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The Canadian Entomologist.

VOL. XXVI.

LONDON, OCTOBER, 1894.

No. 10.

SIXTH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

(ABSTRACT OF PROCEEDINGS BY THE ACTING SECRETARY.)

Morning Session—August 14, 1894.

The Association met at 10 a.m., in Room 12 of the Packer Institute, Brooklyn, N. Y., August 14th, 1894. The following officers and members were present :

President, L. O. Howard, Washington, D. C. ; Vice-President, J. B. Smith, New Brunswick, N. J. ; Acting Secretary, C. L. Marlatt, Washington, D. C. Messrs. William H. Ashmead, Washington, D. C. ; Geo. F. Atkinson, Ithaca, N. Y. ; Nathan Banks, Sea Cliff, N. Y. ; D. W. Coquillett, Washington, D. C. ; Geo. C. Davis, Agricultural College, Mich. ; A. D. Hopkins, Morgantown, W. Va. ; Geo. H. Hudson, Plattsburg, N. Y. ; J. A. Lintner, Albany, N. Y. ; V. H. Lowe, Jamaica, N. Y. ; F. W. Raine, Morgantown, W. Va. ; William Saunders, Ottawa, Canada ; E. B. Southwick, Central Park, New York City ; F. A. Serrine, Jamaica, N. Y. There were also in attendance upon the meetings visitors and members of other scientific societies, the average attendance being twenty-five persons.

The meeting was called to order by the President, and in the absence of the Secretary, Mr. Gillette, Mr. C. L. Marlatt was elected secretary for the meeting.

The President, Mr. L. O. Howard, of Washington, D. C., delivered his annual address, which was entitled "The Rise and Present Condition of Official Economic Entomology," the scope of which is sufficiently explained by the title.

On motion of Dr. Lintner, the thanks of the Society were unanimously extended to the President for the admirable address presented.

A letter from the Secretary, Mr. Gillette, announced that he would be unable to attend the meeting.

The following active members were elected :

F. C. Test, C. E. Chambliss and H. G. Hubbard, all of the Department of Agriculture, Washington, D. C. ; Victor H. Lowe and F. A. Surrine, of Jamaica, N. Y. ; and F. W. Raine, of Morgantown, W. Va.

The following persons were elected to foreign membership :

Walter W. Froggatt, Technological Museum, Sydney, N. S. W.

Charles Whitehead, Barming House, Maidstone, Kent, England.

Geo. H. Carpenter, Science and Art Museum, Dublin, Ireland.

Dr. Geza Horvath, Ministry of Agriculture, Buda Pesth, Austria.

Prof. A. Targioni-Tozzetti, R. Staz. d. Entom. Agric., Firenze. Italy.

Prof. A. Giard, 14 Rue Stanislas, Paris, France.

M. J. Danysz, Laboratoire de Parasitologie, Bourse de Commerce, Paris, France.

Dr. J. Ritzema Bos, Wageningen, Netherlands.

Mr. Sven Lampa, Entomologist, Dept. Agric., Stockholm, Sweden.

Dr. N. Cholodkowsky, Institute Forestier, St. Petersburg, Russia.

Dr. K. Lindemann, Landwirtschaftliche Akademie, Moscow, Russia.

Prof. A. Portschinsky, Bur. Entom., Ministère de l'Agriculture, St. Petersburg, Russia.

Mr. E. C. Reed, Banos de los Cauquenos, Chile.

Mr. J. B. Smith, New Brunswick, N. J., presented a paper on the use of bisulphide of carbon as an insecticide, in which he described a very considerable number of experiments in the use of this substance against the Melon Louse (*Aphis cucumeris*, Forbes), one of the most destructive pests in parts of New Jersey and a very difficult insect to deal with. He used the bisulphide by introducing it about the plants under wooden boxes or bowls, placing the bisulphide directly on the ground under the boxes and also in various receptacles. He concluded that, in melon fields at least, bisulphide of carbon could be used very effectively, and particularly in stamping out an invasion at its very outset, while the plants are still of small size.

The paper was discussed by various members, Mr. Southwick describing a combination of bisulphide with "Polysolve," which he had used in the form of an emulsion ; and Mr. Lintner suggesting the use of cloth coverings in place of the boxes employed by Mr. Smith. Mr. Galloway suggested the use of the protection cloth used by seedsmen, which is treated with oil and is practically air-tight. Mr. Howard referred to the original suggestion by Garman, of the use of a washtub, which

was thought to be very satisfactory for limited applications; and Mr. Smith and Mr. Saunders suggested the use of paper caps, similar to but smaller than those used by farmers for the protection of the hay crop. The subject of the relation of parasites to the control of the louse was also discussed, as well as the effect of the bisulphide on the plants themselves, also upon the germination of seeds, when employed for the eradication of grain pests, etc.

Afternoon Session—August 14, 1894.

The report of the committee appointed last year, on co-operation among station entomologists, was presented by Mr. Smith, in the absence of the chairman. The report covered the matter of concerted work upon the life-history of special insects and their geographical distribution, the selection of certain groups of species to be studied from year to year, co-operation in experimentation with insecticide machinery to avoid duplication, and suggestions in the matter of securing conjoint legislative action among the States. The report was accepted and ordered to be printed, so that opportunity might be afforded members to examine it, in order to be able to take definite action on its adoption at the meeting of 1895.

A letter from Miss Eleanor A. Ormerod was read by the President, in which she expressed her regret at being unable to be present at the meeting.

A paper by Mr. J. M. Aldrich, on spraying without a pump, was read in his absence by Mr. Davis. This paper described a scheme for the mechanical mixture of water and oil by the use of an ordinary Nixon Climax Nozzle, the combination of the water and oil being made in the nozzle itself.

In the next paper Mr. C. L. Marlatt gave a review of a number of experiments conducted during the present year with several standard insecticide mixtures, also a series of experiments testing certain of the more important new insecticides or substances which seem to be of value as insect destroyers recently put before the public. The work was mainly to determine (1) the best methods of treating scale insects; (2) the effect of various mixtures on trees and foliage, in both summer and winter applications; (3) to show the relative merits of the old insecticides compared with some of the newer ones, and (4) also the possibility of successfully combining insecticides and fungicides.

The paper was discussed by Messrs. Smith, Galloway and others.

Professor Galloway followed with a paper on various insecticide substances, with which he had been experimenting for a number of years past, many of them in lines which had not hitherto been worked to any extent. He discussed particularly the kerosene emulsion made with lime, with resin wash, and with Bordeaux mixture. He also described a new method of making resin wash, devised by one of his field agents in Florida, which, briefly, consisted in using purer caustic soda, causing a much more rapid formation of the resin soap. Various other mixtures of possible insecticide value were also suggested. The paper was accompanied by the exhibition of a large series of vials, illustrating the various mixtures and combinations described by the author. The communication was generally discussed, and the important point emphasized that none of the emulsions were as perfect or as permanent as the standard milk and soap emulsions in common use, although some of them are possibly of value for immediate application.

Mr. Webster's paper on "Spraying with Arsenites vs. Bees" was read, in the absence of the author, by the Secretary. The conclusions arrived at were that arsenic is always present in the abdomens of bees frequenting recently sprayed blossoms, and more or less of it reaches the honey sacs; and that bees are, therefore, liable to be poisoned by spraying the bloom of fruit trees. He claimed that his experiments were the first to show conclusively that actual poisoning does result to bees under the conditions mentioned.

In the discussion, Mr. Lintner stated that even in the event of actual harm resulting to the bees, the question is still an open one, for the reason that many noxious insects frequenting fruit blooms are also destroyed. The paper was further discussed by other members.

Mr. Southwick presented a paper on economic entomological work in the parks of New York City, in which he described the general character of the means employed to control destructive insects in the principal parks of New York; he also gave some notes on the occurrences of and damage due to the principal insect pests with which he had to contend. A general discussion of the paper followed, which was participated in by most of the members present.

Mr. Southwick followed with a second paper on the Wood Leopard Moth in the parks of New York, giving an historical account of the insect, its present status, the nature of the injury, the plants affected, and the means he had adopted to exterminate the pest. He stated that this is a

most difficult insect to control, and could only be reached by cutting off the affected limb. In the case of rare trees, he had adopted the plan of putting a little bisulphide of carbon in the larval burrow with an oil can, closing the entrance with putty, which had proved an effective remedy.

The paper was discussed by Messrs. Smith, Howard, and others.

In the absence of Prof. F. H. Snow, of Lawrence, Kansas, his paper was read by Mr. Victor H. Lowe. This communication, entitled "Work in Economic Entomology at the University of Kansas for the season of 1894," related particularly to the work with the Chinch Bug disease (*Sporotrichum globuliferum*), and a new alfalfa and wheat pest, which proved, on rearing, to be *Agrotis introferans*, Grote.

Mr. Smith reported that the same Noctuid had been found by Mr. Gillette to occur very abundantly the present year in Colorado, and Mr. Howard referred to the occurrence of the moth in enormous numbers in Nebraska.

Messrs. Ashmead, Lintner and Hopkins were appointed by the President a committee to nominate officers for the ensuing year.

Morning Session—August 15, 1894.

Mr. Hopkins presented notes on some discoveries and observations of the year in West Virginia. The paper dealt chiefly with wood-working insects, but also covered various garden pests, such as the Potato-scab Gnat, the Melon Plant-louse, etc. The paper was discussed at some length by Mr. Smith, Dr. Lintner, Mr. Raine, and others.

The President read a letter from Mr. Webster, stating that he was unable to be present, on account of being actively engaged in stamping out an attack of *Fidia larvæ* on grape roots, by the use of bisulphide of carbon.

Mr. Howard read a paper on the Eastern occurrences of the San José scale, in which he briefly reviewed the history of the insect in the United States, and showed that as a result of investigations during the winter of 1893-4, and the summer of 1894, the scale has been discovered in six localities in the Eastern United States outside of New Jersey, while in the latter State it occurs at many points. He traced the introduction to two nursery firms in the State of New Jersey, and one in Missouri. He detailed in full the remedial work which has been undertaken by the Division of Entomology of the U. S. Department of Agriculture in each of the six Eastern localities, and showed that by virtue of the active measures

which have been taken, the insect will probably be stamped out in the East by the close of the season.

The next paper was on the same subject, and discussion was therefore deferred.

Mr. Smith then read a paper on the San José scale in New Jersey. He stated that the scale had first come to him from a nursery in the State in March, 1892, but had not been recognized, and he did not become aware of the true nature of the insect until he received the special circular sent out by the U. S. Department of Agriculture early in 1894. He described his work in connection with the stamping out of the scale, and particularly the active and energetic steps taken by the owners of the infested nurseries, from which the scale had been exterminated on young stock. He reported sending out letters to all persons who had obtained stock from the nurseries in question, enclosing the circular from the Department of Agriculture referred to, and the examination of nearly 100 orchards in person. As a result of his observations and work, he felt confident that the scale would ultimately be completely stamped out. The introduction of the scale was shown to have been either in 1886 or 1887, on some plum stock claimed to be curculio-proof, obtained from the San José region in California. Other fruit trees imported from California were also shown to be very likely infested. He gave some facts in regard to the trees and varieties which are most liable to be infested, also some notes on remedies.

In the discussion of these two papers, Dr. Lintner considered the possibility of the introduction of the scale on fruit from California, and concluded that the likelihood of the scale, so introduced, obtaining a foothold was very slight.

Mr. Marlatt thought there was danger in placing too much confidence in the work or the statements of nurserymen as to the completeness of the eradication of the scale, pointing out the great difficulty of thorough extermination and the ease with which a random scale here and there could be overlooked. Mr. Banks referred to the publication in a New York paper of occurrences of the scale in two or three localities in New York, accompanied with the report of the adoption of active measures to stamp it out in each instance.

Afternoon Session—August 15, 1894.

In continuation of the discussion of the morning session, Mr. Smith

exhibited specimens of California pears, obtained in Brooklyn, which were covered with the San José scale in all stages of development.

Mr. Lintner exhibited an apple coming from Ottawa, Canada, handed to him by Mr. Saunders, which was covered with the scales of *Mytilaspis pomorum*.

Mr. Davis read a paper on Mealy Bugs and other lice. He gave a careful résumé of the life-history of the common Mealy Bug (*Dactylopius destructor*), with detailed descriptions of the different stages; also some notes on *D. longifilis*. He also described a Coccus which he found on roots of clover, giving a general account of the habits and careful descriptions of the species. He also referred to *Eriococcus azaleæ* and other scale insects.

The paper was discussed by Messrs. Serrine, Ashmead and Howard. Mr. Serrine thought Mr. Davis's clover Coccus was the same as the one found by Professor Forbes on white clover, and named by him *Coccus trifolii*, Mr. Ashmead coinciding in this view, and Mr. Howard stating that the *Eriococcus azaleæ* was certainly not an introduced species from Belgium, as suggested by the author, since the species is not known in Europe, and Professor Comstock has found it on wild plants near Ithaca, indicating that it is undoubtedly a native species. He said also that the two old species of *Dactylopius* referred to by the author had been shown by Berlese to be synonymous with European species, and that their life-histories had been worked out by this author in great detail.

Mr. Marlatt read a paper on the Pear-tree Psylla in Maryland, in which he described the sudden occurrence of this Northern pear pest in two orchards on the eastern shore of Maryland, in very destructive numbers. The introduction of the species was shown to have been upon nursery stock from infested regions in New York, and the author was confident that the injury, while excessively severe for the moment, would not be of long duration, judging from the past history of the insect. A brief review of the life-history was given, with some notes on the natural enemies, notably a species of lace-wing fly (*Chrysopa oculata*), the larva of which feeds voraciously on all stages of the Psylla; also various species of lady-birds, which are useful in a similar way. The life-history of the lace-wing fly was carefully worked out. Experiments with various insecticides on the eggs of the Psylla were detailed, and general recommendations for remedial work were given.

The paper was discussed by Messrs. Davis, Southwick, Lintner, and others, both Messrs. Southwick and Lintner reporting cases of sudden appearance of the Psylla, with subsequent equally sudden disappearance.

Mr. Smith deferred speaking until the reading of his own paper, which included a reference to the same insect, in which he said that the conditions described by Mr. Marlatt were identical with the conditions obtaining in localities in New Jersey, and that the source of the introduction was also the same.

Mr. Smith then read a paper, entitled "Notes of the Year in New Jersey," which was a summary of the important insects brought to the attention of the Entomologist during the present season. It contained references to occurrences of the Pear-tree Psylla, the Pear Blister-mite, the Pear Midge, a new pear pest in a species of *Agrilus*, probably *anxius*, the habits of this last insect being described at some length. The paper also considered the use of protective coverings for the trunks of trees as a means against the borer; invasions of cutworms; the Periodical Cicada; some potato insects; onion maggots; the remarkable mortality of the Clover-leaf Weevil larvæ, and the Potato-stalk Borer, *Trichobaris trinotatus*, which had been brought to his attention for the first time the present year. The paper was discussed by most of the members present.

Mr. Davis also presented a communication covering notes on special economic insects of the season in Michigan, referring particularly to the occurrence of *Diptotaxis Harperi* as a strawberry pest, a Dipteron raspberry girdler, *Adimonia clavicollis*, as a cherry-tree defoliator, *Notoxus anchora*, as feeding on fruit of cherry.

In the discussion, Mr. Hopkins stated that he had found the raspberry cane maggot, described by Mr. Davis, in the Alleghany Mountains in 1892, but did not rear the adult.

In the absence of Mr. Chittenden, his paper, entitled "Supplementary Notes on the Strawberry Weevil, its Habits and Remedies," was read by Mr. Southwick. The writer noted the occurrence of the Strawberry Weevil (*Anthonomus signatus*, Say.) in more or less injurious numbers in parts of Maryland, Virginia, Delaware, Pennsylvania and New Jersey in 1893 and 1894. Three new food-plants were discovered, the red-bud (*Cercis Canadensis*), the dewberry and raspberry, and the life-cycle from egg to adult was found to extend over a period of four weeks. The methods of oviposition and of severing stems are described. A table showing by States the destructive appearances of the insect from 1871 to

date is given. Under the head of remedies, the necessity of clean culture is pointed out, also the benefit that might be derived from early-blooming varieties of staminates, and of the red-bud tree as trap-crop. Kerosene emulsion and Paris green were found by experiment to be of service, but the latter gave the better results. Directions are given for the applications of these insecticides, three or four sprayings being advised, beginning two or three days before first bloom. The subject of covering beds is considered, and in conclusion the fruit grower is urged not to trust entirely to staminate varieties.

Mr. Smith said he had anticipated damage from this insect the present season, but so far as he had observed, it did not manifest itself in New Jersey.

In view of the lateness of the hour, the following papers were read by title only :

"Notes on the Insects of Northern Idaho," by J. M. Aldrich, Moscow, Idaho. This paper included a few notes on the principal pests of the "Pan-handle" district of Idaho, where the farming land is at an elevation of 700 to 3,500 feet, with a corresponding change in climate. The insects discussed were the Wheat Aphis, the Codling Moth, Bud Moth, Woolly Aphis, Pear-leaf Blister-mite and the San José scale, which latter the author stated was the most dreaded insect pest, and a considerable effort was being made to prevent its spread to new localities.

"Insects of the Year," by F. M. Webster, Wooster, Ohio. Mr. Webster's paper had particular reference to the occurrence of the larvæ of *Fidia viticida*, Walsh, in vineyards, which was the important insect manifestation of the year in Ohio. It also covered the Raspberry *Agilus*, the strawberry Weevil, the Pear-tree Blister-beetle, joint worms, the Bean Leaf-beetle and other garden and small-fruit pests, such as the Grain Louse, Corn Bill-bug and a Thrips which is proving very destructive to onion crops. Other insects were also mentioned briefly.

"Notes from New Mexico," by T. D. A. Cockerell, Las Cruces, N. M. This paper covered numerous short notes on various insects observed in New Mexico, with a description of the climatic and other conditions characteristic of the more important natural districts of the State, and the bearing of these on the insect fauna.

"Some Experience with Mosquitoes," by Howard Evarts Weed, Agricultural College, Miss. This communication covered the result of certain experiments in the use of kerosene as a means of preventing the breeding

of mosquitoes in water reservoirs on the college campus. The use of kerosene was very satisfactory, and resulted in a very marked subsidence of the mosquito trouble. The author also reports that kerosene is a very good preventive to apply to the hands or face in the case of mosquito outbreaks.

The report of the committee on nominations was presented by Mr. Lintner, as follows :

President—J. B. Smith.

Vice-President—C. H. Fernald.

Secretary—C. L. Marlatt.

The report was unanimously adopted and the officers named duly elected. (By inadvertence no second vice-president was nominated or elected.) It was decided to follow the usual custom for the next meeting, and hold it on the two days preceding the meeting of the American Association for the Advancement of Science, and at the place decided upon for the next meeting of that Association. On motion, it was requested that the minutes be printed in full in "Insect Life."

After the reading and approval of the minutes of the entire session, Mr. Southwick moved that the thanks of the Association be tendered to the President and Secretary for the able and satisfactory manner in which they had discharged their respective duties.

The resolution was adopted.

The Association was then declared adjourned by the President for one year.

C. L. MARIATT, Acting Secretary.

SEXUAL CHARACTERS IN SCOLYTIDÆ.

(A Preliminary Contribution.)

BY A. D. HOPKINS, ENTOMOLOGIST OF THE WEST VIRGINIA EXPERIMENT STATION.

(Read before section F. of A. A. A. S., Brooklyn, Aug. 20th, 1894.)

It appears that comparatively little is known regarding the external sexual characters of species in the family Scolytidæ. Indeed, the species of this family are among the most difficult of Coleoptera to study, or to properly identify, unless one has access to a large series of correctly named and classified examples. It is not so surprising, then, that more or less confusion exists with reference to descriptions of the sexes, and that numerous mistakes have been made in following the classifications and

sexual characters given by those Specialists whom we recognize as the best authority on the subject.

There is considerable difference of opinion among Specialists regarding the external sexual characters of species in the genus *Platypus* as based upon those given by Dr. Chapusc in his *Monographie des Platypids*. With a view of satisfying myself on this question, I dissected a number of alcoholic and dried examples of male and female *P. quadridentatus* and *P. compositus*. The results convinced me that the male and female characters given in the description of these two species are reversed.

The fact that descriptions of male and female Scolytids are based largely upon the characters given by Chapusc causes me to question the correctness of interpretations of the external sexual characters in other genera.

This led to the commencement of a systematic study of the sexual characters of all the species of which I had sufficient material. A number of male and female examples of *Xyloterus retusus*, *Xyloterus bivittatus*, *Xyleborus dispar*, and *Xyleborus obesus* were first dissected and a careful study of the male and female genitalia was made. I found that the male organ, while exhibiting remarkable differences in the species of the two genera, possesses certain peculiarities by which it can be readily recognized, even in dried specimens. Guided by this, I continued the investigation until male and female examples of thirty-seven species, representing seventeen genera, were dissected.

According to my interpretations, based upon the finding of the male genitalia in the species examined, the sexual characters, as given by Le Conte in *Rhynchophora* of America, North of Mexico, are wrong in ten species out of five genera, and correct in ten species out of nine genera. In fourteen species out of ten genera external sexual characters were determined, which were previously unknown to me, and most of them are probably new to science. In three species out of three genera, no distinctive or constant characters were observed by which the sexes could be designated.

While the external sexual characters appear to be constant with the species in some genera, in others no particular character is possessed by all of the species. In fact, what may be a good male or female character in one species will be reversed in another species of the same genus.

The greater development of the elytra and abdominal armatures is a

good male character in some species, but not in others. The frontal concavity is a good male character in some genera, but is reversed in others. The flattened or concave front fringed with long hairs is a good male character in some species, but is of no value in others, as we have found it either absent or reversed in species of the same genera. Size and colour appear to be of no value except in *Xyleborus*, where the male is, as far as known, very much smaller and usually paler than the female. Long hairs or bristles on the antennal club appear to be a good female character in *Monarthrum* and *Gnathotrichus*. The long silky hairs with curved points on the tibia and tarsus of male *Xyloterus politus* are rather a remarkable and unique sexual character. Frontal elevations, depressions, lines, channels and punctures are good sexual characters in some species, while the same thing is of no value in other species of the same genus. Thus, it will be seen that the external sexual characters are by no means constant among the species, and that it is not safe to conclude that because one species has a well-marked and known male or female external character, that other species belonging to the same genus will necessarily show the same character. It is my opinion that the sexes of no species of Scolytidæ should be characterized without previously dissecting one or more examples of both sexes.

The male genitalia are composed of certain horny parts, the form of some one or more of which is usually characteristic to the nearly related species of a genus, but a wide difference in the form of all of the parts exists in species belonging to different genera. To characterize the different forms by descriptions and drawings will require more time than I have, as yet, been able to devote to this subject. It appears to me, however, that further study in this line is necessary in order to approach anything like a perfect and natural classification of the Scolytidæ, and I hope to be able to contribute additional information upon this subject in the future.

Below, I submit a list of the species I have examined, and give the sexual characters as I have interpreted them. As previously stated, these conclusions are based upon the finding, in individuals of each species, a peculiar structure composed of numerous horny parts, which is evidently the male generative organ. The only room for doubt, in my mind, is in the bare possibility of an ovipositor composed of horny parts being possessed by the female of any of the species. The fact, however, of the numerous examples dissected, where the presence of the ova left no doubt

as to the sex, I failed to find anything approaching a horny ovipositor, leads me to believe that the genitalia possessing prominent horny parts are, among Scolytids, found only in the male

The descriptions referred to in the following list, unless otherwise noted, will be found in Rhynchophora of America, north of Mexico, by LeConte & Horn, 1886 :

PLATYPUS.

P. quadridentatus, Oliv. ♂ = description of ♀. ♀ new = description of ♂ *P. flavicornis*, except that the two large punctures each side of the anterior extremity of the short dorsal impressed line, referred to, are not punctures, but smooth, shining and slightly convex spaces.

P. compositus, Say. ♂ = description of ♀. ♀ = description of ♂.

CORTHYLUS.

C. punctatissimus, Zimm. ♂ = description of ♀. ♀ = description of ♀.

C. Columbianus, Hopk. ♂ = description of ♀. ♀ = description of ♂.

Proceedings Entomological Society of Washington (not published), also Bulletin 36, W. Va. Expt. Station.

MONARTHURUM.

M. fasciatum, Say. ♂ = description of ♀. ♀ = description of ♂. Additional: ♂: front with coarse punctures; ♀: front with fine punctures, and with slight depression in the middle.

M. mali, Fitch. ♂ = description of ♀. ♀ = description of ♂ except in the long spine referred to, which is not present in any of my examples of either *fasciatum* or *mali*. The long hairs on the club, when adhering, as they often do, resemble a spine. The longest hairs rise from the base of the club on the side next to the head.

GNATHOTRICHUS.

G. retusus, Lec. ♂ = description of ♀. ♀ = description of ♂. Additional: ♂. Club of antennæ with a few short, stiff hairs. No long bristles. Head with a longitudinal elevation in front. ♀. Antennæ with a long bristle rising from the anterior edge of each joint of the funiculus, and the first and second joint of the club; also with a few long hairs, all curving upwards.

G. materiarius, Fitch. ♂ = description of ♀ (?). ♀ new. Antennæ with long hairs and bristles as in *retusus*. Head smooth and sparsely punctured. Additional: ♂. Head with elongated longitudinal elevation in front, ending in an acute point just above base of mandibles.

PITYOPHTHORUS.

- P. minutissimus*, Zimm. ♂ = description. ♀ = description.
P. confinis (?), Lec. ♂ = description of ♀. ♀ = description of ♂.
P. (?) *plagiatus*, Lec. ♂ = description of ♂ in synopsis of the Scolytidae by Zimmerman, and of ♀ in Rhynchophora by LeConte.
 ♀ = description of ♀ (Zimm.) and of ♂ (LeConte).

XYLOTERUS.

- X. retusus*, Lec. ♂ = description. ♀ new. Head convex in front and roughened with minute granules, and with a small depression in the centre.
X. bivittatus, Kirby. ♂ and ♀ = descriptions.
X. (?) (*unicolor*, Eichh.) *politus*, Say. ♂ new. Hind tibia narrower. Anterior edge crooked and near the tip thickly clothed with long, silky hairs with incurving points. Tarsus with fine hairs curved at the points. ♀ new characters. Hind tibia broader. Anterior edge straight, with a few straight bristles. Tarsus with short, straight hairs.
 The male of this species was unknown to Mr. Eichhoff when I examined his collection in 1892, as he remarked to me at the time that of the large series of examples he had examined from North America, he had failed to recognize a male. He also admitted that his *unicolor* was evidently the same as Say's *politus*.

The difference in the antennal club, as suggested by LeConte, and the remarkable male character, together with some other differences, demand, I think, that this species should have a distinct genus erected for it.

XYLEBORUS.

- X. dispar*, Fab. ♂ and ♀ = descriptions.
X. obesus, Lec. ♂ new (?). Length, 2 mm. Width, 1.4 mm.; similar in form to ♂ *X. dispar*, but smaller. Thorax does not project over the head. Head smooth. Elytra distinctly punctured, but not in rows, especially on the side. ♀ = description.
X. xylographus, Say. ♂ new (?). Length, 2 mm. Width, .6 mm. More cylindrical than ♂ of *X. pubescens*. Head punctured in front. Thorax projecting over the head, the anterior portion being slightly rugose, posterior portion smooth. Elytra shining, finely punctured, and with a few granules on the declivity. Body sparsely covered with long, fine hairs. ♀ = description.

I believe this species to be identical with *saxesenii*, Ratz. I can see

no difference in the examples collected here and those of *saxesenii* from France and Germany. Their galleries are also of the same character.

X. pubescens, Zimm. ♂ = description of ♂ *pubescens* and *X. perferans*.
♀ = description. Characters variable, and it is my belief that the names of this and a number of other forms of the genus will prove to be synonyms of *X. perferans*, Woll.*

X. fuscatus, Eichh. ♂ new. I do not see sufficient difference between this and the male of *X. pubescens* to distinguish them as separate species. ♀ = description. I think this will prove to be merely a form of *X. perferans*.

DRYOCETES.

D. autographus, Ratz. No distinctive external sexual characters were observed in the examples dissected.

D. Eichhoffi, n. sp. ♂. Head more convex in front and with only a few long hairs. ♀. Front slightly depressed and thickly covered with long yellow hairs.

This species resembles *D. autographus* in size and sculpture; the principal difference being found in the secondary sexual characters, which are rather prominent in this species, and obscure in the other. It was determined for me in 1891 by Mr. Eichhoff as a doubtful variety of *D. autographus*, but when I visited him in 1892, and called his attention to the different characters, he admitted that it was a new species, and told me to describe it as such. Therefore, I take pleasure in applying the name which must always be familiar to specialists and students in Scolytidæ.

D. granicollis, Lec. ♂, with only a few hairs in front. ♀ with front thickly covered with long yellow hairs.

TOMICUS.

T. calligraphus, Germ. No distinctive external characters observed.

The elytra armatures appear to be somewhat more prominent in the male than in the female, but this does not appear to be a reliable character.

T. cacographus, Lec. ♂ with depression in front. Declivity with slightly stronger armatures and longer hairs. ♀ with frontal depression either absent or obscure.

*Mr. Blandford, in a report on the destruction of beer casks in India, has recorded the same as his impression. London, 1893, p. 12.

T. pini, Harris. ♂ with frontal tubercle and elytral armatures more prominent. ♀ = description.

T. caelatus, Eichh. No distinctive external characters observed.

SCOLYTUS.

S. quadrispinosus, Say. ♂ and ♀ = descriptions.

S. muticus, Say. ♂ = description of ♀ (?). Head broad and flat in front and thickly fringed with long yellow hairs. Last abdominal segment with two tufts of long hair near the posterior margin. ♀ new. Head narrow, with impressed longitudinal line in front, and with only a few long hairs. Last abdominal segment without tufts of hairs.

S. rugulosus, Ratz. ♂ with head slightly flattened and broader than in ♀, the flat surface bearing a few long hairs. ♀ — Head slightly more convex in front, narrower and without long hairs (at least in the examples I have examined).

CHRAMESUS.

C. icoriæ, Lec. ♂ and ♀ = descriptions.

POLYGRAPHUS.

P. rufipennis, Kirby. ♂ head with one and sometimes two acute tubercles in front. ♀ without acute tubercles in front.

PHLOEOTRIBUS.

P. frontalis, Oliv. ♂ and ♀ = descriptions.

HYLESINUS.

H. aculeatus, Say. ♂ = description. The narrow, smooth, longitudinal line referred to is present in both sexes. ♀: front more convex and less pubescent in front.

PHLOEOSINUS.

P. dentatus, Say. ♂ Declivity, with rows of rather prominent tubercles. ♀ Declivity, with rows of granules in place of tubercles.

DENDROCTONUS.

D. terebrans, Oliv. ♂ with only a few short hairs in front. ♀ with numerous longer hairs in front. This character is of little value, however, on account of the liability of the hairs to be rubbed off.

D. frontalis, Zimm. ♂ with frontal channel deeper, and the granulate punctures larger than in female. ♀ Front smoother and more convex.

HYLURGOPS.

H. glabratus, Zett. ♂ with slightly deeper transverse impressions in front, and a longer longitudinal elevated line above base of mandibles. ♀ with frontal transverse line present, but shorter in some individuals, and obsolete in others.

Morgantown, W. Va., August 10th, 1894.

PLATYSAMIA COLUMBIA.

BY J. ALSTON MOFFAT, LONDON, ONT.

During the winter of 1891-2, I received from Miss Morton, of Newburgh, N. Y., six cocoons of *P. columbia*, which she had reared from ova, received from one of her correspondents in Ann Arbor, Mich. They were the first cocoons of that moth I had seen. Their extremely small size as compared with *Cecropia*, their natty appearance and dark colour, relieved by flecks of white silk, was quite novel to me, so I frequently showed them to visitors. Amongst these was Mr. R. Elliot, of Plover Mills, one of our members, whose residence is about fifteen miles north-east of London, and whose name is well-known in ornithological circles, but who is rather a "naturalist" than a "specialist;" clear, calm and appreciative in his observations of nature, and thoroughly reliable in his statements. When he looked at the cocoons, he meditatively remarked: "I think I have seen something like that about our place. Indeed, I feel certain I have seen it, but I shall keep a look-out." On the 14th of April, 1894, I received from Mr. Elliot two *P. columbia* cocoons. They were attached to a branch of larch, on opposite sides of the same branch, and one about half its length in advance of the other. The son of a neighbour of Mr. Elliot found one on a tree growing at his house and showed it to Mr. Elliot, who saw it was what he was on the look-out for, so they searched the trees and found more.

The roughened exterior of the cocoons, their dark brown colour, with white markings, give them such a close resemblance to the bark of the branch, that, but for their prominence, they would be extremely difficult to detect, thus forcing on the observer the conviction that larch must be their natural food-plant. On the 3rd of May a male moth emerged from one of the cocoons, and on the 6th a female from the other. On the 5th of May Mr. Elliot gave me another cocoon, which gave forth its imago on the 13th, also a female. The male is three and a-half inches in expanse of wing; the females are four and four and a-quarter. Those from Miss Morton's cocoons are of corresponding dimensions.

Much doubt was entertained when this moth was first discovered, as to whether it was a "species" or a cross between two. This question was conclusively settled when Prof. Fernald published his description of its early stages (CAN. ENT., Vol. X., p. 43). Miss Morton has succeeded in pairing it with *Cecropia*, and she says the progeny "were all

barren, and quite different from either parent." When the Professor wrote his description, he was not confident that it was distinct from *Gloveri*. Since then Miss Morton has reared *Columbia* and *Gloveri* side by side, and she says: "The difference between their larvæ is marked in all their stages, whilst the cocoons also differ in size and texture." But she considers *Columbia* to be closer to *Gloveri* than to any other of the genus, and she has had large experience in rearing all of them. It is known by those who have handled them to be an easy thing to separate *Columbia* cocoons from all the other *Platysamias*, but there seems to be some difference of opinion as to what especially distinguishes the moth from *Cecropia*. That *Columbia* varies somewhat with the locality where found seems certain. The Quebec and Maine forms, as illustrated by Bowles and Strecker, do not strikingly resemble the Michigan specimens, which, Miss Morton says, are quite constant in general appearance. Prof. J. B. Smith states that all the *Columbias* that he has seen are very much alike. I sent a specimen from Miss Morton's cocoons to Dr. Brodie, of Toronto, who has given *Columbia* a good deal of attention, and he said it did not much resemble any *Columbia* he had; and if he had received it without data, he would have pronounced it a diminutive *Cecropia*. This to me was decidedly confusing, and set me wondering if there were no points of difference whereby to separate the two species unmistakably.

When taking a general survey of the two moths, the attention is at once arrested by the smaller size and darker colour of *Columbia*. But there are gradations in these. A very small *Cecropia* is at times obtained. The male from Mr. Elliot's cocoons is extremely dark, whilst a female received from Miss Morton does not perceptibly differ in general shading from some *Cecropias*. So, single specimens could give no certain indication from these differences.

With six authentic *Columbias* before me, and several fresh examples of *Cecropia*, I will take up that part of Prof. S. I. Smith's original description, where he contrasts the two species, and comment upon it in sections.

"This species differs materially from *S. cecropia*. The male has the antennæ, palpi, thorax and legs much darker." Correct, as a rule. "The short grey (or whitish) band on the hind part of the thorax is not found in *S. cecropia*." I have a male *Cecropia* with an indication of it, and in one of the *Columbias* it is not visible. "The discal spots of all the wings are white, instead of dull red with a white centre." In one of the *Columbias*, the spots are quite red. "The transverse bands of both pairs of wings

are white, instead of dull red bordered internally with white." Here, I think, we get the most distinguishing point of difference between the two moths. There is no symptom of red in the bands of *Columbia*. The "narrow, white, transverse band," which in some of the specimens would be better termed a line than a band, shades externally into the dark grey of the border, whilst internally it is edged with solid black, which merges into the dark brown of the middle area. This appears to me to be the most conspicuous and constant difference between the two species, and would of itself make it quite easy to separate the moths, regardless of size or depth of colouring. "It wants the broad white band so conspicuous on the anterior border of the secondaries of *S. cecropia*, and also the reddish tints and markings near the apices of the primaries." The band is not so clear a white, or so broad, but is edged with black, which is absent in *Cecropia*; the tints on the apices are a distinction of degree, and but a slight one at that.

"The female differs from that of *S. cecropia* in having the palpi, legs, and abdominal rings dark brown, or almost black, instead of dull red." One of the *Columbias* is not distinguishable from *Cecropia* in that respect. "The discal spots of the primaries are linear, obscure and parallel to the transverse band, instead of broad, conspicuous and parallel to the costal border." The spots are more linear, but with a decided tendency toward lunate, thereby being about as much in line with the costal border as with the transverse band. And so far from being obscure, from the absence of red in them they are more conspicuous than in *Cecropia*. There is a male *Cecropia* before me that would answer that description better than any of the *Columbias*. "The discal spots of the secondaries are small and almost round, instead of large and somewhat triangular." No difference except in size, and the absence of red in the spots of *Columbia*. "As in the male, it has the white on the hind part of the thorax, and wants the white on the anterior border of the secondaries, and also the red on the apices of the primaries, on the discal spots, and on the transverse bands." What I have said on these parts of the male answers also for those of the female.

So, then, the only points that are left to me whereby to unmistakably separate *Columbia* from *Cecropia* are the narrow, dull white, transverse band edged internally with black, and the total absence of a red band. These might not separate it from *Gloveri* and *Ceanothi*. I am not familiar with those species.

FURTHER NOTES ON SCALE INSECTS (COCCIDÆ).

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

The numbering is continued from page 193.

(13.) *Tachardia cornuta*, n. sp.—♀ scales crowded on the stems of the plant, lively red-brown in colour, smooth and rather shiny, subtranslucent; elevated so as to form in outline a triangle, the base of which is greater than either side viewed from one side, but with the sides greater than the base when the scale is viewed from one end. In a lateral view the two sides are about equal and meet each other at a right angle; all the other angles of the profile, whether taken from the side or from the end, are necessarily less than right angles.

A more minute inspection shows that the apex of the scale is not a simple pyramid, but consists of a horn or tooth inclined backwards, so that a small but distinct notch appears in the lateral outline on the posterior side. This horn gives the whole scale somewhat the shape of certain teeth of sharks.

Viewed from above, the scale is roughly oval in outline, but presents on each side a slight bulging, before and behind which is a groove or constriction.

Alt. 2, lat. 2, long. $2\frac{2}{3}$ mm.

Boiled in caustic soda, the females give a fine bright carmine, like cochineal.

The young are elongate, bright crimson in colour.

Adult female circular in outline. The abdominal process appears to be formed of three segments; the basal one very large, about as long as the breadth of its base; the second much smaller, broader than long; the third or terminal quite small, abruptly truncate. From this terminal portion arise the anal hairs in two bundles of five each; these hairs are of considerable length.

The lateral tubes are elongate, of the peculiar structure usually seen in the genus. The glands are arranged in the tubes so that their proximal outline in mass, viewed laterally, forms a portion of a circle, not a pointed cone as in *T. melaleuca*.

This lac-insect was discovered by Prof. E. O. Wootton, on a species of Composite growing on Little Mountain, on the occasion of a recent meeting of the New Mexico College Field Club. Little Mountain is in the Mesilla Valley of New Mexico, only a few miles from the Agricultural College. Unfortunately the plant was not in flower, and so cannot be

identified, but it resembles an *Artemisia*. It grows commonly on the mountains, but although I examined many specimens of it, I failed to find any of the scales, which appeared to be very locally distributed.

From holes in some of the scales, it is evident that the species is attacked by a parasite, but the latter has not been bred.

One other species of *Tachardia* or *Carteria* is known from the arid region, namely, *T. larrea*, Comstock. I possess a specimen of this, kindly sent to me by Mr. Maskell, and from comparison with this, and a study of Comstock's description and figures, I concluded that my insect was distinct. But to make quite sure, I forwarded specimens to Washington to be compared with Comstock's types of *larrea*, and Mr. L. O. Howard has very kindly replied as follows:—

"Your new species of *Carteria* differs from *C. larrea*, Comstock, in the shorter, lateral excretory tubes, the shorter anal cone, and in the smaller number of pores in the four groups back of the anal cone. Each of these groups is composed of from 7 to 9 pores, while in *C. larrea* they are composed of from 18 to 25 each."

It may be added, that *larrea* also differs from *cornuta* in not being horned as described above.

The food-plant of *T. larrea* (*Larrea*) grows abundantly in the vicinity of Little Mountain, but no *Tachardia* was found upon it.

(14.) *Orthesia annæ*, Ckll.—Prof. C. H. T. Townsend has kindly sent me particulars concerning an *Orthesia* which he found on *Chenopodium* at St. Joe, Arizona, July 20, 1892. I have no doubt that this is *O. annæ*, which was hitherto known only from specimens found on *Atriplex canescens* at Las Cruces, New Mexico. The species was not described until more than a year after Prof. Townsend's Arizona find.

(15.) *Phenacoccus helianthi*, Ckll.—This has so far only been recorded from Las Cruces, New Mexico. On August 25th, last year, I swept some specimens from herbage at El Paso, Texas, but was not able to find the plant they came off. The eggs and newly-hatched larvæ are pale orange.

The following insects prey on *P. helianthi* at Las Cruces:—

- (a.) *Hyperaspis undulata*. Numerous, the larvæ covering themselves with white secretion and so simulating coccids. Imago shiny black, with a red spot on the disc of each elytron, and a broadly interrupted pale orange-tinted marginal stripe. Identified by Dr. Horn, who tells me that it has long been known as an enemy of aphides and coccids.

- (b.) *Leucopis* (near *bellula*, Dr. Riley informs me). A small grey parasitic dipteran.
- (c.) *Encyrtus*, sp. (fide Dr. Riley). Reddish-ochreous.
- (d.) *Tetrastichus*, sp. (fide Dr. Riley) was also bred, but it is a secondary parasite. The species is black with whitish legs and iridescent wings.

(16.) *Dactylopius solani*, n. sp.—♀ about 3 mm. long, sparsely covered with mealy secretion, but without lateral or caudal mealy processes. Colour pale yellowish. Antennæ of the type normal in the genus; 8-jointed, joint 8 elongate, about as long as 6+7; 2 a little shorter than 8, but longer than 3; 7 a little shorter than 3; 5 and 6 equal, a little shorter than 7; 4 shortest; 1 large and broad, about as long as 3; 8 with three whorls of hairs. Formula 82 (31) 7 (56) 4.

In another specimen, joint 8 was distinctly longer than 6+7. In this, also, joints 4, 5, 6 and 7 were about equal. 3 also may be subequal with 2.

Femur $\frac{1}{4}$ longer than tibia; tibia $\frac{1}{3}$ longer than tarsus; trochanter with a long hair; femur stout, with a row of five short but strong bristles on its inner margin, and four (two pairs) on its outer or convex margin. Tibia with five strong bristles on its outer margin, and five or six on its inner margin. Tarsus with four bristles on its outer, and four on its inner margin. Claw stout, slightly curved. Tarsal knobbed hairs slender, with subobsolete knobs.

Mentum apparently 2-jointed. Derm with scattered hairs and round gland-orifices. Rostral loop very short.

Caudal tubercles as usual in the genus, distinct and fairly large, but not elongated, each bearing two hairs of the same size as those on the anogenital ring.

Anogenital ring with either the normal six hairs, or, in some examples, four hairs of the normal size and two small.

On tubers of potato (*Solanum tuberosum*), at the College Farm, Las Cruces, New Mexico, discovered by Mr. H. H. Griffin. Most of the specimens had been destroyed by parasites, when I received the material at the end of August.

Although we have as yet no definite information beyond that given above, it can hardly be doubted that the species lives naturally on the roots of native Solanacæ, and has thence spread to the potato, which is not cultivated, except by way of experiment, at Las Cruces. It is ex-

tremely probable that the undescribed *Dactylopius* mentioned in Insect Life, iii., pp. 413, 419, as infesting the roots of tomato in New Mexico is the same. Another undescribed *Dactylopius* infests the roots of *Solanum melongena* in Jamaica, and although it certainly resembles *D. solani*, its identity with it cannot be affirmed until adult specimens have been examined. (Entom., 1893, p. 266.)

D. solani is rather an unsatisfactory species to describe, as it possesses just the necessary characters of the genus, neither more nor less. It is thus much like *D. simplex*, Ckll., which lives on leaves of *Pancreatium* in Jamaica, but the similarity need not cause confusion, owing to the great difference of habitat. *D. affinis*, Maskell, which lives on potato-tubers in Australia, resembles *D. solani* considerably, but differs in the lateral filaments and in the proportions of the joints of the antennæ.

D. lavandulæ, Signoret, found on roots of *Lavandula* in Europe, differs in the proportions of the antennal joints; and *D. arecæ*, Mask., on roots of *Arecæ* in New Zealand, will at once be distinguished by the very short second joint of the antennæ. *D. poæ*, Mask., on roots of *Poa* in New Zealand, is quite different from *D. solani*.

At Las Cruces one finds on Compositæ an insect very similar indeed to *D. solani*, which I have described as *Phenacoccus helianthi*. It is distinguished without much trouble by the antennæ, which have 9 joints instead of 8, and by its above-ground habitat. As one contemplates these two insects, it is difficult not to think that we have in *D. solani* a representative of the old stock-form from which *Phenacoccus helianthi* sprang.

(17.) *Diaspis lanatus*, Morg. and Ckll.—This injurious species has, up to the present time, been recognized only in the West Indies and some of the eastern United States. I have now to report it from the other side of the world, namely, Ceylon. Mr. E. E. Green, of Punduloya, Ceylon, lately sent me specimens of what he considered a new species of *Diaspis*, "fatally abundant on cultivated geranium plants," and I can make nothing of it but *D. lanatus*. It similarly infests geraniums (pelargoniums) in Jamaica.

(18.) *Aspidiotus convexus*, Comstock, 1881.—This so-called species, which has been reported from California (Comstock) and New Mexico (Townsend), appears to have no real existence in the form described by its author. The New Mexican form, found on ash in Las Cruces, turns out to be *A. juglans-regiæ* var. *albus*, Ckll. I sent specimens of this to

the Dept. Agriculture, remarking at the same time that the relationship between *convexus* and *juglans-regiæ* needed investigation.

Mr. Pergande, when my letter was received, proceeded to look into the matter, arriving at the following remarkable results:—

MR. PERGANDE'S REPORT.

“Prepared a number of females of *A. juglans-regiæ* var. *albus*, and compared them with typical *juglans-regiæ*, but failed to find any structural differences between the two.

“The slides on which Comstock's types of *A. convexus* were mounted are not in our collection, and were probably taken to Ithaca. I prepared, therefore, 13 females, taken from twigs which had been labelled by Comstock *A. convexus*, ‘type;’ and also 6 females, which had been placed by Comstock in alcohol, while examining the species in California; but, when they were examined under the microscope, it was found that not one of them had any groups of pores, and that they agreed exactly with the description and figure of *A. rapax*.

“To be certain that they really are *rapax*, I prepared also a large number of females, taken from twigs which had been labelled by Comstock *A. rapax* ‘type,’ and found, after comparing those marked *rapax*, that all of them are absolutely identical.

“Comstock must have made a mistake while describing the two species; he had evidently by mistake taken hold of another species, while working on *rapax*. It is quite possible that his *convexus* is identical with either *juglans-regiæ* or *ancylus*. This point could be settled if Comstock would allow us to examine the slides.” (Pergande).

Since *A. convexus* is thus founded on the scale of *rapax* + the ♀ insect of another species, the name must apparently drop. The name “*convexus*” refers to the convex scale of *rapax*, and should be placed in the synonymy of that species—which is itself, according to Mr. Morgan, of Oporto, a synonym of *A. camelliæ* (Boisd).

It is to be observed that in the Dep. Agr. Rep. for 1880 (1881), *A. convexus* is described on p. 295, *A. juglans-regiæ* on p. 300, and *A. rapax* on p. 307. Therefore, those who consider *rapax* distinct from *camelliæ* may have to consider whether the name *convexus*, which has priority of place, should not be preferred for it. On the other hand, if it turns out that *convexus*, apart from the scale, was *juglans-regiæ*, it again has priority of place, should any one care to use the name for a scale which is almost flat.

KENTUCKY BUTTERFLIES.

BY HATTIE H. WARNER, LEXINGTON, KENTUCKY.

The following list has for its foundation a collection belonging to the Experiment Station of the Kentucky State College. The diurnal Lepidoptera have not been made the object of special collecting by the Station entomologist, and doubtless a good many species will be added in the future:—

1. *Papilio ajax*, Linn. Common in all wooded regions throughout the State. High Bridge, Nortonville, Clay's Ferry, etc.
2. *Papilio philenor*, Linn. Frequent throughout the State. Bowling Green, Nortonville, Lexington, etc.
3. *Papilio asterias*, Fab. Frequent everywhere in the State.
4. *Papilio troilus*, Linn. Common locally. Specimens from Glasgow, Clay's Ferry, Fulton, etc.
5. *Papilio turnus*, Linn. Very common everywhere. Specimens from Providence, Lexington, Nortonville, Clay's Ferry, etc.
6. *Papilio cresphontes*, Cram. Rather rare. Lexington, Bowling Green.
7. *Pieris protodice*, Boisd. and Lec. Common some seasons, generally rare. Lexington.
8. *Pieris rapæ*, Linn. Very common everywhere.
9. *Nathalis iole*, Boisd. Very rare.
10. *Callidryas eubule*, Linn. Rather common locally in Western Kentucky.
11. *Colias casonia*, Stoll. Lexington. Not common.
12. *Colias philodice*, Godt. The most abundant butterfly of Kentucky. Occurs in large swarms about damp sand in the latter part of summer.
13. *Terias nicippe*, Cram. Common everywhere in lowlands. Lexington, Nicholasville, Bowling Green, High Bridge, etc.
14. *Terias lisa*, Boisd. and Lec. Found only occasionally. Specimens from Glasgow.
15. *Danais archippus*, Fab. Common everywhere.
16. *Argynnis diana*, Cram. Very rare. A specimen was collected by Prof. H. Garman, at East Cairo, several years ago.
17. *Argynnis cybele*, Fab. Common about thistles in summer.
18. *Euptoieta claudia*, Cram. Common in fall all over the State. Lexington, Bowling Green, East Hickman.

19. *Melitæa phaeton*, Drury. Moderately common in June. Pineville.
20. *Phyciodes nycteis*, Doubleday and Hewitson. Moderately common everywhere. Specimens from Lexington, Pineville, Brooklyn Bridge.
21. *Phyciodes tharos*, Drury. Very common all over Kentucky. Seen from May through the season.
22. *Grapta interrogationis*, Fab. One of the most abundant butterflies of Kentucky.
23. *Grapta comma*, Harr. Rather rare. Specimens from Lexington.
24. *Grapta progne*, Cram. Rather rare. Specimens from Clay's Ferry.
25. *Vanessa antiopa*, Linn. Not common, most often seen in the fall.
26. *Pyrameis atalanta*, Linn. Frequently seen throughout the State. Specimens from Lexington.
27. *Pyrameis huntera*, Fab. Rather common. Specimens from Lexington, East Hickman and Bryant.
28. *Pyrameis cardui*, Linn. Common everywhere.
29. *Junonia cænia*, Hubn. Occasional in Eastern Kentucky. Common in western part of State, along the Ohio River. Specimens from Glasgow and Fulton.
30. *Limenitis ursula*, Fab. Frequently seen during the latter part of summer. Specimens from Glasgow, Lexington, Pineville, East Hickman.
31. *Limenitis disippus*, Godt. Not very common. Specimens from Lexington, Glasgow and Tyrone.
32. *Apatura celtis*, Boisd. and Lec. Common everywhere. Specimens from Lexington and Fulton.
33. *Apatura clyton*, Boisd. and Lec. Occasional. Specimens from Lexington, Fulton and Tyrone.
34. *Faphia troglodyta*, Fab. Occasional in Eastern Kentucky. Common locally in Western Kentucky. Found at Lexington, Hopkinsville and Glasgow Junction.
35. *Debis portlandia*, Fab. Moderately common in Western Kentucky. Specimens from Aden Springs and Fulton.
36. *Neonympha gemma*, Hubn. Occasionally seen. Specimens from Fulton.
37. *Neonympha eurytris*, Fab. Rather common in open woods. Specimens from Nortonville, Midland and High Bridge.
38. *Neonympha sosybius*, Fab. Common everywhere in woodland. Specimens from Fulton.

39. *Satyrus alope*, Fab. Common in mountains of Eastern Kentucky. Specimens from Midland.
40. *Libythea bachmani*, Kirtland. Occurs throughout the State. Common in Western Kentucky, along the Mississippi and Ohio Rivers.
41. *Thecla halesus*, Cram. Lexington.
42. *Thecla humuli*, Harr. Rather rare. Specimens from High Bridge and Fulton.
43. *Chrysophanus hypophlæas*, Boisd. Frequent. Specimens from Lexington.
44. *Lycæna pseudargiolus*, Boisd. and Lec. Frequently seen. Specimens from Lexington and Pineville.
45. *Lycæna comyntas*, Godt. Common everywhere. Specimens from Lexington and Pineville.
46. *Ancyloxypha numitor*, Fab. Abundant everywhere along streams.
47. *Pamphila zabulon*, Boisd. and Lec. Brooklyn Ferry and Lexington.
48. *Pamphila huron*, Edw. Common some seasons in Eastern Kentucky. Specimens from Lexington and Bowling Green.
49. *Pamphila otho*, Smith and Abbott. Rare; one specimen from Glasgow Junction.
50. *Pamphila peckius*, Kirby. Very common everywhere. Seen in June and July.
51. *Pamphila cernes*, Boisd. and Lec. Common throughout the State. Specimens from Lexington, Glasgow, etc.
52. *Pamphila verna*, Edw. Rare, only one specimen in the collection.
53. *Pyrgus tessellata*, Scudd. Common everywhere throughout the State.
54. *Nisoniades martialis*, Scudd. Rare, only one specimen, from Nortonville.
55. *Pholisora catullus*, Fab. Common throughout the State.
56. *Pholisora hayhurstii*, Edw. Not very common. Only one specimen, from Bryant, Kentucky.
57. *Eudamus pyladès*, Scudd. Not very common, a single specimen from Brooklyn Bridge.
58. *Eudamus bathyllus*, Smith and Abbott. Rather rare. Specimens from Glasgow and Bowling Green.
59. *Eudamus lycidas*, Smith and Abbott. Rather rare. Specimens from Glasgow Junction.
60. *Eudamus tityrus*, Fab. Common throughout the State.

A FEW REMARKABLE VARIATIONS IN LEPIDOPTERA.

BY GEORGE A. EHRMANN, PITTSBURGH, PENN'A.

Papilio turnus, ♀, Linn.—I received a curious example of a ♀ *P. turnus*, which has the outer margin greatly produced towards the apex of the primaries; the secondaries are more rounded and not so elongate as in the typical form; and the black discal bars are broader and more suffused. The expanse is only $3\frac{3}{4}$ inches, thus giving the insect a very odd appearance. My specimen was taken in Westmoreland County, Pa. Dr. Holland has an example, taken in Coa'burgh, W. Va., that agrees in every respect with mine.

P. turnus, dim, form *Glaucus*, Linn.—This singular specimen is of the *turnus-glaucus* form, but the right-hand primary is almost as light and boldly marked as the typical *turnus*. I have also an example that is as dark as the darkest forms of *glaucus* and has no trace of yellow in it except on the underside of the right-hand primary, where there are many large, light, yellow blotches, that seem to have been put there artificially. There is another in my collection that has little or no trace of yellow on the forewings, but the discal band of secondaries is nearly as boldly marked with yellow as in *turnus*.

P. asterias, Fabr.—Out of a batch of about forty larvæ that I succeeded in rearing, and carried through the winter of 1892-3, I obtained five fine examples, four males and one female, that have no pupil-spot in the ocellus. There were no two larvæ in this batch that were alike, even at the same stage of existence.

Leucarctia aceræa, Drury.—♂. Same as the typical form, except that the black spots on the right-hand primary, between the median nervures, have blended into one another, thus forming three black bars. This curious example was caught flying around the electric lights of our city, in the latter part of June, 1893. The black bars are half-an-inch long, and give the moth a very singular appearance.

Leucarctia aceræa, Drury, var. *Klagesii*, Ehrmann.—♂. Upper surface of primaries has no black spots whatever, except three small ones on the median portion of the costa, and six exceedingly minute black points on the outer margin. On the secondaries there is a faint black discal spot, and two on the outer margin, one near the apex and one near the inner angle. All these spots are almost obsolete, thus making this an interesting form, and giving it the beauty of having clear white primaries,

and almost immaculate orange secondaries. On the under surface of both pairs of wings the markings are the same as above, but the ground colour of the wings is much lighter than usual, and is of a lovely lemon yellow; the abdomen, thorax, head, antennæ and legs are the same as in the typical form.

Of this form, I have seen several examples in various collections, and I believe that it is a sufficient variation to have at least a name of its own. I therefore claim the pleasure of dedicating this pretty form to the memory of my deceased friend, Frederick W. Klages, who was preparing for a second collecting trip to Jamaica, when he was taken ill and died.

PARTIAL PREPARATORY STAGES OF HEMILEUCA CALIFORNICA, WRIGHT.

BY G. H. FRENCH, CARBONDALE, ILL.

The eggs are sub-globular, between that and sub-quadrate, shaped much like *Luna* and its allies; length, .06 inch; width, .06 inch, by .05 inch in height; smooth, the apex flattened, but the base rounded. Colour, olive green; those on one side of the twig, red tinted. They were placed round a twig of food plant (willow) with one of the long ways across the twig. They were from California, and were deposited about the last of October. As they hatched the middle of the following April, this would give six months as the duration of this period.

Young Larva.—Length, .12 inch. Sub-cylindrical, largest at the anterior end. Body black, or, we might say, orange-black; each joint with six fleshy, cylindrical tubercles, nearly as long as the diameter of the body, from each of which arise two white hairs. Head black; venter, legs and anal segment orange. Duration of this period, 8 days.

After 1st moult.—Length, .16 inch. Shaped as before. Uniform brownish-black, the tubercles and all; hairs grayish-white. Duration of this period, 11 days.

After 2nd moult.—Length, .25 inch. Of a uniform black, about the same shade as before; the two dorsal rows of tubercles orange with black bases, those on the posterior part of the body with the black extending well up on the tubercle, two pale hairs for each tubercle.

During this period all died. Though I had several thousand of them, I failed to get any past the third moult. They were extremely gregarious in their feeding, huddling together on the food plant, and moving but little.

NOTES FROM MY DIARY, QUEBEC, 1893.

BY A. W. HANHAM, WINNIPEG, MAN.

On August 10th, I left by the 4.45 p.m. terry for the Isle d'Orleans, which was reached about 5.30. A short walk uphill brought me to one of my favourite collecting grounds, and the remaining daylight was usefully spent looking for Coleoptera, a few good things being taken.

About dusk I visited a patch of the spreading Dog-bane (*Apocynum androsæmifolium*, Lin.), which was in bloom, growing at one end of a small clearing in the woods; a road ran alongside the fence at this end, on the other side of which was more wood. The evening was clear, with somewhat of a warm breeze. Here, in half-an-hour, I captured eight species of *Plusia*, over 30 specimens. I was kept busy netting and bottling my captures. Things were so numerous that several entomologists could have found a lively and profitable thirty minutes' occupation; unfortunately, I had to tear myself away at 8 o'clock, to catch the boat.

When I got home, I found the following to be the contents of my bottles: *Plusia putnam* *irt.*, 4; *thyatiroides*, Gn., 1; *U-aureum*, Bdv., 1; *mortuorum*, Gn., 1; *iridisignata*, Grt., 1; *ampla*, Walk., 1. The balance consisted of *prev. onis*, Gn., and *simplex*, Gn. The only other noctuid taken at this blossom was *Drasteria erectea*, Cram., rather common. I may add that before dusk I took a fine *Plusia bimaculata*, Steph., on the wing.

BOOK NOTICES.

RANDOM RECOLLECTIONS OF WOODLAND, FEN AND HILL; and WOODSIDE, BURNSIDE, HILLSIDE AND MARSH, by J. W. Tutt, Editor of the Entomologist's Record and Journal of Variation. London: Swan, Sonnenschein & Co.

The name of the author of these two volumes must be familiar to our readers, as an occasional contributor to our pages, while he is widely known as a writer of much scientific repute on matters concerning the Lepidoptera. In these two books he has assumed a lighter and more popular role; his aim has been—to quote his own words—“to bring under the notice of the general public, in readable and untechnical language, a few of the interesting phenomena which are to be observed everywhere around us, by those who take the trouble to look for them, and to give such explanations of their causes as may easily be understood, even by those whose scientific knowledge is small.” He has cer-

tainly carried out his design most successfully, and given to the world two very charming and interesting books on out-of-doors Natural History. Anyone, whether young or old, who takes any pleasure in the beauties of nature, and any interest in the varied world of animal and vegetable life, will read them with the greatest delight, and follow the author with unflagging interest, during his rambles over hill and dale, and by marsh and burn and fen. In the former work, more attention is paid to the habits and variations of insects, while the latter treats of any animal or plant that may be met with in expeditions to widely different localities. Amusing episodes and pretty bits of verse enliven the volumes, and many capital pictures render the later one still more attractive.

REPORT OF THE ENTOMOLOGICAL DEPARTMENT OF THE NEW JERSEY AGRICULTURAL COLLEGE EXPERIMENT STATION, by John B. Smith, Sc. D., for the year 1893.

It is obviously impossible to notice all the ever-welcome bulletins and reports that constantly flow from the various Experimental Stations throughout North America, for copies of which we are very grateful to their authors. We may, however, call attention to Dr. Smith's excellent departure from the ordinary report. After giving the usual general review of the season, and an account of the most important insect attacks of the year, he devotes a large portion of his work to a most useful and admirable account of the "Beneficial Insects," in all the different orders. It is clearly and plainly written, so as to be within the comprehension of non-entomologists, and is profuse^{ly} illustrated with excellent figures, many of them being new productions by means of photography. It ought to be widely distributed, in order to teach the general public that a very large proportion of insects are not noxious, and should not be wantonly destroyed.

CORRESPONDENCE.

INSECTS AT LIGHT.

Sir,—That light is one of the greatest attractions to the Insect World has never been so forcibly demonstrated to me as this summer. In the eastern part of the City of Cleveland, and situated near the Garfield Memorial, are the immense car barns of the C. E. R. Co., one of the street railways of this city. One of these buildings, with a breadth of one hundred feet and a length of over three hundred feet, is painted white on

the inside. At night it is illuminated both inside and out with electric arc lights. The walls, I should judge, are about thirty feet in height. Situated as these buildings are, near the cemetery, some parts of which lie untouched by the hand of man, being in a truly primeval condition, you can see at once that the place is exceedingly favorable to the entomologist. It seems that these white walls, together with the electric lights, form a moth trap which no entomologist could improve. The ends of the building are, of course, left open. This place is a veritable fairyland for the entomologist. During a storm insects of all kinds will fly in, and are easily captured. Among the Lepidoptera which I have taken are the following: *Attacus luna*, *A. Cecropia*, *A. Polyphemus*, *A. Promethea*, *Eacles imperialis*, *Saturnia Io*, *Arctia acraea*; over twenty different species of Hawk moths, and many others too numerous to mention. As I am only collecting Lepidoptera, I have not paid much attention to the other orders of insects. The Coleoptera are also very abundant.

Before I close, I may speak of *Argynnis aphrodite*, which I never saw so common before. On going into a meadow a dozen will fly up at your approach, while they are over everything and everywhere. Never here have I seen a butterfly in such numbers.

GEO. L. LEE, Cleveland, Ohio.

ATTACUS PROMETHEA.

Sir,—Having noticed Mr. Moffat's communication regarding *Attacus promethea* in the August number, it occurs to me that the following may prove of interest. On June 10th, while in Milton, Mass., I placed two females in a box on the piazza for assembling. About 3 o'clock in the afternoon a male was observed flying around the house. He was captured, and a short time later another appeared. They kept coming at intervals until about half-past five, and after that none were seen. There were ten in all, of which number eight were perfect. On the next day, at about the same time, they began to come again, but very much more numerously. At the end of the afternoon, twenty-nine had been taken, besides a large number which were not collected, because of imperfections. The moths were not seen either night. The next day no more moths put in their appearance, and the females were removed. Besides this occasion, I have several times seen the male moths flying around, when there were no females in the vicinity. I have never seen the females fly by day, however, or the males except between three and six o'clock. It seems to me that *Promethea* is habitually a day flyer, but I have never seen any other of the Saturniidae on the wing during the daytime. All the males which assembled showed the same apparent blindness which Mr. Moffat speaks of.

JAMES A. FIELD, Milton, Mass.

Mailed October 5th.