly hostile to this class of inquilines, and attack and kill them whenever they are able to take hold of them; but these robbers are well protected, partly by their much greater agility and partly by their hard covering. The Myrmedonias and *Quedius brevis*, which are soft-bodied insects, carefully avoid mingling with the ants in their galleries, but hide like highway robbers near the entrance of the nest, or within the walls of the galleries, and watch their chances of attacking a solitary ant unawares. The Hetærius, on the other hand, freely mingle with the ants; their covering is extremely hard and very smooth, and moreover their antennæ and legs are retractile, so that the ants cannot do anything with them. As Mr. Lewis says, the ants evidently regard these Hetærius as an unavoidable evil, against which they are unable to defend themselves, and they get along with the beetles as best they can.

These groups just mentioned are by no means strictly separated, and many myrmecophilous insects cannot be classified at present.

In North America myrmecophilous insects have been discovered since more than 40 years, and recorded as such by various authors in describing these species or otherwise; but until quite recently these records were scattered all through the North American entomological literature. As far as the Coleoptera are concerned, Dr. John Hamilton has, with his accustomed carefulness, collated these records and augmented the same with original observations in his paper entitled "Catalogue of the Myrmecophilous Coleoptera, with bibliography and notes," published in the Canad. Entom., v. 20, 1888, pp. 161–166. Some additions were published by him in the same periodical, v. 21, 1889, pp. 105–108. In the other Orders the records of North American myrmecophilous species are extremely meagre. Among the Lepidoptera, *Helia americalis;* of Orthoptera, two species of *Myrmecophila;* of the Diptera, one or several species of *Merodon* and an unknown dipterous parasite. There are apparently no North American records of myrmecophilous Hymenoptera, although in Europe numerous species are known as such (genera *Neomyrmex*, *Formicoxenus*, *Xenomyrmex*, *Tomognathus*, *Ceraphron*, *Diapria*, etc.), and no such records of Heteroptera, although several species are recorded in Europe, *e. g.*, the genus *Microphysa*. In the Homoptera there are a few short references to certain *Aphididæ* (by Walsh), but none to *Membracidæ*, although at least one species is commonly met with among ants. In Thysanoptera, Arachnida, and Myriapoda myrmecophilous species or genera are known in Europe, but I have not come across any American records, although every one who has done any collecting among ants knows that a species of the Thysanopterous genus *Beckia* is extremely abundant in almost every ants' nest, and that at least two species of Acarids swarm in the larger colonies of *Formica integra* and other species. The Neuroptera seem to be the only Order of which no myrmecophilous species are known.

My principal reason for presenting herewith a list of our myrmecophilous Coleoptera so shortly after that published by Dr. Hamilton is that I am able to add, in a number of instances, the names of the ants among which the beetles have been found. Mr. Fred. Blanchard, of Lowell, Mass., has been kind enough to send me specimens of the ants among which he had discovered Coleoptera; some other species of ants in connection with their Coleopterous inquilines were furnished by Messrs. Ulke and Pergande, while the remaining species were observed by Mr. H. G. Hubbard or by myself.

Regarding the names of the ants mentioned in previous records and in Dr. Hamilton's list it may be said that "*Formica pennsylvanica*" is = *Camponotus pennsylvanicus;* "*Formica herculanea*" also = *C. pennsylvanicus;** "*Lasius integerrimus?*" is apparently a wrong determination, and perhaps = *L. claviger;* "*Formica rufa*," probably also incorrectly determined, is either = *F. integra* or *exsectoides*, or an allied species. For these determinations, as well as for those of the other *Formicidæ* mentioned in the following lists, I am indebted to Mr. Theodor Pergande, who is the best authority in this country on this difficult group of Hymenoptera, and without whose help I would have been unable to prepare the appended list.

It appeared to me advisable to exclude from the list of myrmecophilous

* Mr. Pergande considers this as a race distinct from the European *C. herculaneus.*

Coleoptera those species which, in my opinion, are to be considered as accidental or occasional visitors or intruders in ants' nests. Many of these species recorded by former observers were already considered as doubtfully myrmecophilous by Dr. Hamilton. This list of accidental visitors could be still greatly extended from unpublished material, but I mention here only the following:

Panagæus crucigerus, found hibernating in ants' nests (Hamilton), with *Lasius claviger* (Pergande); *Casnonia pennsylvanica*, with *Prenolepis nitens* (Pergande); *Bembidium 4-maculatum; Tachys incurvus*, found abundantly with *Formica exsectoides* (Blanchard); *Colon* (no species has been found among ants by American observers); *Scydmænus capillosulus; S. brevicornis; Eumicrus grossus*, found with ants by Mr. Ulke;* *E. Motschulskii*, with *Lasius alienus* (Schwarz); *Decarthron formisceti; Quedius molochinus*, with *Lasius claviger* (Pergande); *Leptacinus longicollis; Diochus Schaumii; Edaphus nitidus*, found with *Formica exsectoides* and *Aphænogaster fulva* (Schwarz); *Stictocranius puncticeps; Lathrobium dimidiatum*, found with *Prenolepis parvula* and *Cremastogaster lineolata* (Pergande, Schwarz); *Lithocharis* sp., with *Solenopsis debilis* (Pergande); *Tachyporus brunneus; T. scitulus; Conosoma pubescens; Apocellus sphæricollis*, found often with *Ponera contracta* (Pergande); *Arpedium Schwarzi* with *Prenolepis parvula* (Pergande); *Eleusis pallidus; Ptenidium evanescens; Hister Harrisii*, found with *Camponotus pennsylvanicus?* (Hamilton), and possibly to be included among the myrmecophilous species; *Hister americanus*, with *Ponera contracta* (Pergande); *Meligethes brassicæ; Cyphon padi; Pleurophorus cæsus*, with *Prenolepis fulva* (Pergande); *Atænius cognatus*, with *Formica fusca* and *Aphænogaster fulva* (Pergande, Schwarz); *Serica vespertina*, with *Formica Schaufussi* and *Lasius interjectus* (Pergande); *Diœdus punctatus*, with *Aphænogaster fulva* (Schwarz).

Revised List of North American Myrmecophilous Coleoptera.

The following list enumerates the true myrmecophilous species—*i. e.*, those which live in ants' nests during all stages of development; further, those which are myrmecophilous only in the larva state, those which are myrmecophilous only in the imago state, and those which are more frequently found among ants than elsewhere. But it includes also quite a number of still doubtful species, for which it must be left to future observation whether they are to be retained here or referred to the list of accidental visitors. For the bibliographical references of previous records the reader is referred to Dr. Hamilton's list.

* The specimens found with ants at Washington, D. C., constitute, according to Mr. Ulke, a species distinct from the true *E. grossus* from Alabama and Florida. If this be correct, it has to be transferred, as *Eumicrus* n. sp., to the list of myrmecophilous species.

Ptomaphagus parasitus.—Found among *Camponotus pennsylvanicus?* (Hamilton), *Formica fusca* (Hubbard), *F. exsectoides* (Blanchard, Pergande), *F. Schaufussi* (Schwarz).

Ptomaphagus n. sp.—Formerly confounded with the preceding, it was first distinguished by Mr. Blanchard. Occurs with *Camponotus pictus* (Blanchard), *Formica integra* (Schwarz).

Ptomaphagus brachyderus.—Camponotus pictus (Blanchard).

Scydmænus rasus.—Lasius alienus (Hubbard and Schwarz).

Adranes cæcus.—Lasius alienus (Schwarz).

Adranes LeContei.—Lasius umbratus? (Hubbard).

Fustiger Fuchsii.—Unquestionably strictly myrmecophilous, but I could never obtain specimens of the ant with which it occurs.

Atinus monilicornis.—Prenolepis parvula (Ulke).

Biotus formicarius.—"In the nests of a small brown ant" (Casey).

Ceophyllus monilis.—Lasius aphidicola (Hubbard).

Cedius Ziegleri.—Formica exsectoides (Blanchard, Pergande), *F. integra* (Schwarz); "*F. rufa*," mentioned by Dr. LeConte is probably = *F. exsectoides.*

Cedius spinosus.—This is doubtfully referred here; sometimes found among ants (no specimens preserved), under bark, but often also not with ants.

Tmesiphorus costalis.—Found by Dr. LeConte with "*Formica rufa.*"

Tmesiphorus carinatus.—Doubtfully myrmecophilous, but it has been found with ants (no specimens preserved) under bark of old trees.

Ctenistes pulvereus.—Referred here on the authority of Dr. LeConte. None of the eastern species can be called myrmecophilous.

Tyrus humeralis.—Aphænogaster tennesseensis (Schwarz), but occasionally found without the company of ants.

Cercocerus batrisoides.—In all probability to be included here, but no specimens of the ants have been preserved.

Tychus puberulus.—Included on the authority of Dr. LeConte. The eastern species, so far as observed by myself, are not myrmecophilous.

Decarthron stigmosum.—Aphænogaster fulva (Blanchard), *A. Treati* (Hubbard and Schwarz). This is, in my experience, the only strictly myrmecophilous species of the genus.

Verticinotus cornutus.—Referred here on the authority of Dr. Brendel. A second, still undescribed, species of this genus was found by myself in northern and central Florida under moss and not in the company of ants.

Batrisus.—My experience with this genus is that the species of the first group (hind tibiæ without spur) are strictly myrmecophilous, while many species of the second group (hind tibiæ with long terminal spur) appear to live quite independently from the company of ants. *B. globicollis* is certainly not myrmecophilous, and the same may be said of *B. spretus* and allied eastern species which have been separated therefrom by Captain Casey. The determinations of some of the following species of this genus are possibly incorrect.

Batrisus ionæ.—*Lasius alienus* (Schwarz). The ant mentioned by Dr. LeConte as the host is probably the same species.

Batrisus juvencus.—*Aphænogaster tennesseensis* (Schwarz).

Batrisus ferox.—*Lasius claviger* (Schwarz), *L. interjectus* (Pergande).

Batrisus cristatus.—The "large rufous ant with a brownish head" mentioned by Dr. LeConte, appears to be a species of *Aphænogaster.*

Batrisus riparius.—*Camponotus pennsylvanicus ?* (LeConte); found by Mr. Hubbard at Crescent City, Fla., in an old Cynipid gall inhabited by a colony of ants (no specimens preserved); Dr. LeConte found it in Georgia under pine bark apparently not in company of ants.

Batrisus globosus.—*Camponotus pennsylvanicus* (Schwarz); *Lasius alienus, Cremastogaster lineolata* (Hubbard and Schwarz). It is, however, frequently to be found under decaying leaves, etc., not in company of ants.

Batrisus bistriatus.—"With a large rufous ant" (LeConte); "with a medium-sized, honey-yellow ant" (Hamilton). This last-mentioned ant appears to be a *Lasius.*

Batrisus lineaticollis.—"With a large rufous ant" (LeConte).

Batrisus simplex.—The two typical specimens were collected by Hubbard and Schwarz under bark of old stumps in company of ants (specimens not preserved).

Trimium puncticolle.—Included on the authority of Dr. Horn.

Homalota—Several species have been found among ants, but since no comparison of specimens has been made, the number of species remains uncertain.

Homalota sp.—With "*Formica rufa*" at Bedford, Pa. (LeConte).

Homalota sp.—Very abundant with *Formica exsectoides* (Blanchard).

Homalota sp.—An insignificant looking species with *Formica Schaufussi* (Hubbard and Schwarz).

Homalota ? sp.—With *Lasius alienus* (Hubbard and Schwarz).

Homalota ? sp.—Remarkable from the broadly impressed thorax in the male; occurs in the hills of *Formica obscuripes* in Colorado and Nebraska (Schwarz).

Unknown Aleocharid.—Resembling in general appearance the genus *Ecitopora;* occurs with *Tapinoma sessile* at Washington, D. C. (Schwarz).

Lomechusa cava.—*Camponotus pennsylvanicus* (LeConte); "*Formica* rufa" (LeConte); *Camponotus pennsylvanicus, C. pictus* (Pergande, Hubbard, and Schwarz).

Myrmedonia.—Of the six North American species which are known to me, and which appear to be referable to this genus, only two have been found among ants. *M. rudis*, found many years ago by Mr. Ulke resting on fences at sunset, has the appearance of being a myrmecophilous species, but has not been found again in recent years; *M. Sallei* Sharp, occurs commonly in southern California and throughout the southern States, but does not appear to live among ants.

Myrmedonia n. sp.—*Cremastogaster lineolata* (Pergande, Schwarz).

Myrmedonia n. sp.—*Tapinoma sessile* (Blanchard); *Lasius alienus* (Hubbard and Schwarz).

Pelioptera ? gigantula.—This is entirely unknown to me.

Homœusa expansa.—*Lasius claviger* (Ulke).

Oxypoda sp.—"*Formica rufa*" (LeConte). Unknown to me.

Myrmecochara pictipennis.—*Solenopsis geminata* (Schwarz).

Myrmecochara ? n. sp.—*Solenopsis debilis* (Schwarz).

Myrmecochara ? n. sp.—A species undoubtedly congeneric with the preceding, and collected by the late Mr. H. K. Morrison at Lake Tahoe, Cal. No specimens of the ant were received.

Euryusa obtusa.—*Formica integra* (Schwarz); *F. exsectoides* (Pergande).

Euryusa n. sp.—*Lasius bicornis* (Patton). A single specimen, collected at Waterbury, Conn., was given me by Mr. W. H. Patton. The label bears the following inscription: "The beetle on the ground, not near nest; the ant was playing with it; the beetle turned up its abdomen, and the ant opened its mandibles."

Megastilicus formicarius.—*Formica exsectoides* (Blanchard).

Platymedon laticollis.—*Formica obscuripes* (Schwarz); occurs in Arizona, Colorado, and Nebraska.

Oxytelus n. sp.—*Formica obscuripes* (Schwarz); occurs in Colorado and Nebraska.

Oxytelus placusinus.—*Formica fusca*, *Lasius alienus* (Schwarz); occasionally met with under decaying leaves, and not in company of ants.

Limulodes paradoxus.—*Lasius aphidicola* (Schwarz).

Brachyacantha ursina.—The larva is abundant near Washington, D. C., in the colonies of *Lasius claviger*, preying upon the Pemphigus domesticated by the ants (see J. B. Smith: "Ants' nests and their inhabitants," *Amer. Nat.*, v. 20, 1886, p. 680). Whether or not this is the normal habit of the larva must be left to future observations.

Emphylus americanus.—A specimen of the ant among which I found this in Colorado is in the LeConte collection at Cambridge, and, judging from memory, it belongs to *Lasius*.

Hypocoprus formicetorum.—*Formica obscuripes* (Schwarz).

Hister planipes.—*Camponotus pennsylvanicus ?* (Hamilton); *Formica exsectoides* (Blanchard).

Hister perpunctatus.—*Formica Schaufussi* (Blanchard).

Hister repletus.—*Lasius niger* (Blanchard). I agree with Dr. Hamilton that *H. subopacus* is probably also myrmecophilous.

Hetærius brunnipennis.—*Formica fusca* (Hubbard); *F. exsectoides* (Blanchard).

Hetærius Blanchardi.—*Aphænogaster fulva* (Blanchard). The western species of *Hetærius* are unquestionably strictly myrmecophilous, but I have not been able to obtain specimens of the ants.

Echinodes setiger.—The various species of ants, among which this is reported from South Carolina and Georgia, cannot be determined in the absence of specimens. *E. decipiens* is no doubt also myrmecophilous, and probably also the genus *Ulkeus.*

Amphotis Ulkei.—Cremastogaster lineolata (Ulke, Schwarz); *Formica Schaufussi* (Pergande); *F. integra* (Schwarz). Mr. Ulke mentions as host also *F. rufa*, but this must be referred to *F. integra* or *Schaufussi*. My experience with this beetle is that in early spring it is strictly myrmecophilous, but in the fall of the year it is found in decaying fungi. The second species of this genus, *A. Schwarzi*, will no doubt also prove to be myrmecophilous, but it has hitherto been found only washed up on the beach at Fortress Monroe, Va.

Monotoma fulvipes.—Occurred in great numbers in the hills of *Formica obscuripes* in Colorado (Schwarz), but has been found in the Eastern States not in company of ants.

Euparia castanea.—Solenopsis geminata (Riley, Schwarz).

Euphoria inda.—A Cetoniid larva, undoubtedly referable to this species, is quite common near Washington, D. C., in midsummer in the smaller hills of *Formica integra*. The imago I never met with among ants, but Mr. L. Bruner writes that he found it in the hills of *F. obscuripes*.

Euphoria hirtipes.—Mr. L. Bruner kindly informs me that he never found the larva, but only the imago, near West Point, Neb. The beetles occur quite abundantly in the hills—in the centre as well as around the edges—of *Formica obscuripes*, as many as two dozen having been found in a single ants' nest. It was found under the same conditions by Mr. G. M. Dodge at Glencoe, Neb., and has, to my knowledge, never been observed remote from ants' nests. Mr. Bruner also states that he has occasionally found in the hills of the same ant specimens of another *Euryomia* of the size of *E. melancholica*, of which, however, no specimens have been preserved. It is, perhaps, *E. pilosicollis*, which, from its great hairiness, may be supposed to be myrmecophilous.

Cremastochilus.—There is nothing to indicate that the unity in habit is interrupted in this genus. The larvæ have not yet been discovered, but live, no doubt, at the bottom of ants' nests. That the ants derive a certain benefit from the beetles and try to prevent the escape of the latter from their nests, has already been observed by Prof. Hentz (see Scudder's "Entomol. Corresp. of T. W. Harris," p. 7). I mention here only those species of which I am able to give the name of the host.

Cremastochilus variolosus.—Aphænogaster fulva (Schwarz).

Cremastochilus squamulosus.—Camponotus esuriens (Hubbard).

Cremastochilus castaneæ.—Formica integra (Schwarz); *F. Schaufussi* (Pergande).

Cremastochilus canaliculatus.—Camponotus pennsylvanicus (Hamilton). An undetermined species occurs among *Formica obscuripes* in Nebraska (Bruner).

Coscinoptera dominicana.—Larva abundantly in a large ant hill in Wisconsin (Riley); *Camponotus melleus* (Pergande).

Coscinoptera ? sp.—Larval cases in great abundance in the hills of *Formica obscuripes* in Nebraska (Bruner). The imago has not been bred. A third larva belonging to the *Clythrini* was found in ants' nests in Arizona by Mr. Morrison, according to Prof. Riley (Amer. Nat., 1882, p. 598). The relationship of these Chrysomelid larvæ to the ants has not yet been ascertained.

Aræoschizus armatus.—This is myrmecophilous, according to a communication from Mr. H. F. Wickham, but he did not preserve specimens of the ant. I do not know whether or not this is the normal habit of this species. Of another species of this genus, *A. sulcicollis*, Dr. Horn remarks (Trans. Amer. Philos. Soc., v. 14, p. 274): "Under stones in very dry places, and very frequently, though probably merely accidentally, among ants."

Alaudes singularis.—"Specimens are very rare and found living with a small black ant under stones" (Dr. Horn, l. c., p. 362); also found among ants by Mr. H. F. Wickham. I have not the slightest doubt that this species is strictly myrmecophilous. No specimens of the ant are preserved.

Hymenorus rufipes.—Larvæ of this occur commonly in the hills of *Formica fusca* at Washington, D. C. (Pergande, Schwarz), and in the nests of *Aphænogaster Treati* (Pergande); the pupæ of *H. obscurus* were found by Mr. Pergande among *Formica fusca.* I hardly believe that these or other species of *Hymenorus* are strictly myrmecophilous in the larva state.

Anthicus n. sp. ?—A small yellow species, which I cannot refer to any described species, occurred abundantly in the hills of *Formica obscuripes* in Colorado (Schwarz). Every hill I examined contained many hundred specimens of the beetle.

If this material, so far as rendered available by the determinations of the ants, is arranged according to the hosts, we obtain the following list:

Camponotus pennsylvanicus.	Ptomaphagus parasitus, Batrisus globosus, Lomechusa cava, Hister planipes, Cremastochilus canaliculatus.
Camponotus lævigatus . .	Lomechusa montana.
Camponotus pictus	Ptomaphagus n. sp., P. brachyderus, Lomechusa cava.
Camponotus melleus . . .	Coscinoptera dominicana (larva).
Camponotus esuriens . . .	Cremastochilus squamulosus.
Formica fusca	Ptomaphagus parasitus, Oxytelus placusinus, Hetærius brunnipennis, Hymenorus rufipes (larva), H. obscurus (larva).
Formica integra	Ptomaphagus n. sp., Cedius Ziegleri, Euryusa obtusa, Amphotis Ulkei, Euphoria inda (larva), Cremastochilus castaneæ.
Formica exsectoides	Ptomaphagus parasitus, Cedius Ziegleri, Homalota sp., Euryusa obtusa, Megastilicus formicarius, Hister planipes, Hetærius brunnipennis.

Formica obscuripes	Homalota ? n. sp., Platymedon laticollis, Oxytelus n. sp., Hypocoprus formicetorum, Monotoma fulvipes, Euphoria inda, E. hirtipes, Coscinoptera sp. (larva), Anthicus n. sp. ?
Formica Schaufussi	Ptomaphagus parasitus, Homalota sp., Hister perpunctatus, Cremastochilus castaneæ.
Lasius niger	Hister repletus.
Lasius alienus	Scydmænus rasus, Adranes cœcus, Batrisus ionæ, B. globosus, Homalota ? sp., Myrmedonia n. sp., Oxytelus placusinus.
Lasius umbratus ?	Adranes LeContei.
Lasius aphidicola.	Ceophyllus monilis, Limulodes paradoxus.
Lasius claviger	Batrisus ferox, Homœusa expansa, Brachyacantha ursina (larva).
Lasius interjectus.	Batrisus ferox.
Lasius bicornis	Euryusa n. sp.
Prenolepis parvula	Atinus monilicornis.
Tapinoma sessile	Unknown Aleocharid, Myrmedonia n. sp.
Aphænogaster tennesseensis .	Tyrus humeralis, Batrisus juvencus.
Aphænogaster Treati . . .	Decarthron stigmosum, Hymenorus rufipes (larva).
Aphænogaster fulva	Decarthron stigmosum, Hetærius Blanchardi, Cremastochilus variolosus.
Solenopsis geminata . . .	Myrmecochara pictipennis, Euparia castanea.
Solenopsis debilis	Myrmecochara ? n. sp.
Cremastogaster lineolata . .	Batrisus globosus, Myrmedonia n. sp., Amphotis Ulkei.

Dr. Marx said that the myrmecophilous spider, *Myrmekiaphila foliata*, described by Prof. Atkinson, was omitted by Mr. Schwarz. Mr. Ashmead stated that the genera of Hymenoptera mentioned by Mr. Schwarz were probably parasites of the Aphids or Dipterous larvæ to be found in ants' nests, as these genera of Hymenoptera were well known to be parasitic on Aphids and Diptera.

SEPTEMBER 5, 1889.

Eight persons present. President Schwarz in the chair.

Dr. Marx added two genera of spiders, *Synemosyna* and *Synageles*, to the list of myrmecophilous insects presented by Mr. Schwarz at the previous meeting.

Mr. Ulke mentioned that he had found a specimen of *Microrhopala melsheimeri* in an ants' nest at Pen Mar, Pa. This species might prove to be a true myrmecophilid.

Mr. Schwarz thought that it could only be a messmate of the ants in the larva state, if it was not a mere accidental find.

Mr. Ulke, in connection with Mr. Edwards' paper on the noises of Lepidoptera, mentioned that he had this season repeatedly heard the stridulating noise produced by *Harpalus caliginosus* in specimens attracted by electric lights. The noise ceased as soon as the specimens were caught.

Mr. Schwarz corroborated Mr. Smith's statement made at the last meeting regarding the appearance of *Cicada septendecim* in the northern part of the District. He had traced the species (from pupæ skins adhering to trees) from Glenwood Cemetery around Soldiers' Home and across 7th-street Road, but did not see them in the woods bordering Rock Creek. The first *Cicada pruinosa* was heard this year on July 5.

Mr. Schwarz read the following paper:

SUDDEN SPREAD OF A NEW ENEMY TO CLOVER.

By E. A. SCHWARZ.

The sudden appearance of any species of insects in great number of specimens is always an interesting phenomenon. If such species was previously known to occur in the same locality, though as a rarity, we explain this appearance in numbers from the fact that the conditions, climatic or otherwise, have been exceptionally favorable for its increase. But if a species suddenly appears abundantly in a locality in which it formerly did not occur—in other words, if we have an invasion or a sudden migration of a species—the reasons for such movements remain in most cases obscure. It is an example of this sort which has come under my observation within the spring and summer of this year, and which I would like to place on record. The insect in question is a Curculionid, *Sitones hispidulus*, a species introduced from Europe, but whose occurrence in North America has been known for quite a number of years.

The genus *Sitones* contains a tolerably large number of palearctic species, which in the larva and imago states feed on clover, peas, *Medicago*, *Melilotus*, and allied plants, the beetles feeding on the leaves, the larvæ underground on the roots. They probably can also subsist on other plants besides those mentioned. In our country we have on the Pacific coast a few species * which sufficiently deviate in characters to distinguish them from the European species. East of the Rocky Mountains the genus is represented by four species which are identical with European species. Three of them (*S. lineellus*, *flavescens*, and *tibialis*) are especially abundant in specimens in the more northern part of the country, and they are either old importations or belong more probably to the circumpolar fauna. At any rate, they have hitherto never done any serious damage here to clover, peas, or other cultivated plants, whereas in Europe several species of *Sitones* are greatly injurious. It is a well-known fact that if a European insect which is injurious to cultivated plants in its native home is introduced into North America, its injury here is by far more serious than in Europe. For this reason I am inclined to believe that these three species are not imported ones, but belong to the circumpolar fauna. The fourth species, *S. hispidulus*, is evidently a recent importation. Up to 1876 its occurrence in this country was not recorded. In that year it was first mentioned by Dr. LeConte as having occurred near Long Branch, N. J., about the roots of grass growing on the dunes. In subsequent years the species was found under similar conditions, on Long Island, N. Y., by the New York and Brooklyn entomologists; at Brigantine Beach, N. J., by Dr. Hamilton, and at Atlantic City and Cape May, N. J., by myself. Three years ago I found it at Piney Point, Md., also on the beach, but this year it has suddenly made its appearance in the city of Washington. In the spring I found two or three specimens on the walls of the Department of Agriculture, and in May Mr. Ulke found it swarming on red and white clover on the White House lot. At that time it was also common on red clover in the Agricultural grounds. Both Mr. Ulke and myself failed to find it in May and June in the surroundings of the city, although especial attention was paid to this insect. But in the middle of July I found some specimens at Bladensburg, Md., six miles from Washington, and in August Mr. Ulke found it on the mountains near Pen Mar, Pa. The beetle feeds on the leaves of clover, but does not appear to be so voracious as an allied species, *Phytonomus punctatus*. A few larvæ which I found underground feeding on the roots of clover, are doubtless those of the *Sitones*. The effect of the work of the larva on the plant could not be ascertained from the fact that the lawns of our city parks are frequently mowed.

Mr. C. G. H. Brischke tells us (Entomol. Monatsbl., I, 1876, p. 42) what amount of damage the larva is capable of doing to clover in its native home, and should the species continue its spread in this country it is to be feared that we shall have another most unwelcome addition to the already long list of clover pests.

* Their number has recently been greatly increased by Capt. Casey, but it is doubtful whether most of his species will ever be recognized as such.

In the discussion of this communication Mr. Ulke stated that he had found *Sitones hispidulus* in August of this year, at Pen Mar, Pa., and further, that this species was certainly not present in Washington last year, for he had repeatedly and industriously collected, without taking a single specimen, during last summer, on the lawns and clover fields where it was so abundant this year.

Mr. Linell said that years ago he found the species abundantly on the beach at Coney Island, New York.

As a further illustration of the sudden appearance of insects in new localities, Mr. Schwarz mentioned that *Sphinx catalpæ* was this season, for the first time, excessively abundant in the District of Columbia, many trees within the city, but more especially along the Tennallytown road, being utterly denuded by the larvæ. Mr. Schœnborn had informed him that the moth had been first observed here some 4 or 5 years ago at the electric light, and that a few larvæ had been found every year since that time.

Mr. Ulke, in the same connection, commented on the complete disappearance of *Doryphora juncta*, formerly a common species here, after the western species (*D.* 10-*lineata*) became abundant about Washington.

Mr. Schwarz read the following note:

AN INTERESTING FOOD-PLANT OF PIERIS RAPÆ.*—In the latter part of July of the present year I had occasion to visit several points of the Atlantic coast in Virginia and New Jersey. The most common maritime plant all along this sandy coast is *Cakile americana*, of the family *Cruciferæ*. At Virginia Beach, Va., and Cape May, N. J., I was surprised to find the larva of the notorious *Pieris rapæ* feeding on this plant. Hundreds of specimens could have been collected within very short time. They were, however, not evenly distributed, but infested clusters of plants in different places, and occurred often where the plants were most exposed to the spray of the ocean. The larvæ were of all sizes, and eggs and pupæ were also found. For some reason or another no specimens were seen at Anglesea (a little north of Cape May), but I presume that the very low coast at that locality, where the maritime plants are often covered by the high tides, is the reason that the plants are not palatable to the insect.

There is an interesting question connected with this food-plant of

*This note was read before I had an opportunity of seeing part 8 of Scudder's great work on Butterflies, where *Cakile americana* is mentioned among the food-plants of *Pieris rapæ* on the authority of Dr. John Hamilton.

Pieris rapæ, viz., Has this *Cakile*, which is so abundant and widely distributed along our coast, been instrumental in assisting the spread of the butterfly? Unfortunately this question can never be satisfactorily answered, since we cannot ascertain whether this food-habit is a recently acquired one, or whether the *Pieris* took to the plant soon after its introduction from Europe. I scrutinized Mr. Scudder's map accompanying his work on the introduction and spread of *Pieris rapæ* to see whether the latter had spread faster along our sea-coast than inland. Mr. Scudder states that in the year 1869 the species was found in a narrow circle around New York city (not to mention here the localities in Canada and Maine). In the year 1870 we find it already from the north end of Long Island, through New Jersey and Delaware, into Maryland, but near the coast and not going far inland. In other words, it had spread within one year over a long stretch of the coast and a comparatively short distance inland. This would speak in favor of the theory that this maritime food-plant could have been instrumental in the rapid spread of the *Pieris*, but the data given by Scudder refer all to inland stations, where the insects spread by means of the cultivated cabbage, either from field to field or by transportation of infested cabbages.

Mr. Ashmead stated that, in the year 1880, he had found the larvæ of *Pieris rapæ* feeding on *Cakile maritima* below Tampa, Fla.

An exceptionally fine and large specimen of *Lymexylon sericeum* was exhibited by Mr. Schwarz, who called attention to the remarkable secondary male characters, viz., the flabellate maxillary palpi. Several specimens of this beetle were cut from decaying wood of Red Oak, near Washington, D. C., about the end of June; others were found crawling on such trees after dusk.

October 3, 1889.

Seven persons present. President Schwarz in the chair.

Mr. James Fletcher, of Ottawa, Can., was elected as a corresponding member of the Society.

Dr. Fox showed two spiders in which the eyes were abnormal. A male of *Epeira sclopetaria* had but seven eyes, the posterior median of the left side being absent; otherwise the position of the eyes was normal. The second specimen was a young female of *Dictyna* sp. In this the only eyes that could be made out were the four lateral and one posterior median, and all of these were unpigmented, and looked as if they were practically undeveloped. Traces of the other eye-spots were to be seen, however. In neither case could any scar be found to indicate the loss of the eyes from traumatism.

Dr. Marx called attention to a mutilated specimen of *Lycosa* sp. which he had spoken of in a previous meeting of the Society. In this case the large eyes of the second row were wanting, but a cicatricial line was found, showing that they had been removed by a traumatism.

Dr. Marx then read a letter from Prof. Thorell, in which the writer discussed the family terminations, *idæ* and *oidæ*, giving his decision in favor of the latter (*oidæ*). Dr. Marx called attention to the conflict of the two names *Epeiroides* (genus) and *Epeiroidæ* (family) which would occur in this case, and said that with the termination of *idæ* for the family, these would be entirely distinct.

After much discussion, participated in by all the members present, the unanimous opinion was in favor of the termination *idæ*.

Mr. Schwarz read the following letter from Dr. Geo. H. Horn, of Philadelphia, in regard to the breeding habit of a rare Cerambycid:

"Early last spring Mr. G. R. Pilate, of San Bernardino, Cal., sent me a lot of stems of *Opuntia bernardina* from southern California, containing living larvæ of *Cœnopœus Palmeri*. One of these, with the stem and an imago, I sent to Dr. Hagen for certain preservation with his already large biological series. The other stems were allowed to remain in the box neglected, knowing it would be useless to attempt to keep them green and growing.

"On August 15 the box was opened again, and one very lively imago was found and four others dead or nearly so.

"It is probable that the first emerged about August 1. From this it is probable that in the much hotter climate of the Opuntia region the insect may be looked for a month earlier."

Mr. Schwarz said that the food-habits of this species were very remarkable, since all other species of this group (*Acanthocinini*) so far as known, live under bark of various kinds of dying or dead trees. The number of beetles known to bore in Opuntia stems is very small (*Monilema*, *Scyphophorus*, *Acalles hubbardi*), but future investigations will, no doubt, considerably increase the number.

FLIGHT OF A GRASSHOPPER WHEN PURSUED.—Some time in July of the present year there was witnessed by a great number of people, including Mr. Pergande and myself, a curious and exciting sight, viz., a fight between two sparrows (*Passer domesticus*) and a grasshopper. On the lawn in front of the main entrance of the Department of Agriculture a specimen of *Œdipoda carolina* rose into the air after the custom of this species, when it was espied and pounced upon by two sparrows. Instead of dropping to the ground the grasshopper remained on the wing, about 10 or 12 feet from the ground, and flew across the lawn and across the road leading towards 12th street, its objective point being evidently the clump of pine trees near that road, and toward which it flew in as straight a line as it could under these trying circumstances. The whole distance of this flight was at least 80 feet. During all this time it was hotly pursued by the two sparrows and had many narrow escapes, but finally managed to reach the trees.

The reason why I bring this little incident to your knowledge is to mention the clever way in which the grasshopper dodged the constant pouncing of the sparrows. Although it evidently flew as fast as it possibly could, its flight was by far slower than that of the two sparrows in pursuit, who had no difficulty in repeatedly overtaking their intended victim. But just at the critical moments the grasshopper suddenly lowered or raised its flight for a foot or so, never deflecting to the right or left. I think that Orthoptera and Coleoptera generally are not capable of making sudden lateral movements while on the wing, whereas it is well known that in most Odonata and Heterocera and in many Hymenoptera and Diptera, such sudden lateral changes in the direction of the flight are executed with the greatest precision.

To a swallow these sudden changes in the direction of the flight would have made no difference whatever and it would no doubt have captured the grasshopper on the first or second sweep, but the sparrows were utterly unable to follow these movements quickly. That there were two sparrows in pursuit greatly added to the chances of the Œdipoda, for the birds greatly impeded each other, constantly colliding with each other and keeping up a loud and eager quarrelling during the whole duration of the chase.

As stated before, the grasshopper finally succeeded in darting into one of the pine trees; the two sparrows flew around the tree, evidently in the expectation of seeing the grasshopper emerge on the other side, but it did not, and thus ended this exciting race which was very creditable to the abilities of the grasshopper, but by no means so to the reputation of the sparrows as insect-catching birds.

I may add that the sympathies of the numerous spectators were wholly on the side of the grasshopper.

A Peculiar Habit of Chalybion Cæruleum.—This handsome steel-blue wasp of the family *Sphecidæ* is quite common in summer and early fall in the parks and gardens of Washington. It stores its cells with spiders, but I do not know whether it selects only one particular species or several. At any rate, it seems to prefer a small, very common spider (? *Dictyna*), which makes a loose and irregular web on hedges, windows, etc. The spider usually hides under a leaf, or twig, or projecting corner, and is rarely seen on the web itself. I have now noticed—not only once, but repeatedly—a pretty trick on the part of the wasp to secure its prey. It deliberately flies into the web of the spider, gets entangled, hangs down by its hind legs, flutters about; in short, acts like an insect that has been accidentally caught in the net. This last is, in many instances, not inhabited, and the wasp then disentangles itself without difficulty and flies away. If the net is inhabited the owner sallies forth from its hiding-place to look after the disturbance. Upon perceiving such a large insect in its web and possibly recognizing its deadly foe, the spider retreats as quickly as possible, but the wasp now knows where to look for it and easily captures it.

During the discussion of predatory habits of different insects, Mr. Ashmead spoke of the peculiar habit of a Hymenopteron (*Monedula carolina*). It preys on the Horse-flies (*Tabanus*), and often when driving he has seen this species keep ahead of the horse, flying backward all the time, and then make a dart and capture its prey from the horse's body.

Mr. Townsend read the following:

Notes on Some Interesting Flies from the Vicinity of Washington, D. C.

By Tyler Townsend.

The species which form the subject of these notes were collected during the past summer in the vicinity of the upper Potomac landings on the Virginia side of the river, and are rather striking flies, either from their appearance or their habits.

Holcocephala abdominalis, Say.—This is a queer-looking, spectacled-headed, predatory fly of somewhat inferior size, belonging to the family *Asilidæ*, and sub-family *Dasypogoninæ*. The head is unusually broad in front, the eyes being very prominent and presenting a spectacled or goggled appearance. My specimens were taken from July 24 to August 19, either on leaves of plants in rather low situations, or on the wing. They agree well with Say's description, though the abdominal segments seem to be darker above in some specimens than there indicated. To Say's description the following might be added: The coxæ are entirely ashy;

the rest of the legs pale yellowish, with a dot at the extremity of the femora on the upper side; the extremities of the tibiæ, especially the hind pair, and the lower portion of each joint of all the tarsi very dusky. The basal joint of the hind tarsi, which is as long as the three following joints put together, is furnished on the outer edge with a brush of fine, short hairs. This species occurs throughout the Atlantic States.

Trichopoda radiata, Loew.—The species of the genus *Trichopoda* are flower-flies. They belong to the first section (*Phasina*) of the *Tachinidæ*. The species vary from rather small up to large and strikingly appearing flies, and are characterized, at least in all the specimens that I have seen, by having the upper edge of the hind tibiæ ciliate. Only one specimen of the present species was collected, this one being taken August 19, on flowers of Yarrow ~~tansy~~, by Mr. Marlatt. The pulvilli are remarkably developed, elongate, and of a beautiful light honey-yellow color, each pulvillus bifid and apparently consisting of a prong and sheath joined at the base, giving the feet the appearance of having each four anthers, like those of certain grasses, sticking to them. The empodia are bristle-like and of nearly the same color. It is readily recognized by Loew's description, and is there recorded from the District of Columbia.

Trichopoda hirtipes, Fab.—Two specimens, probably this species, were taken August 19, on flowers of mint and golden rod. They are very near to *T. lanipes* Fab., differing only in having the basal half or more of the abdomen and the bases of the femora rufous, while in *lanipes* the legs and abdomen are entirely black. This species bears the locality of Carolina in the O. S. list.

Trichopoda ciliata, Fab.—This is a smaller species, and the specimen which I have doubtfully referred here, the only one mentioned in these notes not from the Virginia side, was taken by Mr. Howard, at Clopper's Station, Maryland, August 4, on flowers of boneset. This species is recorded by Macquart from Carolina, and by Fabricius and Wiedemann from South America.

Trichopoda sp.—Another specimen, very much resembling the preceding, and of nearly the same size, but with the abdomen almost entirely light orange, while that of the preceding is well tipped with black, was taken August 19, on flowers of mint.

Palloptera superba, Loew.—This species belongs to the *Lonchæidæ*, a small family comprising in North America only the two genera, *Palloptera* and *Lonchæa*. It is a very pale-colored fly, with the wings prettily marked with smoky-black, and is found only in the shade of the woods, on the under side of leaves of various trees. I took four or five specimens from August 11 to 19, on under-side of lower leaves of oak and dogwood, about as high up from the ground as I could reach. They are not shy, but when disturbed are very quick in their movements. The species was described by Loew from specimens taken in Pennsylvania, and has been recorded for this vicinity by Glover. The only other N. A. representatives of this genus are two smaller species described by Loew from Sitka.

NOVEMBER 12, 1889.

Twenty-two persons present. President Schwarz in the chair.

Mr. F. M. Webster, of Lafayette, Ind., and Dr. John Hamilton, of Alleghany, Pa., were elected corresponding members.

Mr. Howard exhibited specimens of *Xylonomus rileyi*, Ashm. (*Ichneumonidæ*), recently captured resting on the shady side of the Washington Monument. Mr. Lugger said that he has found this species in Michigan, and Mr. Marlatt that he had found it in Kansas.

Mr. Lugger related his observations on the migrations of *Danais archippus* in Minnesota, and has since furnished the following abstract of his remarks:

ON THE MIGRATIONS OF THE MILKWEED BUTTERFLY.

By OTTO LUGGER.

I have observed the Milkweed butterfly (*Danais archippus*) carefully for the last two seasons in Minnesota. In 1888 the spring was very late. I observed large numbers of these insects flying at St. Anthony Park on May 28. No traces of any milkweeds were visible at that time. All the specimens looked bleached and had but few scales upon their wings, which were almost transparent; yet very few specimens had their wings torn in any way. They flew about rapidly, evidently in search of food, which at this time was scarce, consisting of the honey in the flowers of wild cherries and plums. On June 5 specimens had arrived at Perham, some two hundred miles northwest of Minneapolis. Isolated specimens were observed there on June 3 and 4, but the butterflies were quite numerous a few days later, after which they disappeared. They also fed upon the honey of the cherries and plums. On June 17 I found numerous specimens in St. Anthony Park in the act of mating, and found also three eggs upon the first small leaves of the Asclepias. On June 24 I found numerous specimens at Fargo, Dakota, in the act of mating. In July, in Perham, very large numbers mating; in fact, but very few single butterflies could be found at this date. The males carry the females (or, perhaps, the other way) for a very long time. On July 18 larvæ could be found everywhere upon the plants of Asclepias growing near Perham.

The season of 1889 commenced early, and the butterflies arrived at Fergus Falls (in the Red River Valley) as early as May 2, and they were seen mating on May 26. In this case also the butterflies followed the flowering season of wild cherries and plums. As soon as these flowers cease to bloom the insects disappear, but can be met with again farther north, where these plants are then just beginning to flower.

I think the peculiar pockets in the hind wings of the males are not of any sexual importance, but serve another purpose. I frequently saw flying males during the mating season approach each other from a long distance, as could be observed easily on the prairies. As soon as they came within ten feet of each other they would immediately cease the chase. Evidently in this case each male had been notified by the odor produced in the pockets of the other that the desired interview would prove futile and useless. Two females, on the contrary, would chase each other for a very long time before reaching the same conclusion. As soon as the males recognized each other they invariably would fly away in different directions, and only by the use of a gun could they be captured and their sex ascertained.

The butterflies, in migrating south, do not fly singly, but in large numbers and together. Like swallows, they gather every night for several weeks in certain localities, and after thus becoming accustomed to swarm together, they utilize the first favorable wind to start upon their journey. On August 17, 1888, I found such a swarm near Detroit, Minn., and observed more closely another one near Battle Lake a few days later. To study their motions, I camped for several days in this locality, which is a little grove of poplars near a very small creek. During the day but few butterflies could be seen flying about in search of food. But towards sunset large numbers of them came from all points of the compass and settled upon the trees, selecting the crowns. As long as I could see, butterflies arrived, and millions of them must have crowded together. Early in the morning the butterflies commenced to leave this grove, not singly, but in large numbers, which broke up into smaller companies to scatter over the prairies in search of food. In this instance I am sure that the butterflies met every evening for at least ten days, but very likely for a longer period, as the wind during the period was from the south. With the first wind from the north all had disappeared.

I also observed their motions at St. Anthony Park, but in this case they were already upon their southward journey. During some days with a wind blowing from the north, the air was filled with such butterflies. None flew at a distance above ground less than 250 feet, most of them very much higher. A good field-glass revealed large numbers at a much greater altitude, barely visible as mere spots with this instrument. Nor did the butterflies really fly, but they drifted or sailed along very rapidly with the wind. Their wings were fully extended in an almost horizontal position, and the insects seemed to use them only from time to time to keep their heads in the proper forward position. They flew both during the night and during the day. As soon as the wind changed its course all butterflies descended; it "rained butterflies," as my little boy called this phenomenon. Where no butterflies could be found for several weeks, everything was now alive with them. With their powerful wings they could be seen flying about everywhere, but I did not see a single specimen take food, although numerous thistles invited them. Sometimes the currents in higher layers of the air were in their favor, whilst those below were not. High in the air numerous butterflies sailed by, but those near the surface of the earth tried in vain to reach their relatives. Late in September, 1889, a small swarm of these insects was thus detained at the Park, and, as the nights were cool, they could be picked up frozen in the morning, but they would soon warm up and revive during the day to fly about, evidently waiting for an opportunity to escape to a more genial climate.

Both in the spring of 1888 and 1889, the Danais butterflies were accompanied by the common thistle butterflies *(Vanessa cardui)*. These came in as large numbers as the former, going northwards with the opening of the flowers of wild plum and cherries. Evidently these butterflies winter farther south, as all specimens were denuded of scales, indicating a long flight. Other hibernating insects, such as *Vanessa antiopa*, remain within the State. Their wings in spring are simply faded, but not denuded of scales. There is but one annual brood in Minnesota.

Prof. Riley expressed himself as decidedly of the opinion that in *Danais archippus* there is but one annual brood. He described the spring dispersion of the species northward, generally by isolated individuals, before the food-plant has appeared above ground. He had repeatedly observed these butterflies going against the wind in the spring, and always northward or northwestward. He believes there is no real foundation for the theory of a hibernation in the northern portions of the country.

In reply to a question, Mr. Lugger stated that these butterflies do not move in such regular swarms in the spring as in the fall.

Dr. R. Thaxter said he had found the Archippus butterflies in immense number on the Gulf coast, in winter, generally in the pine woods, some groves harboring millions of specimens. He had seen them *in coitu* in both spring and fall, and also in February, in Florida. During the winter they seem to feed but little, if at all.

Mr. Howard remarked that he had noticed the migration of this butterfly in the middle of October, 1889, at Ithaca, N. Y.

Mr. Lugger found them numerous in Baltimore in October, but they were nearly all frozen.

Mr. Howard read the following paper:

A Few Additions and Corrections to Scudder's Nomenclator Zoölogicus.

By L. O. Howard.

Mr. G. H. Verrall's recent paper on Bigot's orthography, in the Wiener Entomologische Zeitung for August, 1889, although of a controversial nature, has reminded me, in view of the fact that the names criticised were contributed by M. Bigot to Scudder's Nomen. Zoöl., that it might be worth while to record a very few corrections which I have incidentally noted, and more especially as the first of the 10-year supplements to the Nomenclator promised by the Smithsonian ought soon to be under way. The omission of some of these genera is rather remarkable from their prominence, one of them in fact being the type of a family.

Additions.

Bucculatrix, Zeller, Lep., 1848.—Tin.
Datana, Walker, Lepidopt., 1855.—Bomb.
Macrophila, Gray, Lepidopt., 1862.—Geom.
Milyas, Walker, Lep., 1858.—Noct.
Mytilaspis, Targ.-Tozz., Hom., 1868.—Cocc.
Ochsenheimeria, Hueb., Lep., 1816 (?).—Tin.
Podisus, Herrich-Schaeffer, Hem. Het., 1853.—Pentat.
Psychomorpha, Harris, Lep., 1839.—Zyg.
Pulvinaria, Targ.-Tozz., Hom., 1868.—Cocc.
Stenobothrus, Fischer, Orth., 1853.—Acrid.

Corrections.

Diaretus, Först., Hem., 1862. M. read Hym.
Limnophilus, Burm., Neur., 1869. A. read 1839.
Megalopterus, Ramb., Neur., 1842. A. read *Megaloprepus*.
Platysthetus, Mannh., Col., 1830. S. read *Platystethus*.
Polographus, Erichs., Col., 1836. A. read *Polygraphus*.

Mr. Marlatt then presented the following note:

Abundance of Oak-feeding Lepidopterous Larvæ in the Fall of 1889.

By C. L. Marlatt.

The season of 1889 was apparently a most favorable one for Lepidopterous larvæ in the District, as shown by the abundant finds on several collecting trips to the Virginia side of the Potomac and in the neighborhood of Cabin John's Bridge. Larvæ were especially abundant during late summer and early fall, and while a few species predominated the variety was also unusually large. The result of an hour or so's collecting near Cabin John's Bridge on September 29, without the aid of net, umbrella, or any appliance, but simply by "hand-picking," may be given to illustrate the richness of the field, even late in the season. The list comprises merely Macro-Lepidopterous larvæ, and is limited to those found on oak. In addition to those given, were found on oak two species of saw-fly larvæ, Dipterous and Cynipid galls, and a considerable number of Micro-Lepidopterous larvæ.

Hyphantria cunea	Common.
Halisidota maculata	"

Lagoa crispata	1 specimen.
Phobetron pithecium	"
Datana ministra	Common.
Lophodonta angulosa	1 specimen.
Edema albifrons	Very common.
Hyperchiria io	1 specimen.
Anisota stigma	Very common.
" senatoria	"
Acronycta afflicta	3 specimens.
" ovata	2 "

Dr. Thaxter, Mr. Lugger, and Mr. Schwarz corroborated Mr. Marlatt's experience regarding the great abundance of lepidopterous larvæ in the fall of the present year. Mr. Ashmead said that caterpillars were very abundant in Florida in the fall, after a wet summer such as the present had been, but he also had noticed that they were almost invariably parasitized.

Mr. Schwarz read a lengthy paper on "Caprification and Fig-insects," compiled from the works by Solms Laubach, Fritz Müller, Paul Mayer, and Gustav Mayr. After giving definitions of the terms "Caprification" and "Caprificus," and a short historical review of the subject, he proceeded to discuss the inter-relations of the fig insects to the Caprifig and the true Fig-tree, under the following headings: 1. The flowers and fruits of the caprifig and the wild species of *Ficus;* 2. Enumeration of the Fig-insects; 3. Life-history of the true Fig-insects (genus *Blastophaga*), and fertilization of the wild species of *Ficus* and the Caprifig; 4. The true Fig-tree, its differences from and its relations to the Caprifig, and the process of caprification.

Mr. Schwarz added his observations on *Ficus aurea* and its Fig-insects in semi-tropical Florida, and concluded with a few remarks regarding the practical application, to fig culture in the United States, of the results of these recent investigations on caprification.

Mr. Townsend read the following paper:

On the Fall Occurrence of Bibio and Dilophus.

By Tyler Townsend.

The flies of the genus *Bibio* are often very abundant in certain localities in the spring, appearing in swarms and covering all kinds of vegetation. The larvæ, which live in the earth and feed upon decaying vegetable matter, occur in masses together, and this gregarious habit extends into the imago state. The flies are sluggish, and alight wherever they can find a suitable resting-place on grass or foliage, but, so far as I can learn, do no appreciable injury in any part of their existence, although some writers would have us believe that the larvæ cause great destruction to the roots of grass. *Bibio albipennis* is probably the best known species in this country, and owes its notoriety to its peculiar habits and to the fact that it is distributed over the greater part of the eastern half of the United States. It is found from Massachusetts to Colorado. Indeed, it might almost be said to extend from the Atlantic to the Pacific, for the species described by Loew as *hirtus*, which is found in California, is so near to *albipennis* that it is manifestly only a form of that species modified by a long residence on the Pacific slope. *B. femoratus* is found from the Atlantic States to Michigan and Kansas, but does not seem to occur in such abundance as does the first-named species.

The object of this paper is to bring to the notice of the Society several records of the fall occurrence of *Bibionidæ*, to which my attention has been drawn more particularly by Prof. Lintner's notes on *B. albipennis* in his 2d New York Report, and to consider, in this regard, the question of their possible double-broodedness.

I have gathered the following references to the literature on fall appearances of *Bibio*:

1818. Meigen: Systematische Beschreib., etc., vol. i, pp. 310, 317.
1850. Zetterstedt: Diptera Scand., vol. ix, p. 3387.
1856. Walker: Diptera Britann., vol. iii, pp. 137, 139.
1869. Packard: Guide, etc., p. 392.
1877. Siebke: Cat. Dipterorum Norvegiæ, p. 188.
1884. Williston: Stand. Nat. Hist., vol. ii, p. 412.
1885. Lintner: 2d New York Report, pp. 114–115.

Touching American species, we have statements by the following authors:

Packard says that *albipennis* is "double-brooded and flies in swarms in June and October." He gives no details in this connection, but, replying to an inquiry, writes: "In regard to *Bibio albipennis*, I may say I have never reared the species, but must have made the statement in the *Guide* from seeing the swarms in June and September."

Williston says virtually the same, stating that the flies of this species "are found in abundance on willows in early spring, but there is also another brood later in the season."

In answer to a letter on this subject, Dr. Williston also wrote me:

"It was impossible in my article to give credit for the different facts borrowed. I have observed *Bibio albipennis* among the earliest flies of spring, and again in October. I therefore gave the statement, which you will find in Packard's Guide, feeling sure that it was true. You will understand that the whole article is really a statement of our existing knowledge of flies, and for that very fact necessarily contains little that is strictly original."

Lintner, treating the same species, calls attention to Packard's statement, adding that it is the only record known to him of the species occurring in the fall, and that it has never come under his own observation at that time. Writing for information to Mr. E. L. Keen, of Philadelphia, he received the reply that Mr. Keen had never seen the species after July, but had taken "a few specimens of a small black species of *Bibio** in a sheltered ravine" in October.

In regard to European species:

Meigen says that the time of appearance of these flies is, with the exception of *Bibio clavipes*, in the spring. Of that species he writes: "Very common in October and November on bushes. It is remarkable that, while all other *Bibios* known to me appear in the spring, this should make its first appearance in late autumn." Walker records it autumnal in Great Britain.

Zetterstedt, in treating the Scandinavian species, makes *clavipes* the only exception to their spring and summer occurrence. and says that it is "very common on grasses and fruit tree foliage toward autumn (August-October) through all Scandinavia, the Lapland mountains excepted."

Siebke, in his Diptera of Norway, says that *clavipes* occurs from June to September, which is a much earlier date than given by other authors. If these accounts are put together the dates would stretch from June to November, and allow the possibility of two appearances running into each other.

The European *pomonæ* is stated by Walker to be both vernal and autumnal in Britain. Meigen, however, says that it occurs in June and July, while Siebke says June to August.

As to fall occurrences of the nearly allied *Dilophus*, these have come more directly under my notice. On the 7th of November, about noon, the day being bright and clear but somewhat chilly, I secured 13 specimens of *Dilophus* from the shady (north and east) sides of the Washington Monument, near its base. The sunny (south and west) sides of the shaft were first examined, with no other result than the discovery of specimens of the Cluster Fly (*Pollenia rudis*) and a few large Muscids, which seemed to be the only insects that could stand the glare of the sun on the smooth, white surface. These *Dilophus* were of two species. Eleven specimens, ten ♀♀ and one ♂, are near *D. serotinus* Loew; the others are two ♂♂, entirely black and with the wings very dark smoky. Three specimens of a species very near the former, perhaps the same, were taken by Mr. Marlatt in this vicinity on the 5th of May last. Therefore this species probably occurs both in spring and fall.

As a last notice of specimens collected in the fall, I will mention that in the National Museum collections there are no less than 36 specimens of

* This was probably a *Dilophus*.—T. T.

Dilophus, belonging to not more than two species, and all near *D. serotinus*, that bear labels of various dates in October, from the 8th to the 24th, and were collected in Massachusetts and Missouri. Of these, 25 are ♀♀ and 11 ♂♂. The majority of the specimens are from Professor Riley's own collection, now in the National Museum.

In regard to the length of time of transformation of these flies, so far as known, Meigen writes that the larvæ "cast their skins at various times, pass the winter in the larva state, transform in the spring to pupæ, from which in a few days the flies appear." Zetterstedt states that "the larvæ of most of the species are said to live through the winter in dung and rich earth."

It may be contended that fall appearances of these flies are due to transformations of belated individuals, but this seems hardly credible, as we should in that event find them as numerous through the summer as in the fall. The more natural inference to be drawn from these facts is that species which are vernal and autumnal are double-brooded, although these fall appearances may be due to accelerated development. Of these species occurring both in the spring and fall, we have in America *Bibio albipennis*, *Dilophus serotinus*, and an undetermined species of *Dilophus*.

December 5, 1889.

Eleven persons present. President Schwarz in the chair.

Prof. Riley presented a communication on the oviposition of Diptera in which he reviewed the subject of piercing ovipositors in different orders of insects. He stated that in the order Diptera they are very rare, and that it is a broad rule with but few exceptions, that when the Diptera in any way pierce or sting it is through modifications of the mouth-parts. In the *Trypetidæ*, however, as also in some of the allied families of *Ortalidæ* and *Lonchæidæ*, the ovipositor is modified and fitted for puncturing, and he instanced cases like *Trypeta pomonella* and *T. lugens* in which the ovipositors were well adapted to piercing in the one case the apple, and the other case the orange, and placing their eggs in the fruit on the pulp of which the larvæ live.

Prof. Riley also presented a note on the genus *Lestophonus*, stating that upon receipt of fresh material from Mr. Frazer S. Crawford and some further notes from him, he had carefully gone over again the material in the National Museum collection and had concluded that Dr. Williston was wrong, and Mr. Skuse, of Australia, correct, in considering the *L. monophlœbi* distinct from *L. iceryæ*, as species go.

Prof. Riley also presented a communication on Dipterous larvæ inhabiting man. After a general statement of the subject he referred more particularly to two unpublished cases of the occurrence of *Eristalis* larvæ in the human rectum, and as having been passed living therefrom. One of the most explicit and trustworthy accounts is that of Dr. J. W. Compton, of Evansville, Ind., of a case of larvæ which were sent to the late Prof. Baird, and which were determined as those of *Eristalis dimidiatus*. The other case is one recently communicated by Dr. Lintner. The larvæ proved to be those of *Eristalis tenax*.

In connection with the "bullæ" on the wings, mentioned by Prof. Riley, Mr. Ashmead said that Walsh had called attention thereto in the Hymenoptera and had considered them of importance, but that more recent writers had not followed him in this view.

On the subject of *Eristalis* and other larvæ in man there was much discussion. The opinion prevailed that these larvæ could live for some time in the stomach, that they were probably taken in with food, or that the larvæ came from eggs deposited on the anus and had then entered the rectum.

Mr. Howard read a paper on the "European parasites of *Ocneria dispar*" of which he enumerated twenty-four species (among them one also known to inhabit North America) belonging to ten different genera. Of these he considers two to be probably hyperparasites. Fernald's statement that there were eleven European parasites known is evidently taken from Ratzeburg.

In the discussion it was mentioned that *O. dispar* was accidentally introduced by Mr. Trouvelot, of Medford, Mass., about twenty years ago, but that it had not been noticed in numbers until this year.

Mr. Ashmead exhibited a North American specimen of *Halidea*, and offered the following remarks:

Remarks on the Chalcid Genus Halidea.

By Wm. H. Ashmead.

The genus Halidea, the subject of my remarks to-night, was erected by Dr. Arnold Förster thirty-three years ago in his well-known work, Hymenopterologische Studien, published in 1856, and in which but two species are known, *H. insignis* and *H. nobilis*, both found in Europe and described by Förster in: Eine Centurie neuer Hymenopteren.

The genus was dedicated to the well-known Irish Hymenopterist, A. H. Haliday, and belongs in the group *Eupelminæ.*

For years I have been vainly endeavoring to recognize the genus, but, until recently, unsuccessfully, as I failed to find it either in my collections or amongst the numerous chalcideous material that has passed through my hands.

Recently, however, in casually going over a miscellaneous collection of microhymenoptera, assorting it preparatory to identification, I was both delighted and gratified to recognize a single specimen of this rare genus, collected the past summer at Harper's Ferry, Virginia, by my good friend, the President of our Society, Mr. E. A. Schwarz, labeled as having been captured June 19, and which I have brought with me to-night.

It superficially resembles an ordinary *Eupelmus*, the structure of the head, antennæ, and thorax being nearly identical; but it is at once distinguished from that genus and all other genera in the group by the dilated or broadly compressed posterior tibiæ and tarsi—a character that at once attracts attention, even on the most superficial examination.

The middle legs are a little longer than usual, cylindrical throughout; the tibiæ not dilated toward apex, nor is the first tarsal joint compressed and armed with teeth, as in other Eupelmids. The usual long apical tibial spur is, however, present, the thorax deeply impressed, as in *Eupelmus*, while the abdomen is sessile, shorter, and more pointed.

In testimony of my appreciation of the discovery, and as a slight token of my regard for the discoverer, I christen it in honor of our President and submit the following description:

Halidea Schwarzi, n. sp.:

Length, 2 mm.; bronzy-green, the face golden-green; head, broad, closely, minutely punctate; antennæ, 13-jointed, black; the scape, dull metallic green, its length being two-thirds the width between the eyes, slightly dilated apically; pedicel longer than wide; first two joints of funicle small, narrowed, cylindrical, but slightly longer than thick; the joints beyond dilated, nearly as wide as long, densely bristly; the club obliquely truncate; eyes large, oval, occupying the larger portion of the sides of the head, finely pubescent; thorax more than twice as long as wide, densely scaly, the disk deeply impressed; metathorax short, the hind margin golden-green; legs brown, the anterior pair dusky, the tarsi one-third or more longer than the tibiæ; middle pair paler brown, longer, and cylindrical throughout, the tibial spur long and white; posterior pair brown-black, the tibiæ and tarsi strongly dilated, pubescent; all coxæ metallic green, the posterior pair being brighter and more of a golden color; abdomen sessile, acute ovate, not longer than the thorax, flat above, roundedly keeled beneath, bronzy-green, brighter beneath; ovipositor short, only slightly exserted; wings slightly subhyaline, pubescent, the veins pale brown; the postmarginal vein is very long, gradually shaving off at apex of wing; the marginal less than twice as long as the stigmal vein.

The question of an author's right to change his published generic or specific names was discussed. Dr. Förster, who intended to name the genus after Mr. Haliday, subsequently revised the name so as to read *Halidaya* instead of *Halidea*. Prof. Riley, Mr. Howard, and others held that, in this instance, the name was alterable, while Mr. Mann, Mr. Ashmead, and Dr. Fox held that a name once published should hold, unless there was a gross typographical error.

Mr. Townsend read the following paper:

Further Note on Dissosteira (Œdipoda) Carolina.

By Tyler Townsend.

In the September number of the Can. Entom. for 1884 there appeared some notes by myself on the peculiar aërial performances of this locust, common throughout the U. S., and which Mr. Bruner tells me he has taken even in southern Mexico. The observations there given, as well as the present notes, were made in Michigan, and the latter being somewhat supplementary during two subsequent years are offered as follows:

During August and September of 1885, while observing the actions of this locust, I noticed that when one individual was attracted by another's oscillations, it alighted on the ground beside it as soon as the latter had ceased its aërial performance, when they ran by each other several times in succession, but did not clasp, as I had observed them to do before. No further observations were made on the subject until the following year, so that up to this time I had never examined the sex of these individuals, but nevertheless believed them to be in all cases males.

In 1886 the first performance of the season was noticed on July 27, the first specimen having been seen on July 1. On August 7 a specimen captured in the oscillating act proved on examination to be a male. On August 8 I had the opportunity of closely watching individuals as they went through their peculiar actions, when meeting on the ground, these actions being somewhat different from what I had previously noted. When two met on the ground, one having been attracted by the other's aërial exhibitions, they passed closely by each other once, twice, and perhaps several times, alternately jerking up and lowering the hind femora during the whole time, and more excitedly when nearest to each other. This continued for a few seconds, when one of the actors in the scene quickly flew up and away. I noticed these actions at this time in numerous cases without seeing any two thus engaged unite. On the other hand, I did not see any in actual conflict, but was rather impressed with the idea that the participants had no warlike intentions during these actions. The specimens were at this time nearly all males.

On August 9 two specimens taken in the act of aërial oscillation were both males. Of two going through their actions on the ground, the one which flew away first was caught and found to be a male. The other escaped. The females were just beginning to appear at this date.

The latest oscillations of the season were observed on October 10. There had been none noticed for nearly a month previous to this time, owing to the fact that the weather had been decidedly cold and with much rain. These last performances were due to the fact that for the preceding seven days the weather had, without exception, been warm and dry.

My explanation of these actions is as follows: From the fact that only the males seem to take part in these aërial performances, I believe that they are at these times exhibiting their powers and graces—in other words, paying court—to the females. As these exhibitions attract other males, when the excited antics are indulged in on the ground, I imagine that each one is thereby trying to drive the other off the field, generally endeavoring to intimidate him, and rarely actually clasping in conflict. This is to be inferred from the fact that the vanquished one soon flies away, leaving the other in possession of the field. There is little doubt that in some instances the males actually clasp and fight with each other; but more often one of them seems to be conquered without recourse to blows—withdraws before that point is reached. The females doubtless are in waiting in convenient spots, from which they witness these scenes, and ultimately accept the males whose superior intimidating powers have resulted in their being left in undisputed possession.

Mr. Schwarz exhibited specimens of a Cerambycid beetle, *Cyrtomerus pilicornis* Fabr. (determined by Dr. Horn), a species hitherto not known from the United States. It occurs sparingly on the Island of Key West, Fla., where it infests the branches of felled or dying trees of *Conocarpus erecta*. The species is widely distributed in the tropical and semi-tropical regions of America.

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