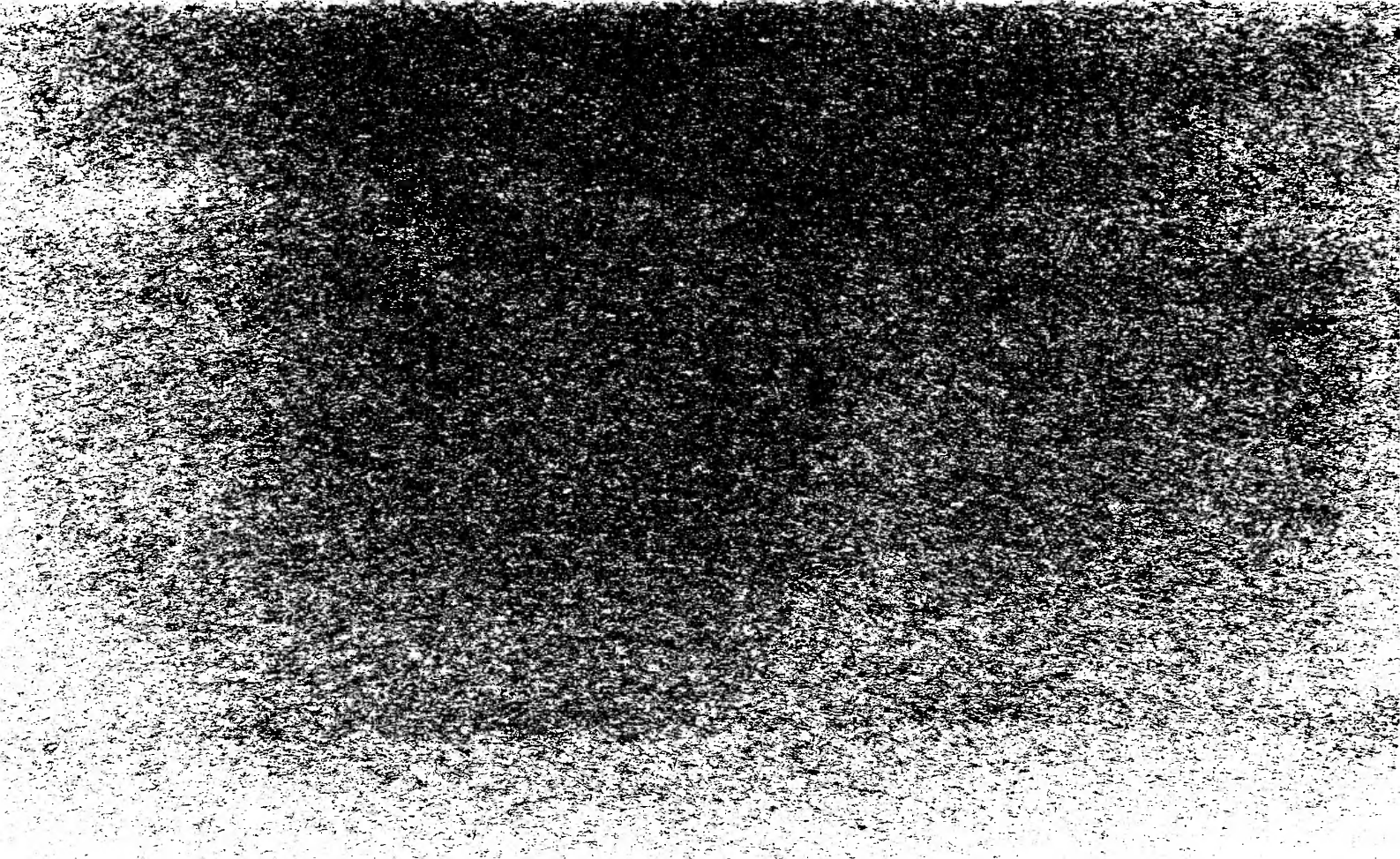


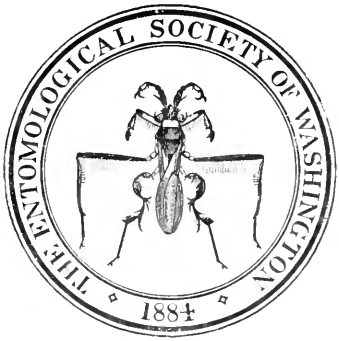
PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

WASHINGTON.



Volume XI, 1909

(Meetings of December 10, 1908, to October 14, 1909)

CARLISLE, PA. WASHINGTON, D. C.

Published by the Society,

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Edited by HARRISON G. DYAR.

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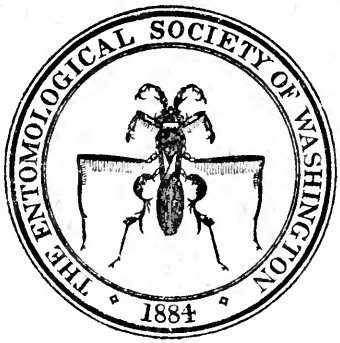

Volume XI, No. 1.

JANUARY-MARCH, 1909.

MEETINGS OF DECEMBER 10, 1908, TO FEBRUARY 11, 1909.

PUBLISHED BY THE SOCIETY,

QUARTERLY

CARLISLE, PA. WASHINGTON, D. C.

1909.

THE
ENTOMOLOGICAL SOCIETY
OF WASHINGTON.

ORGANIZED MARCH 12, 1884.

The regular meetings of the Society are held on the first Thursday in each month, from October to June, inclusive, at 8 P. M., at the residences of members.

Annual dues of active members, $3.00; of corresponding members, $2.00; initiation fee (for active members only), $1.00. Remittances of dues should be made to the Secretary-Treasurer, E. F. Phillips, Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C.

OFFICERS FOR THE YEAR 1909.

President ..... O. HEIDEMANN.
First Vice-President ..... F. M. WEBSTER.
Second Vice-President ..... A. L. QUAINTANCE.
Recording Secretary ..... J. C. CRAWFORD.
Corresponding Secretary-Treasurer ..... E. F. PHILLIPS.
Representing the Society as a Vice-President of the Washington Academy of Sciences .....A. D. HOPKINS.

Executive Committee.

THE OFFICERS,

L. O. HOWARD, C. L. MARLATT, HARRISON G. DYAR.

Publication Committee.

H. G. DYAR, NATHAN BANKS, J. C. CRAWFORD.

PROCEEDINGS OF THE
ENTOMOLOGICAL SOCIETY OF WASHINGTON.

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Address all communications to the Corresponding Secretary, E. F. PHILLIPS, Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C.

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON.

VOL. XI JANUARY–MARCH, 1909 No. 1

MEETING OF DECEMBER 10, 1908.

The 226th regular meeting was held at the Saengerbund Hall, 314 C street, N.W., President Hopkins in the chair. Messrs. Ainslie, Burgess, Burke, Busck, Crawford, Ely, Gill, Heidemann, Hopkins, Hyslop, Jenne, Jones, Knab, Kraus, Lawford, Morgan, Patten, Quaintance, Sanders, Sasscer, Schwarz, Townsend, Ulke, Van Horn, and Webster, members, and Messrs. Braucher, Clemons, Dovener, Hammar, Nelson, Russell, and Wilson, visitors, were present.

Messrs. E. A. Back, R. A. Cushman, A. G. Hammar, G. E. Merrill, H. M. Russell, E. G. Smythe, and H. F. Wilson, of the Bureau of Entomology, U. S. Department of Agriculture, and Mr. Douglas Clemons, of the Division of Insects, U. S. National Museum, were elected active members of the Society.

The following officers were elected for the year 1909: President, Otto Heidemann; First Vice-President, F. M. Webster; Second Vice-President, A. L. Quaintance; Recording Secretary, J. C. Crawford; additional members of the Executive Committee, L. O. Howard, C. L. Marlatt, and H. G. Dyar.

An amendment to the Constitution, uniting the offices of Corresponding Secretary and Treasurer, was proposed. In accordance with the Constitution this could not be voted on until the next regular meeting, so the Corresponding Secretary and the Treasurer for 1908 consented to hold office until the matter was settled.

Dr. Hopkins stated that his address as retiring President was as a Vice-President of the Washington Academy of Sciences.

Dr. Hopkins stated that his address as retiring President was not ready for the evening, but would be delivered in the near future. He said that he had been busy completing a work in which he had been engaged for years and he was glad to announce to the Society that the monograph of the scolytid genus *Dendroctonus* would soon be published by the Bureau of Entomology of the Department of Agriculture. It will be issued in two parts, the systematic part as a technical bulletin and the economic as a regular bulletin. He explained the main features of the monograph and exhibited a number of plates and maps. He said that it would be a foundation for all future work on the Scolytidæ and should also prove a great help to other workers in the rhynchophorous Coleoptera. It shows strikingly the great importance of careful systematic work as a basis for good economic work.

Mr. Quaintance congratulated Doctor Hopkins upon the thoroughness of the work and said that in this respect it should serve as a model for other entomologists.

Mr. Schwarz also made some complimentary remarks and called attention to the fact that predaceous insects, being independent of host plants, are better indicators of life zones than are the plant feeders.

Informal Meeting of January 2, 1909.

An informal meeting in honor of the visiting entomologists present in the city after attending the entomological meetings held in Baltimore during the sessions of the American Association for the Advancement of Science, was held at the Saengerbund Hall, 314 C street N.W., on the evening of January 2, 1909.

Messrs. Ainslie, Barber, Burgess, Burke, Busck, Caudell, Clemons, Couden, Crawford, Currie, Dyar, Hammar, Heidemann, Hinds, Hooker, Hopkins, Hunter, Jenne, Knab, Kraus, Marlatt, Morgan, Morris, Pergande, Popenoe, Schwarz,

Smythe, Townsend, Van Horn, Webb, and Webster, members, and Messrs. Ainslie, Bentley, Bird, Braucher, Brooks, Cooley, Cotton, Haseman, Hooker, Kelley, Lloyd, Lowe, Pettit, Rumsey, Shafer, Smith, Snodgrass, Tracy, Vickery, and Worsham, visitors, were present.

Professor Webster being called upon by the President, took the chair.

During the evening the following responded with short notes concerning their special lines of work: Messrs. Tracy, Pettit, Cooley, Lowe, Brooks, Worsham, Hinds, and Bird, visitors, and Messrs. Schwarz, Hunter, Dyar, Hopkins, and Marlatt, members.

Meeting of January 14, 1909.

The 227th regular meeting of the Society was held at the Saengerbund Hall, 314 C street N.W., on the evening of January 14, 1909, Mr. C. L. Marlatt, host, the President in the chair.

Messrs. Ainslie, Barber, Busck, Clemons, Crawford, Davis, Gill, Heidemann, Howard, Hunter, Jenne, Jones, Knab, Kraus, Lawford, Marlatt, Morgan, Patten, Phillips, Popenoe, Quaintance, Sanders, Schwarz, Smythe, Ulke, Webb, and Wilson, members, and Messrs. Braucher, Kelly, Lowe, Vickery, and Wood, visitors, were present.

The minutes of the 226th regular meeting and of the special meeting of January 2, 1909, were read and approved.

The President announced the substitution of Dr. Phillips as chairman of the Auditing Committee, for Professor Webster, and the committee then reported, the report being adopted by the Society.

The names of Messrs. E. O. G. Kelly, F. B. Lowe, and R. A. Vickery were proposed for corresponding membership and referred to the Executive Committee.

The change in the Constitution uniting the offices of Corresponding Secretary and Treasurer was adopted.

Dr. Phillips was nominated for the office of Corresponding Secretary-Treasurer, and the rules being suspended the Secretary cast the vote of the Society for him.

Mr. E. L. Morris sent in his resignation, which was accepted by the Society with regret.

The Society requested Doctor Howard to give a paper on the older members of the Society, to be delivered at the anniversary meeting on the occasion of the twenty-fifth anniversary of the founding of the Society.

Doctor Howard then presented a paper* entitled "Four Poineer Economic Entomologists," which was discussed by Messrs. Ulke, Gill, Schwarz, Davis, and Lowe.

The Constitution of the Entomological Society of Washington, as amended, stands as follows:

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. Members.

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 an active member, but shall not

*Withdrawn for publication elsewhere.

be elected until the next following meeting, except upon the 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 those who 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.

Article IV. Officers.

The officers of the Society shall be a President, a First Vice-President, a Second Vice-President, a Recording Secretary, and a Corresponding Secretary-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 I. 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.

Section II. 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.

Section III. The Corresponding Secretary-Treasurer 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. He shall have charge of all moneys of the Society, and shall make disbursements only under the 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.

SECTION IV. 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 publications, and transact any other necessary business.

ARTICLE VI. MEETINGS.

The regular meetings of the Society shall be held, unless otherwise ordered, on the first Thursday of each month. The annual meeting for the election of officers and the delivery of the presidential address shall be the regular meeting for the month of December. The terms of office shall begin January 1. Special and field meetings may be called by the Executive Committee.

ARTICLE VII. FEES.

SECTION I. The initiation fee of active members shall be one dollar; the annual fee three 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 II. Corresponding members shall pay no initiation fee, but shall pay an annual fee of two dollars, 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 III. 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.

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.

Meeting of February 11, 1909.

The 228th regular meeting of the Society was held at the home of Mr. J. D. Patten, 2212 R street N.W., on the evening of February 11, 1909, with the President in the chair and the following present: Messrs. Ainslie, Barber, Benton, Burgess, Burke, Busck, Casey, Caudell, Clemons, Crawford, Currie, Dyar, Gill, Hall, Hammar, Heidemann, Hopkins, Howard, Hunter, Hyslop, Jenne, Knab, Kraus, Marlatt, Morgan, Patten, E. F. Phillips, W. J. Phillips, Pierce, Piper, Popenoe, Quaintance, Sanders, Schwarz, Ulke, Webb, and Webster, members, and Messrs. Braucher, J. Doll, A. K. Fisher, Kelly, Lowe, B. P. Mann, Nelson, Strauss, T. W. Vaughan, Vickery, Viereck, Wall, and Wood, visitors.

The minutes of the 227th meeting were read and approved.

Messrs. E. O. G. Kelly, F. B. Lowe, and R. A. Vickery were elected corresponding members of the Society.

The name of Mr. R. W. Braucher was proposed for corresponding membership and referred to the Executive Committee.

Upon motion of Doctor Howard a resolution was passed for the sending to the American Entomological Society of congratulations on their celebration of the fiftieth anniversary of the founding of their society.

The February meeting being the anniversary meeting of the twenty-fifth year since the founding of the Society, the evening was devoted to reminiscences of the earlier years of the Society, the first being a paper by Doctor Howard entitled "The Entomological Society of Washington." The second paper* of the evening, by Mr. Schwarz, "Reminiscences of the Presidents of the Society," was followed by discussion of both papers with other reminiscences, in which Messrs. Mann, Gill, Ulke, Casey, and Patten participated.

*Not published.

THE ENTOMOLOGICAL SOCIETY OF WASHINGTON.

By L. O. Howard.

In the life of a nation, twenty-five years is but a moment of time. In the life of a great scientific society, a quarter of a century is but a brief period. But in the life of an individual, twenty-five years becomes a very appreciable space. Think, for example, of the individuals composing our Society, which commemorates its twenty-fifth anniversary to-night. At the time of its founding, of the eleven men present, Riley, Barnard, Johnson, Morris, and Schaffhirt are gone, and of the others only Mann, Schwarz, and the speaker remain in Washington. Of the twenty-six members listed in the Proceedings published nearly two years later, ten have died, and only seven remain in Washington. Morris was already an old man, but lived eleven years longer, until 1895, when he died at the ripe age of 92—a notable example of physiological value of entomological pursuits. Riley and Uhler were in their prime. Heidemann and Pergande were still young. Marx and Lugger were in their vigorous forties, men of wide experience and of infinite humor, whose droll stories will live perhaps almost as long as their recorded scientific achievements. Schwarz was in his active thirties, but he looks as young now as he did then, and is mentally if not physically as active. Casey and Smith and Mann and Hubbard and I were still in our hopeful twenties, all of us to round out the following quarter century except poor Hubbard, the best of us all. Ashmead and Marlatt, Fox and Hopkins, Webster and Quaintance, Dyar and Currie, and the rest of you appear on the scene much later. Some of you, Crawford and Phillips, our Secretaries, with Burke and Webb and others, were perhaps being spanked and put to bed that memorable night in February, 1884, while still others were disembodied spirits floating around in the ether waiting to be born and absolutely uncertain as yet whether you could select parents who would allow you to become entomologists or not.

Many of the facts connected with the first ten years of the Society's existence have been summarized by the speaker in a paper read at the one hundredth meeting, June 7, 1894. Certain intimate facts concerning the composition and business of the Society were treated in a more or less statistical manner, but a number of interesting and important facts were brought out, and, reading it over again after a lapse of fifteen years, I am particularly impressed by the summary of the character of papers read in those first ten years. While the communications

had been mostly short, and published as a rule rather in abstract than in extenso, they were for the most part of great biological interest. There were almost no classificatory papers. They treated of habits or transformations, of geographic distribution, of parasitism, of technique, of insect physiology, of evolutionary problems, of insect products, of the relations of flowers to insects, and subjects of this character.

It is notable that only 13 papers out of a total of 341 even touched upon economic entomology. There was a reason for this, and that reason perhaps was largely due to the personality of the first President of the Society. It is fairly well expressed in his retiring address at the close of the first year of the Society's existence. He wrote (p. 24, vol. 1, Proceedings Entomological Society of Washington):

"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 fact remains, 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. entomologists—that the members of the Division decided to join in the organization of this Society * * *. 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."

It would be most interesting, if there were time, to compare in a similar manner the character of the papers read and meet-

ings that have been held in the last fifteen years with those recorded in my review of the work during the first ten years. There has been a decided change. The Proceedings are not less valuable, they are undoubtedly more valuable, since perhaps the majority of the communications of the first ten years were short though interesting notes. Nevertheless, I doubt whether even such an enthusiastic entomologist as dear old James Fletcher could have written me about the Proceedings of the past five years as he did after reading the first number of the Proceedings published by the Society in 1886, that he had taken it up after dinner and had not laid it down until he had read the last word at midnight!

This means that our Proceedings in the first place contain more lengthy systematic papers, and in the second place of a more serious and more permanent character. Even Fletcher's letter, however, need not indicate that the early Proceedings had any of the character of romance, and any of us glancing through the pages of that first number must realize that the man who collects in the field and who closely studies living insects will find there the observations of others who did the same and who did them with their eyes and minds open.

In his address, Riley spoke with pride of the Division he had founded. Let us see just what was the composition of that Division at that time. It consisted of Riley, himself, of Mann, of Pergande, of Schwarz, of Barnard, of Koebele, of Smith, and of Howard. Marx was employed on another roll as the general artist of the Department, and Heidemann as general engraver for the Department. Riley went on to state that the Division fell far short of his ideal and of the necessities of the country, and spoke of the difficulties of building it up to that ideal under the unfortunate political unscientific atmosphere that pervaded the Department; and it would be very interesting to talk it over with him were he still with us, and find out how far the organization now falls short of his ideal. We are perfectly aware that it has not yet satisfied the necessities of the country, yet, as imaginative as Riley was and filled as he was with the evidences of that artistic temperament which accounted for some of his peculiarities, I hardly believe that he would have expected at this time a larger or more efficient organization than now exists. Against the eight men he then had on his rolls, we have more than a hundred scientifically trained, and, against the appropriation of something like $20,000 which then was spent by the Government upon entomological work, funds now exceed half a million per annum.

But far better than this is the change in the atmosphere. What Riley termed "the unfortunate political unscientific atmosphere that pervades the Department" has disappeared. The present atmosphere is one of progress, of enthusiastic, forceful, energetic progress, but a progress that shall be gained absolutely by the strictest and most truthful methods—in other words the methods of true science. This characterization is one governing, I believe, all of the scientific bureaus under the United States Government at present. It was written only with the Department of Agriculture as a whole in view, but it should surely be extended to cover all, and in this complex whole the Bureau of Entomology bears its important part and desires of all things the discovery of scientific truths in the interest of scientific truth for the benefit of the people of the United States and humanity at large. It is a mistake to believe that we should not talk over our official work at our Society meetings. Let us talk it over among ourselves as much as possible, in season and out of season. Where we can get the greatest number of entomologists together is the best place to talk it over. When it comes to publication, that is another matter. Results obtained by official labors should be published by official sources, provided they are appropriate to such publications. Incidental results of biological interest may be published in the Proceedings of the Society or elsewhere, according to conditions.

One unique feature of the Society that has developed during recent years has been the broadening of certain of its discussions beyond the confines of strict entomological science. Fernow, Gill, Waite, Stiles, Holm, Vaughan, Sudworth, Pollard, E. L. Morris, Cook, and other botanists and zoologists, and even paleontologists, have joined us, realizing both that entomology is an enormous science and that the Entomological Society is in many ways the livest scientific society in Washington. How often have we seen them sitting listening with courteous interest to the more technical papers, their faces lighting up with an interest more than merely courteous when a topic even slightly impinging upon an idea of broad biologic capabilities was suggested, and springing to their feet to take part in a discussion soaring far beyond insects and becoming as broad as the problem of life itself. This has meant much to this Society and has made it unique among all the entomological societies of the world. We strict entomologists owe much to these men, and among them especially to Dr. Theodore Gill. To have had the privilege of this intimate association with this great naturalist, to have heard at first hand and on

so many occasions his views on so many broad subjects, backed by his mature judgment and supported by his great wealth of knowledge, is an experience and a pleasure which none of us will ever forget.

But in speaking thus of Doctor Gill, we must not fail to mention another, and this one an entomologist. I think the newer men already appreciate what I am about to say, but I must emphasize it. Years ago B. Pickman Mann once said to me, "The principal reason for the existence of the Entomological Society is E. A. Schwarz." Is it not true? What an indifferent meeting it would be without him! There are volumes upon volumes of entomological knowledge packed away in his brain, and with tables of contents and elaborate indices prepared for instant use. This unexampled store of entomological information is always at hand and ready for use in our discussions—is always ready to be imparted in the kindliest and most humanistic spirit to every worker. We should perhaps paraphrase Mann's saying, and put it thus: What has made the Entomological Society valuable to us beyond all other organizations has been the constant presence and participation in its discussions of Eugene A. Schwarz and Theodore N. Gill.

The most cursory of glances through the Proceedings will serve to emphasize what has just been stated. On one page we see that Mr. Schwarz spoke on the composition and extent of the coleopterous fauna of Alaska, and on the next page Doctor Gill is reported to have said that Mr. Schwarz's statements were reinforced by the distribution of other animals, discussing the mollusks and fishes and mammals. And so it goes.

While the discussions have been broad beyond the confines of insect knowledge the papers read have practically been confined entirely to the different aspects of entomological science. There was one exception, however. On November 1, 1894, Doctor Gill presented a paper on a remarkable new family of crabs, and stated that he thought himself justified in presenting the paper before an entomological society for the reason that in his opinion the Crustacea are more closely related to the Insecta than are the Arachnida. A vigorous discussion ensued.

The present speaker frankly stated that he had voted against the reception of the paper by the Program Committee on the ground that however loose the definition of the word "entomology" may be, it is generally understood to refer to the class Insecta, and that the scope of this class is so enormous that the tendency of the Society should be to contract rather than to expand the range of topics considered at its meetings. The ad-

mission of papers on Arachnida had been from the beginning largely a matter of courtesy and precedent.

Doctor Gill, on the other hand, argued that the word "entomology" should apply to the whole group Arthropoda, and I wonder whether he holds the same view now. I once heard Doctor Gill at the Cosmos Club arguing vigorously against the possibility of the existence of such a creature as the sea-serpent, but on the very next night, happening in to the club, I heard him give an elaborate argument, and a quite convincing one, that there is a strong possibility that such a creature as the sea-serpent may still exist! That showed me for the first time that Doctor Gill rather likes to argue, and that at the Cosmos Club it makes very little difference which side of the argument he takes. I hope and believe that it is different at the Entomological Society.

But in regard to the crab paper, I am glad to state that Mr. Schwarz agreed with me. He said that arachnologists have affiliated with entomological societies largely because they are so few in number and because there are no more nearly related associations of specialists. There was no hard feeling in the discussion, which changed immediately into a broad morphological field apropos to the hind legs of the crabs under discussion having apparently developed into breathing organs, and the whole group of insects was discussed for comparable developments and a number were pointed out. But it is noticeable that no more papers on crabs have been read before the Society since that night.

How many interesting meetings have been held! A long succession of them stand out plainly in my eye. I recall the earnest faces; I can hear the voices of all who are gone: I can hear the ready laughter which followed a quaint remark of Lugger or of Marx, and even now it bubbles out as spontaneously at one of Schwarz's humorous turns of expression.

One of the meetings which none of us who were there will forget—and there were only eight of us—was held February 7, 1895, at my house in Georgetown. It had been snowing all day, and from 3 o'clock snow had been coming down so rapidly that it was impossible to see ten feet in front of one. I expected no guests as I looked out into the still whiteness, but at 7.45 the door-bell rang, and I opened the door to find a white pillar standing there which shook itself and revealed the smiling face of Doctor Gill. The bell rang again, and in came Schwarz and Marlatt, and then Benton and Coquillett, and finally a shouting was heard without; the door was opened, and there was Ashmead and a cab driver floundering around

in the snow trying to find poor old Ashmead's overshoes, which he had lost, and while the search continued a stalwart figure in hip-boots arrived and it proved to be Dr. C. Hart Merriam in his north-western mountaineer garb, come to the meeting on special invitation to hear a paper on the geographical distribution in the United States of certain insects injuring cultivated crops, which was one of the early attempts to use Merriam's now famous life-zone maps in a practical way. Everyone was in goods spirits that night, and the geographic distribution discussion was a lively one. It covered the whole field of zoology and botany. Ashmead contended among other things that parasites always followed their hosts and Doctor Merriam retorted that he had never known the bedbug to occur in the Boreal Zone, whereupon Doctor Gill stopped that part of the discussion by the remark that we can not trust to negative evidence, for upon negative evidence alone he himself would be inclined to say that the bedbug does not occur in the city of Washington!

The social feature of the meetings of the Society has always been an important one. It is good to have more men. It is especially good to have the great influx of young men who have come to us since Congress has begun to be so liberal with its appropriations. But it is nevertheless with regret that we older fellows see the custom of meeting at one another's homes pass away. This custom is revived for tonight by the warm-hearted hospitality of Patten, that loyal member who has struggled with our complicated accounts and large financial transactions as treasurer of the Society for so many years. But this, in theatrical parlance, is a one-night stand only. We think of the evenings in the homes of Riley, Marx, Schwarz, Smith, Heidemann, Mann, Fox, Dodge, Fernow, Ashmead, Gill, Marlatt, Stiles, Dyar, Patten, Pollard, Banks, Benton, Chapin, Quaintance, and others, and of the charming meetings in Baltimore with Uhler, with regret. The social feature is retained, it is true, at our present enjoyable meetings at Saengerbund Hall; but they lack the intimate quality which rendered the old ones (and this one, thanks to Patten) so delightful.

In those early days entomology and beer went together. There were good reasons for this. Marx, Schwarz, Heidemann, Pergande, Lugger, Schoenborn, Ulke, were all Teutons, as their names indicate; John B. Smith's real name is Johann Schmidt. At that period the German university idea dominated scientific America. There were thousands of young Americans in the German universities each year. The American university students adopted in part the customs of the

German university students. Some of us had been in Germany. Ashmead spent a year in Berlin. Stiles, having returned to this country, hardly knew whether he was speaking English or German.

The after meetings of the Entomological Society were interesting; the conversation was good; the refreshments were unlimited in quantity but limited in kind; you could have light beer or dark beer, and that was about the extent of the variation. It was my custom to order two cases of beer, each of 24 bottles, for an average attendance of 7 or 8, and I always made the arrangement with the grocer to return those bottles which were not empty, as well as the empty ones, but it soon became a standing joke between us that it was unnecessary to make any provision concerning the unempty bottles. I am not sure that this custom, which no longer holds, was a good one. I am not sure that it was a very bad one. So far as I know, it never seriously affected the health of any of the members, but on the whole perhaps it was unfortunate and I am inclined to believe that the present method is the best. I should dislike to see some of the younger members of the Society drink as much beer as some of us did at their ages, and, while I would not vote the prohibition ticket as Banks does, I believe that Banks was about right when the Society met at his house for the first time and he gave us hot lemonade and cold lemonade and some very excellent raisin cake. It is true that a few glasses of beer will make a stupid remark sound witty, but there was no necessity for any such stimulus to the imagination in the old days, because all of the remarks were witty.

There are so few of us left that it will be interesting perhaps to say something about the men who attended that organization meeting in 1884. Doctor Barnard was an extremely tall man, 6 feet 3 at least, very slender, with a full blond beard. He had been a professor in Iowa, an inspector at Pennikese under Agassiz, had occupied Comstock's chair at Cornell while Comstock was in Washington, and was now working away on machinery with which to fight the cotton caterpillar, and was principally interested in the perfection of the cyclone nozzle.

Albert Koebele was a young German of about 27 or 28, recently come from New York, where Professor Riley had met him at one of the meetings of the Brooklyn Entomological Society, and was acting as preparator in the Division of Entomology. His future successes in discovering and importing *Novius cardinalis* and other beneficial insects were as yet little dreamed of.

Judge Laurence Johnson was a man of perhaps 55 or 60 years

of age, who had been an agent of the Entomological Commission and afterwards of the Division in the study of the cotton caterpillar in Mississippi. He lived at Holly Springs, in that State, and was much interested in entomology. He was at that time in Washington on a visit in connection with the cotton caterpillar work. The judge was a fine man and made many friends among the entomologists here. He is probably still alive, although I have not heard from him since September, 1905. He wrote me at that time from Pachuta, Miss., relative to mosquitoes. He stated in this letter that prior to 1858 to 1859 mosquitoes were unknown at Holly Springs, Miss. They were carried there by the new Mississippi Central Railroad. The judge, in 1876, caught the first *Stegomyia* at Holly Springs and took it to be a new species of *Culex*. Now mark an interesting thing: in 1853 Holly Springs did not quarantine against the fever, and refugees came there; persons with the fever were brought there, and got well or died without communicating the disease; in the scourge of 1878, however, Holly Springs being known as an immune place, people swarmed in there and yellow fever patients were brought, but, as just shown, the *Stegomyia* had been brought in by the railroad, and the population of Holly Springs was more than decimated.

Mr. B. P. Mann is still with us in Washington. At that time he was Assistant Entomologist, and was engaged largely in work on the Bibliography of Economic Entomology.

Doctor Morris I have already spoken of. At that time he was well above 80 years, and very stout and florid, with perfectly white hair and smooth face. He was then pastor emeritus of a Lutheran church in Baltimore. He had done no actual entomological work for many years, but was still greatly interested in the subject and full of anecdotes of the earlier entomologists.

While I was writing these words this morning the door of my office opened, and in came old Professor Cyrus Thomas, 84 years of age, but mentally as active as ever. He came in to suggest the idea that certain non-migratory locusts, after a succession of dry seasons, grow longer wings and become migratory. And he went on to say (mark the coincidence), "J. G. Morris came into my laboratory once years ago, when Darwin's book on The Origin of Species was first making such a stir, and while he was objecting to the whole idea of evolution, I told him this about the grasshoppers; and he said, 'Thomas, what *are* we coming to?'"

You can imagine the scene. These two ministers of the Gospel, having the advantage over other members of the cloth

in being naturalists, puzzling their brains already in the effort to harmonize the facts of nature with the teachings of the church.

Professor Riley needs no extended mention here. The literature of entomology is full of references to him, and his personality has been described in many biographical records.

Dr. A. J. Schafhirt was a man of middle age and fine personal appearance. He was a druggist, and kept a shop in the neighborhood of the Government Printing Office. He was much interested in entomology and, naturally, especially in the insects affecting drugs and stored products, but I think at one time he had made a general collection of insects.

Alonzo H. Stewart was at that time quite a boy, although he was the chief of the pages of the Senate. I imagine that he could not have been more than 18 or 19 years of age at the time of this initial meeting. He was greatly interested in insects, and during the early meetings frequently came with interesting specimens for exhibition and with many questions to ask about them.

The other two persons present, Mr. Schwarz and myself, need no description to this assemblage. Letters were read from Colonel (then Captain) T. L. Casey, Mr. C. R. Dodge, and Professor John Murdock. Captain Casey and Mr. Dodge are both in Washington, and are known to members.

Professor John Murdock at that time had just returned from Point Barrow, Alaska, where he had been spending many months in connection with an expedition under the Signal Service of the Army. He had collected largely both in ethnological and zoological lines, and was in Washington working on the report of the expedition. He subsequently became Librarian of the Smithsonian Institution, and is now connected with the Boston Public Library. He attended several of the meetings of the Society. He is a charming man, a delightful talker, graduate of Harvard, and a very well posted zoologist; in fact he filled the chair of zoology in the University of Wisconsin during the period when Professor Birge was connected with the University of Tokyo.

So much for the members present at the first meeting. It will be unnecessary to do anything further in this way of personal description. Reminiscences will come to all of the older members no doubt after I have finished.

On one occasion years ago a member of a prominent northern entomological society came to Washington and attended a meeting of our Society. After adjournment I asked him, "Well, what do you think of our society?" "Huh!" he said,

"I don't think it is an entomological society at all." "Why?" I asked. "There wasn't a bit of quarreling," he replied. And it is perfectly true that during the whole period of twenty-five years there has not been a trace of hard feeling, of anger, of jealousy, or of scheming for office; though the meetings have frequently been vigorous, they have always been of the most friendly character. As to office, the question has always been, not which of two aspirants to select, but how can we get some good-natured member to accept. This means no depreciation of the honor of office in the Society, but is indicative of the absolutely universal modesty of its members.

But this is only one of the good qualities which our Society collectively possesses. That so large a number of our resident members are professional entomologists is a great element of strength. There is nothing amateurish about our meetings and about our published proceedings. An observation brought before one of our meetings meets with a speedy recognition of its true value and its true bearings to a greater degree I think than in any other scientific society with which I am familiar. Our progress has been steady and sound. That the same rapid progress will continue through the remaining three-quarters of our first century of existence is almost too much to expect, but it is devoutly to be hoped for. Such a rate of progress for example would give us in the year of our centennial, 1984, an average attendance of 1792, and I doubt whether the hospitable successors of the hospitable John Patten will be able to house that gathering.

The following papers have been accepted for publication.

NEW SPECIES OF AMERICAN LEPIDOPTERA.

By Harrison G. Dyar.

Family ERYCINIDÆ.

Tmetoglene eulesca, new species.

Body black, the palpi orange. Wings black, with a slight blue reflection; fore wings with a bluish white ray in the lower half of the cell, one in the interspace above vein 2 and two in the submedian interspace, none reaching the margin; a row of four large bluish-white spots across the apex of the wing. Hind wing with white rays in all the interspaces, not reaching the margin. Beneath the markings are repeated, purer white. Expanse, 37 mm.

Two specimens, Motzorongo, Mexico, May, 1908, from Mr. R. Müller.

Type—No. 12218, U. S. Nat. Mus.

Tmetoglene laridetta, new species.

Head black, the palpi and nape orange. Wings black with a blue reflection, the fore wing with a white band across the apex, not attaining the costa or outer margin and diminishing in width from the costa outwardly. Hind wing with the fringe white. Beneath as above. Tip of the abdomen orange.

One specimen, Motzorongo, Mexico, August, 1908, from Mr. R. Müller.

Type—No. 12219, U. S. Nat. Mus.

Tmetoglene meridæ, new species.

Head black, palpi and pectus orange. Legs black, lined with white on the inner side. Abdomen with sublateral white lines. Fore wing black, the area including the lower half of the cell and thence outwardly to above tornus filled with pale metallic blue except the veins and margins; in the black area above a diffuse white band crosses the wing below apex, cut by the black veins. Hind wing pale metallic blue, the veins and margin black. Beneath the markings are repeated, but all are white with a bluish tint, the intravenular markings scarcely more blue tinted than the subapical band. Expanse, 40 mm.

One specimen, Merida, Venezuela, from Mr. S. Briceno.

Type—No. 12220, U. S. Nat. Mus.

Family SYNTOMIDÆ.

Autochloris patagiata, new species.

Antennæ black, the tips white on the outer side; head black, with metallic blue spots on the vertex, orange behind the eyes, some white

scales above the mouth and at bases of antennæ. Thorax black, with two large orange spots, the patagia orange, bordered narrowly with black. Abdomen black, the first five segments broadly transversely banded with orange, a row of metallic blue subdorsal spots, most distant on the last two segments; venter black; legs black with white spots on the coxæ. Wings yellowish hyaline, veins black; a marginal black band much expanded at apex and slightly at vein 2; a large black discal mark; an orange stripe along costa to the marginal band; inner area broadly orange to the middle, cut by the black vein 1. Hind wing with the black border broad, especially from inner angle to vein 2; discal mark black; base orange shaded; veins 5 and 6 crossing the hyaline area orange. Expanse, 37 mm.

One female, Misantla, Mexico, October, 1908, from Mr. R. Müller.

Type—No. 12214, U. S. Nat. Mus.

Family ARCTIIDÆ.

Prumala alinda, new species.

Head yellow, crimson behind the eyes, palpi crimson at the sides, brownish in front; thorax yellow with a few crimson hairs, the patagia bordered within with purple. Abdomen yellow, the dorsum with crimson hairs. Legs yellow, the tarsi crimson. Fore wing yellow marked with purplish—a broad band from apex to tornus, widened a little outwardly between veins 5 and 6 and at tornus, followed by a row of small spots in the interspaces; a large blotch, rounded quadrate, the four corners touching respectively vein 1 at base, the subcostal vein at basal third of cell, vein 3 near its origin, and vein 1 beyond the middle; three round spots at the end of the cell; the veins and costa are narrowly marked with crimson wherever crossed by the purple markings. Hind wing semitransparent, roseate, yellowish on the costa; a faint purplish mark in the interspace below vein 2 shows through from the under side. Expanse, 48 mm.

One male, Mexico City, Mexico, May, 1908, from Mr. R. Müller.

Type—No. 12215, U. S. Nat. Mus.

Allied to *Prumala lophocampoides* Felder.

Ecpantheria andromela, new species.

Male.—Head white on the vertex, the front and palpi black. Thorax white, the tegulæ and patagia black except their edges, three large round black patches on the disk. Abdomen orange above, with long black hair on the two basal segments, a row of dorsal black spots, the last segment largely black; beneath white, black on the sides, and a

lateral row of small black spots. Legs black, the tips of the mid and hind tibiæ and the basal hind tarsal joints marked with white. Fore wing nearly entirely black; small angular white spots at the base, on submedian interspace at middle of cell, a narrow mark arising from inner margin at outer third, forked above, two spots on the costal edge beyond the middle, two on the outer margin, the upper containing two round terminal dots, the lower one spot or none, a speck at the tornus. Hind wing black, some white in the fringe only below vein 3. Expanse, 37 mm.

Female.—Thorax as in the male, but the black spots much smaller, that on the patagia divided into two. Abdomen continuously black dorsally, the venter also black in the middle. Wings white, the veins ocherous where they cut the black markings; these consist of two dots near the base, followed by an angled row of four spots subbasally, next three spots obliquely below median vein, next a band from costa to inner margin, cut by ocherous veins, strongly angled in the middle and touching the origin of vein 3; five minute dots at the end of the cell, next a band of narrow spots between the veins, excurved over the discal venules, the spots between veins 3 to 5 much attenuated; next a subterminal band, cut by ocherous veins above vein 2, broken into spots at veins 3 to 5, where it is much narrowed; a terminal row of irregular spots and spots in the fringe at apex and veins 3 to 5. Hind wing with a row of spots across the cell, on each side of the distal cross-vein, an outer band, cut by ocherous veins and narrowed at veins 3 to 5; a row of terminal spots above vein 3. Expanse, 47 mm.

Four males and one female, Mexico City, Mexico, July, August, and September, 1908, from Mr. R. Müller.

Type—No. 12216, U. S. Nat. Mus.

Allied to *Ecpantheria atra* Oberthur.

Pygarctia pterygostigma, new species.

Head gray, narrowly pink in the nape. Thorax gray. Abdomen crimson above with a row of dorsal spots; venter gray. Wings gray, a large yellowish-white mark at the end of the cell of the fore wing. Legs gray, the fore coxæ pink within. Expanse, 28 mm.

Two females, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12217, U. S. Nat. Mus.

Family NOCTUIDÆ.

Centrartha requies, new species.

Head dark brown, the short palpi paler brown. Thorax, basal and terminal spaces of fore wing and an angular discal mark creamy

white; median space broadly dark submetallic purple brown, bronzy on the edges and irrorate with pale purple scales; the costa is brown to the base; outer and inner lines faintly indicated in white, filiform, crenulate; three black terminal dots above the middle of the outer margin; the discal mark is situated in the cell, its lower angle touching the reniform, which is faintly outlined. Hind wing white, finely powdered with fuscous, except on the fringe. Beneath the fore wings are silky blackish, except costa, apex, and discal mark, which are pale. Hind wings silky white. Abdomen shaded with fuscous above. Expanse, 24 mm.

One specimen, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12221, U. S. Nat. Mus.

I have placed this species in the genus *Centrartha* according to Sir G. F. Hampson's sixth volume of the Catalogue Lepidoptera Phalaenae. It is very close to *Chamaeclea gladiola* Barnes, described from Arizona, but differs especially in the shape of the discal mark. In *gladiola* this is large, round and full, while in *requies* it is less than one-third of the size and roundly triangular. I have at present no specimen of *gladiola* before me, but shall be surprised if it is not congeneric with *requies*. This differs conspicuously from *Chamaeclea pernana* Grote in lacking the frontal process and in having a large claw on the tip of the fore tibia within.

Genus STIBADIUM Grote.

Stibadium laverna Druce.

Thalpochares laverna Druce, Biol. Cent. Am., II, 496, 1898.

A specimen before me from Tehuacan, Mexico, agrees with Druce's figure of *Thalpochares laverna*, except in being darker throughout. The difference is probably due to the freshness of the specimen. It belongs, structurally, to *Stibadium*, as, indeed, the markings and coloration would suggest.

Stibadium psamathochromum, new species.

Uniform pale gray, shining, the markings faintly shown; outer line filiform, strongly angled subcostally; reniform faintly indicated; subterminal line indicated by a pale shade, dentate at veins 3 and 4. Hind wing paler, shining grayish. Expanse, 27 mm.

One specimen, Tehuacan, Mexico, from Mr. R. Müller.

Type—No. 12223, U. S. Nat. Mus.

The color is paler and grayer than in *expallidus* Grote, the

markings much as in *manti* Barnes, except that the lines appear dark on a paler ground. Their course, however, is the same.

Stibadium crenulosum, new species.

Fore wing with the median and terminal spaces blackish brown, extreme base and subterminal space light reddish-brown; inner line visible below the cell as long lunules between the veins; outer line crenulate, irregularly doubled; a few brown streaks in the pale subterminal space; reniform whitish with a curved central dark bar. Hind wing fuscous shaded, especially subterminally, the fringe pale. Expanse, 24 mm.

One specimen, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12224, U. S. Nat. Mus.

The species has the size and aspect of *navium* Harvey, but the dark shadings are blacker and not powdery, while the terminal space is sharply discolorous; the inner line is obscure, but strongly toothed.

Stibadium concinnum, new species.

Fore wing olivaceous gray, powdery, the ground color lighter along the outer line and around the orbicular; basal space uniform; inner line white, narrow, evenly arculate; orbicular large, round, black-filled, narrowly white-edged; reniform dark-filled, but scarcely darker than the surrounding area, narrowly white-outlined, constricted; outer line narrow, white, angled at vein 6, a black costal patch above the angle, subterminal line white, powdery, with a distinct black inner edge, becoming broader towards the inner margin and obscurely cut by the veins; fringe with a narrow white line at the base. Hind wing whitish, with a faintly indicated outer line, the terminal space gray-shaded; a grayish discal bar; fringe dark, with a white line at the base. Expanse, 30 mm.

Two specimens, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12225, U. S. Nat. Mus.

The species is allied to *curiosum* Neumoegen and *pityochromus* Grote, but is more contrastingly and neatly marked than either. The dark border to the submarginal line is somewhat as in *triplagiatus* Smith, but more extended and also broken by the veins.

Stibadium curiosum Neumoegen.

Mr. Müller sends a specimen from Tehuacan, Mexico, darker than the ordinary form. A blackish shading from the base

extends nearly to the outer line, obscuring the markings, and the hind wings are nearly solidly blackish. I consider it to be a varietal form.

Stibadium jalada Schaus.

Collected by Mr. Müller at Tehuacan, a new locality for the species.

Stibadium corazona Schaus.

Collected by Mr. Müller at Mexico City.

Genus BASILODES Guenée.

The following species all have the frontal process with a raised rim and central tubercle. Sir G. F. Hampson defines a genus for them in the seventh volume of the Catalogue Lepidoptera Phalaenae, but I refrain from using the name, because it appears to be new, and has as yet not been validated by the citation of species under it.

Basilodes territans Hy. Edwards.

The male specimens before me agree with Doctor Ottolengui's figure of the female (Can. Ent., xxx, pl. 5, fig. 4), rather than with his figure of the male. I do not think, however, that there can be two species involved.

Basilodes arizona French.

Plusia arizona French, Can. Ent., xxi, 161, 1889 (Sept.).
Plusia acantha Druce, Biol. Cent. Am., Lep. Het., i, 329, 1889 (Nov.)
Basilodes arizonae Ottolengui, Can. Ent., xxx, 106, 1898.
Basilodes arizonae Dyar, Bull. 52, U. S. Nat. Mus., 196, 1903.

French's description agrees entirely with Druce's figure, while the types of both authors were taken by the same collector, presumably in the same locations. A specimen before me from the Schaus collection has the frontal process present, with a raised rim and central cone distinct; in the true *Basilodes* (*chrysopis* Grote and *pepita* Guenée) the central cone is lacking.

Basilodes pterochalcea, new species.

Fore wing bronzy golden; costa light purplish-brown, widening over the reniform, which is outlined in brown; a patch of this color at the base, widening below to the middle of the inner margin; fringe checkered light and dark brown; a row of brown dots between the veins in subterminal position. Head and thorax purplish brown. Hind wing grayish, the fringe pale. Expanse, 34 mm.

One female, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12226, U. S. Nat. Mus.

The distribution of golden upon the fore wings is as in *Deva* (?) *ornata* Ottolengui, but that species has no frontal process.

Basilodes chalcotoxum, new species.

Dark purplish-gray, irrorated with whitish; lines obsolete; a band of bronzy golden from the base of cell curves over at the origin of vein 2 and touches the inner margin beyond the middle, where it is edged with whitish; outer line faintly indicated in dark, followed by a bronzy luster, which becomes a small bronze patch on veins 6 and 7. Hind wing dark brown, the outer half of the fringe whitish. Expanse, 32 mm.

One female, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12227, U. S. Nat. Mus.

The species much resembles *Plusia acema* Druce (Biol. Cent. Am. Lep. Het., 1, 330, 1889), described from a single male, but the present species is larger, more slender, while the golden band is narrower and cut in on the outer side at the origin of vein 3.

Basilodes chryseochilus, new species.

Head and thorax ochraceous before, dark brown on the disc. Fore wing purplish to the outer line, the terminal space broadly pale golden, with two olivaceous brown-shaded lines; inner line slender, dark, produced into two long teeth, one on the discal and one on the submedian fold; outer line close to the pale margin, slender, dark, arcuate inward below, retracted subapically obliquely to the costa; median area indistinctly streaked with dark purplish; veins finely lined in brown; reniform ocherous brown, a little lighter than the ground color, without darker edge; fringe very pale brown. Hind wing blackish, the fringe very pale brown. Expanse, 35 mm.

Two females, Tehuacan, Mexico, September, 1908, from Mr. R. Müller.

Type—No. 12228, U. S. Nat. Mus.

The form is slender, the fore wings rather long and narrow.

Antaplaga subfumosa, new species.

Head and thorax above orange red; abdomen pale gray. Fore wing silky yellowish, with a smoky shading except along the costa and apex, the shading darkest toward base about vein 1. Hind wing pale smoky,

darkest costally, the fringe pale. Beneath, fore wing and costal portion of hind wing dark smoky, the rest of the hind wing pale. Expanse, 35 mm.

One female, Mexico City, Mexico, August, 1908, from Mr. R. Müller.

Type—No. 12230, U. S. Nat. Mus.

Allied to *Antaplaga thoracica* Hy. Edwards, but larger and shaded with smoky.

Plagiomimicus resoluta, new species.

Brownish gray with a pale metallic luster; lines dark bronzy brown; inner line slender, bent at right angles on submedian fold, else straight and without wavings; reniform and orbicular outlined in brown, large, slightly paler than the ground; outer line heavy, straight from inner margin to vein 7 and followed outwardly by a broad pale shade, diffused towards outer margin, the line bent sharply back to costa at vein 7, but the shade continuing more narrowly to apex; subterminal line narrow, faint, pale, crenulate; a brown line at base of fringe, which is concolorous with the ground color of the wing. Hind wing smoky brown, the veins narrowly darker; an outer diffused pale band; a brown line at the base of the fringe, which is dark. Expanse, 32 to 34 mm.

Two males, Tehuacan and Guadalajara, Mexico, one from Mr. R. Müller, the other from the Schaus collection, where it was labeled "*Plagiomimicus tepperi* Morr."

Type—No. 12231, U. S. Nat. Mus.

This species does not belong to *Plagiomimicus*, but, as the name which Sir G. F. Hampson uses for it is at present without included species, I refrain from using it. The species has a long claw on the inner side of the fore tibia, the front convex, protuberant, and roughened in a central area with a corneous plate below.

Family NOTODONTIDÆ.

Dasylophia roberta, new species.

Fore wings light brown, reddish on the costal half, ocherous on the inner half; veins narrowly black; discal mark large, narrowly elliptical; terminal dots large, powdery, subconfluent; lines broken and diffused; subbasal lines single, black, strongly exserted mesially, dentate on the veins; inner line parallel to the subbasal one, reaching the middle of the cell, single, black, powdery and indistinct, dentate on the veins; outer line double, represented by two rows of dots on the veins above vein 3, a powdery angulate line below; an obscure oblique brown

shade line from middle of vein 2 to the outer margin at vein 4. Hind wings soiled whitish. Expanse, 47 mm.

One female, Orizaba, Mexico, October, 1908, from Mr. R. Müller.

Type—No. 12222, U. S. Nat. Mus.

Family GEOMETRIDÆ.

Selidosema insaria, new species.

Palpi short and slender; antennæ of the male with a very short bare tip, the most of the shaft with long pectinations. Wings with entire margins, carneous gray, whitish towards the base, purplish-shaded along the margins; lines obliterate, the outer represented by a row of purplish-brown dots on both wings, the wing sprinkled with scattered irrorations; on the hind wings a faint shaded inner line; a row of small black points in the base of the fringe; beneath evenly irrorated, with small dark discal dots. Thorax and abdomen of the same color as the base of the wings, the abdomen with a double dorsal row of black points. Expanse, 24 to 27 mm.

Two males and one female, Fort Meade, Fla., from Mr. F. A. Merick.

Type—No. 12209, U. S. Nat. Mus.

Stenaspilates metzaria, new species.

Gray, the median space blackish-shaded. Fore wing with a projection at the end of vein 7 and a double one at veins 4-5; gray, slightly olivaceous; the median space is shaded in dark brown, bounded by the dark lines, which are both nearly straight, the inner one slightly relieved on the paler ground, the outer not separated from the median shading; discal dot minute, rounded, blackish; a row of minute, terminal black dots between the veins, most distinct towards the apex. Hind wing slightly ocherous tinted, except at the anal angle, where the gray color prevails; a faint outer dark line, indistinctly paler margined without; a blackish discal bar; two black dots at the apex terminally. Beneath paler, irrorate, the outer lines and discal marks indicated in blackish, the discal mark of the fore wing a narrow ringlet. Expanse, 36 mm.

One male, Claremont, Cal. (C. W. Metz), from Mr. C. F. Baker.

Family PYRALIDÆ.

Subfamily CRAMBINÆ.

Genus ARGYRIA Huebner.

Under the name *Platytes*, Sir G. F. Hampson refers (Proc. Zool. Soc. Lond., 1895, 946) *squamulellus* Zeller and *densellus*

Zeller to this genus. These species have been listed in the genus *Chilo* in American publications; Kearfott retains them in this genus at present (Proc. U. S. Nat. Mus., xxx, 392, 1908). My specimens of *densellus* seem correctly referred to *Argyria,* as I cannot detect any trace of the frontal prominence characteristic of *Chilo;* but *squamulellus* seems better referable to *Diatraea,* if my speimens are correctly determined.

Argyria densellus Zeller.

Chilo densellus Zeller, Horae Soc. Ent. Ross., xvi, 158, 1881.

Zeller's description is unsatisfactory, but his figure shows that the wings have the veins lined with white, bordered with dark powdering, the interspaces again dark. I have three specimens corresponding with these characters, which I consider to be the true *densellus* of Zeller.

Argyria multilineatella Hulst.

Spermatophthora multilineatella Hulst, Ent. Amer., III, 134, 1887.

This has been made synonymous with *densellus,* but incorrectly so. The wings have the veins lined with brown, bordered with whitish, the interspaces again brown in the middle. Outwardly from the cell across the discal dot is often to be seen a long pale shade, whereas this region in *densellus* is commonly covered by a dark shade. The species is clearly distinct, and in fact has the markings almost completely reversed from those of *densellus.* It is a commoner species. Twenty specimens are before me from Florida, Texas, New Jersey, and Connecticut.

Argyria differentialis Fernald.

This species differs from *Diatraea* in venation, as noticed by Professor Fernald in his original description, and is clearly not properly referable to that genus.

Argyria consortalis, new species.

Very similar to *differentialis* Fernald. The hind wings are whiter, without the brown shading on the veins; an obliquely cut terminal shade from below the apex inward across the wing is distinct.

Four males, Dade City, Florida, from Mr. F. A. Merrick.

Type—No. 12210, U. S. Nat. Mus.

Genus HAIMBACHIA, new.

Hind wing with vein 6 from the upper angle of the cell; fore wing with veins 7 and 10 from the cell; palpi extending over twice the length

of the head; fore wings with vein 6 from the cell; front rounded and not prominent; proboscis developed; hind wings with veins 4 and 5 from a point; fore wing with veins 11 and 12 anastomosing.

Type—*Crambus placidellus* Haimbach.

Haimbachia placidellus Haimbach.

Crambus placidellus Haimbach, Ent. News, XVIII, 44, 1907.
Chilo placidellus Kearfott, Proc. U. S. Nat. Mus. XXX, 392, 1908.

Mr. Haimbach has presented a type specimen to the National Museum. I take pleasure in dedicating the new genus to him.

Genus DIATRÆA Guilding.

Sir G. F. Hampson describes this genus as having a conical protruding front; but I am unable to verify this statement. All the specimens of *Diatra a saccharalis* that I have seen have the front rounded and not exceeding the eyes. I am therefore obliged to correct the generic diagnosis in this respect. I refer here the following North American species only:

Diatraea saccharalis Fabricius.
Diatraea parallela Kearfott.
Diatraea squamulellus Zeller.

Genus IESTA, new.

Hind wing with vein 6 from the upper angle of the cell; fore wings with veins 7 and 10 from the cell; palpi extending a little over the length of the head; fore wings with veins 8, 9, 10 stalked, 7 from the cell; front rounded and not prominent; proboscis minute; vein 11 anastomosing with 12.

Iesta lisetta, new species.

Body and fore wing straw color, the veins narrowly lined in brown; discal and terminal intervenular dots black; two oblique narrow brown parallel outer lines. Hind wings whitish, without markings. Expanse, 16 mm.

Two specimens, Dade City, Fla., from Mr. F. A. Merrick.
Type—No. 12211, U. S. Nat. Mus.

Family COSSIDÆ.

Hypopta francesca, new species.

Gray; whitish cinereous, reticulate with blackish; the reticulations are uniformly distributed, broad, transverse, partly confluent in transverse lines, which are most obvious subbasally and subterminally. Hind wing entirely blackish gray. Beneath blackish gray, the reticulations showing on a lighter field on the costæ of both wings and continuously along both sides of vein 1c from base to margin; this curved gray stripe is mottled with bars of dark gray. Expanse, 21 to 23 mm.

Two specimens, Fort Meade, Fla., from Mr. F. A. Merrick.
Type—No. 12213, U. S. Nat. Mus.

ON THE IDENTITY OF CULEX PIPIENS LINNÆUS.

[Diptera, Culicidæ.]

[PLATES I TO III.]

By Harrison G. Dyar and Frederick Knab.

The family Culicidæ, comprising the mosquitoes, is based upon the genus *Culex* of Linnæus, of which the generally recognized type is *Culex pipiens* Linnæus. The genus and species date from the beginning of binomial nomenclature, the tenth edition of the Systema Naturæ. In this work, page 602, Linnæus treats the genus thus:

VI. DIPTERA.

224 Culex. Os aculeis setaceis intra vaginam flexilem.

pipiens. 1. C. cinereus, abdomine annulis fuscis octo. *Fn. svec.* 1116.
Fl. Lapp. 363, 364.
Blank ins. t. 15. *f. A-D.*
Reaum. ins. 4. *t.* 43, 44.
Swamm. quart. t. 23.
bibl. t. 31. *f.* 4-8. *t.* 32. *f.* 1-5.
Joblot. micr. 1. *pp.* 2. *t.* 13. *f. A. B. C. D. E. H. I. L.*
β. *Kalm. itin.* 2. *p.* 268. Musquetoés.
Habitat in Europæ *aquosis; copiosissima in* Lapponia; *etiam in* America *obvia. Kalm.*
Mas antennis plumosis vix pungit aut sugit sanguinem.
Larva in Aquis; Pupa bicornis reversa; Insectum pipiens, pungens; in Indiis magis venenata. Anseres allicit, pullos Gallinarum nutrit Lapponum *calamitas felicissima.*

bifurcatus. 2. C. fuscus, rostro bifurco. *Fn. svec.* 1115.
Raj. ins. 74. *n.* 4.
Reaum. ins. 4. *t.* 40. *f.* 1, 2.
Habitat in Europa.

pulicaris. 3. C. alis hyalinis: maculis tribus obscuris. *Faun svec.* 1117.
Fl. Lapp. 365.
Derh. phys.-th. l. I. *c.* II, *f.* 5, 6.
Habitat in Europa; *in* America. *Kalm.*
Cursitat, mordet, relinquit punctum fuscum. Amoen. acad. 3. *p.* 343.

reptans. 4. C. niger, alis hyalinis, pedibus nigris annulo albo. *Fn. svec.* 1118.
Habitat in Europa, *reptatu molestus tempore vespertino.*

equinus. 5. C. ater, abdomine fusco, fronte alba. *Fn. svec.* 1120.
Fl. Lapp. 359.
Habitat circum Equos, *quorum sanguinem haurit, inter crines eorum cursitans.*

stercoreus. 6. C. testaceus, alis reticulatis, linea thoracis, tribusque abdominis nigricantibus.
Habitat in stercoribus.

As above stated, *Culex pipiens* has generally been recognized as the type of the genus, and that no doubt correctly, as this would seem to be the most common, and in a sense, officinal species included, and would thus be intended as the type on Linnæus' own ideas. Moreover, it is the first species. Of the others, *bifurcatus* has been recognized as a mosquito, an European species of *Anopheles;* but very little is said about it, and it was obviously subordinated in Linnæus' conception of the group. The other species are not mosquitoes at all; *pulicaris* is a *Ceratopogon, reptans* and *equinus* are species of *Simulium,* and *stercoreus* is apparently some Cyclorhaphid fly. They do not agree with Linnæus' definition "Os aculeis setaceis intra vaginam flexilem," and he could not have had any of them in mind as typical of the genus. The only species so agreeing are the first two, of which the first is much the commoner and better known. We therefore see no reason for attempting to reverse the generally accepted procedure, and would confirm *Culex pipiens* Linnæus as the type of the genus and family.

The next point to be determined is the identity of *Culex pipiens.* Linnæus obviously intended the term to cover all mosquitoes known to him, directly or indirectly, except the *Anopheles,* with long palpi in the female, which he separates under the name *Culex bifurcatus.* Linnæus had experienced mosquitoes in Lapland, and they evidently made a lasting impression upon his mind, as he speaks of them as "most abundant" and as a terrible plague in that country. He also includes the common domestic forms, as he speaks of their furnishing food to chickens, and he also refers to their occurrence in America and "The Indies," but not by personal observation. The first separation of species from this aggregate was by Linnæus himself, in the following manner: Previous to the date of the tenth edition of the Systema Naturæ, Linnæus had published *Culex vulgaris* (Act. Ups., 31, 1736) and *Culex alpinus* (Flor. Lapp., 364, 1737); but as these antedate the beginning of zoological nomenclature, they are excluded from consideration. Moreover, Linnæus himself refers these species as synonyms of *pipiens* in the second edition of the Fauna Suecica, 1761. However, the descriptions reappear in the second edition of the Flora Lapponica, 1792, so the names may be considered to become valid on that date. Under ordinary conditions, the fact that the names first appeared as synonyms would render their subsequent use inadmissible; but in Linnæus' case we hold that an exception should be made, and the resurrection of the names allowed. Linnæus first proposed the names to represent valid species, and subsequently referred

them to the synonymy. He had clearly the right to again resurrect them. The only reason why he had apparently not that right is because the arbitrarily established beginning of zoological nomenclature, 1758, happened to intervene between the proposal of the names and their reference to the synonymy, which caused their first valid appearance as synonyms without accompanying description. We think that in this case the fact of their previous description may justly be considered.

Of these species, *Culex vulgaris* is apparently a *Simulium*, but *Culex alpinus* is a mosquito, and judging from its place of occurrence, an *Aedes* in the broader sense. This constituted a restriction of the original conception of *Culex*, by the elimination of the *Aedes* element, the forms abundant in Lapland, and leaves for our consideration only the common domestic species. We exclude also the exotic forms as not personally known to Linnæus. In this course we follow and confirm the conclusions of F. V. Theobald in his monograph of the mosquitoes of the world, who recognizes as *Culex pipiens* the common domestic mosquito of Europe.

Having arrived at this point, we next inquire what is the common domestic mosquito of Europe and does it occur in America? We find in America no less than five closely allied but distinct species living as larvæ in artificial accumulations of water and infesting dwellings as adults, which have been known to us collectively as "*Culex pipiens*, the house mosquito." It is probable that there are likewise in Europe several species mixed under the name *Culex pipiens*. Ficalbi (Bull. Soc. Ent. Ital., XXVIII, 289, 1896) takes as *Culex pipiens* the common house mosquito of Italy and describes it fully. He had, however, some doubt as to the correctness of his identification and suggests the alternative name *Culex haematophagus*. Now his description indicates that the house mosquito of Italy is not the same species as the one of northern Europe. This latter should clearly be recognized as the true *Culex pipiens*, while the other may bear the name *Culex haematophagus* Ficalbi. It appears to be especially distinguished by the lateral expansion of the abdominal bands on the last two segments, which does not occur in the true *Culex pipiens*, nor in *Culex fatigans*, which Theobald recognizes from the Mediterranean region. It suggests in this character the American *Culex similis* Theobald, an Antillean species resembling the *pipiens* group.

Theobald recognizes that *Culex pipiens* extends to North America, and he separates under the name *Culex fatigans* the more southerly distributed form, extending through the tropics

of both the new and old worlds. He does not, however, go into the matter in sufficient detail and his presentation is not convincing. We find in the male genitalia excellent characters of specific definition. It is true that Theobald describes these structures, but he has not illustrated with accuracy the basal parts that show the specific distinctions to the best advantage, having confined his attention chiefly to the appendages of the side pieces, which are practically alike in all the species.

The exact definition of *Culex pipiens*, therefore, still remains in some obscurity, and we propose now to resolve it. We would restrict *Culex pipiens* to that species with the basal clasps of the male genitalia as shown in our figure 4, plate II. We omit the side pieces in our figures as they are alike in all the species referred to. Our specimens are from Copenhagen, Denmark, (Dr. F. Meinert), St-Remy-la-Varenne, Maine et Loire, France (R. du Buysson), and Buda-Pesth, Hungary (Dr. C. Kertesz). We have bred specimens with similar genitalia in America, and are able to confirm the occurrence of the species here, no doubt as an importation.

Our common rain-barrel and house mosquitoes comprise the following, as defined by the male genitalia. The adults are generally separable on minor characters of coloration, which we shall describe fully elsewhere; but the colorational characters of these species are unstable and unreliable to a large extent; neither are the venational differences pointed out by Theobald of any value.

Culex pipiens Linnæus.

The harpes (Plate II, fig. 4, *a*) with a crown of spines as in all the species here discussed, but with rudimentary basal process (fig. 4, *b*). Harpagones divided into four plates, the upper one (fig. 4, *c*) rather narrow, long, exceeding the tip of the harpes, often bent nearly at right angles near the middle; second piece (fig. 4, *d*) a rather broad plate narrowed at the tip, with a rounded point; third piece a thin, often obscure plate, similar to the second piece but smaller and weaker; fourth piece (fig. 4, *f*) a broad, concave stout plate with a narrow rounded tip.

The species is especially characterized by having the harpagones divided into four plates, all the allied species having at most three. In the lowest forms here shown the harpones are divided into two separate plates, the outer one variously toothed, as in *proximus* (fig. 6), *salinarius* (fig. 7), *similis* fig. 8), and *lachrimans* (fig. 9); next they become divided into three plates, as in *restuans* (fig. 5), the second division still

toothed, although in a simpler manner; next there are three divisions, as in *quinquefasciatus* (fig. 1), *comitatus* (fig. 2), and *dipseticus* (fig. 3), but without teeth, and finally four in *pipiens*. Moreover the plates are of moderate length, none especially elongated or shortened; all have rounded pointed tips, without any teeth.

We are not sufficiently acquainted with the European fauna to say whether *Culex pipiens* develops local races or allied species in outlying countries adjoining its range, as *quinquefasciatus* and *similis*, hereinafter discussed, do; but such is probably the case. In America it does not, and this furnishes additional support for the opinion that the species has been introduced comparatively recently into America.

Culex quinquefasciatus Say.

This seems to be the earliest name for the widely distributed species called *Culex fatigans* by Theobald. We have prepared mounts of the genitalia of specimens from various parts of North and South America, Hawaii, the Philippines, and India, and find them constant. Theobald's distribution for this species is therefore evidently, in the main, correct. His citation of the North American localities which have been given under the name *pungens* do not show the exact distribution. In general, the "*pungens*" from northern localities are either *pipiens* or *restuans*, those from points south of Washington are *quinquefasciatus*, although the ranges of the species overlap to a certain extent. Just how much we do not know.

Specimens from the moist parts of North America, the southern Atlantic States to Mississippi Valley, and from eastern Mexico have genitalia of the normal form (fig. 1), like those of specimens from the West Indies, Guiana, and Brazil, as well as the Philippines and India. In the arid parts of the United States and the western coast of Mexico a modified form of genitalia is seen (fig. 3), representing a distinct race of the species. We are not acquainted with the line of separation of the forms, as our material is insufficient. Our specimens of the race, for which we propose the name *dipseticus*, are from Indio and Coachella, Cal. (in the Salton Sink), La Paz, Baja California, Acapulco and Salina Cruz, Mexico. On the coast of California the species has become modified to a specific degree, and we characterize it here under the name *comitatus* (fig. 2).

In Jamaica we have recognized this species under another name, *revocator*, because the palpi and the proboscis are more or less distinctly white-tipped. The genitalia are however, unmodified from the normal *quinquefasciatus* form, showing

that the species is but narrowly separated from *quinquefasciatus*, if, indeed, it is a true species at all.

In the genitalia of the typical form (Plate 1, fig. 1) the harpes have a small basal projection, larger than in *pipiens*, but still in a rudimentary condition. The harpagones are divided into three plates; the second (fig. 1, *c*) is a rather slender plate about as long as the harpes, with rounded pointed tip; first plate (fig. 1, *d*) broad, very long, with bluntly rounded tip; third plate (fig. 1, *f*) essentially as in *pipiens*.

The species is especially characterized by the great length of the central plate of the harpagones, which is not divided into two portions, as in *pipiens*.

In the genitalia of the race *dipseticus* (fig. 3), the first branch of the harpagones is not especially elongated (fig. 3, *c*). The other characters remain essentially the same, including the flat and pointed condition of the second plate (fig. 3, *d*).

Type—No. of the race *dipseticus*, 12229, U. S. Nat. Mus.

Culex comitatus, new species.

The genitalia (Plate 1, fig. 2) have the general characters of *quinquefasciatus*, race *dipseticus*, but differ especially in the character of the second plate of the harpagones (fig. 2, *d*), which is no longer a plate, but a tubular structure, with oblique open tip. The first plate of the harpagones is broad and rather long, with rounded tip, essentially as in *dipseticus*. The basal projection of the harpes is very short, but this cannot be especially emphasized, as its apparent condition varies greatly with the position of the mount.

Our specimens are from National City, San Diego, Sweetwater Junction, Laguna, Avalon, Los Angeles, San Pedro, San Luis Obispo, and Stanford University, California, all these places being on the coast, south of San Francisco, or on the adjacent islands.

It is somewhat curious that the species *Culex quinquefasciatus*, after ranging throughout the warmer parts of the world unchanged, should, in the arid parts of America, develop first a distinct race and finally a species. This must be of significance in regard to the original home of the species. Evidently *quinquefasciatus* is of tropical American origin, and has latterly spread, no doubt through the agency of commerce, to all the warmer regions of the world. In these places it has not been resident long enough to develop local races and species, as it has done in America. Conversely, it is probably that *Culex pipiens* is of European origin, and has only latterly spread to America through the agency of commerce.

Culex comitatus has the same habits as its congener, *quinquefasciatus*. The larvæ occur in all sorts of artificial accumulations of water, and the adults frequent houses and attack the inmates at night.

Type—No. 12201, U. S. Nat. Mus.

Culex restuans Theobald.

The genitalia (fig. 5) have the harpes with a distinct, though short basal projection (fig. 5, *b*). Harpagones divided into three plates; first plate (fig. 5, *c*) narrow, rather short, with rounded pointed tips; second plate broad, short, the tip broadly rounded, with small reversed teeth near the middle and a large, sharp, angular spine projecting outward from near the base; third plate (fig. 5, *f*) essentially as in *pipiens*, but shown foreshortened from side view in the figure.

The genitalia agree with those of *quinquefasciatus* in the number of divisions of the harpagones, but are readily distinguished by the peculiar form of the second division, with its large lateral tooth.

This species agrees with the foregoing ones in the vestiture of the mesonotum, which consists of the ordinary narrow, curved scales, which cover the surface rather completely. In all of the following the vestiture is of minute, hair-like scales, not covering the surface. The dentation of second division of the harpagones allies the species with the next group, typified by *Culex similis* Theobald. This species, therefore, stands by itself, allied to both the *pipiens* and *similis* groups, but more closely to the former.

Culex salinarius Coquillett.

The genitalia (Plate III, fig. 7) have the harpes with a long curved arm from the outer base (fig. 7, *b*). Harpagones divided into two plates; the outer one (fig. 7, *d*) a broad plate with a series of long teeth, which lie nearly in a plane, a large tooth above, partly separated, and an upcurved one below are separated by a row of smaller, more even teeth; inner plate concave, tapering to a rounded tip (fig. 7, *f*).

The species is especially characterized by the absence of the long lateral tooth of the outer plate of the harpagones, which is present in the two following species.

This species, together with the following ones, *similis* Theobald, *factor* Dyar and Knab, and *proximus* Dyar and Knab, form a distinct group, separate from the *pipiens* group. We should not discuss them in this connection, except that the similarity of coloration of the adults has led to confusion. The

vestiture of the mesonotum is distinctly different in this group from that of the foregoing *pipiens* group, and serves readily to distinguish them, without the criterion of the male genitalia.

Culex salinarius is a close ally of *similis* Theobald, and may be considered to take its place in North America. *Culex similis* inhabits the Antilles, while *salinarius* is found throughout the eastern part of North America, from Maine to Florida and westward to the Mississippi Valley. The two species are doubtless derived from a common American stock, but have been long separated, and have developed well-marked specific characters. *Culex factor* represents these species along the Pacific coast of Mexico and Central America.

Culex factor Dyar and Knab.

In this species, which we have not figured, the genitalia are of the type seen in *salinarius* and *similis*. The outer plate of the harpagones has above a large tooth, followed by three slender, well-separated ones below, the lower angle forming a large rounded angle, too large and broad to be described as a tooth; a long horn-like tooth arises in a different plane, and exceeds the other teeth in length. The lower plate of the harpagones is of the usual form. The harpes have the erect portion crowned with spines as usual, the basal projection very long and curved, as in our figure of *salinarius* (fig. 7, *b*).

The species is especially characterized by the fewness of the central teeth of the outer plate of the harpagones, and the long horn-like tooth, which exceeds the other teeth in length. The scales of the mesonotum are hair-like and sparse, but they are larger and coarser than those of *salinarius* and *similis*.

The species inhabits the west coast of Mexico and Central America, seeming especially at home in salt water. Most of our specimens were bred at Salina Cruz, Mexico, from salt pools behind the beach, and Mr. Jennings has obtained the species in the La Boca swamp in the Canal Zone, Panama, which is a low swamp on the Pacific side of the Isthmus. We have also specimens from Tehuantepec and Santa Lucrecia, Mexico, bred from fresh water, showing that the species is not confined to salt water. It is evidently much like our *salinarius*, which is most abundant near salt marshes, although generally distributed throughout the country, but perhaps this is more addicted to actually salt water than *salinarius* is.

Culex similis Theobald.

The genitalia (Plate III, fig. 8) have the harpagones and harpes essentially as in *salinarius*, but are especially distin-

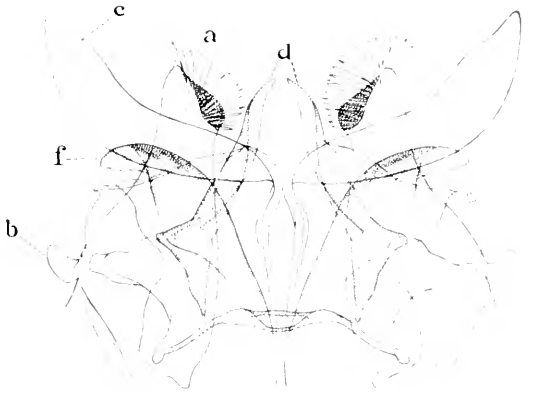
guished therefrom by the long lateral tooth of the harpagones (fig. 8, *e*), which arises in a different plane from the other teeth. This species ranges throughout the Antilles; we distinguish the form occurring upon the mainland in the Guianas under the name *lachrimans*. This is probably not more than a geographical race, yet the genitalia (fig. 9) apparently differ in the shape and proportions of the teeth of the harpagones. These apparently differ in different slides, owing to the position of the parts, and too much stress should not be laid upon these apparent differences. Nevertheless, there are no doubt some actual differences, and the race is a good one, as we note certain slight differences in the coloration of the adults.

The name *lachrimans* was proposed by us (Smiths. Misc. Colls., quart. iss., LII, 259, 1909) as a substitute for *Culex aikenii* Dyar and Knab (Proc. U. S. Nat. Mus., XXXV, 61, 1908, which was preoccupied by *Gnophodeomyia aikenii* Aiken (Brit. Guian. Med. Ann., 1906, 60, 1907), since *Gnophodeomyia* falls as a synonym of *Culex*. The name *Culex lachrimans* was founded upon adults and larvæ. It has since transpired that there was a mixture of material, the adults being *Culex quinquefasciatus*, the larvæ *Culex similis*. We have concluded to restrict the name *lachrimans* to the larvæ, and it will thus stand for the local race of *similis* inhabiting the Guianas.

Culex proximus, new species.

The genitalia (Plate II, fig. 6) have the basal projection of the harpes (fig. 6, *b*) long and curved. Harpagones divided into two plates, the upper one very irregularly shaped and toothed, a large blunt tooth at the bottom, long and curved, a similar but shorter one at the top with a group of smaller ones between; a long sharp tooth arising in a different plane from the others (fig. 6, *e*) and exceeding any of them in length; lower plate concave, broad, with narrowed rounded tip (fig. 6, *f*). The plate is shown fully extended in the figure and appears very broad in comparison with some of the other figures, for example *restuans* (fig. 5, *f*), but this difference is due to the position of the parts in the slide. The species is especially distinguished by the length of the lateral tooth of the harpagones (fig. 6, *e*), which exceeds all the other teeth in length.

Our specimens of this species come from the Canal Zone, Panama, and are in part those referred to by Mr. Busck as *Culex regulator* (Smiths. Misc. Colls., quart. iss., LII, 67, 1908). *Culex regulator* is a synonym of *Culex similis*, to which this species is closely allied, but we believe that the



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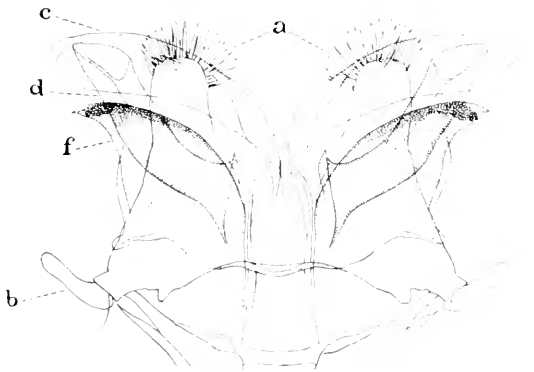

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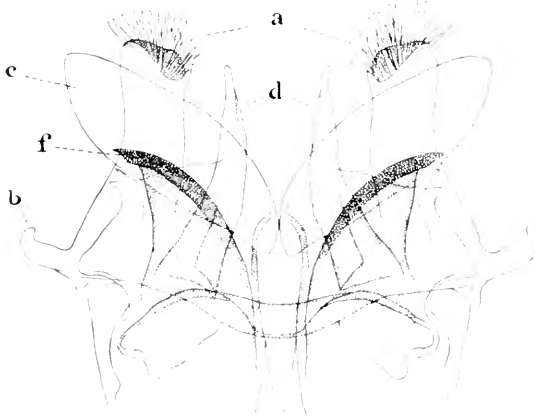
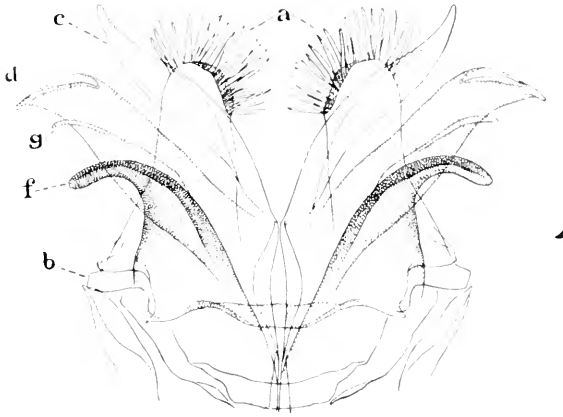


3

GENITALIA OF MOSQUITOES



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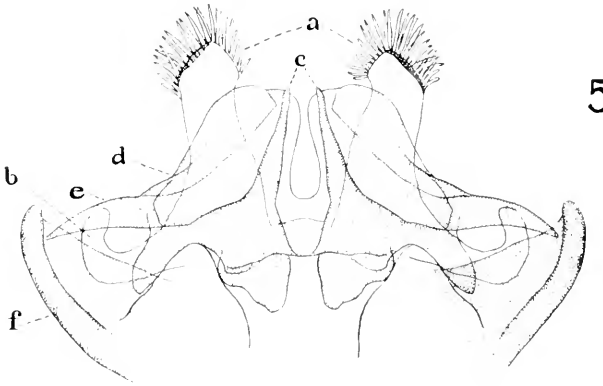

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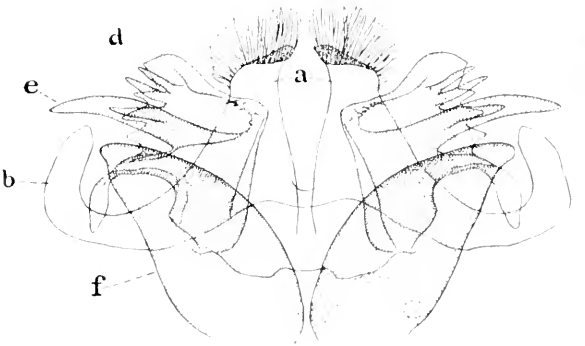

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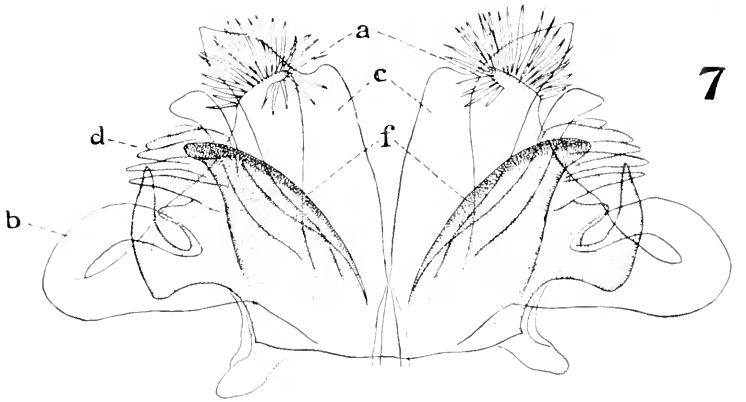
GENITALIA OF MOSQUITOES



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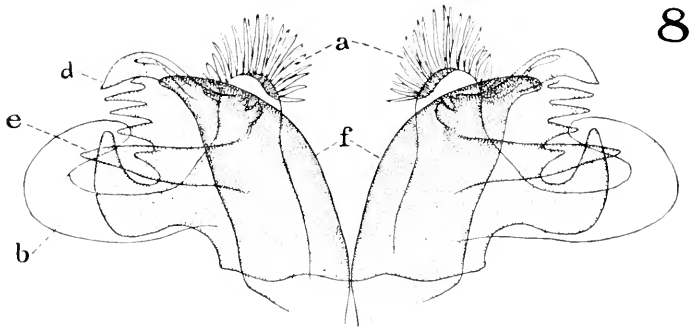

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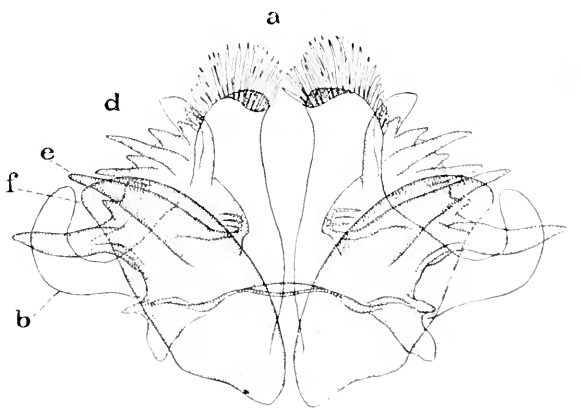

9

GENITALIA OF MOSQUITOES.

Central American form has departed widely enough from the common stock to deserve specific distinction. *Culex similis*, therefore, exists in the Antilles, gives rise to a race, *lachrimans*, in the Guianas, and develops a separate, but closely allied species, *proximus*, in Central America. This is a parallel development to that of *Culex quinquefasciatus*, referred to above, with its race in the arid regions of North America, developing a separate species upon the Pacific coast.

We have before us, besides the forgoing, several other species of the *salinarius* group, but of which we either do not possess males or they are so obviously distinct in markings that we do not consider it necessary to go further with them in this connection.

EXPLANATION OF PLATES I TO III.

Figures of the basal parts (harpes and harpagones) of the male genitalia of certain species of *Culex*.

1. *Culex quinquefasciatus* Say, Iloilo, P. I. (G. W. McCoy).
2. *Culex comitatus* Dyar and Knab, Los Angeles, Cal. (Dyar and Caudell).
3. *Culex quinquefasciatus* variety *dipseticus* Dyar and Knab, Salina Cruz, Mex. (A. Dugès).
4. *Culex pipiens* Linnæus, Urbana, Ill. (F. Knab).
5. *Culex restuans* Theobald, West Springfield, Mass. (F. Knab).
6. *Culex proximus* Dyar and Knab, Taboga I., Panama (A. H. Jennings).
7. *Culex salinarius* Coquillett, Chesapeake Beach, Md. (H. G. Dyar).
8. *Culex similis* Theobald, Santo Domingo, W. I. (A. Busck).
9. *Culex similis* variety *lachrimans* Dyar and Knab, Georgetown, British Guiana (E. D. Rowland).

DESCRIPTION OF A NEW MOSQUITO FROM CUBA.

[Diptera, Culicidæ.]

BY HARRISON G. DYAR and FREDERICK KNAB.

Culex ignobilis, new species.

Proboscis and legs without pale rings; proboscis swollen toward the tip; abdomen without dorsal pale bands, dull blackish, lateral spots yellowish white, basally situated on the segments; venter pale-scaled, with indistinct dark bands toward the tip. Occiput with pale scales and erect black forked ones. Scales of the wings broad, many obliquely subtruncate.

Four specimens, San Antonio de los Baños, Cuba (J. H. Pazos).

Type—No. 12239, U. S. Nat. Mus.

A BRIEF NOTE ON CHALCODERMUS COLLARIS HORN.

[Coleoptera, Curculionidæ.]

By Jas. A. Hyslop.

In the summer of 1907, while engaged in collecting parasited Rhyncophora for the Cotton-Boll Weevil Investigations, I collected a large number of seed pods of *Cassia chamæchrista* at Marr's Station, Md., infested with a then unknown curculionid larva. Part of this material was preserved and sent to Mr. Pierce for discription, the remainder was placed in rearing jars on the day of collection, September 17, and observed from day to day until October 1, when I was called away from this city. But no pupæ were found. On leaving Washington this material was handed over to Dr. F. H. Chittenden, of the Bureau of Entomology, who sent me the following note some time later:

Chalcodermus collaris issued from the cassia seed pods you left with me. They started to emerge October 4 and continued to appear until October 8.

Though this observation does not determine the length of the pupal stage of this insect, I give it as a guide to future observation.

THE COPULATING AND FEEDING HABITS OF IDIARTHRON ATRISPINUS STAL.

[Orthoptera, Locustidæ.]

By A. N. Caudell.

From a translation of a letter from A. Tonduz of San José, Costa Rica, which was kindly furnished by Prof. H. Pittier, I quote the following paragraph:

One day I observed two of my crickets (*Idiarthron atrispinus*) copulating and after separating the female had two white gobular masses attached to her posterior; she then bent down so as to tear this white mass with her mandibles. I observed the same act with another subject and upon another occasion.

The above indicates that the ejection of the sperm mass by the male in the form of a bilobate seminal sac (the two masses mentioned in the above extract being very surely the two lobes of a single sac) is not confined to *Anabrus* and *Peranabrus* as recorded by Gillette,* and Snodgrass,† and long before by

*Ent. News, vol. xv, p. 321-324, pl. xix (1904).

†Journ. N. Y. Ent. Soc., vol. xiii, p. 79-80 (1905).

Feilner.* When more is known of the mating habits of Orthoptera this will very likely be found to be quite common, at least in the Locustidæ. It has now been noted in *Anabrus, Peranabrus, Scudderia,*† and *Idiathron,* and I have seen much a sac in a cabinet specimen of a species of *Orophus.*

Idiarthron atrispinus is an important enemy to the coffee plant according to the letter mentioned above. Last year was the first time the writer noted damage done by this insect. Its ravages probably commenced in late August or early September. During the day the insects hide in the dry or damp sheaths of the banana plant and probably in other lurking places of like nature. In the Museum Gardens at San José the two or three coffee trees had all their leaves pierced and an immense number of their berries peeled and sometimes entirely hollowed out by the bites of the insects. The crickets hide here during the day in the petiole grooves of a large perfoliate-leaved tree or under old manure sacks spread on the ground, but in coffee plantations their chief refuge is probably the banana. It is very hard, in fact almost impossible, to discover one of the insects in a coffee tree during the day, which fact delayed for some time the discovery of the real culprit. The nature of the injury indicated some strong-jawed depredator, and as this insect was very plentiful in the neighborhood it was suspected. Specimens placed in a jar with intact leaves and berries of the coffee tree established their guilt beyond question by producing exactly the same injuries as found on trees in the open.

*Rept. Smiths. Inst., 1864, p. 429-430 (1865).

†Ent. News, vol. XIX, p. 45 (1908).

DESCRIPTIONS OF NEW HYMENOPTERA.

By H. L. Viereck.

Superfamily ICHNEUMONOIDEA.

Family BRACONIDÆ.

Proteropoides, new genus.

Near *Proterops.* First abscissa of radius as long as the second, which latter is a trifle longer than the second transverse cubitus, radius of hind wings not broken, uniformly thickened throughout and nearly attaining apex of wing, maxillary palpi 4-jointed, anterior margin of anterior ocellus distinctly above an imaginary line drawn tangent to uppermost edge of eyes, posterior ocelli nearer to each other than to the nearest eye margin, but a little farther from each other than from the anterior ocellus.

Type—Proteropoides hertzogi, new species.

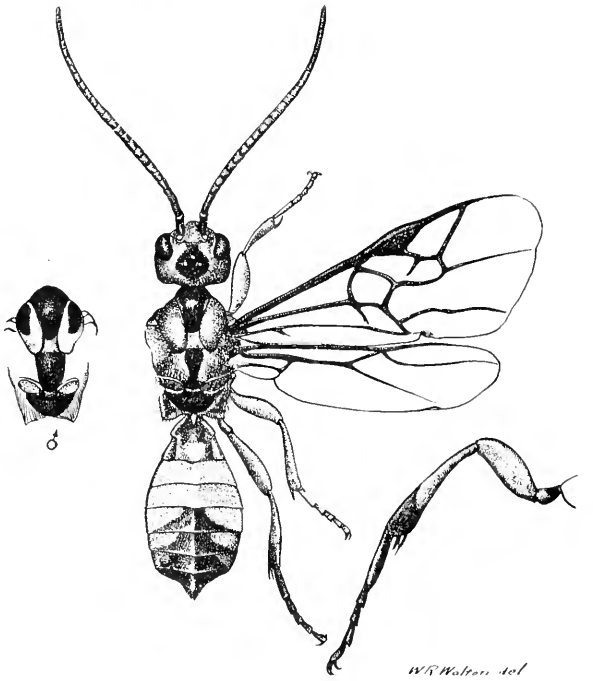

Fig. 1.—*Proteropoides hertzogi* Viereck.

Female 4 mm. long; tegument shining, seemingly sculptureless; antennæ more than 22-jointed, first joint of flagel about as long as the

two following combined, head orange color, with a black stain between insertion of antennæ and occiput, eyes black, mandibles with dark tips antennæ brown to fuscous, the brown joints tipped with fuscous; thorax mostly orange, the middle lobe of mesonotum, mesopleura with the former entirely and the latter mostly black, scutel, postscutel and metathorax partly blackish, wings fuscous, stigma and veins blackish, legs almost entirely orange yellowish and apical tarsal joint of front legs, apical half of middle tarsi, base of hind coxæ and trochanters, apex of hind tibiæ, hind tarsi beyond basal half of first tarsal joint, more or less fuscous; abdomen with the first dorsal segment joint of front legs, apical half of middle tarsi, base of hind coxæ and trichanters, apex of hind tibiæ, hind tarsi beyond basal half of first tarsal joint, more or less fuscous; abdomen with the first dorsal segment blocked off into three parts by an impressed line or groove on each side of the middle half along the posterior margin, these pieces becoming narrowed anteriorly, the laterals attaining a triangular shape, central lobe of first dorsal segment partly blackish, apical one-half of dorsum of abdomen with a blackish median longitudinal stain, rest of abdomen orange color, exserted portion of ovipositor scarcely as long as the first joint of hindmost tarsi.

Male somewhat shorter than female; nearly all of dorsum of thorax black.

Type female and male, collection State of Pennsylvania, Capitol, Harrisburg, Pa.

Type locality, Harrisburg, Pa.

Harrisburg, Pa., July 27, August 2 (D. K. McMillan); June 14, 1908 (P. H. Hertzog).

Chelonus carpocapsæ, new species.

This species is very like *C. fissus*, from which species as well as all other species of *Chelonus* it can readily be separated by the structure of the metathorax, which along the outer and upper edge of the posterior face is produced into four nearly equidistant prolongations that are nipple-shaped in outline, the productions nearest the middle line are farther from each other than from the outermost productions. This structure of the metathorax calls to mind the structure of the apical margin of the abdomen in *Chrysis (Tetrachrysis) nitidula*, though the productions are by no means thinned out or pointed in this case as in the foregoing species; scape and basal third of flagel brownish, basal half of posterior tibiæ mostly brownish, the apical half almost black.

Type—No. 12258, U. S. National Museum, Washington D. C.

Type locality, Douglas, Mich. Seven specimens, August 3 to 6, 1908. On authority of Mr. Braucher, working under the direction of Mr. Quaintance, the host of this species is the codling moth or *Carpocapsa pomonella*.

Superfamily SPHECOIDEA.

Family CRABRONIDÆ.

Crabro (Hoplocrabro) spinibuccus, new species.

Cheek approximately as in accompanying drawing (fig. 2, *a*), female 7 mm. Dullish, sericeous, and finely punctured; enclosure of metathorax covered with fine radiating striæ becoming coarse at base and apex, on each side of the median groove of the metonotum the latter region is nearly sculptureless. Pygidial area flat, sparsely coarsely punctured.

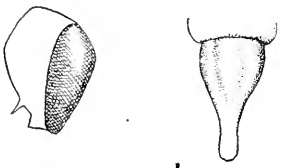

FIG. 2.

Mostly black in color; clypeus mostly, scape entirely, tubercles, pronotum, postscutellum, and more or less of the outer side of tibiæ and the coxæ and trochanters yellow, rest of antennæ and legs, the mandibles, and abdomen more or less brown; wings brownish transparent, nervures and stigma dark brown, tegulæ testaceous.

Type in collection of the American Entomological Society, Philadelphia, Pa.

Type locality, Havilah, Cal.

Crabro (Cuphopterus) foveolineatus, new species.

Differs from the known species of this subgenus in having the foveæ of the front narrow or linear.

Females 9 mm., finely sculptured all over and in most places subtle, satiny, with exceedingly fine striæ that are close together and interspersed with minute but distinct punctures that are very sparse; frontal foveæ more than 5 times as long as wide, practically parallel-sided and extending along the upper one-third of the inner eye margin; metathorax with a deep impression posteriorly, the enclosure longitudinally finely closely striate, subtle, satiny, the rest of the metathorax sculptured much the same, the striæ transverse to oblique; pygidum funnel-shape in outline (fig. 1, *b*), with the narrow portion alone margined, the remainder rounded, seemingly impunctate throughout, the broad portion longitudinally concave; black, scape, pedicel, anterior and middle legs, pronotum, scutel, postscutel, the posterior trochanters, and the upper division of the mesopleura entirely yellow; clypeus, mandibles, posterior tibiæ and abdomen mostly yellow, partly brown; flagel, tips

of mandibles, posterior coxæ, femora and tarsi, and apical abdominal segment entirely brown; cheeks with a yellow mark adjoining mandibles, wings brownish transparent; veins and stigma dark brown.

Type in American Entomological Society, Philadelphia, Pa. Type locality—Shasta County, Cal.

Superfamily VESPOIDEA.

Family TIPHIIDÆ.

Paratiphia algonguina, new species. The Algonquin Paratiphia.

This is apparently the only species of *Paratiphia* in the eastern part of the United States. According to present knowledge it seems to be confined to the State of New Jersey. This form has been erroneously determined as *P. albilabris* Spinola, which latter has hyaline wings and hails from California. From *P. clypeata* Smith, formerly *Tiphia*, *P. varipunctata* Cameron, *P. fuscipennis* Cam., *P. robusta* Cam. and *P. fuscinerva* Cam., this species is readily separated by the nonconcolorous wings. From *P. duodecemmaculata* Cam. by the immaculate abdomen.

Male 8 mm. long. Nearly all of the tegument shining black, punctate, with the punctures ranging from adjoining to at least as far as three puncture-widths apart, bedecked with silvery pubescence that nowhere is so thick as to obscure the tegument and is made up of hairs the longest of which are shorter than the 13th joint of the antennæ, the hairs also much thinner than the thinnest vein in the wings.

Head a little wider than long; eyes diverging above; converging below; malar space practically wanting; if straight lines were drawn connecting the centers of the ocelli an obtuse-angled triangle would be formed, shortest distance between the posterior ocelli apparently equal to the shortest distance between the lateral ocellus and the nearest eye margin; clypeus about twice as wide as long, yellow, with rather distinct punctures from one to several puncture-widths apart, its anterior margin seemingly depressed somewhat arcuately, convexly rounded; mandibles falcate, rounded off at tips, with a rounded angle or vestigial tooth on the inner margin near the apex, mostly yellow above, brownish at apex; antennæ nearly of the same diameter throughout, the pedicel distinctly narrower than the scape or the first joint of the flagel, scape rather oviform, equal in length to the length of the pedicel and the first and second joints of the flagel combined, first and second joints of flagel subequal in length, wider than long, the succeeding joints longer than wide but only slightly so or not much longer than wide, with the exception of the apical joint, which is easily twice longer than wide. Metathorax with a superior and posterior aspect in addition to its sides,

the posterior aspect rugosopunctate or nearly and separated from the superior aspect by a convex ridge which is not sharp and with a low rather angular prominence on each lateral edge in the middle, the superior aspect rather irregularly coarsely sculptured with a rather distinct median, longitudinal, rounded off, low carina, sides of metathorax with transverse striæ, each stria being nearly as coarse as the longitudinal carina on the superior aspect; wings hyaline, excepting the stigma and veins, which are dark brown, and a stain occupying the greater portion of the apical half of the wing, which is brown, hirsute, with shorter hairs than on the body; the hairs are also of a different kind and dark.

Abdomen with a distinct anterior aspect to the first dorsal segment, separated from the dorsal aspect by a transverse, curved carina; segments along the apical margin with a fringe made up of apparently single and rather appressed hairs; pygidium bounded on each side and apically by a rather distinct carina.

Type, female and male—No. 12252 U. S. National Museum, Washington, D. C.

Type locality, Lakehurst, N. J.

The type female and male and three paratopotypes were submitted to the writer for determination by Prof. John B. Smith. Another specimen, a paratype, was collected by Mr. V. A. E. Daecke at Brown's Mills Junction July 21, 1907.

Female 6.5 mm. Differs from the description of the male as follows:

Longest hairs seemingly shorter than the twelfth joint of the antennæ.

Head, shortest distance between posterior ocelli somewhat shorter than the distance between lateral ocellus and nearest eye margin, clypeus black; mandibles with hardly a rounded angle on the inner edge, castaneous throughout, pedical as wide and about as long as the first joint of the flagel scape easily twice as long as its greatest width or about equal to the combined length of the pedicel and first and second joints of the flagel, most of the joints of the flagel subequal and wider than long.

Superior aspect of metathorax with a triangular enclosure formed by two oblique lateral lines, the enclosure bisected by a longitudinal raised line; wings with the apical fourth and greater part of the third fourth brownish, the brownish portion streaked with faint hyaline lines.

At least the apical half of pygidium with adjoining punctures, excepting the pygidium the apical dorsal segment of the abdomen is rugose or reticulate rugose.

Female paratype from Lahaway, N. J., August 1, 8 mm. long, with the second transverse cubitus wanting in the left wing and represented in the right wing by an abscissa nearly one-third as long as the hypothetical second transverse cubitus.

The specimens from the type locality were collected on July 7, and paratype Ocean County, N. J. (J. B. Smith); paratypes from Clementon, N. J., June 25, 1899 (collected by the writer and in the collections of the New Jersey Agricultural Experiment Station and the Academy of Natural Sciences, Philadelphia, and June 24, 1906 (H. S. Harbeck) show variation in size and in the sculpture of the metanotum, there being on the latter longitudinal and lateral carinæ in addition to the median longitudinal carinæ, which are about as stout as the last mentioned carinæ.

Two of the paratopotypes are somewhat smaller than the type; the paratype from Brown's Mills Junction has the carina of metanotum and the metapleural carinæ poorly defined.

Superfamily APOIDEA.

BRACHYCEPHALAPIS, new subgenus.

Type—*B. californica* new species.

Differs from *Melitta americana* Sm. in that the head is wider than long, whereas in the above species it is as wide as long. The relation of the posterior angle of the mandible is as in *Melitta americana* Sm. or the same as in Robertson's *Anthophoroidea*, but in other major characteristics it is as in the same author's *Andrenoidea*.

Melitta (Brachycephalapis) californica, new species.

Female 14 mm. Third abscissa of the radius about two-thirds as long as the second transverse cubitus, the first abscissa of the radius as long as or a little longer than the radial side of the stigma, the transverse median vein practically interstitial with the basal vein, the second abscissa of the radius a little longer than the third abscissa of the radius Black pubescence or hairs on the vertex and along the inner eye margin, pale yellowish hairs on the inner side of the posterior metatarsi, the dark hairs of the anal fimbria brown, otherwise essentially as in *M. americana* Sm.

Type—California Academy of Sciences, San Francisco, Cal.

Type locality, Santa Margarita Island, Lower California.

One paratype, No. 12256 U. S. National Museum, with almost exactly the same characteristics as the type, from Magdalena Bay, Lower California. Both taken in March.

COQUILLETTAPIS, new genus.

Type—*C. melittoides* new species.

Related to *Entechnia*, from which it differs in the relation of the posterior angle of the mandibles to the eye, which is

essentially as in Robertson's *Andrenoidea* in the structure of the anterior femora and in the *Andrena* habitus.

Coquillettapis melittoides, new species.

Female 12 mm. long.

Head with the occipito-clypeal distance greater than the ocular distance, first joint of flagel on its upper side seemingly slightly longer than the next two joints combined on their upper sides. The second and following joints of the flagel excepting the apical joint subequal and wider than long, the apical joint approximately one and one-half times as long as wide at base, ocelli forming a slightly arcuate row, the posterior ones about as far from each other as from the nearest eye margin, cheeks rounded off and at their widest part slightly wider than the eye as seen from the side, malar space practically wanting, mandibles simple, except for a slight indication of a tooth on the inner margin near the apex, tegument of the head mostly smooth, polished and impunctate, a few scattered punctures on the cheeks and along the eye margins on the front; clypeus and labrum appear to be uniformly uneven and shiny; thorax above shining, and sparsely punctured, anterior femora at base beneath produced into a hairy falcate process which is directed downward backward and inward; this process from base to apex is approximately half as long as the femur, scopa of posterior tibiæ and metatarsi plumose on account of hairs that are branched and most of which are longer than the greatest width of the joint to which they are attached; abdomen shining above and beneath, indistinctly sculptured, being sparsely punctured and somewhat roughened above, more closely punctured beneath.

Tegument almost entirely black except where relieved by some brownish, as in the mouth parts, tegulæ and tarsi; pubescence black except on vertex, dorsum of thorax and first dorsal abdominal segment, where it is ocherous.

Type—No. 12253, U. S. National Museum, Washington, D. C.

Type locality, Los Angeles County, Cal. One specimen collected by Mr. D. W. Coquillett.

PANURGOMIA, new genus.

On account of its two submarginal cells, etc., this might be relegated to a relationship with *Rhophitoides* Schenck. It is however more likely, judging from its habitus, that this genus is nearer *Nomia* and really an Andrenid with only two submarginal cells, the first nearly one and a half times as long as the second on the cubital vein. In the relationship between the posterior angle of the mandible to the posterior eye margin

and in the glossa it is the same as Robertson's *Anthophoroidea,* in other characters like that of his *Andrenoidea.*

Panurgomia fuchsi, new species.

Female 10 mm. long.

Head with the ocular distance slightly greater than the occipito-clypeal distance, cheeks rounded, somewhat trapezoidal in outline, as viewed from the side, malar space practically wanting, ocelli forming a slightly arcuate row, the lateral ocelli seemingly a little nearer to each other than to the nearest eye margin; the third joint of the antennæ somewhat shorter than the next two joints combined; beyond the first joint of the flagel, the joints are subequal in length, ranging from slightly wider than long to slightly longer than wide, except the apical joint, which is about one and one-half times as long as the joint preceding the same; mandibles simple, except for a rounded tooth on the inner margin about halfway between the middle and the apex of the mandible; clypeus smooth and shining, with a few scattered punctures; labrum round and shining, front and cheeks mostly shining and sparsely punctured. Thorax with the dorsum shining and covered with short felt-like hair, excepting the postscutel, which is dull and provided with long hairs, and the metanotum, which is mostly dull and bare, being finely granular; posterior tibia and third metatarsus provided with a scopa composed of stiff, simple hairs, most of which are distinctly longer than the widest part of the posterior tibia. Abdomen very closely punctured, or rather indistinctly so, and shining, the dorsal segments indistinctly suppressed, the second dorsal segment being depressed one-fourth the distance from the apex, or less than one-fourth; pygidium dull, indistinctly sculptured and spatulate in outline. Tegument mostly black, greater part of flagel brown, most of the mandibles and mouth parts castaneous; tegulæ, costa, and stigma testaceous, rest of the veins translucent brownish; tarsi, and stigma testaceous, rest of the veins translucent brownish; tarsi more or less dark brown, the apex of the first, second, and third dorsal-abdominal segments yellowish, preceded by a black band which in turn is preceded by a reddish-brown band; the depressed portion of the fourth dorsal segment and the apical half of the fifth dorsal segment more or less pale. Pubescence ochreous, sort of brownish on the dorsulum.

Type locality, Prescott, Ariz.

One specimen, collected by Mr. Fuchs.

DOLICHOCHILE, new genus.

Type—Dolichochile melittoides new species.

Female 10 mm. long, head somewhat wider than long, that is, with the ocular distance greater than the occipito-clypeal distance. Superficially exactly like *Melitta americana* in color and sculpture, except that the

disc of the dorsulum and scutel are less punctured and more polished and that the abdomen above is polished and less punctured as well as less distinctly punctured. First joint of flagel distinctly longer than either the second or third joints, but shorter than these two combined and just about as long as the fourth. The fourth and following joints almost equal in length, excepting the apical joint, the longest side of which is distinctly though not much longer than the corresponding side of the joint preceding it. The apical joint is obliquely truncate at tip. The truncature smooth and polished; mandibles so long that the tip of a completely flexed mandible would extend almost to an imaginary vertical line drawn tangent to the outermost edge of the eye; the inner margin provided with a rounded tooth near the middle, beyond which there is an emargination and then an arcuate edge to the tip; labrum polished and rounded; malar space present and distinct, rather quadrate, and as long from eye to mandible as is the first joint of the flagel; ocelli in an arcuate row, the lateral ones a little nearer to each other than to the nearest eye margin; first recurrent vein received by the second submarginal cell a little before the middle. Otherwise virtually as in *Melitta americana.*

Type—No. 12254 in the U. S. National Museum, Washington, D. C.

Type locality, Clementon, N. J. One specimen collected June 24, 1906, by G. M. Greene.

Melitta americaniformis, new species.

In size and sculpture like the species described above. In color and structure like *Melitta americana.*

Type—No. 12255, U. S. National Museum, Washington, D. C.

Type locality, Jamesburg, N. J. One female specimen collected July 4 in a cranberry bog by Professor John B. Smith.

BIRKMANIA, new genus.

Related to *Macrotera,* from which it differs in the first joint of the labial palpus, being just about as long as the three following joints united and in the claws being toothed near middle, not cleft.

Type—Birkmania andrenoides new species.

Birkmania andrenoides, new species.

Female 8 mm.

Ocular distance about one and one-half times as great as the occipito-clypeal distance; cheeks rounded and about as wide as the eyes as seen from the side; malar space wanting; mandibles simple, the inner edge undulate; clypeus transverse, nearly twice as wide as long, shining somewhat more than the rest of the head and provided with distinct punctures that are from two to five or more puncture widths apart; the supraclypeal area punctured like the clypeus; rest of the head punctured,

but not so distinctly nor so sparsely as the clypeus; frontal fovea in the form of a cuneate impression nearly as long as the scape and parallel to the margin of the eye, from which it is separated by a space as wide as the fovea itself; first joint of flagel nearly as long as the next two joints combined; the fourth to the eleventh joints of the antennæ subequal in length; the apical joint about as long as the two preceding; thorax shining and punctured, excepting the metathorax, which has a triangular rugulose area on the metanotum and is otherwise finely shagreened; hairs of tibial scopa simple, sparse, and about as long as the tibia is wide on its flat side; transverse-median vein and basal vein interstitial, as are the first transverse cubitus and the first recurrent veins; abdomen shining with a fine ripple-like sculpture and with punctures not so distinct as on the clypeus, but just about as sparse; the apical margin of the dorsal segments obscurely testaceous, the second dorsal segment depressed about one-third the distance from the apex to the base; tegument mostly black, the mandibles partly castaneous, the flagel translucent brown beneath; tarsi and claws more or less dark brown; pubescence ochreous, excepting on the face cheeks and pleura, where it is rather whitish.

Type—No. 12257, U. S. National Museum, Washington, D. C.

Type locality, Fedor, Lee County, Tex. One specimen collected by the Rev. Birkman, April 9.

NEW CHALCIDOIDEA.

[Hymenoptera.]

By J. C. Crawford.

Leucospis robertsoni, new species.

Female: Length 9 mm., ovipositor reaching beyond apex of first abdominal segment; head and abdomen metallic, thorax black, with metallic tints; pubescence yellowish; the following parts reddish: scape and basal joints of antennæ, prothorax except a black spot on each side, postscutellum and metathorax, metapleuræ, mesopleuræ behind, first abdominal segment and base of second, front and middle legs except coxæ, hind tibiæ and tarsi, margins of hind femora and apices of hind coxæ: a narrow line on rear of prothorax and narrow lines on sides and rear of mesonotum more yellowish; face below antennæ brownish, finely irregularly vertically rugose, with scattered large punctures on sides of face; above antennæ strongly metalllic, rugoso-punctate; first joint of flagellum shorter than pedicel, the second about twice as long as the first; cheeks from eyes to base of mandibles longer than second joint of flagellum; eyes slightly emarginate within; prothorax without any sign of a transverse keel; mesothorax strongly coarsely rugoso-punctate; postscutellum with a semicircular raised area strongly margined, the margin reflexed and projecting;

metathorax with a high median longitudinal keel, angulate at apex; from slightly behind the middle of the keel and one on each side run forward to base of metathorax a pair of diverging keels; metathorax with many stout yellow hairs; wings deeply infuscated; hind femora hardly twice as long as broad, with a large tooth below and from this to apex with saw-like teeth; hind coxæ punctured all over; abdomen closely coarsely punctured, in places golden green.

Male: Very similar to the female, but the median keel on metathorax rounded behind instead of angulated. Length 9 mm.

Southern Florida; Robertson, 12821, 12891, 12892; 1 female, 2 males.

Type—No. 12581, U. S. National Museum.

LARIOPHAGUS, new genus.

Type—L. texanus Crawford.

Dorsum flattened; antennæ 13-jointed, slightly clavate, with two ring joints, pedical longer than first joint of funicle; the mandibles distinctly four-toothed; the antennæ inserted on the middle of the face; the occipital foraminal depression immarginate; the mesonotum transverse; the parapsidal furrows only very slightly indicated anteriorly; the metathorax with a very short neck, with a median longitudinal carina, and a transverse one near base; the marginal vein distinctly longer than the postmarginal, pastmarginal distinctly longer than the stigmal vein.

In Doctor Ashmead's classification of the Chalcid flies, this genus will run in the tribe Pteromalini to no. 26, where it differs from the two genera given by having the lateral folds of the metathorax complete and from *Diglochis* in having the abdomen elongate. The other genus given under this alternate, namely, *Hypopteromalus*, does not, according to Doctor Ashmead's own classification, belong to this tribe, since it has the abdomen distinctly petiolate and not sessile.

Lariophagus texanus, new species.

Female: Length about 2 mm.; head and thorax black, sometimes with a slight metallic tinge, especially on face beneath, the abodmen having various shades of green, coppery and purple; insect very robust; head slightly broader than the thorax; antennæ black, the scape testaceous; head and thorax with fine thimble-like punctures, those above insertion of antennæ coarser; metathorax finely reticulate, black, with a green tinge; the transverse carinæ running laterally to the apices of the lateral folds; metathoracic spiracles, small, oval; wings hyaline; legs dark; apices of femora, tibiæ, and tarsi reddish testaceous; abdomen smooth and shiny; the apical segments very finely reticulate.

Male: Similar in size and structure to the female.

Type locality: Victoria, Tex. Parasitic on *Laria (Bruchus) prosopis*.

Also, Victoria, Tex., bred from stems of *Leucosyris spinosus*.

Type—No. 12583, U. S. National Museum.

PROCEEDINGS

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APRIL-JUNE, 1909.

MEETINGS OF MARCH 11, 1909, TO APRIL 8, 1909.

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1909.

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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON.

VOL. XI APRIL–JUNE, 1909 NO. 2

MEETING OF MARCH 11, 1909.

The 229th meeting of the Society was entertained by Mr. Heidemann, on March 11, 1909, at the Saengerbund Hall, 314 C street N.W., with the following present: Messrs. Banks, Barber, Burgess, Burke, Caudell, Clemons, Crawford, Dyar, Ely, Gahan, Gill, Hall, Hammar, Heidemann, Hopkins, Howard, Hyslop, Jenne, Knab, Kraus, Lowe, Patten, Phillips, Popenoe, Quaintance, Reeves, Sasscer, Schwarz, Ulke, Vickery, Webb, and Webster, members, and C. V. Burke and Wall, visitors.

The minutes of the 228th meeting were read and approved.

Mr. R. W. Braucher was elected a corresponding member.

The President announced the Publication Committee to consist of Messrs. Dyar, Banks, and Crawford.

Messrs. Schwarz and Hopkins were elected a committee to draw up resolutions of appreciation of the work of Mr. Van Horn.

—In the absence of the author Mr. Burke read the following paper:

NOTES ON SOME OF THE EUCNEMIDAE OF THE EASTERN STATES.

[Coleoptera, Eucnemidæ.]

(Plate IV.)

By R. W. Van Horn.

The object of this paper is to record some observations on the habits and life history of a family of Coleoptera that heretofore has been somewhat neglected by American entomologists.

The writer wishes to acknowledge himself indebted to Mr. E. A. Schwarz for the identification of some of the adult beetles, and to Dr. A. D. Hopkins for suggestions in preparing this paper for publication. The observations were made by the writer whilst employed in the Branch of Forest Insect Investigations, Bureau of Entomology.

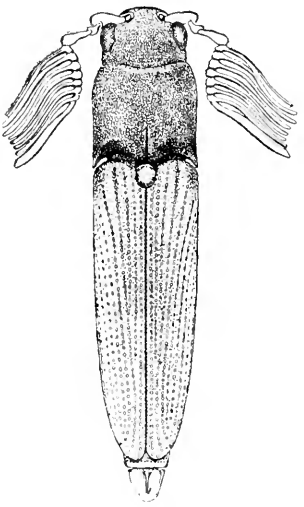


Fig. 3.—Adult male of *Tharops ruficornis* Say.

One of the parasites of these beetles is of some interest, as it proves to be not only a new species, but also appears to represent a new family of the Hymenoptera.

Species of the family Eucnemidæ, especially in their larval state, are not only of scientific interest on account of their appearance, but several may prove of some economic interest as well. Their occurrence in the East, with the exception of two or three species, may be considered rare, though the difficulty of collecting specimens may account in some measure for the obscurity in which their life history has been shrouded. Unless the collector is somewhat familiar with their mines and the condition and identity of the host plants, the insects will generally be overlooked. It is not possible at the present time to take up the family in specific order, so that the object is more to give a general description of the character of the galleries, the appearance and habits of some of the most characteristic species, the host plants, and the conditions under which the insects live and undergo their transformations.

Observations made thus far indicate that among the species which infest deciduous trees there are two distinct groups, viz, those that bore in the hard, solid wood, and others which live in the softer decaying wood. Besides these there are a small number of species, comprising about four genera, that have been collected from under the bark of dying and dead coniferous trees. Mr. H. E. Burke, of the Bureau of Entomology, collected a number of adult specimens of *Melasis rufipennis* in *Abies concolor*. He found that they had bored through the bark and to a distance of 2 or 3 inches into the solid wood of a dying tree. Whether this was for the purpose of ovipositing or merely to obtain food it is impossible to say.

Deltometopus has been found beneath the bark of *Pinus virginiana*, and *Epiphanis* and *Analastes* in the adult form under dead bark of different coniferous trees. There is no record of the larvæ of any of these species having been collected, and no observations have been made on their life history.

FIG. 4.—Work of *Tharops ruficornis* larvæ in *Cornus florida*.

Of the eastern species which live in sound, hard wood, there are only about three known genera, two of which attack practically all hard, fine-grained wood, preferably the maple. The most common of these is *Melasis pectinicornis*. While these species normally infest the sound wood, they are sometimes found in slightly decaying wood, as under damp conditions the wood will often begin to decay before the brood has emerged. Species of the genera *Tharops* and *Melasis* make transverse galleries extending directly across the grain of the wood in more or less of a semicircle, though seldom, if ever, extending entirely around. Such a gallery once recognized could not be mistaken for any other.

A specimen of the work of *Tharops ruficornis* in *Cornus florida*, collected at Virginia Beach, Va. (fig. 4), showed that the larvæ had completely severed the trunk almost as neatly as if done by a saw, though not as regularly, as it required nearly a

dozen larvæ to accomplish the feat. This presents an economic side, as this beetle, when numerous, as it sometimes is in hard-wood forests along the coast and along the border of streams, is quite capable of doing considerable damage to timber. It makes a broad gallery, extending deep into the wood, yet so shallow as often to escape notice unless the beetle has emerged, when a small round hole will be seen.

Although species of these genera seemingly prefer lowlands along waterways they are also found at considerable elevation, infesting all fine-grained hard-woods. In these *Melasis pectinicornis* and *Tharops* sp. are often found closely associated and with intermingling mines. They are also found closely associated with a number of Cerambycid, Buprestid, and Ptinid larvæ, particularly a small *Ptilinus* sp.; all seem to dwell together in perfect harmony. One characteristic of this group of borers in sound wood, and one which is rather unusual in coleopterous larvæ, is the fact that at no time can any trace of ejected borings be found around the host plant. They seem to work in complete secrecy, the borings being packed behind the larva as it cuts its way through the wood, and the mine always is wide enough for it to turn around.

The larvæ of this family are very sluggish in their movements, and when taken from their mines seem incapable of any movement beyond the bending of the body from side to side. There is no record of any species of these beetles having been observed in the act of ovipositing, but from the appearance of the ovipositor it is probable that the eggs are placed in the cracks and crevices of the bark, after the manner of the Cerambycidæ and Buprestidæ, where they hatch and the young larvæ work their way directly into the wood. They then mine through the sapwood and (unless the tree is exceptionally large) into the heartwood, where they attain their full development or nearly so; they then work their way into the sapwood again and excavate the pupal cell from 0.25 to 1 inch from the surface, directly across the grain of the wood. After completing its cell, the larva makes a small round exit hole to within a hair's breadth of the surface for the emergence of the young imago. While the larva is making its pupal cell it is in a looped or doubled-up position, as some species of the Buprestidæ are often found, especially *Agrilus*. It is doubtful whether the larvæ are in this position at the time of their pupation, as it would seem that the muscles of the body should be straight at this time, or nearly so. There seems to be no regular time for the general emergence of the imagos, this period ranging from May to August inclusive, though

probably more emerge during the month of June than at any other time. From present indications the immature stages last from ten to fifteen or even eighteen months, according to the favorable or unfavorable conditions prevailing. The more advanced larvæ attain their full growth by the latter part of the fall, some transforming to adults and remaining dormant in their pupal cells throughout the winter, while others, quite often of the same brood, overwinter in the larval form. The pupal stage is very short, lasting but a few days. There is no record of their overwintering in this stage.

The other genus of this group infesting sound wood is *Nematodes*. Species of this genus make an entirely different mine from the two previously mentioned ones. Instead of the broad, flat, transverse mine these larvæ excavate an oval or nearly round mine, just large enough for the passage of the larva; it extends in a general parallel direction with the grain of the wood, though winding in and out, and in some instances it is found to have turned entirely around. The pupal cell is made in the same parallel way. In this instance there is no exit hole made by the larva, for it pupates close to the surface of the wood and as the adult possesses large, strong mandibles it is no great task for it to make its escape. This insect seems to require damp conditions for its development, just opposite from the condition which is normally preferred by species of *Melasis* and *Tharops*. The galleries are usually discolored by a bluish fungous growth, and near the surface or beginning the gallery will often appear to be sap-stained, which would indicate that the larva had been at work in its host before the sap had entirely dried up. The life history of species of this genus has not been satisfactorily worked out and the period of time required for the development of the insect is not known. Contrary in habit to the other two genera, this insect seems to be partial to the coarse-grained woods of different species of oak. A black oak sapling at Lynnhaven, Va., was found thickly infested near the base by *Nematodes atropos* larvæ, pupæ, and young imagos on June 15. Some of the beetles were then beginning to emerge. Most of the mines appeared to be only 5 or 6 inches in length; they are, however, very difficult to trace to their source and many of them are doubtless longer. Species of this genus are very rare, and even if abundant would presumably be of little economic importance, as the small parallel mines would be less injurious to timber than the broad transverse mines of *Melasis* and *Tharops*. Although no known larvæ of this family possess legs, as do those of the true Elaterids, there is in the larva of *Nematodes atropos* a chitinous

prosternal plate projecting slightly beyond the line of the body and ending in two short but sharp hooks which no doubt aid the larva in its movements. Not the least striking larval character of this family is the unusual shape of the mandibles, which depart from the general rule of all known coleopterous larvæ by curving outward. This character has held good in all species examined by the writer. The muscles are attached to the mandibles in such a manner that when they contract, instead of bringing the edges together they throw them apart. Instead of biting or pinching the wood the mandibles act as miniature rasps or saws. This, as can be seen from the broad galleries of *Tharops* and *Melasis*, would be more useful to the larvæ than the usually fashioned ones. This theory of the movement of the mandibles was substantiated by the writer by observing through a microscope a larva of *Melasis pectinicornis* at work in its gallery. During the transformation of the larva to pupa the mandibles change their form and position and the adult possesses mandibles similar in general shape to those of other beetles. The adults of the borers in sound wood possess very powerful mandibles and in *Nematodes* they overlap.

Species that infest decaying wood are represented by only two genera, namely, *Fornax* and *Microrrhagus*. The form of the gallery and condition of the wood in which the larvæ of these genera live are very similar, except that *Fornax* has a relatively larger mine. It has been suggested that the larvæ of these two genera make no definite gallery but simply push their way through the soft wood, which closes behind them and leaves no trace of their passage. While it is usually impossible to trace a gallery its entire length, yet when the wood is not in too far advanced a state of decay they are clearly visible and may be seen curving about in the wood, running in a longitudinal direction, then turning in a transverse one.

There is an abundance of evidence that the larvæ not only make galleries in decayed wood but that they also occasionally mine in solid wood. As an example of this the writer found a large dead willow thickly infested with *Fornax badius* larvæ, several of which had bored through the soft sapwood to a distance of 3 or 4 inches into the solid heartwood. The mines of species of this group are relatively small and more open than those of the opposite one. The difference in size may be accounted for by the fact that the wood is softer and more elastic than solid wood, giving it a tendency to close behind the larva, thus reducing the diameter of the mine and the soft, damp state of the wood causing the borings to pack and adhere more readily to the sides of the gallery.

The larvæ of this group usually make their pupal cells deep in the sapwood. While making these cells they assume the looped position similar to those of the opposite group. To determine whether these larvæ would pupate in this position, two full-grown larvæ of *Fornax badius* were taken from their pupal cells and placed in similar shaped ones made with a knife in *Liriodendron* (the host from which they were taken), one in a straight position and the other in a hooked one, and the latter was observed to change its position to a straight one before pupating. This species has been reared to the adult stage during the first week in June. All present observations indicate that there is but one generation a year, the immature stages lasting from ten to twelve months.

The mouthparts of the larvæ of this group are quite microscopic, and when viewed through an ordinary hand lens the head appears perfectly solid, and the mandibles, surrounded as they are by twelve other saw-like teeth, seem to be immovable fixtures. The larvæ of this group apparently employ a different method in excavating their galleries from those of the opposite one. Instead of depending entirely upon their mandibles, which are comparatively small and feeble, these larvæ utilize the chitinized teeth with which the head is armed, the head being connected with the thorax in a manner somewhat corresponding to the ball and socket joint of vertebrate animals. This enables the larva to move its head freely and in any direction, and also gives it additional strength. Assisted by the powerful muscles of the body and the hardened, chitinized body-wall, it is capable of sawing even into solid wood. No parasites have thus far been bred from species of these genera.

The borers in decayed wood are harder bodied and more chitinous than those of the opposite group. They also possess much smaller mouthparts, the mandibles being much shorter, but having the same outward curve. On the ventral side of the last segment is a shallow, spoon-shaped depression, chitinous and roughened around its border and finely punctured in the center. The body is of a uniform shining straw-color, with dark brown markings on the thorax and head and dark brown mandibles and caudal end. All the larvæ of both groups possess nine pairs of spiracles.

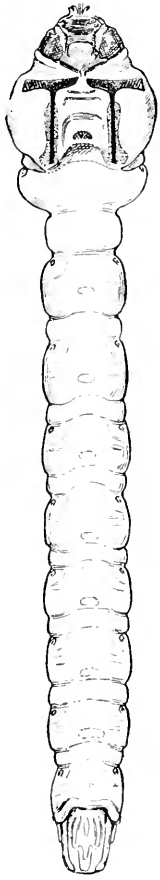
In the borers of solid wood, with the exception of *Nematodes*, the body is softer, less chitinous, and lighter in color. In *Melasis* and *Tharops* the full-grown larvæ are usually translucent or wax-color, with head and mandibles dark brown. In the larvæ of these genera there are a pair of slightly raised chitinous T-shaped markings on both the dorsal and ventral

sides of the prothorax. These stripes in the full-grown larva usually change on the ventral side to an inverted L, owing to a shortening and rounding-out process which then takes place, causing the segments to overlap slightly. In *Nematodes* the abdominal segments are longer and more rounded and each segment appears to be composed of two. The body is also darker in color and more chitinous. The larvæ of this genus may readily be recognized by the presence of two sternal processes or hooks on the prothoracic segment. The last segment is dilated, chitinized, with a concave ventral depression. Species of *Melasis* and *Tharops* possess this concave depression on the ventral side of the last segment, but it is not chitinized nor dilated. The crops of two typical representatives of these respective groups were examined under a compound microscope. That of *Melasis pectinicornis* contained nothing but minute fragments of wood fiber, and that of *Fornax badius* only liquid which may have been extracted from the damp wood in which they live. This comparatively small family of beetles, which has been recognized by many writers as distinct, has been placed by LeConte and Horn, in their classification of Coleoptera, published in 1883, as a subfamily at the head of the Elateridæ. The only character separating them from the true Elaterids is found in the insertion of the antennæ at the extreme front. The clicking apparatus is present, but usually undeveloped, so that it is impossible for the beetle to hop into the air. According to information from Mr. Schwarz, there is a small species of *Deltometopus* which is capable of making a feeble leap, but Doctor Horn doubts the position of this genus in the Eucnemidæ. The eucnemids possess much better characters in the larval form than in the adult. Perhaps one of the best characters for separating them from the Elaterids is the absence of legs or feet in the larvæ. The habits and life history of most of the species are also widely different from those of the true Elaterids. In their immature stage they approach much nearer several genera in the Buprestidæ, particularly *Agrilus*.

While the writer has frequently found the larvæ closely associated with other coleopterous and hymenopterous larvæ, he has seen no evidence of their possessing predatory habits.

REFERENCE TO LITERATURE.

It seems more convenient in this short bibliography to give an outline of the subject treated by each writer.



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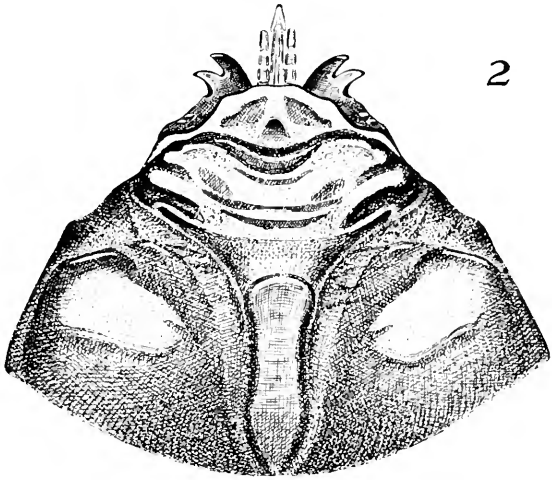

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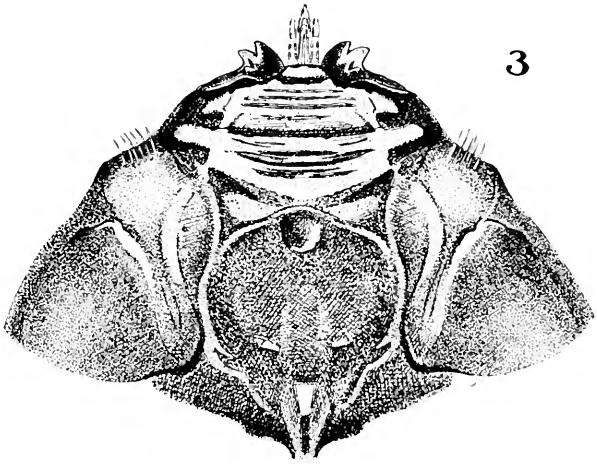


3

LARVA OF EUCNEMIDAE, THAROPS RUFICORNIS SAY

1847. Perris (Ann. Soc. Ent. France, p. 541) gives a good description of the larva of *Melasis flabellicornis*. He mentions the outward curve of the mandibles and gives a short sketch of its life history. He states that the eggs are laid in April, and that the young imagos can be found in their pupal cells throughout the winter and emerge with the first warm weather. He also mentions the broad, flat nature of the galleries.

1856. Coquerel (Ann. Soc. Ent. France, p. 511) gives a description of the larva of *Formax madagascariensis*. He states that the two last larger teeth situated on opposite sides of the head are the mandibles, and suggested that the larvæ of this genus destroy other wood-boring larvæ by piercing their bodies and sucking their juices.

1862. Baron C. R. Osten Sacken (Proc. Ent. Soc. Phila., v. 1, p.112) describes the larva of *Formax badius* and suggests that it possesses predatory habits. His description and drawing differ in some slight details from specimens identified as this species in our collection; his specimen, however, does not appear to have been fully developed, which would account for this in a measure.

1870. J. C. Schioedte (Nat. Tidsskr., III, 6, p. 490) gives a description, accompanied by some admirable drawings, of the larva of *Melasis buprestoides*, showing its mouthparts. He states that this species lives in the burrows of other wood-boring insects.

1870. E. Perris (in Bonvouloir, Monogr. Eucnem.) gives careful descriptions, accompanied by figures, of the following species: *Farsus unicolor*, *Melasis buprestoides*, *Eucnemis capucina*, and *Xylobius humeralis*.

EXPLANATION OF PLATE IV.

Tharops ruficornis Say.

1. Larva, dorsal view.
2. Head of larva, dorsal view.
3. Head of larva, ventral view.

Dr. Hopkins, in discussing the paper, stated that in a number of respects it was quite remarkable. It relates to a group of beetles to which considerable attention has been attracted by some of the leading coleopterists of Europe and this country; yet very little was known about the different stages and habits of the species. Therefore the amount of original information on these insects secured by Mr. Van Horn, conveyed in this

paper, and recorded in his notes, is worthy of the highest commendation. When we consider that only a little more than two years ago, December, 1906, he knew practically nothing about insects and that his education was limited to the country schools, his accomplishment in this, as well as his general rapid progress, was nothing less than phenomenal.

His work on the eucnemid beetles was almost entirely on his own initiative and carried on in addition to his regular duties as preparator in Dr. Hopkins's office. He was inspired, perhaps, by finding a curious larva while on an excursion to Great Falls, on December 31, 1907, which attracted much attention; no one in the Museum or the Bureau of Entomology could identify it beyond the family it represented. Evidently he determined that he would find out for himself, which he did, and thus demonstrated that he was endowed with the true spirit of the so-called old-fashioned naturalists, who, through their love for nature, and natural ability to see and do things, succeeded in spite of many disadvantages and apparently insurmountable obstacles.

The last time we saw Mr. Van Horn at the office was on February 4, 1909. On February 9, following a temporary illness, on leaving his home with a bundle under his arm, he remarked to his mother that he was going to the laundry. This is the last that has been heard of him. Dr. Hopkins concluded his remarks with the statement that he felt very deeply this apparent unhappy ending of such a promising career, mainly on account of the great need of men of his character and ability to assist in the present work on forest insects, take charge of important lines of investigations, and continue the efforts to advance the science of forest entomology as the older workers drop out.

Mr. Schwarz is in full accord with those authors who consider the Eucnemidæ as a family distinct from the Elateridæ. It is to be regretted that the early stages of some of the outlying genera, as *Perothops* and others, are still unknown.

—Mr. Crawford next discussed the remarkable parasite reared from these beetles by Mr. Van Horn in a paper entitled:

A NEW FAMILY OF PARASITIC HYMENOPTERA.

By J. C. Crawford.

(Plate V.)

VANHORNIIDÆ, new family.

Type—The following new genus and species:

VANHORNIA, new genus.

Antennæ 13-jointed in both sexes, inserted just above the clypeus; mandibles broad, with three teeth on the outer side, the mandibles working away from each other, when closed widely separated; vertex very high, the top of the eyes about one-half the distance from mouth-parts to vertex; ocelli arranged in a triangle, the lateral ones on a level with the top of the eyes; prothorax narrow, the lateral angles reaching the tegulæ; the neck of the thorax rather long; parapsidal furrows distinct; postscutellum separated from the metathorax (the true first segment of the abdomen) by a furrow; the trochanters show only one segment in both sexes; venation very similar to the genus *Helorus;* the basal nervure complete, extending forward to the subcostal nervure; abdomen sessile, the dorsum in the female showing two distinct segments, in the male three, due to the complete fusing of the first three segments; venter chitinized; ovipositor exserted; the venter grooved for its reception, since when the second segment of the abdomen is closed over the venter it forces the ovipositor to be directed forward along the ventral surface.

This genus is named for Mr. R. W. Van Horn, who discovered it.

Vanhornia eucnemidarum, new species.

Female: Length 6 mm. Black, sparsely punctured, each puncture bearing a short, light-colored hair; antennæ brown, the first two joints more reddish, scape and pedicel short, first joint of funicle almost as long as the three following; head sparsely, finely punctured, punctures closer along lower end of anterior orbits; prothorax rugoso-punctate; mesothorax finely sparsely punctured; parapsidal furrows formed by rows of pits; scutellum at base and apex with a row of large pits; postscutellum coarsely rugose and with a median longitudinal carina; metathorax rugose, truncate, the truncation separated from the pleuræ by a carina, which above joins a carina running to the base of metathorax; abdomen truncate at base, the truncation carinate, lateral angles produced; abdomen finely, sparsely punctured in certain lights; the points of fusion of segments 1 to 3 can be seen; segment 1 (1 to 3 combined) with longitudinal striæ extending about one-third of dis-

tance to apex and with a median longitudinal carina extending two-thirds of the distance; ovipositor about 4 mm. long.

Male: Length 6 mm. Similar to the female.

Secured from the cells of larvæ of the family Eucnemidæ.

Type locality: Female, Silver Spring, Md.; male, Lynnhaven, Va. Both collected by Mr. R. W. Van Horn. Paratype female, Plummer's Island, Md., May 31, 1908, E. A. Schwarz, collector; paratype male, Silver Spring, Md., Van Horn, collector.

Type—No. 12584 U. S. National Museum.

Explanation of Plate V.

Vanhornia eucnemidarum Crawford.

1. Adult female.
2. Head of female.
3. Abdomen of female.

—On behalf of the author, Professor Webster read the following paper:

HOW LYSIPHLEBUS FASTENS ITS APHID HOST TO THE PLANT.

[Hymenoptera, Braconidæ.]

By E. O. G. Kelly.

During the fall of 1908, in connection with his investigations of *Toxoptera graminum*, the writer carefully bred and reared several hundred parasites belonging to the genus *Lysiphlebus* Foerster.

In order that some careful interbreeding could be done, individual aphids, upon turning brown (caused by the parasites), were removed from the host plant to small homeopathic vials stoppered with cotton, in which the adult *Lysiphlebus* emerged. In removing these brown aphids from the plant they were observed to be securely fastened to it by silken threads enmassed in a glutinous substance which had become dry and hard. The glutinous substance and silk are more or less brittle and numbers of cocoons (as they really are cocoons) were broken open on the ventral side at the point of attachment, while being removed from the plant. The breaking open of the cocoon was nearly always fatal to the parasite, in fact, it proved to be inconveniently so; consequently another

VANHORNIA EUCNEMIDARUM CRAWFORD

method for removing the parasitized aphids was adopted—that of cutting off the inhabited portion of the plant without molesting the aphid skin or enclosed parasite.

In order to study the development of the *Lysiphlebus* larva after the skin of the aphid turns brown, full-grown aphids containing a full-grown *Lysiphlebus* larva were placed on glass slides with the ventral side next to the slide. For a short time before death, and four to six hours after death of the parasitized aphid, the yellowish parasitic larva can be seen through the thin semitransparent skin of the host; thus the revolutions of the parasitic larva, while shaping the aphid body into the globular form as observed by Professor Webster (Proceedings Ent. Soc. Washington, vol. IX, p. 110), can be seen until the skin begins to change its color. The aphid becomes very feeble just before death, but tenaciously grasps the leaf and dies thereon with a rigid death grip. This tends to hold it to the leaf temporarily while the parasitic larva is shaping the host body into a globular form. When the parasitic larva finishes shaping and partially drying the aphid skin it pushes its head through the ventral side, and, by working its body into the opening, makes a slit the entire length of the abdomen, and by pushing, twisting, and revolving converts it into an irregular oval-shaped opening. It then begins to fasten the aphid to the leaf or other object upon which the host insect happened to make its last stand, by spinning silken threads and spitting out a glutinous fluid, attaching one end of the thread to the leaf or other object, and the other to the inside wall of the aphid skin. The larva moves its head back and forth from leaf to aphid, progressing forward with each stroke, thus forming a zigzag strand of silk around and around the opening until the aphid skin is made fast. The larva continues spinning and shaping a cocoon on the inside wall of the aphid skin for 20 to 26 hours, when the cocoon is finished. The silken film formed over the ventral opening is not transparent or but faintly so in specimens removed from plants, but it is quite transparent when attached to the glass slide and by careful focusing and adjustment of light the insect can be readily observed.

After finishing the cocoon, the larva folds itself and becomes quiet; wing pads, legs, and antennæ become apparent in 60 to 75 hours from the time the larva began making its cocoon; it changes color from yellow to black in 100 to 120 hours, and becomes adult in 7 to 8 days (the length of these different stages depends upon the temperature).

The larva spins a silken cocoon, attaching it to inside wall of the aphid, leaving it entire; it does not make any opening in the cocoon nor cut away any of the aphid wall. When the insect becomes fully developed it kicks and pushes about until it frees itself from the pupal envelope and then begins to use its mandibles freely upon the silk of the cocoon; in three to five hours it cuts out a disc of the aphid skin and crawls out ready to fly away.

The adult is not only ready to fly away, but is also ready to begin reproducing its kind. Virgin females began ovipositing within four minutes after escaping from the cocoon; another mated to a male within less than one minute; this latter oviposited in *Toxoptera graminum* within five minutes, from which adult *Lysiphlebus* were afterwards reared.

—Mr. Gahan gave some remarks on the rearing of parasites from the nests of *Thyridopteryx ephemeraeformis* and mentioned finding *Dicymolomia julianalis* feeding on the eggs. The previous records found by Mr. Gahan were from cat-tail heads. One of the parasites, *Leucodesmia typica* How., was reared for the first time since the original material on which the species was based.

Mr. Quaintance said that about a year ago he and Mr. Jones had reared *D. julianalis* from the same source and on looking up the literature found it recorded years ago by Professor Riley.

Dr. Dyar was of the opinion that this species was a scavenger looking for insect remains and that their eating of the eggs was accidental. Specimens in the National Museum have been bred from the heads of *Typha* and from cotton bolls, where they were probably scavengers.

—Mr. Banks recorded the finding of several specimens of the southern house spider (*Thalamia parietalis* Htz.) at Washington.

—Mr. Banks noted the occurrence of the young of the chicken tick (*Argas miniata*) on diseased quail sent in from California by Professor Grinnell. From this he was inclined to think that this species is a native of this country and not introduced.

—Mr. Banks spoke of adopting the superfamily system for the spiders, which in his opinion showed the relationships to a better advantage, and gave an arrangement of the families in the proposed superfamilies:

Theraphosoidea (Theraphosidæ, Atypidæ).
Scytodoidea (Scytodidæ, Dysderidæ, Oonopidæ, Oecobidæ).
Drassoidea (Drassidæ, Clubionidæ, Zodariidæ).
Agalenoidea (Agalenidæ, Dictynidæ).
Theridioidea (Theridiidæ, Pholcidæ, Mimetidæ, Linyphiidæ).
Epeiroidea (Epeiridæ, Tetragnathidæ, Uloboridæ).
Thomisoidea (Thomisidæ, Sparassidæ).
Lycosoidea (Lycosidæ, Pisauridæ, Oxyopidæ).
Attoidea (Attidæ, Lyssomanidæ).

—Mr. Schwarz made some remarks on the twig-girdling longicorn beetles of the tribe Onciderini. He said that hitherto the habits of only a few species were known and these all belonged to the genus *Oncideres* or to very closely allied genera. He now exhibited specimens of *Ecthœa quadricornis* Oliv., from Trinidad, W. I., sent in by Mr. J. H. Hart, together with a cacao twig girdled by the adult beetle. This genus is remote from the genus *Oncideres* and may indicate that the whole tribe possesses the habit, in the adult stage, of girdling twigs.

Mr. Schwarz added that, since the cacao and various species of rubber trees are being extensively cultivated in Central America, we may expect that quite a number of native insects will attack and injure these trees. He mentioned as an example that the Bureau of Entomology had recently received from Central America the larvæ of two species of native Buprestidæ, *Euchroma goliath* and *Colobogaster cyanitarsis*, with the statement that these insects were injurious to rubber trees.

Meeting of April 8, 1909.

The 230th meeting of the Society was entertained by the bachelor members of the society on April 8, 1909, at the Saengerbund Hall, 314 C street N.W., with the President in the chair

and the following present: Messrs. Barber, Burgess, Burke, Busck, Clemons, Crawford, Gahan, Hall, Hammar, Heidemann, Hopkins, Howard, Hyslop, Kincaid, Knab, Kraus, Phillips, Piper, Popenoe, Sanders, Sasscer, Schwarz, Smythe, Viereck, and Webb, members, and Messrs. C. V. Burke, Cory, McAtee, McCray, Middleton, Spillman, and Wall, visitors.

The minutes of the last meeting were read and approved.

The committee on the Van Horn resolutions reported and the resolutions were ordered sent to the family.

Messrs. H. L. Viereck, and H. S. Smith were elected active members of the Society.

—The following paper was read by the author:

THE RÔLE OF AIR IN THE ECDYSIS OF INSECTS.

By Frederick Knab.

That air is employed by insects in the process of ecdysis was first brought to my notice while watching a mosquito issue from the pupa. When the mosquito emerges from the pupa it is distended with air far beyond its natural size; in fact it is inflated to such a degree that the integument is stretched to its utmost. This distension goes so far that the scales of the abdomen, which later overlap to form a complete covering, are separated so that the pale integument is visible between them, while between the segments there is a broad band of naked skin which later is folded under the ends of the segments. This inflated condition is gradually acquired during the pupal period. As the pupa grows older it becomes more buoyant, until finally, towards the period of eclosion, it can go down into the water only with great exertion, and when its efforts cease the pupa is immediately carried to the surface.

A similar inflated condition appears to obtain in Coleoptera. I have noted that in newly emerged beetles the body is much distended. This is particularly obvious in the thoracic region through the position of the elytra. At this time the elytra are separated from the hind margin of the pronotum by a considerable area of smooth integument which disappears beneath the pronotum as the body contracts to its normal dimensions.

The great tension to which the insect's covering is subjected at the time of ecdysis by the contained air was demonstrated to me in a striking manner by a chance experience. Last year, while at Cordoba, in Mexico, one of the attendants of the

hotel called my attention to "a very strange animal." Upon the veranda floor was a large cockroach *(Periplaneta americana)*, which had just moulted and was resting with its hind feet still upon the cast skin. Its glistening white color made the over-familiar insect appear strange to the attendant. I placed my foot upon the insect, whereupon it burst with a loud report which could be heard all over the building.

It seemed evident to me that this inflated condition at the time of ecdysis, found in such widely different insects, could not be exceptional. More probably it is not only general among insects, but even an essential factor in the moulting process. Naturally I turned to entomological literature in the expectation of finding some explanation of this phenomenon. However, upon examining a number of the best treatises on entomology, I found, much to my surprise, that not one of them alluded to the function of air in ecdysis. Nevertheless it had been observed and studied and I finally came upon a series of papers which deal with this subject or touch upon it.

The earliest of these papers is by Jousset de Bellesme and records observations upon the last moult of a dragon-fly.* He found that the dragon-fly upon emerging from the nymphal skin at once increased to about twice its previous size. This was accomplished by air pressure within, for, when the insect was punctured, it immediately collapsed. More careful investigation showed that at this time the main tracheæ were not filled with air, but the digestive tract was inflated with air. As there is a fixed quantity of blood within the body this blood is driven to the periphery by the pressure exerted by the greatly dilated digestive tube. Jousset de Bellesme also ascribes the development of the imaginal colors and the hardening of the chitin to the abundant blood-supply thus forced to the periphery. In summing up he makes as his main point that the dragon-fly, by employing air to inflate its digestive tube, obtains the necessary force to accomplish the greater part of its transformation. Thus during ecdysis the digestive tract assumes a function entirely distinct from that of normal life. In concluding he remarks: "Everything leads one to believe that what I have described in the dragon-fly is repeated in a large number of insects and constitutes a very general mechanism in this class of animals."

After a considerable interval Kunckel d' Herculais published his observations upon the ecdysis of certain Orthoptera

*Phénomènes qui accompagnent la métamorphose chez la Libellule déprimée. Compt. rend. Acad. Sci. Paris, v. 85, pp. 448-450 (1877).

and brought together all that was known regarding the rôle of air in the ecdysis of insects.* The studies of Kunckel d' Herculais were largely made upon an injurious locust of Algeria (*Stauronotus maroccanus* Thunberg) and similar conditions were found by him in other Orthoptera. In the acridiids observed by him the air is employed during each successive moult and furthermore by the female at the time of oviposition. Moreover the air plays an important part in the escape of the newly hatched young from the egg-cocoon.

The young locust possesses, dorsally, between the head and the prothorax, a bladder (ampoule cervicale) which can be inflated or retracted. Six or seven of the newly-hatched locusts direct their efforts against the lid of the egg-cocoon and by means of their cervical bladders force it off. Such is the pressure thus exerted that the lid of the cocoon sometimes flies several centimeters. The cervical bladder is further employed when the young locust works its way through the crevices in the ground to the surface. By inflating and retracting this organ it is able to vary the dimensions of its body in such a manner that it can squeeze through crevices that would otherwise be impassable. When the young locust has reached the surface of the ground it casts its first skin and here the cervical bladder is again brought into service to rupture the skin. To inflate this cervical bladder blood is forced into it from the body cavity and this is accomplished by the agency of air. The air is taken into the digestive tract directly by swallowing until the crop becomes greatly inflated, and by this means the blood is pressed into certain parts of the body. Kunckel d'Herculais also found that at the time of moulting the tracheæ are not filled with air and therefore the tracheal system takes no part in this process.

As before stated this mechanism is again employed at each moult. In the last moult the wings are expanded by blood forced into them by the same means, that is, the inflation of the digestive tract with air. Lastly in the female the air performs an important function during oviposition, as by its means the abdomen is forced into the ground. This was discovered through the fact that a locust with an abdomen 5 cm. in length is able to bore a hole into the ground 8 cm. in depth. The air taken into the digestive tract greatly distends the abdomen and

*Mécanisme physiologique de l'éclosion des mues et de métamorphose chez les Insectes orthoptères de la famille des Acridides. Compt. rend. Acad. Sci. Paris, v. 110, pp. 657-659 (1890).

Du rôle de l'air dans le mécanisme physiologique de l'éclosion, des mues et de la métamorphose chez les Insectes Orthoptères de la famille des Acridides. Compt. rend. Acad. Sci. Paris, v. 110, pp. 807-809.

as the insect is firmly braced, by means of its fore and middle legs, the abdomen is forced into the ground.*

Kunckel d' Herculais was fully aware of the wider bearing of these observations and in addition to these upon Orthoptera gives a number of less complete ones upon other insects. In earlier investigations he had found that the ptilinum of cyclorhaphous flies is not inflated by the pressure of air from the tracheæ but by blood forced into it from the general body cavity by contraction of the thoracic and abdominal muscles. Most likely in this case also the digestive tube is distended with air when the imago issues from its puparium. Balbiani informed Kunckel d' Herculais that a similar function is indicated in the case of the homopter *Conomelus limbata* Fabr., for he had found that its digestive tube is filled with bubbles of air at the time of moulting.

Hubbard in his observations on *Psocus citricola* Ashmead describes the office of air in the hatching of this insect.† The eggshell is perfectly transparent, so that the insect within can be readily observed. Before hatching the young insect swallows bubbles of air until the steadily expanding head finally bursts open the egg. This observation was repeated independently upon an European psocid (*Stenopsocus cruciatus* L.) and described more in detail by Peyerimhoff.‡ He found upon the amnion of the young psocid a frontal chitinous organ consisting of a dentate ridge. While this structure is the instrument for rupturing the egg-shell the ingested air furnishes the necessary force. After the insect has hatched the amnion is in its turn ruptured and shed by the pressure exerted through the air taken into the digestive tract.

Busck has observed that the larva of the tineid moth *Marmara salictella* Clemens in its penultimate moult comes forth greatly inflated and afterwards shrinks to its normal size. He has recorded the curious use of the air in its digestive tract made by the larva of this moth when forming its cocoon.§ Globules are expelled from the anus, which consist of an aggregation of small bubbles of air surrounded by some delicate substance. The larva thrusts its anus through openings in the

*Mécanisme physiologique de la ponte chez les Insectes Orthoptères de la famille des Acridides.—Rôle de l'air comme agent mecanique et fonctions multiples de l'armure génitale. Compt. rend. Acad. Sci. Paris, v. 119, pp. 244-247 (1894).

†Insects affecting the orange, 1885, p. 195.

‡Le mécanisme de l'écosion chez les psoques. Ann. Soc. Ent. France, v. 70 (1901), pp. 149-152.

§Proc. Ent. Soc. Wash., v. 5, pp. 102-103 (1902).

cocoon and deposits these globules upon its outer surface, where they are fastened by silk from the larva's mouth.

The cases which have been cited, although few, are of such widely different insects that it seems almost certain that in this inflation of the digestive tube with air we have a principle which is fundamental in the moulting process of insects. If one stops to reflect it will appear quite obvious that something besides mere muscular exertion is necessary to liberate the insect from its exuviæ. At the time of emergence the chitin is soft and therefore cannot offer sufficient resistance for any great muscular exertion. Thus at this time the insect is hardly capable of making full use of its muscles. Even if one allows for the lines of weakness, which are already determined in the pupal shell, it will still be admitted that it takes a considerable force to rupture, for example, the chrysalis of a moth. An insect issuing from its pupa hardly gives the impression of great muscular vigor. This subject well merits further investigation. Thus in the case of Lepidoptera and Diptera the digestive tract is closed during the pupal period; by what means does it become inflated with air?

SUPPLEMENTARY NOTE.—At Dr. Howard's suggestion I have examined the work of Maillot and Lambert on the silk worm for further information on the process of ecdysis in the Lepidoptera.* The description given by them of the eclosion of *Bombyx mori* is manifestly faulty and the interpretation of the processes involved is incorrect; yet it shows that in this case also the swallowing of air is an important factor, if not in the escape of the imago from the chrysalis, at least in the expansion of its wings. The authors incorrectly state that the wings are expanded by the forcing of air into the veins. What is here important is the observation that while the wings are being expanded the crop is being rapidly filled with air. It is perhaps best to quote the original passage:

> En même temps que les ailes s'étendent et que les téguments deviennent secs, le jabot, a l'interieur du corps, vidé du liquide qu'il contenait, se gonfle d'air rapidement; aussi l'appelle-t-on *sac à air*. Les innombrables trachées qui se ramifient dans l'abdomen se replissent aussi d'une grande quantite d'air.

The last statement, that the air taken into the crop serves to fill the tracheæ, is of course an assumption and it is clear that we have here the process previously discussed.

*Traité sur le ver à soie du mûrier et sur le mûrier, p. 293 (1906).

Dr. Hopkins spoke of the various insects using air to aid them in different ways, citing the bladder used by *Thalessa* to aid in oviposition and in Diptera of the breaking open of the puparium by the ptilinum.

Mr. Kincaid asked whether the air used in means of ecdysis had ever been analyzed to see if it was carbon dioxide or air. Mr. Knab replied that, in some cases at least, it was air obtained directly by ingestion immediately before ecdysis.

—The next paper of the evening, "Some Habits of Empid Flies," by W. L. McAtee,* was discussed by Messrs. Schwarz, Barber, Knab, Hopkins, and Howard.

—Professor Trevor Kincaid gave the society a very entertaining talk on his experiences in Japan, telling of the mode of living, the various customs, the entomologists of the country, and work of obtaining and shipping the parasites of the gipsy moth.

—Mr. Busck then read the following paper:

BÖVING'S STUDIES OF THE EARLY STAGES OF DONACIA.†

[Coleoptera, Chrysomelidæ.]

By August Busck.

This most interesting and exhaustive work on the early stages of the beetle genus *Donacia*, for which my friend and former colleague Doctor Böving was given his doctor's degree at the Royal University in Copenhagen, was privately printed in Danish and is therefore apt to be overlooked by the American worker.

Some of the members of the Society will remember that Mr. E. D. Sanderson read a paper on this subject before the Society in May, 1900.‡

This paper, as well as that of another American worker on the group, MacGillivray,§ is very carefully analyzed and the

*Withdrawn for publication elsewhere.

†Adam Giede Böving. Bidrag til Kundskaben om Donaciin-Larvernes Naturhistorie. Copenhagen, 1906.

‡Published Can. Ent., xxxii, p. 249-263, 1900.

§Aquatic Insects of New York State, part 5, 1903.

‖Berliner Ent. Zeitschrift, xxxi, p. 325-334, 1887.

conflicting results of his own work and that of Smidt-Schwedt* are compared by Dr. Böving. The first half of the work deals with previous work on the group, and especially with that of the above-mentioned authors, with which the author differs about the much-discussed points on the respiration and the feeding of the larva and the making of the cocoon.

The second part presents the author's own observations and results and is supplemented by some very fine plates.

The main points in the life history of these beetles will be familiar to most of the members; the eggs are laid in clusters on the water plants on which the adults feed; each species feeding as adult on the same plants on which the larvæ are found under water. The larvæ attach themselves to the roots, partly by the weakly developed legs, but more especially by two stout spines on the eighth abdominal segment; they feed on the juices of the roots and when full grown make a tough, oval cocoon attached to the root.

Doctor Böving has through many observations in the field and in the insectary, as well as through anatomical studies, proved that the breathing of these larvæ is done solely through the caudal spines, which according to him are nothing more than highly specialized spiracles; these are inserted into the air-cells of the plant from which the fresh air is supplied; the other normal spiracles are used only to expel the used air, which escapes as minute bubbles. He shows that the air passes through the thin membranes covering the openings in the spines, directly from the air-cell of the root to the tracheal system, and that only in this way is the breathing possible; not as suggested by Sanderson and MacGillivray by the absorbtion of air from the water, or by the catching of air-bubbles from the root when the epidermis is torn by the spines. The entire inbreathing takes place through the caudal spines, the entire outbreathing is done through the normal abdominal spiracles.

Relating to the feeding, Doctor Böving shows that it is essential for the larva to exclude the water from the place where it gnaws the root; this it accomplishes by drawing the head into the thoracic segments and forming a watertight compartment by pressing the anterior part of the body against the root; it then bites out a plug from the surface of the root and inserts its head, filling out the opening completely; it feeds only on the juice of the plant, swallowing no solids. Böving suggests, though he has not been able to actually prove it, that the larvæ do not void any excrement at all.

*Berliner Ent. Zeitschrift, XXXI, p. 325-334, 1887.

The making of the cocoon involves, according to Doctor Böving, three distinct processes. When ready to pupate the larva is closely attached to the root by the caudal spines and by the legs and with its head withdrawn into the thorax. From numerous small glands all over the body is then secreted a tough, sticky fluid, which covers the body as a thin mantle and also spreads over the part of the root on which the larva sits. While this outer cocoon is yet semifluid and elastic, the larva stretches itself inside it and blows the cocoon up by air sucked from the root, with the interior of which the larva is yet in connection through the caudal spines.

This outer mantle absorbs and carries with it all the dirt on the larva, so that it lies clean and white within, filling about one-half of the cocoon.

The larva then begins to secrete from the mouth a varnish-like fluid, which it smears around on the inside of the cocoon by rubbing the head back and forth. During this work it finally withdraws the caudal spines and turns around so as to apply the varnish to all parts of the cocoon.

If the larva is taken out of the cocoon at this stage the alimentary canal is found to be much swollen and filled with a clear honey-yellow matter, which Doctor Böving thinks is in the main the accumulated excrement; this content of the alimentary canal is ejected from the anus and used to cover and strengthen the bottom of the cocoon toward the root. The cocoon thus finished the larva gnaws one or two holes through the bottom into the air-cells of the root and thus reestablishes the temporarily suspended respiration.

The different species of *Donacia* gnaw one or two holes and it is possible to identify the species from the position and number of these holes alone.

The larva then in time transforms to pupa and eventually to adult. The length of the larval period covers two seasons.

During the writer's visit in Copenhagen, last fall, Doctor Böving generously gave him, for the collections of the U. S. National Museum, a fine set of the material on which his paper was based—eggs, larvæ, and cocoons in various stages, adults, and work.

—Mr. Schwarz said that in North America we have some species of *Donacia*, especially of the subgenus *Plateumaris*, which are evidently not aquatic in their habits, their larvæ being supposed to live in very wet ground on the roots of *Sagittaria* and similar plants. Such larvæ may differ somewhat in structure from those described by Doctor Böving.

The following paper was read by title:

HEMEROBIIDAE FROM QUEENSLAND, AUSTRALIA.

[Neuroptera, Hemerobiidæ.]

By Nathan Banks.

The species described and recorded in the following pages were taken in Australia by Doctor R. C. L. Perkins, who collected in Queensland. Extremely few collectors have paid any attention to these insects, so it is not surprising that most of them are new. Only a few other forms have been recorded from Australia by McLachlan and by Gerstaecker.

In general appearance they are very similar to our native species, but nearly all belong to new genera. Two genera, *Sisyra* and *Micromus*, are represented in our country and in Europe. I have added the description of a new species from the Fiji Islands, also sent by Doctor Perkins.

Table of Genera.

1. No recurrent vein at base of the fore wings ..... 2.
   A recurrent vein at base of fore wings ..... 3.
2. But one radial sector, which is connected to radius twice; no gradate series ..... *Sisyra.*
   Several radial sectors; at least one gradate series of veinlets. *Micromus.*
3. Many cross-veins between subcosta and radius; one many branched radial sector..... *Psychopsis.*
   Few, if any, cross-veins between subcosta and radius..... 4.
4. A series of cross-veins in hind wings; two series in fore wings... 5.
   No series of cross-veins in the hind wings; no outer gradate series in the fore wings..... *Notiobiella.*
5. Outer margin of fore-wings very plainly excavate....*Drepanepteryx.*
   Outer margin of fore-wings entire..... 6.
6. Two radial sectors; no stigmal gradate series..... *Carobius.*
   Three radial sectors; second not forked; a gradate series obliquely inward from the stigma..... *Psychobiella.*
   Four radial sectors; three gradate series in the fore-wings; two series in the hind wings..... *Megalomina.*

Sisyra brunnea, new species.

Brown, thorax and legs more yellowish brown, wings brown in general appearance; more closely it is seen that the veins are dark brown, and a brown streak runs through the middle of each cell; several of the costal cross-veins and some of the others more heavily marked

with brown or almost black; stigmal area darker in both pairs. Antennæ blackish on basal part, yellowish toward tip. Vertex smooth and shining; antennæ rather long, fully one-half the length of the fore wings; wings of usual shape; the radial sector has three branches, and is connected back to the radius three times, once near the tip. In the hind wings the radial sector bends away and then toward radius and is connected back to radius twice; the radial sector has three branches; the anal vein has four branches to the hind margin.

Expanse, 9 to 10 mm.

From Kuranda and Brisbane, Queensland, Australia.

Sisyra punctata, new species.

Yellow-brown; wings brown, the veins pale dotted with brown; hind wings with the stigma and costa beyond dark brown; antennæ yellowish, except the base, also legs. Basal joints of the antennæ elongate, nearly twice as long as usual. Vertex rather broader and more flat than usual, and hairy, not shining. Wings of the usual shape and veined as in *S. brunnea*, but the hind wings are plainly broader than in that species.

Expanse, 10 mm.

From Bundaberg district, Middle Queensland, Australia.

PSYCHOPSIS.

Five species of this genus are now known from Australia, and have been treated by Mr. Froggatt in the Proceedings of the Linnean Society, New South Wales, for 1903.

I have seen but one species, *P. mimica* Newm.

Micromus froggatti, new species.

I propose this name to replace the *Micromus australis* Froggatt, which is preoccupied by the *Micromus australis* Hagen, 1858, from Ceylon. There are numerous specimens in the collection, from Middle Queensland and Cairns district, North Queensland, which agree with two specimens kindly sent me by Mr. Froggatt.

Micromus vinaceus Gerst.

From Cairns district, North Queensland; it is readily separated from *M. froggatti* by the broader wings, and six radial sectors.

Drepanepteryx humilis McLachl.

One specimen from Middle Queensland, Australia; there are two other species of the genus described from Australia.

MEGALOMINA, new genus.

A recurrent vein in fore wings; four radial sectors, first simple and connected to medius; fore wings acute and almost falcate at tips; three series of gradate veinlets in fore wings; two series in the hind wings; antennæ rather long, and legs are also slender.

Type.—M. acuminata.

Gerstaecker's *Megalomus lanceolatus* probably belongs to this genus.

Megalomina acuminata, new species.

Head yellow; thorax yellowish, dark on sides; legs pale yellow, hind tibiæ long, slender, curved and fusiform; antennæ fully two-thirds the length of the fore wings, pale yellow, apical part darker. Fore wings pale brownish, venation brown, dotted with darker brown, a streak on the cubitus and on lower part of graduate series dark brown, and some of the outer gradate veinlets dark brown, extreme tip with small dark patch; hind wings pale brown, stigma darker, venation yellowish brown. Fore wings long and slender, acute at apex, hind margin near the tip faintly concave, four radial sectors, costal area not very broad at base, with many veins.

Expanse, 22 mm.

From Bundaberg district, Middle Queensland, Australia.

CAROBIUS, new genus.

Fore wings with a recurrent vein; first radial sector connected to medius; an outer series of gradate veinlets in the hind wings; in the fore wings there is an outer gradate series, but no inner series, except a few from near base of the first radial sector; two radial sectors, first not connected to the second.

Type.—C. pulchellus.

Carobius angustus, new species.

Head yellow-brown; antennæ dark brown, not one-half as long as fore wings; thorax yellow brown; prothorax dark on sides, and some dark spots on meso and metathorax; abdomen dark above, paler beneath; legs pale yellow. Fore wings faintly brownish, darkest on apical and hind margins; venation pale, with long dark brown streaks, forkings and cross-veins all broadly dark brown; stigma dark brown; hind wings

faintly dusky; venation uniformly pale yellowish brown; stigma darker. Fore wings rather narrow, over two and one-half times as long as broad, costal area not very broad at base, and with few veins; second radial sector forked twice. Tip of female abdomen with a superior pair of long, slender, curved appendages.

Expanse, 11 mm.

From Middle Queensland, Australia.

Carobius pulchellus, new species.

Head pale, a dark spot between antennæ, and one each side on the vertex; antennæ pale yellow, hardly one-half the length of the fore wings; thorax pale in middle, blackish on the sides; abdomen blackish above, pale beneath; legs pale yellow, middle and hind tibiæ fusiform. Fore wings yellowish, hyaline, venation mostly pale, the gradate veinlets dark brown, also the bases of the costal veinlets a broad dark streak along radius for one-third the way out, and also one along anal margin, and from stigma is an oblique stripe outward, and some spots on basal part of wing, varying somewhat; in one specimen the streaks are absent, only stigma brown, and a short brown spot on radius at end of what was the streak on the fully marked specimen. Hind wings pale, venation pale, stigma brown. Fore wings fully two and a fourth times as long as broad; costal area very broad at base, and quite densely veined; second radial sector with two forks. Tip of female abdomen with two short, straight processes.

Expanse, 12 mm.

From Brisbane, Queensland, Australia.

PSYCHOBIELLA, new genus.

A recurrent vein in front wings. Radial sector connected to medius some distance out from the origin of the first sector, three radial sectors, the second simple, others forked, the cross-veins at cubitus disjointed and of about equal length; the outer gradate series is very long, of about 12 veinlets in the type species. In the hind wings there is an outer gradate series of cross-veins, and one radial sector with three branches.

Psychobiella sordida, new species.

Head and thorax pale yellowish brown; antennæ similar, two-thirds as long as the fore wings; legs pale yellow, middle tibiæ fusiform; abdomen brown. Fore wings a uniform brown, stigma rather reddish, venation pale, spotted and dotted with brown, hind wings more hyaline, the stigmal region darker. The fore wings are fully two and a-half times as long as broad, with the costal space broad at base; about seven veinlets in the inner gradate series, and twelve in the outer series, the

latter very oblique; the tip of the female abdomen shows two short, slender appendages close together.

Expanse, 16 mm.

From Bundaberg district, Queensland, Australia.

NOTIOBIELLA, new genus.

Related to *Symphcrobius*. A recurrent vein in the fore wings; in hind wings no outer gradate series; in fore wings there is an inner gradate series, but no outer series at all; there are two radial sectors, the first connected to the second near its base; the middle and hind tibiæ are enlarged near tip.

Type.—N. unita.

Notiobiella externa, new species.

Head and thorax yellow brown; abdomen brown; legs pale yellow, middle and hind tibiæ fusiform; antennæ pale, tips rather darker, about one-half the length of the fore wings. Fore wings pale, venation pale brown, the forkings often dark brown, two spots between subcosta and radius near base, and over subcosta at the stigma is a dark brown spot extending out each way. Hind wings pale, stigma barely darker. Fore wings rather narrow, about two and a half times as long as broad, costal area not very broad at base, and with few veins; two radial sectors.

Expanse, 9 mm.

From Middle Queensland, Australia.

Notiobiella stigmatica, new species.

Extremely pale yellowish throughout; apical third of antennæ black; antennæ plainly more than one-half the length of the fore wings. Wings hyaline, veins faintly brown, and some cross-veins faintly margined with brown; the cross-vein connecting medius and cubitus near base is dark brown; in the hind wings the stigmal area is more yellow. Fore wings a little more than twice as long as broad, broadest at middle, costal area not very broad at base, and with few veins; two radial sectors, connected at extreme base of the second one; in the hind wings the stigmal area is very strongly swollen or bowed outward. The tip of the male abdomen has a pair of strong claspers.

Expanse, 11 mm.

From Middle Queensland, Australia.

Notiobiella unita, new species.

Head pale yellowish; antennæ similar, about one-half the length of fore wings; thorax yellowish brown; abdomen also brown, but darker

above near tip; legs pale yellowish, middle and hind tibiæ fusiform. Fore wings pale, venation mostly pale brown, but the forking of many veins is dark brown, and a dark brown spot on a veinlet connecting the first and second radial sectors. Hind wings pale, stigmal region distinctly darker. The fore wings are fully two and one-fourth times as long as broad, plainly broadest at middle, the costal region not very broad, and with but few veins; two radial sectors.

Expanse, 14 mm.

From Bundaberg district, Queensland, Australia.

Notiobiella obliqua, new species.

Face pale yellowish, vertex dark and with rather long yellow hair; thorax yellowish brown, darker on the sides; abdomen dark brown; antennæ pale yellowish, not one-half as long as fore wings; legs pale yellow, middle and hind tibiæ fusiform, and each with a submedian brown band. Fore wings very broad, hardly twice as long as broad, costal area extremely broad at base, so that the wing is about as broad at base as at middle; color pale yellowish, but with an oblique brown band across it, beyond middle on costa, and before middle on anal margin; the forks of many veins and some cross-veins are dark brown, and two distinct dark brown spots in basal half between the subcosta and the radius; costal area very densely veined; two radial sectors; hind wings pale, with a brown stigma.

Expanse, 12 mm.

From North Queensland, Australia.

Notiobiella pretiosa, new species.

Head pale yellowish, vertex with two submedian dark dots; antennæ pale, blackish beyond middle, tip pale, basal joints with dark mark on inner side; thorax pale, anterior margin dark, two dark dots on each lateral lobe, and the scutelli black; abdomen brown, apex pale; legs pale, the swollen tibiæ with two faint dark marks. Wings hyaline, venation close and dark brown, almost all of the cells have several brown spots, usually transverse, and forming irregular bands across the wing, the largest spot is toward the base and between the subcosta and radius; hind wings faintly smoky, stigma darker, veins brown. Fore wings about two and a fourth times as long as broad, front and hind margins sub-parallel, tip broadly rounded, costal area extremely broad at base, and with many veins, no distinct stigma, two radial sectors, first near base, second far out. Hind wings have the stigmal area barely swollen outward.

Expanse, 10 mm.

From Fiji Islands (Coll. Muir).

—Mr. Busck exhibited adults and larvæ of the remarkable and rare myrmecophilous beetle *Paussus kannegieteri* Wasmann, which were liberally presented to the National Museum by Doctor Böving, together with an interesting paper* on this, the first authentic larva known of that peculiar family.

Two previous records have been made of supposed *Paussus* larvæ, but Doctor Böving shows that these must have belonged to other groups.

The article, of which there is a summary in English, is accompanied by a beautiful plate.

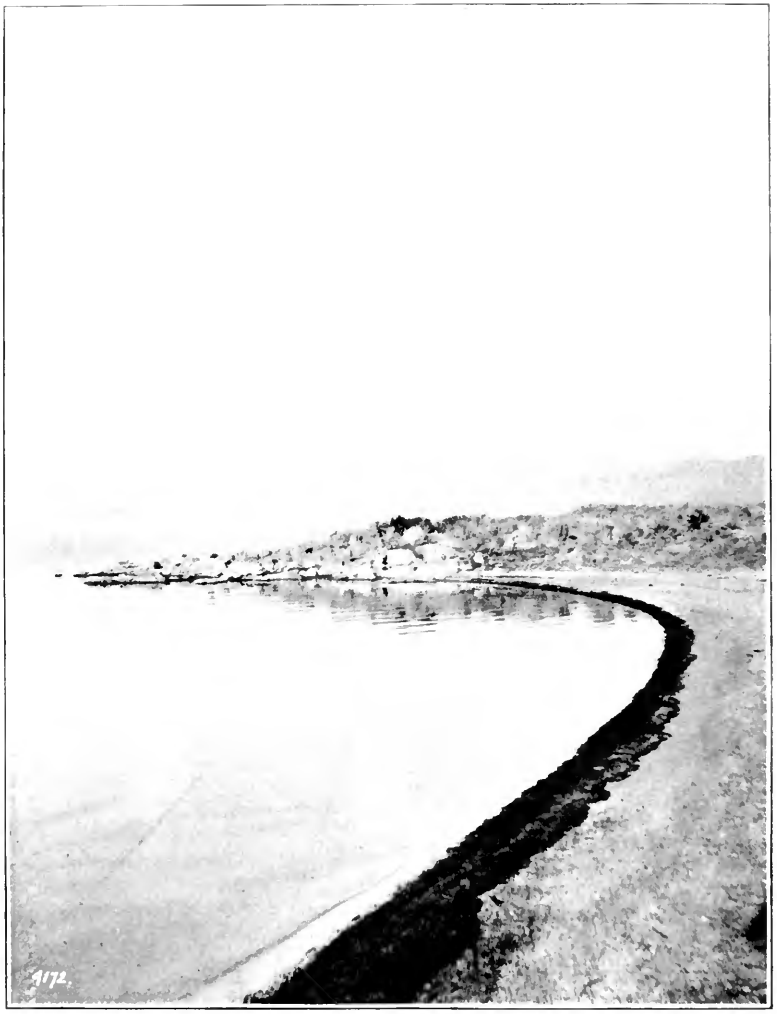
—Mr. Schwarz referred to an article on the insect fauna of the Great Salt Lake, Utah, published in the Canadian Entomologist for 1891, pages 235--241, in which some space was devoted to the occurrence, in enormous numbers, on the shore of the lake, of the puparia of the salt-fly, *Ephydra gracilis*. These puparia accumulate on the sandy shores of the lake in a windrow many inches in width and several inches high. A photograph (Plate VI) illustrating a similar accumulation of *Ephydra* puparia on the shores of Mono Lake, in California, was taken by Mr. W. K. Fisher in September, 1901. The photograph is here reproduced, the black line along the shore showing the masses of the puparia. The particular species of *Ephydra* occurring at Mono Lake has been described as *Ephydra hians* Say.

In response to a query Dr. Howard stated that the washing ashore was a perfectly normal habit of the puparia.

Mr. McAtee spoke of the Indians drying the pupæ, which were considered a great delicacy. Birds, especially the ducks and shore birds, are very fond of these pupæ and swallows catch great numbers of the adults on the wing.

—The following papers were accepted for publication:

*A. G. Böving. Om Paussiderne og Larven til *Paussus Kannegieteri*. Vidensk. Meddel. Naturhist. Forening, Copenhagen. 1907, pp. 109-136, with plate II.



PUPARIA OF EPHYDRA HIANS SAY ON THE SHORE OF MONO LAKE, CALIFORNIA

SOME SPECIES OF CALLIGRAPHA.

[Coleoptera, Chrysomelidæ.]

By Frederick Knab.

In those forms of *Calligrapha* in which the pale elytra show a pattern composed of sutural stripes, humeral lunules, and a number of irregular spots, the specific limits have been largely a matter of individual opinion. This must continue to be the case while collectors and systematists are content to dispose of such questions by a furtive examination of the specimens that chance puts in their way. The writer has long been dissatisfied with the accepted definition of the species and for some years has observed these beetles in nature whenever opportunity offered. It has become constantly clearer that distinct species are confused under the same specific name and that the definition of the species will have to be entirely reformulated. While the writer is not prepared to do this at present it seems advisable to characterize a few of these forms and it is hoped that this will stimulate others to give their attention to this group. Determination of the food-plants of the different species is the key to a proper understanding of them; unfortunately our knowledge in this direction is still very incomplete. Furthermore, it is only with large series before him that the student can hope to gain a mastery of these difficult forms.

The two species described here as *rhoda* and *rozena* group with *scalaris* LeConte. There seems to be no doubt as to the form LeConte had before him when he described *scalaris*. It is the one which occurs upon the elm (*Ulmus americana* L.) and the linden (*Tilia americana* L.) and the form most frequently referred to under the name *scalaris*. In *Calligrapha scalaris* the pronotum and the elytral pattern are bright metallic green, sometimes with a strong bluish cast; the form is rather elongate and depressed and the size averages larger than any of the other species. The surface appears shining; the punctuation of the pronotum is moderately coarse and close at the sides, fine and sparse upon the disc, though subject to considerable variation. The punctures limiting the elytral pattern are rather fine, the markings are flat, and show little if any convexity. The punctures upon the disc are very fine and well separated. The white ground-color of the elytra shows a silvery luster in sexually mature specimens.

Calligrapha rhoda, new species.

Form subovate, convex. Color of the body and elytral pattern dark olivaceous, submetallic; the legs, antennæ, and palpi ferruginous yellow.

Ground-color of the elytra creamy white; in sexually mature specimens the greater part of the disc becomes suffused with dull red and those parts that remain pale take on a yellowish-silvery luster. The red color occupies the posterior two-thirds of the disc, beginning behind the humeral lunule; a broad outer margin and narrow margins around the dark pattern are silvery. The elytral pattern consists of a double sutural stripe, to which are joined a heavy arcuate stripe along the middle third and a spot near the apex; the humeral lunule is double to beyond its middle and its inner branch extends obliquely close to the upper end of the arcuate mark; the humeral lunule encloses two spots which are sometimes joined; close to the outer margin near its middle is a small spot and there are a number of irregular small spots scattered over the disc. The epipleura are pale, with their outer and inner margins ferruginous. The punctures limiting the elytral pattern are coarse and close and the markings are distinctly convex. The punctuation of the pale surface is coarser and closer than in *C. scalaris*. The head and pronotum are finely alutaceous and coarsely punctured; the punctures of the pronotum are finer upon the disc, although nearly as dense as at the sides; towards the sides there is a depression of confluent punctures. The labrum is ferruginous and there is a ferruginous spot upon each mandible. The claws are but slightly divergent. Length, 7 to 8 mm.

Food plant: *Corylus americana* Walt.

Localities: West Springfield (21 May, 1903, 15 June, 1901, 13 July, 1902, 5 August, 1900, Knab), Chicopee (24 July, 1892, Knab), Westfield (5 September, 1903, Knab), Wilbraham (19 June, 1903, Knab), Notch Road, Mount Holyoke (24 June, 1898, Knab), Massachusetts; Canobie Lake (2 July, 1892, G. Dimmock), New Hampshire; Port Huron (June, Hubbard and Schwarz), Michigan; Marshall County (11 June, 1903, W. S. Blatchley), Indiana; Glen Ellyn (5 June, 1904, A. B. Wolcott), Illinois; Central Illinois (April, 1883, O. S. Westcott); Beaver Dam (W. E. Snyder), Milwaukee County (June, F. Rauterberg, 20 July, 1900, C. R. Brown), Wisconsin; Olmstead County, Minnesota (C. N. Ainslee); Creve Coeur Lake, St. Louis County (17 July, 1903, G. W. Bock), Missouri; Onaga (3 June, 1901, F. F. Crevecoeur), Kansas; Deer Park (4 July, Hubbard and Schwarz), Maryland.

Type—Catalogue No. 12571, U. S. National Museum.

Cotypes in the collections of the U. S. National Museum and of the author.

This species feeds exclusively upon the hazel, both in the imago and the larval states, and as far as known it is the only species of *Calligrapha* found upon this plant. While the elytral

pattern is practically identical with that of *C. scalaris,* the present species has a facies which makes it at once recognizable. The form is shorter and much more convex than *scalaris* and the elytra, on account of the coarser punctuation, look much rougher. The pronotum and the elytral markings are a very dark olive, while in *scalaris* these parts are bright green or blue-green. The red color upon the elytra is only apparent upon sexually mature specimens and disappears after death. The claws are less widely divergent than in *scalaris.* The species occurs but sparingly upon its food-plant.

Calligrapha rowena, new species.

Form subovate, convex. Color of the body and elytral pattern dark blue-green, submetallic; the legs, antennæ, and palpi ferruginous yellow; labrum ferruginous. Ground-color of the elytra yellow; in sexually mature specimens the greater part of the disc is bright orange-red, the anterior third and a broad outer margin golden. The elytral pattern consists of a double sutural stripe to which is joined, behind the anterior third, a short and heavy arcuate stripe; before the posterior third is a detached arcuate spot which represents the posterior branch of the complete arcuate stripe of *C. rhoda* and *C. scalaris;* the spots near the apex, which in *rhoda* are usually large and joined to the sutural stripe, are either obsolete or small and detached. The humeral lunule is short and very heavy, double to beyond the middle; it encloses a heavy, roughly lunate or rounded spot which is sometimes fused with it. There is a large spot on the outer margin near its middle; the spots upon the disc are small and vary in number from 3 to 8 upon each elytron, while in *rhoda* there are 10 or 11. The punctures limiting the elytral pattern are coarse and the markings are more or less convex. The punctuation of the disc is distinctly coarser than in *rhoda* and consequently the surface is uneven. The epipleura are pale with their outer margins ferruginous. The head and pronotum are alutaceous, but more shining than in *rhoda* and coarsely punctured. The punctures of the pronotum are rather sparse and those upon the disc but little finer than the ones at the sides; half-way down the sides is a depression with more or less confluent punctures and bounded by a more or less impunctate area. The claws are more divergent than in *rhoda.*

Length, 6.5 to 8.5 mm.

Food-plant unknown.

Localities: Montreal, Province of Quebec (6 June, 1899, 10 June, 1906, 23 June, 1907, G. Chagnon); Hamilton, Province of Ontario (from C. W. Leng); Massachusetts (from

J. D. Sherman, Jr.); New Britain (Knab), Bridgeport (June, 1895, Knab), Connecticut; Pennsylvania (National Museum collection).

Type—Catalogue No. 12572, U. S. National Museum.

Cotypes in the collections of the U. S. National Museum and of the author.

This species is of striking appearance on account of the reduction, both in number and size, of the discal spots of the elytra and in fresh specimens this is enhanced by the brilliant red discal color. It is even more robust in form than *rhoda*.

Calligrapha amelia, new species.

Closely related to *Calligrapha philadelphica* Linnæus. Form elongate-ovate, convex. Color of the body and elytral pattern dark blue-green, submetallic; the legs, antennæ and palpi ferruginous yellow; labrum, and the mandibles in part, ferruginous. Ground-color of the elytra white with slight creamy tinge and, in sexually mature specimens, with silvery luster. The elytral pattern is similar to *C. philadelphica*. The sutural stripe is very narrow, usually green but shading to ferruginous in some specimens. The subsutural stripe is broader, detached, and does not attain the apex; in some specimens it is abbreviated or interrupted posteriorly. Outside of the subsutural stripe, medianly, is a long arcuate stripe which is usually more or less broken in the middle. The humeral lunule is usually broken into four spots, of which the posterior oblique one is the largest; the spot enclosed by the lunule is rather large, rounded or roughly lunate. The spots upon the disc are heavy, more or less rounded, and about 12 to 15 in number upon each elytron. The punctures limiting the pattern are moderately coarse, the markings slightly convex; the punctuation of the disc is rather coarse and sparse. The epipleura are pale with ferruginous outer margin. The head and pronotum are obsoletely alutaceous, coarsely but not densely punctured; the punctures on the sides of the pronotum tend to form pits and those upon the disc are but little finer.

Length, 6.5 to 9 mm.

Food-plant: *Alnus rugosa* (Du Roi) K. Koch (*serrulata* Willd.).

Localities: Washington, D. C. (1 June, Hubbard and Schwarz, 20 May, 1906, Knab); Fort Washington (1 July, Hubbard and Schwarz), Hyattsville (27 August, Knab), Maryland; Pimmit Run (5 June, 1904, Knab), Glen Carlyn (30 May, 1906, Knab, 14 July, 1908, Heidemann), Great Falls (27 June, 1909, Knab), Virginia; White Sulphur Springs, West Virginia (A. Fenyes); New Jersey (J. B. Smith); Staten Island, New York.

Type—Catalogue No. 12573, U. S. National Museum.

Cotypes in the collections of the U. S. National Museum and of the author.

This species averages larger than *C. philadelphica;* it is a little more robust and the markings are heavier. The head and pronotum are shining blue-green, while in *philadelphica* they are distinctly alutaceous and the color is a duller brassy green. In *philadelphica* the inner lunule of the humerus is nearly always complete, gently arcuate and more slender; it encloses two widely separated slender spots and all the markings are more delicate.

C. amelia, in the imago and larva states, occurs exclusively upon the alder *(Alnus rugosa); C. philadelphica* lives only upon *Cornus* (*Cornus stolonifera* Michx., Massachusetts, G. Dimmock; *C. amomum* Mill., vicinity of Washington, D. C., Knab). In the vicinity of Washington these two species may often be found in close proximity upon their respective food-plants, a natural result of the habits of these two plants.

The writer is well aware of the extensive literature which deals with the species of the group to which the foregoing belong. However, until our knowledge is more complete, any attempt to handle this literature critically would only add to the existing confusion. Certain it is that the numerous misidentifications, not only of the beetles but of the food-plants as well, have made the subject a most complicated one.

NOTES ON MICROLEPIDOPTERA, WITH DESCRIPTIONS OF NEW NORTH AMERICAN SPECIES.

By August Busck.

Aristotelia placidella Zeller.

Gelechia placidella Zeller; Verh. Zoo.-Bot. Gesellsch. Wien, xxiv, p. 441; pl. 12, fig. 11, 1875.

Aristotelia natalella Busck; Proc. U. S. Nat. Mus., xxvii, p. 756, 1904.

Gelechia placidella Zeller, from Vancouver Island, has hitherto been overlooked and is mentioned neither in my Gelechiid revision nor in Dyar's List of North American Lepidoptera.

The type in Lord Walsingham's collection, which I have now examined, proves the above synonomy.

Sophronia roseicrinella, new species.

Second joint of labial palpi rosy white, exteriorly mottled transversely with fuscous; the well-developed brush dusky; terminal joint

white, strongly mottled with black and with black tip. Face white. Head and thorax mottled with fuscous. Fore wings with the rosy-white ground color strongly overlaid with brown and fuscous scales, especially on dorsal half and towards apex. On the middle of costa begins an outwardly strongly oblique, ill-defined, brown shade; at apical third is a narrow, strongly outwardly angulated, spear-formed fascia of unmottled rosy white, edged towards the base of the wing with dark scales: the apical third of the wing outside the fascia is neatly mottled with black on white ground and just before the sharp-pointed apex is a small black round dot. Hind wings whitish fuscous. Abdomen with the first joints velvety yellow above. Legs ochreous; tarsi blackish with narrow ochreous annulations.

Alar expanse: 15 mm.

Habitat—Kerrville, Texas. F. C. Pratt, collector.

Type—U. S. National Museum No. 12262.

This is the second species of the genus recorded from America; it is very distinct from and quite as pretty as *Sophronia primella* Busck, also described from Texas.

Anacampsis crescentifasciella Chambers.

Dyar, List North American Lepidoptera, No. 5703, 1903.

This species, which in collections has hitherto been represented by the unique type in the U. S. National Museum and some of Chambers's original specimens in the Cambridge Museum, was lately received from Mr. W. D. Pierce, who bred four specimens from *Krameria secundiflora* at Dallas and Victoria, Texas.

Gelechia lipatiella, new species.

Labial palpi, tongue, face, and head ochreous white. Antennæ blackish brown with narrow white annulations. Thorax blackish brown. Fore wings blackish brown with white markings; basal and dorsal parts lighter brown with a strong coppery sheen; at basal fourth is an outwardly oblique, white costal streak, which reaches beyond the fold, but not to the dorsal edge; at apical third of costa is an inwardly oblique white fascia of the same angle as, but in opposite direction from the first costal streak. Between these two white streaks is a nearly round, but not sharply defined, white spot just within the costal margin; on the extreme apex before the cilia are a few white scales. Abdomen blackish brown with white tip. Legs blackish brown with white annulations.

Alar expanse: 12 to 13 mm.

Habitat—Platte Canyon, Colorado, E. J. Oslar, collector.

Type—U. S. National Museum No. 12279.

A typical *Gelechia* of the black, white-marked group, intermediate between *arizonella* Busck and *bimaculella* Chambers, differing from the former in the dark thorax and from both in the smaller size and in details of the white ornamentation. The lighter brown and coppery color of the basal and dorsal parts of the wing is also an easy distinction.

Gelechia biforella, new species.

Labial palpi light ochreous, mottled with dark brown; brush on second joint rather short, furrowed. Antennæ light brown with black annulations. Face whitish ochreous. Head and thorax light ochreous brown. Fore wings with light ochreous scales, each tipped with dark brown, and with a purplish sheen; on the middle of the wing is a large oval transverse deep black spot, narrowly edged with ochreous; on the end of the cell is a similar but smaller and more circular black spot, also edged with light ochreous scales; base of costa is blackish and at apical third is a small ochreous costal spot.

Alar expanse: 6 mm.

The striking ornamentation of this species reminds one very much of *Telphusa glandifercella* Zeller.

Habitat—Cotulla, Texas, at light; J. C. Crawford, collector.

Type—U. S. National Museum No. 12263.

Dichomeris hirculella, new species.

Tuft on second joint of labial palpi long, pointed, blackish exteriorly, ochreous fuscous on the inner side; terminal joint ochreous. Face and head iridescent, light fuscous. Thorax and fore-wings ochreous fuscous, mottled with black scales and with larger irregular, blackish spots, of which two or three are found on the cell, one or two at the end of the cell, and five or six on apical fourth; around apical edge is an indistinct series of blackish dots, more or less confluent; cilia ochreous. Hind-wings opaque, light fuscous. Legs blackish fuscous; tarsal joints with narrow, ochreous annulations.

Alar expanse: 11 to 12 mm.

Habitat—East River, Connecticut; Chas. R. Ely, collector.

Type—U. S. National Museum No. 12264.

A small, obscure, narrow-winged species, nearest in form and color to *Dichomeris ligulella* Hübner, but smaller and without the transparent hind wings found in that species.

The name *Dichomeris* Hübner will take the place of *Ypsolophus* Fabricius. The contention of Mr. Durrant that Fabricius's idea of his genus *Ypsolophus* was equivalent to the genus *Cerostoma* of authors, while amply proven by him is further verified by the examination of Fabricius's type in the

Royal Museum in Copenhagen, which I had opportunity to study last year; there are found in their original order only six species under the genus *Ypsolophus* and all of these belong to *Cerostoma*.

Dichomeris delotella, new species.

Second joint of labial palpi with the well-developed, pointed tuft blackish brown exteriorly, ochreous fuscous on the inner side and with the apical edge whitish; terminal joint ochreous fuscous with black tip. Antennæ light ochreous with narrow black annulations. Head and thorax ochreous brown, sprinkled with fuscous. Fore-wings light ochreous brown, sprinkled with dark brown and black scales. There is a prominent, large, blackish-brown, triangular, dorsal dash at basal fourth, reaching oblilquely outwards more than half way across the wing; on the costal edge is a series of small blackish-brown dots, separated by light ochreous spaces; on the end of the cell is a small, indistinct, blackish-brown spot, edged by a few white scales; apical fourth of the wing is heavily overlaid with blackish brown, rather sharply limited from the lighter basal part of the wing; the extreme edge around apex is light ochreous with ill-defined blackish-brown marginal dashes. Hind-wings ochreous fuscous. Cilia a shade lighter. Abdomen dark fuscous. Legs blackish fuscous, with the tips of the tarsal joints and the tuft on posterior tibiæ ochreous.

Alar expanse: 14 to 15 mm.

Habitat—Baboquivari Mountains, Santa Rita Mountains, and Hot Springs, Arizona (E. A. Schwarz), May--June.

Type—U. S. National Museum No. 12265.

Most nearly related to *Dichomeris cupatoriella* Chambers, from which the pattern easily distinguishes it.

Dichomeris georgiella Walker.

Depressaria georgiella Walker, Cat. Lep. Het. Br. Mus., xxxv, p. 1827, 1866.

Trichotaphe georgiella Walsingham, Proc. Zool. Soc. London, p. 312, 1891; Busck, Proc. U. S. N. M. xxiv, p. 731, 1902; Busck, l. c., xxv, p. 916, 1903; Dyar, List N. Am. Lep., No. 5672, 1903.

Ypsolophus roscocostellus Walsingham, Trans. Am. Ent. Soc. Phil., x, p. 185, 1882; Busck, Proc. U. S. N. M., xxv, p. 916, 1903; Dyar, List N. Am. Lep., No. 5689, 1903.

As stated in my "Revision of the North American Gelechiidæ," 1903, Walker's *georgiella* was unknown to me at that time and was left in the genus *Trichotaphe*, where it had been placed by Lord Walsingham, though it was obvious from Walker's description of the labial palpi that it could not be a typical *Trichotaphe*.

I have since on two occasions examined Walker's type in the British Museum and found it to belong to the present genus and to be identical with *Dichomeris roseocostella* Walsingham.

While writing on this genus I might mention that I now regard the *malifoliella* of Fitch as but another synonym of *ligulella* Hübner and the hitherto unidentified *querciella* Chambers as a synonym of *ventrella* Fitch.

Dichomeris deflecta, new species.

Second joint of labial palpi white, sprinkled with light ochreous scales; terminal joint nearly pure white with the extreme tip black; the terminal joint in the type (female) before me is rather peculiarly deflected and appears as a continuation of the tuft on second joint, but I judge this is merely an accidental position assumed when the insect was killed. Tongue long, curled, scaled at base. Maxillary palpi distinct, short, simple, pointed. Antennæ light fuscous. Head and thorax white, sprinkled with light ochreous scales. Fore-wings elongate, pointed, termen slightly sinuate below the somewhat produced apex; the white ground color is heavily overlaid with light ochreous, fuscous, and blackish scales, the central part of the wing only being nearly unmottled; there is a large round, blackish, first discal spot and a small black dot at the end of the cell; the flexus is marked by a few black scales and the veins are indicated by longitudinal blackish-fuscous lines, which terminate in a series of apical spots along the edge of the wing. Hind-wings ochreous fuscous. Legs white; the anterior pairs strongly mottled with fuscous, the posterior scarcely so.

Alar expanse, 23 mm.

Habitat—Redington, Arizona.

Type—U. S. National Museum No. 12278.

A large light species, not mistakable for any other described American species of the genus, but reminding one in a general way of the much larger *Dorata lineata* Walsingham.

ETHMIIDÆ, new family.

In my "Revision of the American Oecophoridæ" (Proc. U.S. Nat. Mus., xxxv, p. 205, 1908) was suggested the necessity of recognizing *Ethmia* Hübner and allies as a family distinct from the Oecophoridæ, with which they have hitherto been classed. The family name was even proposed in the manuscript, but due to my absence in England at the time, it was left out in the final proof by a mistake, which is now corrected.

The main structural character by which this family may be distinguished from the Oecophoridæ is the proximity of vein 5 in the hind wings to vein 6 instead of to vein 4, as in Oecophoridæ, it being radial, not cubital; but the general habitus is

very different from that of the hitherto supposed allies and the genus *Ethmia* has no near relationship with *Depressaria,* which has been regarded as a derivative from it.

The genera *Azinis* Walker, *Tamarrha* Walker, and some other exotic genera belonging to this family differ from *Ethmia* only in secondary sexual characters of the males and must be included in that genus.

ELACHISTIDÆ, Authors.

The supposed family Elachistidæ as defined in Meyrick's Handbook of British Lepidoptera and in Dyar's List of North American Lepidoptera is found to comprise several groups, which have really no close relationship, and a complete rearrangement must be made.

The genus *Cycnodia* Herrich-Schaeffer,* of which *Mendesia* Joannis† and *Triboloneura* Walsingham‡ are in the writer's judgment synonyms reveals a highly developed type with nine veins in the hind wing, one more than is normally found. After vain efforts to explain the additional vein, termed by Abbé Joannis "7 *bis*" in some other way (as an acquired modern character, a secondary sexual splitting of vein 7), I am at last forced to accept it as a persisting primitive character, as my friend, Mr. J. Hartley Durrant, first suggested to me last summer.

Genera with this additional vein cannot have been derived from any modern genera with only 8 veins, but must be remains of a quite separate branch from early micropterygid ancestors, and such genera must hence logically be regarded as a separate superfamily, parallel with and systematically of equal value to all of the other modern microlepidoptera.

The name CYCNODIOIDEA may appropriately be utilized for this group, which may be of larger extent than at present realized, because the higher forms have attained very much the same characters and general habitus as the higher
the same characters and general habitus as the higherTINEOIDEA. The genera *Elachista* of authors (*Apheloscetia* Stephens, Walsingham); *Stephensia* Stainton; *Perittia* Stainton; *Scirptopda* Wocke; *Polymetis* Walsingham, and *Aphigalia* Dyar are direct derivations from *Cycnodia* and must consequently be included in this superfamily, though they have lost or at least partly lost the vein "7 *bis*"; some of these genera appear to be syn-

*Syst. Bearb. Schmett. Europe, v, p. 211, pl. XIII, fig. 13, 1885.

†Bull. Soc. Ent. France, LXXI, p. 230, 1902.

‡Ent. Mo. Mag., XIX, p. 54, 1908.

onyms. The exact relationship of the genera *Tinagma* Zeller, *Douglasia* Stainton, *Coelopoeta* Walsingham, and their allies is not apparent at present, but I expect they will eventually be proven to belong to the CYCNODIOIDEA.

I am under much obligation to Lord Walsingham and Mr. Durrant for type material of their genera in this group and to Abbé J. de Joannis, who has liberally sent me type material of his genus *Mendesia*.

The genus *Mompha* Hübner (Meyrick) (*Laverna* Curtis) forms the basis of another natural family, which according to Durrant* should be called Lavernidæ.

This comprises the bulk of the genera hitherto placed in the Elachistidæ, such as *Cosmopteryx* Hübner, *Stathmopoda* Stainton, *Anybia* Stainton, *Pancalia* Curtis, *Chrysoclista* Stainton, *Perimede* Chambers, *Ithome* Chambers, *Walshia* Clemens, *Stilbosis* Clemens, *Cyphopora* Herrich-Schaeffer, *Stagmotophora* Herrich-Schaeffer, *Blastodacna* Wocke (=*Leucophryne* Chambers), *Theisoa* Chambers, *Synalagma* Busck, *Erineda* Busck, and several others.

This family, which is related to the Gelechiidæ, Oecophoridæ, and Blastobasidæ and which is rather higher in the sequence than any of them, nearest to Gelechiidæ, is restricted to genera with long recurved, pointed palpi, with veins 7 and 8 in the fore wings stalked (or coincident) and with vein 7 to costa. A revision of the North American moths of this family is now under way.

A third group is formed by the genera *Scythris* Hübner (=*Arotrura* Walsingham=*Colinita* Busck), *Bryophaga* Ragonot, and *Apostibes* Walsingham. This group I include temporarily in the Plutellidæ, though it may eventually be recognized as a separate definable family; I do this with much hesitation, because my learned friend Mr. Edward Meyrick, in a recent letter, has expressed it as his opinion that the group is allied to and derived from the Oecophoridæ; but though the posterior tibiæ strongly suggest this family, I am unable to see how the pterogostic characters could have been derived from œcophorid stock. The real point of difference is probably our different interpretation of the veins in the fore wing; Mr. Meyrick regards vein 8 absent and vein 7 to costa, while the writer believes it one of the dorsal veins which is absent and consequently vein 7 to termen.

The genus *Colcophora* and its few true allies form a fourth group, which I believe we all agree is closely allied to and

*Ent. Mo. Mag., XLV, p. 51, 1909.

derived from the Plutellidæ, but which will eventually be recognized as a separate family. Whether the genus *Batrachedra* Stainton is as closely related to this group as is generally accepted may be open to some doubt; *Coleophora* can at least not be a derivative from *Batrachedra*, as suggested in Meyrick's Handbook, because *Batrachedra* has the more specialized venation of the two genera.

The writer wishes to acknowledge the large share of the credit which is due to Messrs. Edw. Meyrick and J. Hartley Durrant for any value there may be in the above suggestions; I have discussed the subject very thoroughly, in person and in letters, with both of them.

On the other hand, the writer must alone bear the responsibility for any errors in the conclusions. A large amount of work had to be done; even the purely mechanical part was no small item. Thus more than 250 slides of carefully denuded wings of species in these groups have been made, which constitute a valuable permanent basis for verification and further study of the subject.

Genus THEISOA Chambers.

Can. Ent., VI, p. 75, 1874.

Type—Theisoa bifasciella Chambers (=*Occophora constrictella* Zeller).

New synonym: Cacelice Busck, Journ. N. Y. Ent. Soc., X, p. 93, 1902.

Type—Cacelice permolestella Busck.

A critical study of the genera hitherto classed under the family name Elachistidæ proves the above synonomy; the writer has given a delineation of the characteristic venation (l. c., pl. XII, fig. 2). The two species at present included, *Theisoa constrictella* Zeller and *T. permolestella* Busck, are specifically quite distinct.

Genus ERINEDA, new.

Type—Erineda clycella Busck.

Labial palpi long, smooth, curved; second joint slightly thickened with appressed scales; terminal joint slender, pointed, shorter than second joint. Antennæ two-thirds, without pecten on basal joint, with long thin ciliation on the rest of the joints as in the genus *Stathmopoda*. Head with long hairlike scales, smoothly brushed down over the face and partly over the eyes; these scales are easily mistaken for pecten on the antennæ by superficial examination. Tongue short, spiraled. Maxillary palpi absent. Fore wings narrow, pointed, smooth, with 11 veins; vein 6 absent; vein 11 distant from base, approximate to 10; veins 7 and 8 stalked; 9 out of their stalk; 2 from before the end of the cell;

3, 4, and 5 equidistant from the end of the cell. Hind wings ½, narrow, lanceolate, with 8 veins, all free, though so closely approximated on account of the narrowness of the wing that veins 6 and 7 might as properly be said to be connate or stalked from a common origin; cell open between 5 and 6. Hind tibiæ smooth, with tufts of spines above the spurs. The hind legs are probably carried erect during rest and walking.

The genus is allied to *Stathmopoda* H.-Sch. (*pedella*, Linn.), which it closely resembles in general habitus as well as in the form of palpi and antennæ; the fore wings, however, are much less attenuated than in *Stathmopoda* and the venation easily distinguishes it.

Erineda elyella, new species.

Labial palpi and basal joint of antennæ golden yellow; rest of antennæ yellowish fuscous with narrow black annulations and with long (6) fine ciliation. Face, head, and thorax golden yellow. Fore wings shining bronzy fuscous, with a dorsal longitudinal streak of golden yellow from base to tornus. Hind wings light bronzy fuscous. Abdomen yellow. Forelegs dark fuscous; other legs yellow with fuscous joints.

Alar expanse, 11 mm.

Habitat—East River, Connecticut; Chas. R. Ely, collector.

Type—U. S. National Museum No. 12266.

An interesting addition to our known fauna, which I take pleasure in naming in honor of the collector.

Psacaphora passerella, new species.

Labial palpi long, recurved, rather thick, clothed with smoothly appressed scales, white with an ill-defined brown annulation at the end of the second joint. Face, head, and thorax silvery white. Antennæ brown. Basal half of the fore wings white, slightly overlaid with ocherous; extreme base of costa black; a small black costal streak at basal third and a small black dot near base on the middle of the wing; exterior half of the wing strongly overlaid with golden brown, edged towards the white basal half by a tuft of black raised scales near dorsal edge; another similar tuft is found near the dorsal edge at apical third; between these tufts is a short black costal streak and in the apical part of the wing is a small, longitudinal, central, black streak, on both sides of which the ground color shows through as a small costal and dorsal silvery spot. A transverse black line crosses the tip of the apical cilia. Basal two-thirds of the hind wings deep black, apical third fuscous. Legs white; tarsi annulated with black.

Alar expanse, 7 mm.

Habitat—East River, Connecticut; Chas. R. Ely, collector.

Type—U. S. National Museum No. 12267.

Venation as in the type of the genus; fore wings 12 veins; 7 and 8 stalked; 7 to costa; rest separate. Hind wings with 8 veins; 5 and 6 stalked; rest separate. Basal joint of antennæ with pecten.

To this genus belong the European *schrankella* Hübner, *terminella* Westwood, and *raschiella* Zeller. The American *Mompha engelella* Busck also falls in this genus, as indicated in the original description.

Psacaphora purpuriella, new species.

Labial palpi, head, and thorax dark shining purple; antennæ purple. Basal half of forewings uniformly dark shining purple. Apical half bright brick-red with a large purple spot in the middle and with a small white costal dash at apical fifth; cilia and extreme apex and tornus purplish black; the dark parts on the apical half of the wing have in some lights a strong metallic golden reflection. Hind wings purplish black. Abdomen and legs uniformly purplish black, with strong metallic reflection.

Alar expanse, 12 mm.

Habitat—Florissant, Colorado, "at flowers of *Argentina anserina* Linn.;" T. D. A. Cockerell, collector.

Type—U. S. National Museum No. 12268.

A brilliant insect, typical of the genus, with vein 3 and 4 in hind wing connate, as it is often found in specimens of the type of the genus.

Perimede particornella, new species.

Labial palpi bronzy fuscous. Face light bronzy fuscous. Antennæ dark bronzy, with apical third white. Head and thorax dark bronzy brown. Fore wings shining dark bronzy brown with three small dull black dots of slightly raised scales, one on the middle of the fold, one on the middle of the wing, and one at the end of the cell. Hind wings shining whitish fuscous; cilia ocherous fuscous. Abdomen ocherous fuscous; female with short, stout flattened horny ovipositor. Legs uniformly dark fuscous; tuft on hind tibia somewhat lighter.

Alar expanse, 12 mm.

Habitat—Washington, D. C., and Plummer's Island, Maryland; Busck, collector.

Type—U. S. National Museum No. 12269.

Typical of the genus; easily recognized by the shining fore wings and the white-tipped antennæ.

Heliodines metallicella, new species.

Palpi and head dark steel gray with strong bluish metallic reflections. Thorax dark metallic blue. Fore wings deep orange-red; base of the

wing and patagium light steel-gray; before the middle of the wing is a straight perpendicular light steel-gray fascia, bordered on both sides with black scales; apical third of the wing light steel-gray, edged basally with a narrow line of black scales; the apical metallic gray color reaches along the dorsal edge to the middle of the wing. First abdominal segments bluish black; rest of abdomen deep orange-red; extreme tip black. Legs bluish black.

Alar expanse, 8.5 mm

Habitat—Williams, Arizona; H. S. Barber, collector.

Type—U. S. National Museum No. 12270.

A remarkably fine species, typical of the genus in oral and pterogostic characters, but at once distinguished from all described American species of the genus by its complete transverse fascia.

Scythris eburnea Walsingham.

Arotrura eburnea Walsingham, Insect Life, I, p. 116, fig. 22, 1888.
Arotura eburnea Dyar, List N. Am. Lep., No. 6173, 1903.
Holcocera arizonella Kearfott, Can. Ent., XXXIX, p. 8, 1907.
Colinita arizonella Busck, Journ. N. Y. Ent. Soc., XV, p. 140, 1907.

Lord Walsingham and Mr. Durrant have already published* the generic synonomy indicated above, as worked out during my stay at Merton Hall last year. By fixing *chenopodiella* Hübner as type of *Scythris*, *Arotrura* Walsingham and *Colinita* Busck became synonyms of that genus. The specific identity of *Arotrura eburnea* and *Holcocera arizonella* Kearfott did not occur to me in 1907, but is at once established by the examination of the types.

Allononyma vicarialis Zeller.

Simaethis vicarialis Zeller, Verh. Zoo.-Bot. Gesell. Wien, XXV, p. 322, 1875.
Hemerophila vicarialis Busck, Journ. N. Y. Ent. Soc., VIII, p. 243, 1900; Dyar, List N. Am. Lep., No. 5530, 1903.
Orchemia diana var. *betuliperda* Dyar, Proc. U. S. N. M., XXV, p. 403, 1902; List N. Am. Lep., No. 5537 *a*, 1903.
Allononyma diana var. *betuliperda* Busck, Proc. U. S. N. M., XXVII, p. 746, 1904.

Examination of Zeller's type in Lord Walsingham's collection proves the above synonomy.

*Ent. Mo. Mag. XLII, p. 46 and 52, 1909.

LOTISMA, new genus.

Type—Sciaphila trigonana Walsingham (Dyar's List N. Am. Lep., No. 5413).

Tongue very long, spiraled. Labial palpi long, rather straight, upturned, reaching vertex; second joint very long, roughly thickened with loose scales towards apex; third joint short, thick, smooth with apex obtuse. Face and head with smoothly appressed scales. Fore wings about three times as long as broad; costa nearly straight, but slightly deflexed at the pointed apex; termen straight and oblique; dorsum straight; 12 veins, all separate; internal vein from between 10 and 11 to between 8 and 9; 7 to below apex; 3, 4, and 5 from the end of the cell; 2 from apical fifth of the cell; 1*b* furcate at base; 1*c* distinct. Hind wings wider than the fore wings, with straight costa and rounded tornus; 8 veins; 3 and 4 short-stalked; 6 and 7 parallel; 5 radial, nearest 6. Posterior tibiæ smooth.

The genus much resembles *Hemerophila*, but has more thickened palpi and differs in the position of the internal vein in the fore wing and of vein 5 in the hind wing.

The type species, described as a tortricid by Lord Walsingham, was redescribed by the writer as *Hemerophila kincaidella* (Proc. U. S. Nat. Mus., XXVII, p. 746, 1904).

Olethreutes albiciliana Fernald.

Miss Cora H. Clarke, of Boston, who for many years has made interesting contributions to life histories of insects and to whom the writer is under obligation for several valuable biological notes, notably the life history of the new genus and species *Ectoedemia populella*,* sent me last fall stalks of the common "touch-me-not" (*Impatiens*) containing larvæ of a tortricid, which this spring proved to be the above pretty species.

Miss Clark observed the larva during summer, and in September collected them in abundance at Magnolia, Mass.

The larva lives in the hollow stalk and in the succulent pith in the swelled joints; it overwinters as larva and towards spring gnaws a small circular hole in the stalk near a joint, leaving only the extreme epidermis intact as a semitransparent port hole; just inside this it spins a few threads of silk and pupates with its head toward the window, through which eventually the imago issues. In the insectary the first moth issued the latter part of April.

The writer has observed larvæ with similar habits in *Impa-*

*Busck, Proc. Ent. Soc., Wash., VIII, p. 97-99, 1907.

tiens on Plummer's Island, Maryland, but has not yet had opportunity to breed the moths.

Hemimene plummeriana, Busck.

Proc. Biol. Soc. Wash., XIX, p. 181, 1906.

This interesting little species has been bred at the type locality (Plummer's Island, Maryland), by Mr. E. A. Schwarz from the flowers of pawpaw *(Asiminia triloba)*. The larvæ are short, thickset, purplish or greenish white, with light-brown head and brown divided cervical shield. The adults issued May 16.

This is an unusual food plant for the genus *Hemimene (Dichrorampha)*, which has been supposed to be confined to the Compositæ.

CAMERARIA Chapman.

The Entomologist, XXXV, p. 141, 1902.

Type—Lithocolletis guttifinitella Clemens.

Miss Annette Braun's "Revision of the American species of *Lithocolletis*"* is a very valuable addition to the literature on American microlepidoptera, and the author deserves great credit for her careful work, and especially for the excellent plates, which are a great help in the identification of the many closely allied species of this group. The generic arrangement, however, shows some lack of logic and cannot be maintained.

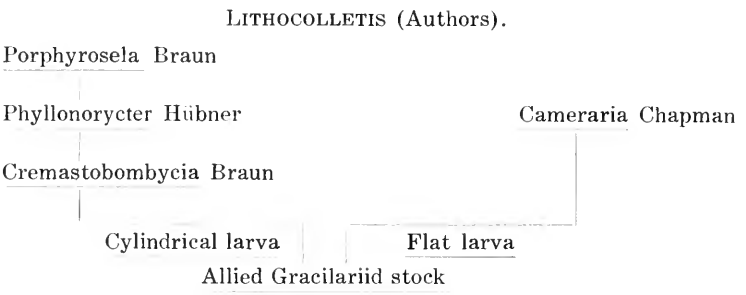
The genus *Lithocolletis*, as understood in Dyar's List of North American Lepidoptera and by the earlier American workers on the group, consists, as repeatedly pointed out by Clemens and Chambers, of two main divisions—the cylindrical-larva group and the flat-larva group. These two branches have developed parallel from gracilariid stock, probably not from the same but from nearly allied origin. There can clearly not have been any crossings between these two branches of development since the first separation; neither could one have been developed from the other.

That the imaginal characters are structurally identical could be expected; they started alike and have had the same conditions to meet; but each group has retained its typical larval development, its typical feeding habits, its peculiar cocoons, and its typical coloration. In any of the stages it can at a glance be decided to which of the two groups a given species belongs.

In the one of these main branches of the phylogenic tree a

*Trans. Am. Ent. Soc., XXXIV, p. 269-357, pls. XX-XXIV, 1908.

few species have not reached as far as the majority in the development towards the *Lithocolletis* ideal; they have retained a small unessential vein from the ancestral type, which the main body of species have lost; and a single species is slightly in advance over the main body by having lost an extra vein. Thus we have:



It may be that these subdivisions of the cylindrical-larva group are worthy of subgeneric rank; I consider the differences too trivial for generic use. It would be logical to include all the species of both groups in one genus; this at least would be a natural group; but to erect subgenera for two of the subdivisions of the one main branch and then include the other main branch in the third subdivision is obviously unscientific.

The best way is to recognize the two easily defined main divisions of the group as good genera, for which the names *Phyllonorycter* Hübner* (type, *rajella* Linné) and *Cameraria* Chapman† (type, *guttifinitella* Clemens) must be used.

I have treated this comparatively unimportant case in some detail, because it elucidates similar cases of much more far-reaching consequences, in which I think the present classification of the microlepidoptera weak, or rather, unnatural.

We have been doing our classification too much horizontally, so to say—any twig on the entire phylogenic tree which has reached a certain type of imaginal structure has been placed in such or such a genus or family without sufficient regard for its origin. This does not produce a natural system.

In the above diagramatic phylogenic tree it is of course the easiest to say that everything which has reached a certain level *A* is to be considered a systematic entity and that what

*Hübner, Tentamen, 1806.

†The Entomologist, xxxv, p. 141, 1902.

reaches to the level *B* is another family or subfamily, as the characters may warrant, irrespective of whether it originated from main branch *I*, *II*, or *III*.

But such a system would be purely mechanical and not according to nature's own divisions. And while we with our limited powers of observation are forced to adopt to some extent some mechanical arrangement in order to get any classification at all, it is manifestly obligatory, when we can trace the phylogeny and realize the true natural lines, that we utilize such knowledge and not continue our temporary mechanical system, merely because it is easier.

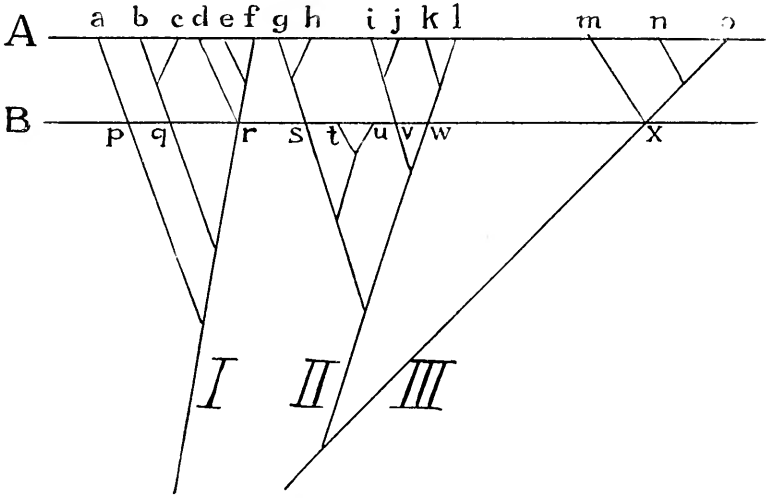


FIG. 5.—Diagrammatic phylogenic tree.

Thus in the above illustration it is clearly correct to place the species (or genera) *a*, *b*, *c*, *d*, *e*, and *f* in the same family or genus *A* as their common characters may warrant, but in this family must not be placed *g*, *h*, *i*, ... to *o*.

Likewise it may be proper to include *s*, *t*, *u*, *v*, *w*, and even *x*, in one systematic entity (*B*) of whatever rank the characters may warrant, but *p*, *q*, and *r* will have to be considered separately, although they may have developed similar characters.

And while *e*, *f*, and *g* may look enough alike to tempt putting them all in one group, *e* and *f* are first cousins and therefore justly placed together, but *f* and *g* have their common ancestors far back in ancient history and have attained similar characters on entirely independent lines.

There are several such cases in our present classification. Miss Braun's treatment of the *Lithocolletis* group is a case in point, but a very striking example is the superfamily CYCNODIOIDEA, mentioned above (p. 92), which has been classed as a part of the family Elachistidæ. The discovery of the 9-veined genera throws an entirely new light over the group and proves that it has really nothing whatever to do with the forms with which it has hitherto been associated and to which it is embarrassingly alike in structure.

Lithocolletis ostensackenella Fitch (*ornatella* Chambers). Miss Braun has included this in the cylindrical-larva group, to which the pattern of the imago would refer it, but the larva plainly separates it therefrom and the making of the cocoon outside of the mine is heterogenical to both groups. The species is probably best referred temporarily to the genus *Leucanthiza* Clemens, to which it is clearly closely related, in spite of the slight difference in venation.

Gracilaria elotella, new species.

Labial palpi white, second joint dark fuscous exteriorly; maxillary palpi white on the inner side, fuscous exteriorly. Antennæ white, annulated with brown. Face, head, and thorax shining silvery white. Fore wing white with golden-brown and black markings; at the base of the wing is a brown costal spot; on the middle of the wing is a golden-brown transverse fascia, broader on the costal edge than on the dorsal and edged posteriorly by a sharp black, somewhat angulated line; at apical third is an outwardly strongly oblique fascia attenuated towards dorsum and edged posteriorly with black and a similar fascia also edged with black, but hardly so oblique is situated between this and the tip of the wing. Across the cilia and the extreme tip of the wing is a transverse streak of mixed brown and black. Fore and middle legs with swollen black femora and white tarsi. Hind legs white, shaded externally with brown; tibiæ smooth.

Altar expanse: 6 to 7 mm.

Habitat—East River, Connecticut; Chas. R. Ely, collector.

Type—U. S. National Museum, No. 12271.

Nearest to *Gracilaria fulgidella* Clemens, from which it differs by the white basal half of the fore wings, broken only by the costal basal spot.

Tisheria albostraminea Walsingham.

Proc. U. S. Nat. Mus., XXXIII, p. 224, 1907.

This species, which was described from a unique specimen (U. S. N. M. type No. 10356) collected by Mr. Beutenmüller

in New York, has long been known to me in nature and the recording of its food plant will materially aid in its future recognition.

The larva makes a small, very pale straw-colored upper mine in leaves of oak around Washington. The mine is normally placed at the edge of the leaf and frequently causes the edge to bend over in a small fold.

The species has several generations in this vicinity; the first mines collected in early April, 1900, produced moth the same month and others were bred in July and August.

Dyotopasta yumaella Kearfott.

Plutella yumaella Kearfott, Can. Ent., XXXIX, p. 6, 1907.

Dyotopasta yumaella Busck, Journ. N. Y. Ent. Soc., XV, p. 140, 1907; Proc. U. S. N. M., XXXIII, p. 227, 1907.

Pseudoxylesthia angustella Walsingham, Proc. U. S. N. M., XXXIII, p. 226, 1907.

The above names apply to the same species. The unique female specimen on which Lord Walsingham founded his genus *Pseudoxylesthia* had lost its head and had through a mistake of the preparator been supplied with a head of quite a different insect, as we discovered on closer examination at Merton Hall last summer. This accounts for the discrepancies between the generic descriptions.

Tinagma obscurofasciella Chambers.

Douglasia obscurofasciella Chambers, Journ. Cinn. Soc. Nat. Hist., III, p. 291, 1880; Dyar, List North Amer. Lepidoptera, No. 6172, 1903.

Tinagma crenulellum Engel, Entom. News, XVIII, p. 279, 1907.

The writer must take the blame for the fact that Mr. H. Engel redescribed this species and thus created a synonym. *Douglasia obscurofasciella* was at the time not recognized, but there can be no doubt that the two names apply to the same species, which is congeneric with and specifically very close to *Tinagma perdicellum* Zeller, of Europe. Chambers gave a very good drawing of the unique venation of this genus.

DESCRIPTION OF AN UNIDENTIFIED NOTODONTIAN LARVA.

[Lepidoptera, Notodontidæ.]

By Harrison G. Dyar.

The following-described larva is supposed to be that of *Schizura apicalis* Grote and Robinson, but the adults were not bred. They were found feeding on the leaves of the low-bush blueberry in an open field at Lincolnville, Maine, August 15, 1908, being at that time fully grown.

Larva.—Head elliptical, much higher than wide, scarcely exceeding joint 2, but separated by an incisure; flattened before. Clypeus less than half as high as the head, triangular. Smooth, shagreened, green, broadly whitish purple over the face above. The purple is mottled with green towards the median suture and there is a little patch of purple mottling on the side, above and behind the ocelli. Width, 2.5 mm. Body robust, compressed, sloping up from joint 2 to joint 5 slightly, joints 5 and 12 slightly humped, their tubercles *i* forming high, shining brown cones, approximated dorsally; all the other tubercles minute, except those on joint 2, which are perceptible, but concolorous and not elevated. Setæ rather long, black. Anal feet elevated, divergent, rather long. Green mottled with whitish, which forms a tessellated pattern on the dorsum of joints 6 to 12. A narrow whitish-purple band dorsally on joints 2 to 5; joint 5 all purple except brokenly posteriorly dorsally; a white straight lateral stripe along tubercles *iii* on joints 5 to 12, below which oblique purple shades to the feet cover most of the subventral space; a small dorsal purple patch on joint 11 joins joint 12, which is more or less completely purple shaded to the feet, joining the subventral purple area; the purple extends in a dorsal band onto joint 12; the anal feet are darker purple. Small purple patches at bases of the thoracic feet, which are pale. The green color is mottled with white and dotted with purplish. In one specimen there was considerable dorsal purple shading on joint 6. The purple is darker around the spiracle of joint 5. There is a faint green dorsal line, defined by the white mottlings, which are also cut obliquely by green subdorsally. Tubercle *ii* of joint 5 is whitish.

The larvæ entered earth and spun thin cocoons. They pupated in the fall, but died over winter.

Actual date of issue, August 31, 1909.

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PROCEEDINGS OF THE
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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF WASHINGTON.

VOL. XI JULY-SEPTEMBER, 1909 No. 3

MEETING OF MAY 13, 1909.

The 231st meeting of the Society was entertained by Dr. Gill at the Saengerbund Hall, 314 C Street N.W., on the evening of May 13, 1909, with the President in the chair and the following present: Messrs. Barber, Caudell, Clemons, Crawford, Davis, Dyar, Gill, Heidemann, Hooker, Hopkins, Knab, Lawford, Phillips, Popenoe, Quaintance, Sasscer, Schwarz, Smythe, Ulke, and Viereck, members, and Messrs. McCray and Wall, visitors.

The minutes of the previous meeting were read and approved.

Messrs. W. L. McAtee, A. H. McCray, and D. L. Van Dine, of the U. S. Department of Agriculture, were elected active members of the Society.

A communication from the Washington Academy of Sciences with reference to the movement now on foot to secure funds for the erection of a building for the use of the local scientific societies was read and on motion of Dr. Hopkins the President was authorized to appoint a committee to aid the project.

—The first paper of the evening, "Remarks on Certain Orange Aleyrodids, with Description of a New Genus,"* by Mr. A. L. Quaintance, was discussed by Messrs. Schwarz, Gill, and Hopkins.

—Mr. Schwarz then presented a paper on a saw-fly injurious to willows and exhibited numerous photographs by Mr. Barber in this connection.

*Withdrawn for publication elsewhere.

ILLUSTRATIONS OF THE LIFE HISTORY OF A SAW-FLY (HYLOTOMA PECTORALIS LEACH) INJURIOUS TO WILLOWS.

[Hymenoptera, Tenthridinidæ.]

By E. A. Schwarz.

During the latter part of August, 1906, it was noticed that the willows on the Potomac River about 10 miles above Washington were utterly defoliated by some insect, apparently not a single tree escaping the injury. No observations on the insects were made during that year, but in the following year we found that a certain percentage of the defoliated willows, roots and all, were killed, while many other trees were killed above ground in that year and the defoliation was again a complete one. We were prevented from visiting the locality until the latter part of August, when it was ascertained that the author of the mischief had been the larva of a saw-fly. At that date the insect had disappeared, and on September 2 a party of Washington entomologists made a determined effort to find its cocoons. None were found under the defoliated trees, but a few were obtained in the more elevated ground. These were kept in breeding cages over winter, but, as is usually the case in trying to breed saw-fly cocoons, they never hatched.

In the month of April, 1908, there occurred two freshets in the Potomac River of considerable magnitude, and early in the month of May a place was found, Plummer's Island, where many thousands of the cocoons (pl. IX, fig. 9) had been washed up by the high water. Cocoons from this place were taken back to Washington and from them quite a number of the imago saw-flies were obtained in our rooms during the last week of May. On May 29 the first specimens were seen to emerge at the place on Plummer's Island just mentioned, the saw-flies apparently copulating immediately after issuing on the low plants that grow on that place. On May 30 the first eggs were observed by us, and the female saw-flies were watched in the act of oviposition. The issuing of the saw-flies from their cocoons and the oviposition extended from that date to the first week in July.

In ovipositing the female saw-fly at first carefully explores the surface of the willow leaf, then commencing at the tip of the leaf and proceeding toward the base (pl. VIII, fig. 1), inserts its eggs at regular intervals in the edge of the leaf. It takes about one minute for the saw-fly to oviposit one egg. When one side of the leaf has been furnished with eggs, the saw-fly returns to the tip of the leaf and lays eggs on the other side of the leaf. The number of eggs (pl. VIII, figs. 2-3) laid in one leaf

varies considerably. We counted more than 60 in one leaf. They are at first not easily visible unless the leaf is held against the light, but gradually the color of the leaf tissue which surrounds the eggs becomes more or less brownish, when the eggs can be seen without difficulty. A fortnight later the first larvæ were seen. No observations were made on the number of molts or of the development of the larvæ, because, as stated above, the oviposition extended more than two months and there were always small and large larvæ to be found on the same branch of the willows. In the beginning of August the full-grown larvæ (pl. VIII, fig. 5) were seen to drop to the ground and to crawl off in search of a place for pupation, which was never on the low ground where the willow trees grow, but on the slope of the higher ground well above the height of a moderate freshet. However, in this year comparatively few of the larvæ reached full maturity. There were many of them starved to death in places where a complete defoliation had taken place. Countless others were killed by what we consider as a fungoid insect disease, so that their dead bodies lying on the ground or hanging on the trees made a very unpleasant stench.

Some observations were made on two species of parasites. From numerous leaves beset with eggs which were collected in the first week of June we obtained in our breeding jars a large number of an egg parasite which seems to be undescribed, and cannot at present be referred to by name. According to Mr. Crawford it belongs to the Tetrastichidæ. We never observed in the field the issuing of these parasites from the eggs, nor did we ever see in the field a single specimen, but from the fact that we bred the same egg parasite from eggs collected in the latter part of June and the early part of July, it must be concluded that the parasite is able to undergo two generations in the eggs of a single generation of the host.

A second parasite, which has been named by Mr. Crawford as *Testrastichus hylotomæ*, was first observed by us issuing in great numbers from the cocoons found in the ground. The imago parasite was seen frequently by us in July, flying singly around behind the saw-fly larvæ. The latter manifestly were aware of the proximity of an enemy, and were moving their abdomens in the air in the fashion of many other saw-flies, trying to frighten off the parasite. In this case it is evident that this particular species of parasites hibernates in the body of the saw-flies and issues only the next spring. Of other enemies only a single species of a Pentatomid was observed to suck the half-grown saw-fly larvæ.

The saw-fly under consideration (pl. VIII, fig. 4) agrees perfectly well with specimens named in the U. S. National Museum

collection as *Hylotoma pectoralis* Leach, and its larvæ (pl. VIII, fig. 5) also agree with specimens preserved in the National collection. There may be, however, some doubt as to the correct determination, since the only records we have on the food habits of the saw-flies are not in accord with those recorded here. Rev. Thomas W. Fyles, in the Canadian Entomologist (1886, vol. 18, p. 38), has noticed these larvæ in great numbers feeding on the white birch in the vicinity of Quebec during the month of September, Mr. John George Jack (Psyche, vol. 6, 1891, p. 10) bred the saw-fly from larvæ found the previous summer feeding on the foliage of *Betula alba* in the Arnold Arboretum at Jamaica Plain, Mass. and Dr. Dyar (Can. Ent., vol. 27, p. 210, 1895) found them on *Betula lenta* at Wood's Hole, Mass., and on *Betula papyrifera* at Keene Valley, N. Y. Near Washington, D. C., is a species feeding exclusively on the black willow (*Salix nigra*), leaving intact every other species of willow and never being found on the only species of birch (*Betula nigra*) that occurs on the banks of the Potomac. The full extent of the injury is not known to us. Mr. H. S. Barber traced the injury along the banks of the river from near Washington up to Seneca, a distance of about 22 miles. All the willows growing on the more elevated ground were left intact.

The accompanying series of photographs were made by H. S. Barber.

EXPLANATION OF PLATES.

PLATE VII.

Hylotoma pectoralis: Willows defoliated by the larvæ.

PLATE VIII.

Hylotoma pectoralis:

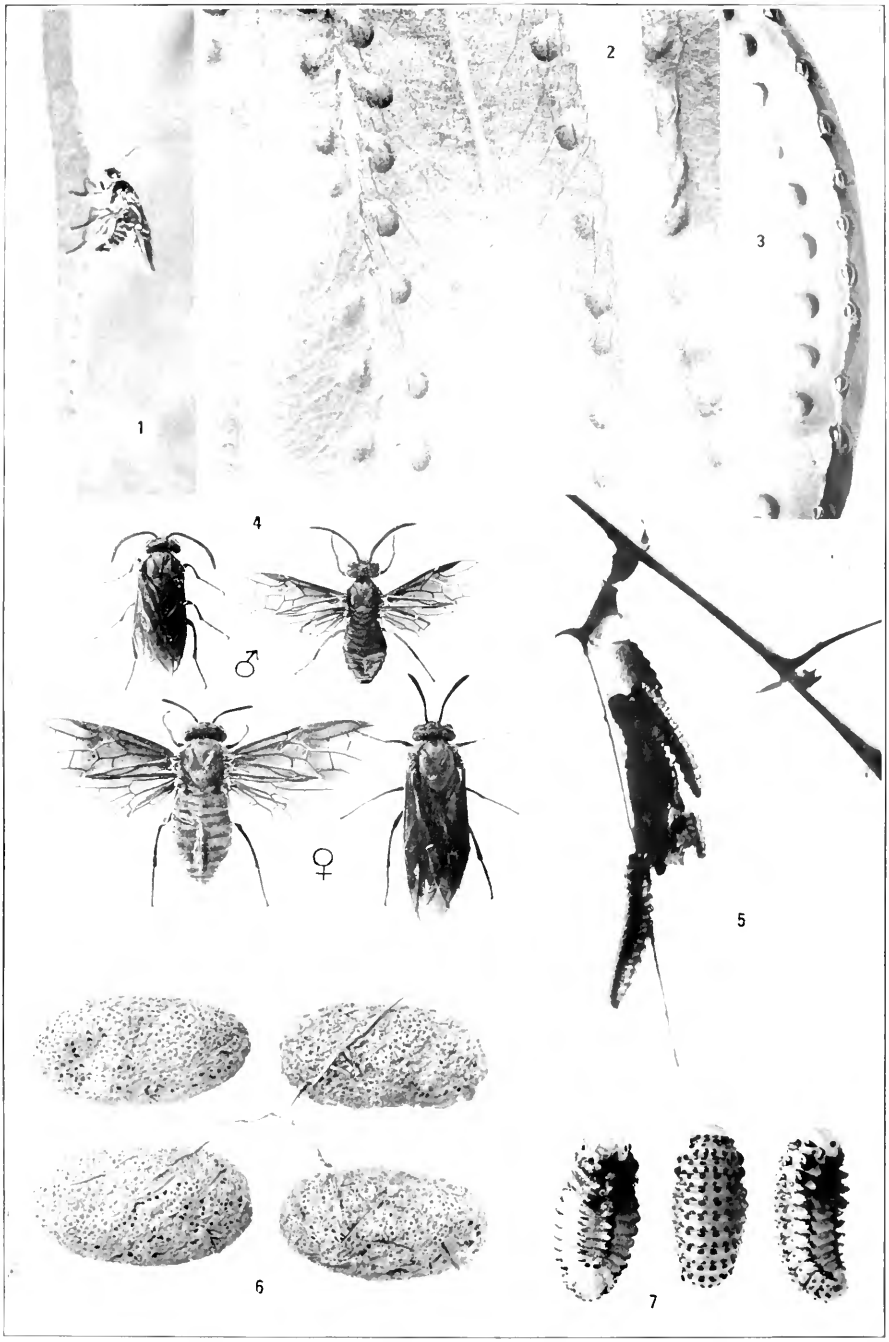
1. Female ovipositing.
2. Eggs just laid.
3. Eggs nearly ready to hatch.
4. Imagos, male and female.
5. Full-grown larvæ.
6. Cocoons.
7. Dormant larvæ from cocoons.

PLATE IX.

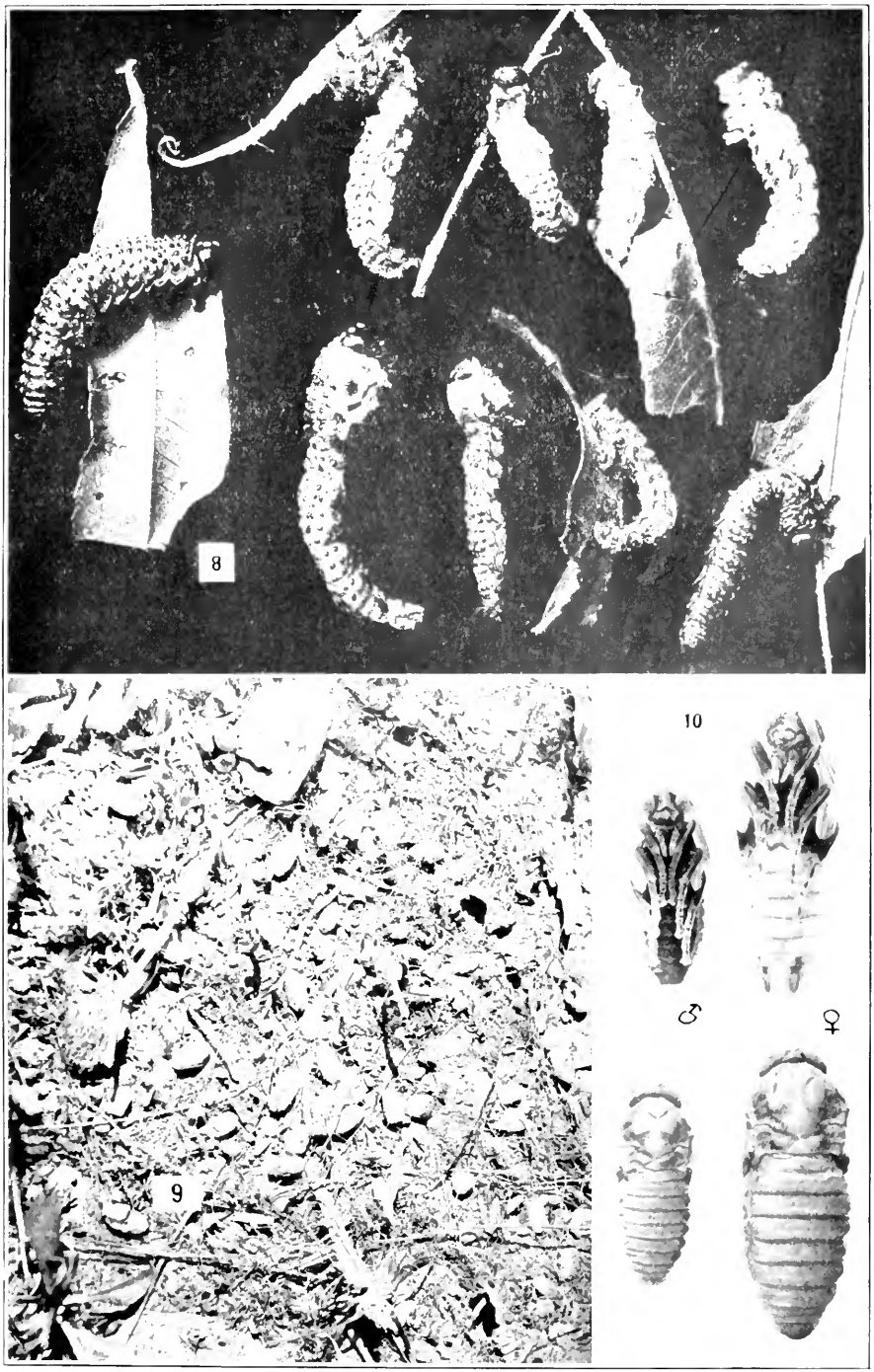
Hylotoma pectoralis:

8. Larvæ destroyed by fungus.
9. Cocoons upon the ground.
10. Pupæ, male and female, dorsal and ventral views.

PUPA OF TENEBRIO MOLITOR, PARASITIZED BY LARVAE OF HELOTOMA PECTORALIS LEACH.



HYLOTOMA PECTORALIS LEACH.



LARVAE, PUPARIA, AND PUPAE OF HYLOTOMA PECTORALIS

Dr. Dyar stated that while the larvæ of the species of *Hylotoma* were distinct, the adults were hard to distinguish, and referred to an article by himself (Journ. N. Y. Ent. Soc., v. 18, 1897), in which five different types of *Hylotoma* larvæ produced a jumble of different adults. Further study of the species is badly needed.

Dr. Hopkins thought that this species might become a serious pest, especially if it should work on other species of willow, such as the basket willow.

—Mr. Hooker presented the following paper:

NOTE ON AN EXTRA NYMPHAL MOLT OF ARGAS MINIATUS.

[Acarina, Argasidæ.]

By W. A. Hooker.

As an introduction to the observation which I wish to record, a brief account should be given of the molting habits of the ticks. As is generally known by entomologists, in order to develop it is necessary for ticks to engorge blood. Immature ticks molt following each meal of blood. *Ornithodoros savignyi* and *O. moubata*, two African species, the latter of which transmits human tick fever, are exceptions, however, as both are inactive in the larval stage and pass the first molt before ingesting blood. While there is no evidence that ticks develop through feeding upon plant juices, as do some of their near relatives, the possibility of which has even recently been considered by one investigator, it is undoubtedly true that they (at least the Ixodid ticks) imbibe more or less moisture. With the exception of *Ornithodoros megnini*, it appears to be necessary in order to oviposit that blood be engorged following the last nymphal molt.

While the Ixodid ticks pass but two molts (larval and nymphal) during their life, there appears to be a difference in the number passed by the Argasids. In the genus *Ornithodoros*, while *megnini* passes but two molts before arriving at the adult stage and none afterwards, *savignyi* and *moubata* appear to have three or more, and the latter is reported to continue molting as an adult. Whether there is a variation in the number of nymphal molts in each of these two latter species, however, does not appear to have been determined. The species of the

genus *Argas* have generally been supposed to pass three ecdyses before arriving at the sexually mature stage. This has been reported by Lounsbury to be the case with *Argas persicus*, the South African fowl tick, the habits of which appear to be identical with those of our fowl tick, *Argas miniatus*. The structure of these two species is so much alike that Nuttall and Warburton, in their recent monograph of the Argasidæ, have considered *miniatus* a synonym of *persicus*. *In breeding experiments with miniatus I have found that something like one-fourth of the individuals bred to maturity, under similar conditions, have an extra or third nymphal ecdysis, making a total of four ecdyses during their life.* This is not a sexual variation, as both males and females were among those which molted a fourth time before the external sexual characters appeared. Neither is it due to a difference in the food supply, as all of the ticks were well engorged, nor to climatic conditions, since it occurred under exactly the same conditions as were furnished the other ticks. It has occurred in broods bred during the fall and winter and during summer. The engorgement of blood, in each instar, before the following ecdysis can take place, necessitates an exposure to the danger of discovery by the fowl, mouse, or other enemy, or to injury in other ways. It thus appears that the three-molt habit is most advantageous, since but four instead of five engorgements are necessary before reproduction can commence. A much greater advantage is gained than is at first apparent, since it is in the more mature stages that the exposure to danger in the search for the host is greatest. These three-molt ticks may perhaps be considered as descendants from a mutant which, through the process of natural selection, have now come to predominate. On page 121 of Volume III of the Proceedings of this Society, Dr. C. V. Riley states that he knew a specimen of *Argas reflexus* to remain alive in a corked vial without food for some five years, molting repeatedly during the period. The statement, however, both as to the period of longevity and number of molts, still remains to be substantiated.

It is well known that in some insects the number of molts may vary, an excessive number at times being due to some physical cause, such as a lack of food combined with low temperature or to a partial starvation. This has been considered by Packard as due to the hypodermal cells retaining their activity. Packard has reviewed the literature on the number of molts in insects in his Textbook of Entomology, pages 615-618, but cites no case in which a variation occurs when similar amounts of food and climatic conditions are supplied.

Dr. Dyar said that in Lepidoptera there was quite a variation in the number of molts, and that if food was scarce the larvæ had more molts. He was of the opinion that cases occurred in the Lepidoptera similar to the one cited by Mr. Hooker, in which the number of molts occasionally varied under apparently similar conditions. Such an occurrence, however, is rather unusual.

Mr. Schwarz called attention to the fact that in one of the past volumes of Proceedings of this Society, note was made of a dermestid which lived on for years and continued to molt when deprived of food.

—Mr. Caudell presented the following paper:

MISCELLANEOUS NOTES ON ORTHOPTERA.

By A. N. Caudell.

A genus with more than one originally included species, none of which have been designated as type, can be referred in part here and in part there, but when a type species is once designated the genus is given entity and must thereafter follow its type. Kirby refers *Phasma crawangense* Haan to his genus *Phasgania*. But *crawangense* is the selected type of *Dixippus* Stål and thus *Phasgania* must be placed in synonymy under that genus, which has priority. *Dixippus* is therefore resurrected from the synonymy under *Lonchodes* Gray, and under it is to be listed the species recorded in Kirby's catalogue under *Phasgania*.

Phasma graveolens King* is eligible to citation in catalogues in synonymy under *Anisomorpha buprestoides* Stoll.

Some time ago I showed the generic name *Phyllodromia* Serv. to be preoccupied by the earlier dipterous genus of the same spelling, and replaced Serville's name by the new generic name *Blattella*. This action has been almost generally accepted, but two noted English writers have not done so. As the reason for this one of the writers, Mr. Kirby of the British Museum, wrote me that he was not sure but that *Liosilpha* Stål was available for use in this connection and, until time permitted

*Proc. Ent. Soc. Lond., 1867, p. LXXX (1867).

the settling of the point, he had thought best to use the Servillean genus with both *Liosilpha* and *Blattella* cited in synonymy. The other writer not accepting the change, Mr. Shelford, of the Oxford Museum, who is a specialist on the Blattidæ, writes as follows: "I note that you use *Blattella* for *Phyllodromia* Auct. What is wrong with *Liosilpha* Stål? Personally I stick to *Phyllodromia* and will do so until dipterists make use of it, which they don't do at present." Recently* Mr. Shelford examined *pumicata*, the type of *Liosilpha*, and found it not to be congeneric with *germanica*, the type of *Phyllodromia*. He thus proves *Liosilpha* unavailable for use in the place of *Phyllodromia*, but he still uses Serville's name, ignoring *Blattella*. This stand, which is in accordance with the nomenclatorial views expressed in the above extract, seems indefensible, and it is to be deplored that so able an entomologist should so arbitrarily set aside priority, the cornerstone of systematic science. *Phyllodromia* Zetterstedt, the dipterous genus of 1837, preoccupies *Phyllodromia* Serville, the orthopterous genus of 1839, no matter if the earlier name is in present use or not. Therefore, the replacing genus *Blattella* should be used in conformity with the laws of nomenclature.

Ceratinoptera castanea Shelford (Sjöstedt's Exp. Kil. Meru, etc., 17, Orth., 2 Blatt., 22, 23, 1907), is preoccupied by *Ceratinoptera castanea* Brunner (Syst. Blatt., p. 77, 1865). In view of Mr. Shelford's knowledge of the Blattidæ it seems inconceivable that this preoccupation is unknown to him. It is probably intentional on his part and in full accord with his avowed disregard of the law of priority. Deeming a new name for the preoccupied *Ceratinoptera castanea* Shelford a systematic necessity, I propose the name *shelfordi* for it.

Nauphœta basalis Kirby has been referred to the genus *Paranauphœta* and is preoccupied in that genus by *P. basalis* Serville. Kirby's species will require a new name if it is congeneric with Serville's species.

The new generic name *Polychitonacris* was proposed by Mr. Rehn† to replace the preoccupied genus *Polysarcus* of Saussure. *Pycnosarcus* was proposed for the same purpose three years earlier by Bolivar. Thus *Polychitonacris* Rehn falls as a synonym of *Pycnosarcus* Bolivar.

Hadrotettix mundus Scudder is a *Trimerotropis*, as determined by an examination of the types, and belongs in the

*Deutsche Ent. Zeitschr., p. 120 (1908).

†Proc. U. S. Nat. Mus., vol. xxxvi, p. 162 (1909).

pacifica group. *Derotmema lentiginosum* Scudder is also a *Trimerotropis* and is synonymous with *T. gracilis* Thomas.

Phyllonotus Hancock* was based upon three species, *plagiatum, sagrai,* and *saussurei,* all of which were soon afterwards shown to really belong to the genus *Choriphyllum* of Serville. This was all through an error of compilation, as later explained by the describer, but the genus *Phyllonotus* as published falls as a synonym of *Choriphyllum* and a new name is required for the species intended to be placed under *Phyllonotus.* These species are *Cicada rhombea* Linnæus, *Choriphyllum foliatum* Hancock, and *Choriphyllum westwoodi* Hancock, and for them I propose the generic name *Zaphyllonotum,* of which *foliatum* may be considered the type. *Phyllotettix* Hancock† can not be used for the above, as it sinks into synonymy under *Choriphyllum* along with *Phyllonotus,* the genus for whose replacement it was made.

Orphulella walkeri Bruner (Ohio Nat., vol. VII, p. 11, 1906), is preoccupied by *Orphulella walkeri* of the same author described two years earlier (Biol. Cent.-Amer., Orth., vol. II, p. 73). The previous name was suggested to replace the *Stenobothrus mexicanus* of Walker (which Bruner refers to *Orphulella)* in case that species is not proved a synonym of *punctata* DeGeer. This is a reprehensible method of establishing new names, but, being published, the name has place in nomenclatorial literature and can not be ignored. The later species is from the same general region as the earlier one and is said by the describer, in discussion, to be a possible synonym of one of Walker's illy defined species of *Stenobothrus.* The *walkeri* of 1904 was made to replace Walker's *mexicana* in case it was found to be distinct and the *walkeri* of 1906 was definitely described as a new species and merely suggested as a possible synonym of one of Walker's species of *Stenobothrus.* Thus these two species *walkeri* can not be considered as the same conception and the later one, that of 1906, must fall. To replace it I propose the new specific name *losamatensis.*

Snodgrass (Proc. Wash. Acad. Sci., vol. IV, p. 439, 1902), describes *Sphingonotus trinesotis* and says it occurs in three varieties and describes these as *chathamensis, indefatigabilensis,* and *albemarlensis.* As, by the laws of nomenclature, one of the varieties of a species must bear the species name, I designate the typical form as *chathamensis,* which name there-

*Tett. N. Amer., p. 45 (1902).

†Ent. News, vol. XIII, p. 188 (1902).

fore is to be quoted in synonymy under *trinesotis*. The same conditions prevail in *Sphingonothus tetranesiotis* on page 444 of the same article. Here four varieties, *charlesensis*, *barringtonensis*, *hoodensis*, and *indefatigabilensis*, are described, none being given the specific name. I here designate the last described variety, *indefatigabilensis*, as the typical form, thus sinking it into the synonymy under *tetranesiotis*.

From a copy of Bolivar's article in Bol. Soc. Espan. Hist. Nat., vol. v, pp. 343--347 (1905) I find, from pen corrections entered by the author, that the *Rhacocleis gessardi* there mentioned, and noted by me in Genera Insectorum, Fasc. 72, p. 5 (1908), is an error for *maura* Bonn.

Gryllacris incerta Tepper (Trans. Royal Soc. S. Austral., vol. xv, p. 154, 1892) is invalidated by the previously established *Gryllacris incerta* of Walker (Cat. Derm. Salt. Brit. Mus., vol. i, p. 189, 1869). The first described one is now referred to another genus; but once a homonym always a homonym, so the last named species must be renamed. In place of Tepper's name I therefore propose *certa*.

Prochilus Brullé of 1835 is preoccupied by the mammalian genus of the same spelling by Illiger in his Prodr. Mammal. et Avium, p. 109 (1811). The name was also used prior to 1835 by Cuvier in ichthyology. To replace the preoccupied orthopterous genus I propose the name *Zaprochilus*.

Sia Giebel (Zeit. für Gesammt. Naturwiss., vol. viii, p. 114) was probably published in October of 1861. This genus seems to be the same as *Licola* Walker (=*Bugajus* Brunner) and, being the earliest, is to be used. The type species, *S. ferox*, replaces Saussure's species *couloni*, as that species was not described until January 22, 1862 (Ann. Soc. Ent. France (4), vol. i, p. 490, pl. xii).

—Mr. Schwarz noted that the name of the species of the insect catching grass referred to in Volume VIII, page 5, of the Proceedings, should be *Cenchrus viridis*.

—Mr. Schwarz said that the species of Hymenoptera which was referred to in Volume X, page 62, of the Proceedings, was not the blue mud-dauber, but *Trypoxylon albitarse* Fabr.

—The following papers were accepted for publication:

NOTES ON THE FAMILY ÆGERIIDÆ (SESIIDÆ), WITH A SYNOPTIC TABLE OF THE NORTH AMERICAN GENERA.

[Lepidoptera, Ægeriidæ.]

By August Busck.

The character which has been relied upon* to distinguish the family Ægeriidæ, namely, the absence of vein 8 in the hind wings, proves to be an illusion. The apparent ease with which the venation can be studied in the more or less transparent wings of this group of moths has probably occasioned the error, but if careful slides are made of softened and denuded wings, it is plainly seen that the normal eight veins are really present in all the genera, though veins 7 and 8 are sometimes partly coalescent.

The mode of attachment between the fore wing and the hind wings in this family is peculiar and has added to the difficulty of interpreting the venation rightly. Aside from the frenulum, which normally, though not invariably,† is single in both sexes, the hind wing has a narrow, sharp, upward fold along the costa, into which the downwards-folded dorsal edge of the fore wing fits snugly and securely. Anyone who has spread moths of this group must have noticed how easy the task is, if the specimen is fresh and soft. By merely guiding the fore wing up into position the hind wing follows along; but if once the two wings are separated, it is exceedingly difficult to get them into their natural relations again and a poor mount results. This is because the fold on the hind wing is elastic and is difficult to wedge open again if the edge of the fore wing has slipped out. This fold locks the long, thin wings together very effectually and enables the strong flight of these moths.

If a pair of wings of a dry, well-mounted specimen is placed on a slide it is practically impossible to separate them without injury to the wings, except by sliding them longitudinally away from each other.

When this fold on the hind wing is softened and straightened out in a slide-mount the costal and subcostal veins are both observable.

A similar, though not quite so strongly developed, arrangement for holding the wings together is found in the Syntomidæ.

There is considerable difference of opinion about the nomenclature of the family Ægeriidæ (Sesiidæ). The writer is in-

*Meyrick, Handbook Brit. Lep., p. 562, 1895.

†Females are occasionally found with divided frenulum.

clined to side with the conclusions of our European colleague in this matter, at least in the main. He has, however, at the present time no opportunity to reach conclusive opinions on these questions, which are essentially foreign to the science of entomology proper—and the purpose of the present paper is solely to deal with the structural questions. For convenience, therefore, the names of the genera have been adopted as they are given by Beutenmüller* and as used in the present American List.†

The type of each conception is cited at the end of the article and any other set of names can thus readily be substituted. To further assist in this I have appended the principal synonymy as used in (1) Meyrick's Handbook of British Lepidoptera, (2) Rebel, Cat. Lep. Europ., and (3) by Lord Walsingham and Mr. Durrant, the latter of whom has kindly sent me their opinions on the subject in full.

As to the systematic position of the family I concur with Meyrick in regarding it a derivative from the Hyponomeutidæ and coördinate with the other true microlepidopterous families, such as the Gelechiidæ, Oecophoridæ, etc.

The writer has had some difficulty in using the synoptic table of the genera in Beutenmüller's valuable Monograph,‡ and ventures to publish the following, which may perhaps also enable a more natural sequence of the genera.

The difficulty in using the synoptic table in the Monograph is augmented by the text figures of the venation, to which one naturally refers for confirmation; these figures are almost without exception faulty and in some cases very misleading. To cite some examples: Fig. 8 of *Melittia satyriniformis* lacks a vein (3) in the hind wing; figs 9 and 10 of *Gaea emphytiformis* and of *Euhagena nebraskæ* show veins 3 and 4 in the hind wings connate instead of approximate; fig. 11 of *Alcathoe caudata* shows one vein (10) too many in the fore wing and shares the main fault of nearly all the other figures in showing vein 7 in the fore wing ending far down on the dorsal edge instead of at or above apex. All of the genera except *Melittia* and *Aegeria* (in the sense of Beutenmüller's monograph) have vein 7 in the fore wing to or above apex.

*Monograph of the Sesiidæ of America, Mem. Amer. Mus. Nat. Hist., 1901.

†Dyar, Bull. U. S. Nat. Mus. No. 52, 1903.

‡Memoirs Amer. Mus. Nat. Hist., vol. I, part VI, 1901.

SYNOPTIC TABLE OF GENERA OF SESIIDÆ.

1. Hind wings with veins 3 and 4 stalked ..... 2.
   Hind wings with veins 3 and 4 not stalked ..... 10.
2. Forewings with 11 veins; one vein absent ..... 3.
   Fore wings with 12 veins ..... 4.
3. Fore wings with a costal vein (10) absent.....*Alcathoe.*
   Fore wings with a dorsal vein (4) absent ..... *Bembecia.*
4. Tongue rudimentary; fore wings with vein 7 to termen...*Aegeria.*
   Tongue developed; fore wings with vein 7 to costa or apex..... 5.
5. Labial palpi nearly smooth; if rough beneath, then with short scales ..... 6.
   Labial palpi hairy ..... 8.
6. Hind tibiæ nearly smooth throughout ..... *Parharmonia.*
   Hind tibiæ not smooth throughout ..... 7.
7. Hind tibiæ rough haired throughout ..... *Sannina.*
   Hind tibiæ tufted at the spurs, smooth between ..... *Sesia.*
8. Hind tibiæ nearly smooth ..... *Podosesia.*
   Hind tibiæ rough haired ..... 9.
9. Labial palpi upturned, nearly reaching vertex ..... *Vespamima.*
   Labial palpi short, porrected ..... *Palmia.*
10. Fore wings with veins 7 and 8 coincident ..... 11.
    Fore wings with veins 7 and 8 stalked ..... 12.
11. Tongue rudimentary ..... *Parathrene.*
    Tongue developed ..... *Calasesia.*
12. Hind wings with vein 3 closely approximate to 4..... 13.
    Hind wings with vein 3 approximate to 2.....*Melittia.*
13. Tongue rudimentary ..... 14.
    Tongue developed ..... *Memythris.*
14. Head and thorax long-haired ..... *Euhagena.*
    Head and thorax smooth ..... *Gaea.*

I am unable to separate *Sanninoida* Beutenmüller from *Sesia* Fabricius (Beutenmüller), and *Albuna* Hy. Edwards from *Memythris* Newman. The characters which in the microlepidoptera are recognized as generic are identical in these two pairs of genera relatively, and even the secondary sexual characters, the anal tufts, relied upon by Beutenmüller, are not tenable and seem mere questions of degree.

The natural sequence of the genera would seem as follows, placing those with the highest developed pterogostic characters first:

1. *Bembesia* Hübner; type: *hylæiformis* Laspeyres.
2. *Alcathoe* Hy. Edwards; type: *caudata* Harris.
3. *Aegeria* Fabricius; type: *apiformis* Clerck.

4. *Sesia* Fabricius; type: *tipuliformis* Clerck.
   Syn: *Sannioida* Beutenmüller; type: *exitiosa* Say.
5. *Parharmonia* Beutenmüller; type: *pini* Kellicott.
6. *Sannina* Walker; type: *uroceriformis* Walker.
7. *Podosesia* Möschler; type: *syringæ* Harris.
8. *Vespamima* Beutenmüller; type: *præcedens* Hy. Edwards.
9. *Palmia* Beutenmüller; type: *sequoiæ* Hy. Edwards.
10. *Gaea* Beutenmüller; type: *solituda* Hy. Edwards.
11. *Euhagena* Hy. Edwards; type: *nebraskæ* Hy. Edwards.
12. *Parathrene* Hübner; type: *tineiformis* Esper.
13. *Calasesia* Beutenmüller; type: *coccinea* Beutenmüller.
14. *Melittia* Hübner; type: *satyriniformis* Hübner.
15. *Memythris* Newman; type: *tabaniformis* Rottemburg.
    Syn: *Albuna* Hy. Edwards; type: *pyramidalis* Walker.

The differences in the nomenclature are confined to the following four genera:

1. *Sesia* (Beutenmüller, Dyar, Staudinger).
   Trochilium (Meyrick).
   Aegeria (Walsingham, Durrant).
2. *Aegeria* (Beutenmüller, Dyar, Meyrick).
   Trochilium (Walsingham, Durrant, Staudinger).
3. *Memythris* (Beutenmüller, Dyar).
   Sciapteron (Meyrick, Staudinger).
   Parathrene (Walsingham, Durrant).
4. *Parathrene* (Beutenmüller, Dyar, Staudinger).
   Zenodoxus (Grote and Robinson, Walsingham, Durrant).

The following names are omitted in Dyar, Catalogue North American Lepidoptera, 1903:

Sesia (Carmenta) minuta H. Edwards, Papilio, 1, p. 204, 1881. Georgia.

Sesia (Pyrrhotaenia) meadii H. Edwards, Papilio, 1, p. 204, 1881. California.

This is, according to Beutenmüller, the male of *polygonia* H. Edwards. Dyar, No. 4244.

Memythrus (Trochilium) luggeri, H. Edwards, Psyche, VI, p. 108, 1891. Minnesota.

This is, according to Beutenmüller, a synonym of *simulans* Grote. Dyar, No. 4181.

NEW GEOMETRIDÆ AND NOTES.

[Lepidoptera, Geometridæ.]

By Richard F. Pearsall, *Brooklyn, N. Y.*

So much attention has been directed of late by collectors to this group, that it has resulted in the capture of many new and singular forms. These have accumulated with great rapidity during the past year, and it seems advisable to give names to some of those which in my opinion require to be thus accorded specific distinction. Many more remain yet to be described, especially among the *Eupitheciæ*. It was with the intention of reducing somewhat the unwieldy mass of material at present classed as such that I proposed the genus *Nasusina*. I find in practice that it works out with clearness the species which should be placed under it, and that they present when grouped three well-marked styles of ornamentation. One is represented by the angulate linear picturing of the type, *inferior* Hulst, and another by *niveifascia* Hulst and allies, with large blotches of color, and a third by *desperata* Hulst, with heavy, oblique central wing-bands. With them must be included, *Eup. leucata* Hulst, the unique type of which is at New Brunswick and was recently examined by me. To the first group will belong the species described below.

Genus NASUSINA Pears.

Nasusina opinata, new species.

Expanse: Male, 13 mm.; female, 16 mm.

Palpi moderate, heavy, black; above and at tip, white. Antennæ slender, shortly ciliate in male. Front whitish crossed below antennæ and above clypeus, with a narrow black line. Vertex, thorax, and abdomen with gray and white scales mixed, the latter with pale ring at base. Second segment and tufts which are well marked, jet black. All wings much produced at apices, which are rounded. Color pale silver-gray, with narrow cross lines of black, much like *inferior* Hulst in pattern. A series of these lines parallel to each other from the basal area of primaries, the outermost one-third from base rounding out sharply and almost touching; the small oval jet-black discal dot turns sharply backward and reaches inner margin about one-half its costal distance from base. A narrow clear space follows, including discal dot. Then a series of four black parallel hair-lines, the outermost much the heaviest and forming inner boundary of extra discal geminate pale lines. These lines run nearly straight across costa, then sharply toward outer margin, making at vein 6 a backward turn, with angle blunt at apex, and run in waves to inner margin, parallel with outer margin. Extra

discal parallel to these lines and not paler than central space, which is somewhat clear from markings. Subterminally darker, having between veins 4 and 6 a faint patch of black scales and also subcostally at apex a few pale brownish scales are apparent within the terminal narrow black line cut at veins. Subterminal white line much broken; clearer at anal angle. Fringes pale, dark at base. Secondaries with lines as on primaries, the geminate pale line running parallel with and near to outer margin, the rest straight across wing from inner margin to costa, where they become indistinct. A central clear space as in primaries, but with its outer boundary line traversing the discal dot, which is a mere point. A black triangular patch at basal inner margin. Beneath, pale silvery-gray, the lines above clearly reproduced, those bordering the geminate extra discals darkest. Discal dots jet black, distinct on all wings. Body beneath, legs and abdomen white, sprinkled with gray and brownish scales, the latter blackish at top.

Types— ♀ IX, 2, 07 and ♂ IX, 8, 08, from Prescott, Ariz. (Kunzè), and cotypes in author's collection from same locality; also in collection of Mr. J. A. Grossbeck.

Genus EUPITHECIA Curtis.

Eupithecia exudata, new species.

Expanse, 16 mm.

Palpi short, stout, bushy; dark brown, with a few paler brown scales on upper ridge. Antennæ stout, tufted with black along upper side so heavily as to appear serrate, much compressed, very shortly biciliate. Front and thorax yellowish-brown, a dark brown band across former at center, the latter with a small whitish scutellar spot. Abdomen stout, clothed above with coarse scales in dark and pale brown, becoming grayish at tip. First segment pale, second nearly black. Tufts well-developed black. Primaries produced at apex, margin nearly straight. Secondaries small, the apex extended, outer margin retreating and much rounded. Primaries yellowish brown, darkened along costa and subterminally, with a heavy sprinkling of black scales. These also mark the veins in short dashes, rather sparingly. Two pale whitish dashes across costa, one-third out, would indicate the beginning of basal line, but no lines are apparent crossing the wings, excepting the usual pale geminate line extra-discally. This line, somewhat clearer whitish where it crosses costa, turns outward with a slight curve, thence in a straight course, inclined basally to inner margin well within the anal angle. Subterminal line, just perceptible, soiled-whitish, ending at anal angle in a clearer white spot. Basally this spot is made more distinct by a cluster of black scales. Terminal line black, heavy, widely broken at veins. Fringes rather heavy, long, brown, darker at base. Discal dots moderate, round, distinct black.

Secondaries in color and markings same as primaries; the geminate pale line, not distinct, can be traced parallel to margin. An irregular line of black scales runs from middle of inner margin to the fine linear black discal dot. A white spot and cluster of black scales at anal angle. Terminal line black, broken at veins. Fringes pale brown, long, faintly barred. Beneath all wings a yellowish ashen, dark ashen subterminally, the pale line as above, but more clearly defined, curving regularly out from costa around discal dot, and inwardly margined with dusky scales, becoming broad and jet black at costa. On secondaries, the irregular line of black scales, running from inner margin to discal dot, is heavily marked, on one wing appearing to run through it, ending in a black spot at costa; a dark ashen basal area, and outside the pale line, is a dusky line, curved strongly outward as it leaves inner margin, thence curving to costa, hence *not* parallel to outer margin. Body beneath, legs, and abdomen soiled-white, thickly sprinkled with dark gray scales, the latter with two terminal segments dark, as above.

Types—Two males from Merrick Museum collection, taken at New Brighton, Pa., one IV, 29, 03, by H. D. Merrick, the other IV, 27, 08. The latter Mr. F. A. Merrick has kindly allowed me to retain. The species seems to be rare, but should be easily recognized by the heavy antennal structure.

Eupithecia promulgata, new species.

Expanse: Male, 19 mm.; female, 22 mm.

Palpi long, dark brown, tipped with white. Antennæ moderate, in male shortly biciliate, in female ciliate. Front, thorax, and abdomen above dark brownish-gray, darker brown across thorax in front and beneath abdomen. A white spot on scutel, one on third segment of abdomen at sides, and at its extreme tip. Wings broad, somewhat extended apically, with outer margins rounded, on secondaries slightly flattened from veins 2 to 6. All wings a dark gray-brown, darkened along costa and subterminally. The cross-lines are double, whitish (clear white in female) where they cross the veins, producing a mottled effect. The basal pair about one-third out run in outward curve, somewhat waved, to inner margin. Intradiscal pair leave costa above the large black oval discal spot, the inner line passing in a curve just outside it to the point where vein 2 leaves cell, then with another outward curve to inner margin. Extra discal line pale geminate, rather broader at costa runs outward to vein 6, turns abruptly and proceeds, excepting a slight outcurve below vein 2, almost in straight line to inner margin. All veins are marked with short black dashes, a series of heavier ones indicating an obscure extra discal line across both wings. Subterminal line white, fine, serrate, clearly marked from costa to vein 4, ending in a large clear white spot between veins 3 and 4. Another similar

spot anally below vein 2. Terminal line black, broken at veins. Fringes long, same color as wings, checkered. Secondaries paler basally, only intra- and extra-discal lines crossing them, the latter most distinct and parallel with outer margin. Discal dots round, black, a little obscure. Subterminal white line not so clear as in primaries, but the large white spots between veins 3 and 4 and at anal angle are well marked. Beneath all wings grayish ashen, the white lines reproduced as above and broader. On primaries, two or three darker patches at costa indicate the beginning of shade lines which fade out before reaching middle. Subterminal space darker. The extra discal, a series of indistinct dashes on veins as above, is clearer on secondaries, rounds out about discal spot to a point between it and inner margin, then wavy to margin. Discal dots more definite than above, black. Body beneath and legs white, with tips of tibiæ and tarsi barred with dark gray. Abdomen beneath clear white, a lateral black streak on segments 3, 4, and 5 and in the male a little dusky at tip.

Types—Male and female in author's collection. The male taken IV, 13, 06, at New Brighton, Pa., by Mr. H. D. Merrick, the female at Big Indian Valley, Catskill Mountains, VI, 23, 07, by the author; a cotype female was captured IV, 30, 03, by Mr. H. D. Merrick at New Brighton, Pa., and is in the Merrick Museum. A single female specimen captured many years ago in North Carolina (no date) by Mr. Morrison, it is supposed, is in the collection of the Brooklyn Institute Museum, New York, and has been made a cotype. These are the only examples I have knowledge of at present. The species seems uncommon, and closely resembles *youngata* Taylor, but is a shade smaller. It is readily separated from it by the long palpi, by the biciliate antennæ of the male and by the white abdomen beneath; which in *youngata* is a sooty black at tip. Through the generosity of Mr. F. A. Merrick I have been permitted to retain the male, which I have constituted a type in order that I might keep before me its structural peculiarities.

Eupithecia albigrisata, new species.

Expanse, 18 mm.

Palpi moderate, rough-scaled, dark gray. Front and vertex dark gray, the scales large, silky. Thorax dark gray, white posteriorly. Fore wings, pale silver-gray, a shade darker along costa and subterminally. From base to subterminal space the wings are crossed by about eight fine gray lines, indistinct except at costa and internal margin, this entire space having a whitish appearance. A broken line of black scales starts from cloudy spot on costa, just within discal dot and touching it, turns backward and runs along vein beneath cell to

base, also extending along vein 2 nearly to margin. Extra discal pale line crosses costa, then makes a sharp angle outward, and curves inward gently to inner margin, divided by a hair-line of gray, its outer section being pure white. Subterminal space with central pale line not white, crenulate, and its course parallel with extra discal pale line. A dark gray spot outside it at anal angle. Marginal line distinct, black, cut at veins. Discal dots large, linear, black. Fringe silver-gray, long, clouded at veins. Secondaries with about five fine gray lines, indistinct, except the one just outside discal dot, which is darkened and diffuse. From base to subterminal, which is a shade darker, the wing is whitish in color. Marginal line and fringe as in fore wings. Discal small, round, distinct. Beneath pale silvery gray, with all lines broken into dots. Extra discal pale line on fore wings evident. A dark line runs from costa to discal dot, with a dark shade line outside and parallel to it, darker and broader at costa. Discal dots as above. Abdomen with first segment whitish, second dark gray, the rest pale gray, with tufts dark gray. Legs dark gray.

Type—One male from Atlanta, Ga., May, 1905; collection of author. The type is very thin in wing texture, but is in good condition.

Eupithecia fortunata, new species.

Expanse, 15 to 17 mm.

Palpi short, barely visible beyond front dusky-slate tip and beneath white. Primaries somewhat extended at apex, broadly rounded, secondaries full, rounded margin slightly flattened between veins 3 and 6. Antennæ slender, barred, dark gray and white; in the male shortly ciliate. Head and all parts above dark slate, evenly mixed with whitish scales, soft and powdery in appearance, the latter clear white in a spot at posterior of thorax, along sides, and a line along dorsum of abdomen, a spot at terminus of vein 2 on primaries, the termination of a very indefinite subterminal line, and forming on primaries, basal, intradiscal and extradiscal geminate cross lines, the two latter only being present on secondaries. Basal line on primaries leaves costa one-third out, and with a small angle, curves irregularly to inner margin a little nearer base than on costa. Intradiscal makes a sharp outward angle at costa above and enclosing the round, jet-black discal dot in male, passing just outside and touching it in the larger female, thence straight across wing, in general direction, but having at vein 1 a small sharp outward angle. Extra discal leaves costa three-fourths out and almost without angle sweeps boldly outward in a curve, approaching intradiscal above vein 2, where it makes a corresponding outward angle before reaching inner margin, well within the definite anal angle. Between these lines and the broad subterminal space the color is darker

slate. Subterminal white line is indicated by scattered white scales, more definite near costa. Terminal line black. Fringe pale slate, checkered with black opposite veins and having at base a whitish line. Secondaries with powdery surface as in primaries. The geminate cross lines clearer at inner margin, almost disappear costally. Intradiscal runs straight across wing, including the small black distinct discal dot. The extra discal parallel to outer margin, in other respects similar to primaries. Beneath sprinkled with dark brown and clear white scales, the pattern as above, on all wings strongly reproduced. The extra discal on all wings bordered internally and externally, with a darker narrow line of brown, and the sharply distinct, somewhat linear discal dots are black. Body, legs, and abdomen beneath with white and brown scales mixed, the latter predominating at tip of abdomen.

Types—Male and female were taken at Chimney Gulch, Golden, Colo. (Oslar), V, 22, 08; also a cotype female; all in author's collection.

This is the species associated by Doctor Hulst in his collection at New Brunswick with the true type of *Eup. subcolorata*. The specimen is in very poor condition, but its strongly marked underside probably led him to believe it the same.

Eupithecia conceptata, new species.

Expanse, 18 to 20 mm.

Palpi moderate bushy brown, tipped with white. Antennæ in male biciliate, finely serrate, with a small fascicle of fine hair springing from each tooth, in female simple strongly ciliate, as much so as is the male in many species. Wings narrow, produced at apices. Front yellowish-brown. Beneath antennæ a small jet black spot and below these at orbits a white spot which apparently may join in an indefinite band across front, or may be entirely absent. Collar and vertex paler. Thorax with a broad band of dark brown across front, yellowish-brown of russet centrally, paler posteriorly. Abdomen with first and second segments nearly white, remainder with row of broken black spots on either side of dorsum, producing a pale line centrally, its general color a brownish gray. No tufts apparent. Primaries, ground-color yellowish-brown, darkened basally and subterminally by a mixture of dark brown and black scales, these in the female frosted with white, producing a grayish look. Within extra discal, along vein 1, the median vein, and subcostally, occasionally to outer margin along vein 6, strongly tinged with russet. A decided dusky spot from angle of extra discal along costa to apex. The pale geminate cross-lines are outlined with black hair-lines, the basal narrow and lost in darker basal area. Intradiscal, nearly one-third out, makes a sharp outward angle below costa, another between veins 1 and 2, and touches inner margin one-half out. Another black hair-line, heavier at costa, passes outward just beyond

discal dot in a sharp curve, thence in waves basally toward inner margin close to intradiscal. The geminate extradiscal, with a sharp angle below costa, runs parallel with this line, its inner boundary line well marked and heaviest at costa. Discal dots small, oval, jet black, encircled with white scales. Subterminal white line not traceable in male, except as a white spot, and clustering black scales about it, between veins 1 and 2 at anal angle, in female, distinct, with clear white anal spot, having some black scales about it, and also in scallops of central portion. Secondaries pale yellow-brown, dusky along border. Inner margin flecked with black scales, and showing the commencement of extradiscal and intradiscal lines, neither of which cross the wing. No discal dots. Terminal lines black. Fringes dusky, a pale line at base, centrally darker. Beneath uniform pale-yellowish, the extradiscal pale line outlined by black scales outwardly as points on veins. Discal dots not clear but apparent, linear on primaries, small round dots on secondaries. Terminal line black, cut at veins, and the fringe darkened at these points. Body, legs, and abdomen beneath dusky, the latter paler with black lateral streak on second segment.

Type—Male from Denver, Colo., and female from Chimney Gulch, Golden, Colo., V, 22, 08 (Oslar), with four cotypes from same localities in author's collection.

Eupithecia quakerata, new species.

Expanse, 21 mm.

Palpi moderate, stout, bushy. Antennæ stout, very shortly ciliate. Wings narrow, a little extended apically. Front, thorax, abdomen above, and wings a uniform pale-drab, darkened along costa of primaries, subterminally on all wings, and along inner margin of secondaries by a few scattering black scales, dusted very thinly also over the pale central portion. None of the usual cross-lines occur centrally, but a single black hair-line runs straight from costa to inner margin, a little waved, and with a very small angle at costa, crosses the usual location of discal dot and entirely obliterates it. The clear white subterminal line, scalloped between veins, forms above vein 2 a large white blotch, surrounded by clustering black scales, thence in a narrow line to anal angle. Terminal line black, narrow, continuous. Fringe same as ground-color, having central dusky line. Secondaries without discal dots or lines, showing only at inner margin the inception of geminate extradiscal. At anal angle a small clear white dot, and black scales below vein 2. Beneath pale drab, narrowly dusky along outer margin of wings. Discal dots clear on all wings, linear, black. On primaries four indefinite dusky lines cross wing outside discal dot, the two outer enclosing the pale extradiscal, curving outward without angle, and disappearing when half across. The inner of these lines is marked

at costa by a jet black spot and there is a similar spot above the discal dot. Terminal line black, cut at veins. Secondaries with extradiscal outlined in dusky dots on veins. Within these, at inner margin, appear two or three more faint dusky lines. Terminal line continuous black. Body and abdomen at base pale drab, the latter dark at tip, with a lateral black band on central segments. Legs dusky.

Type—One male, taken at San Miguel, Colo. (Oslar), in author's collection.

Eupithecia limnata, new species.

Expanse, 22 to 24 mm.

Palpi long, not bushy, dark yellow-brown, tipped with paler. Wings broad, not much produced apically, thin in texture, with margin rounded; in secondaries, a little flattened below vein 6. Antennæ yellow-brown, stout, heavily biciliate, in male the fimbriæ long and silky. Front pale yellow-brown, with a few dark-brown scales intermixed, vertex paler and without the dark central spot generally present in *olivacea* Taylor. All above yellow-brown, mottled with dark-brown scales. A broad band of the same color crosses thorax in front, and some examples are marked along costa with blotches of same. Abdomen with tufts and a fine lateral line of black, second segments sometimes darkened above with brownish scales. Three pale lines cross the primaries, the first narrow, rounded from costa to inner margin, is close to base, and the basal area enclosed is wholly dark brown. A broader pale line crosses at one-third out, angulate below costa, where it widens, and then irregularly to inner margin, its outer boundary line marked with dark brown scales, heaviest at costa. The extra discal pale line is most distinct, with a sharp outward angle below costa, its course thence almost straight, with an inward slope to inner margin two-thirds out, its inner boundary line of dark brown scales wavy, with an outward scallop between the veins. The central portion is thus clearly defined by these dark brown irregular cross-lines. Submarginal space broad, traversed centrally by a broad, wavy pale line, clear white sometimes, ending in a large white blotch near anal angle. Fringes long, as in all of the *filmata* group, of ground-color, cut with paler between veins, as is also the narrow black terminal line. Secondaries same as primaries, but more thinly scaled basally. The dark brown scales predominate along inner margin, and outline partly across wing the extradiscal pale line, and the beginning of the intradiscal. All lines lost before reaching costa. Discal dots on all wings large, linear, jet-black, and black dashes mark the veins brokenly. Beneath all parts as above in color, but paler, the extradiscal pale line evident, bordered inwardly by a narrow dark brown line and outwardly by a broad shade line of same, much waved on its outer border, limited apparently by

the convolutions of the subterminal white line above, on secondaries becoming narrow and indefinite. Body, legs, and abdomen beneath pale.

Type—♂ IV, 4, 03; ♀ IV, 5, 03, Victoria, B. C. (Anderson); and six cotypes in author's collection. Besides these are eleven examples, six of which I have made cotypes in the collection U. S. National Museum. They are all males and are labeled III, 23, 03 (2); IV, 6, 03, Wellington, B. C. (Bryant); IV, 10, 03 (2), Victoria, B. C. (Anderson); III, 18, 03, Seattle, Wash. (Kincaid). The rest are in poor condition, but from these same localities.

This is the species I have repeatedly referred to, particularly when describing *filmata* Pear. as the *lachrymosa* Hulst, following the opinion of Rev. G. W. Taylor, as expressed when he described a near relative in this group with its biciliate antennæ under the name *olivacea*. A recent study of *lachrymosa* in the Hulst collection at New Brunswick, the type of which is a male from Oregon, proves it to possess simple ciliate antennæ, and therefore entirely distinct, though superficially it bears a great resemblance to this species. There is still another closely related species which I think I can separate on structural characters, described next in order.

Eupithecia usurpata, new species.

Expanse, 21 to 23 mm.

Somewhat smaller, but in shape and color much as is *limnata*. It is best described by comparison with that species. Front darker, vertex not clear whitish, mottled, or with a central dark spot as in *olivacea* Say. Antennæ bilicate, the cilia shorter, not so silken, with more of a tendency to separate into fascicles. Color above and beneath an even, soft, darker yellowish-brown, not mottled as in *limnata*, the pale cross-lines and subterminal white line barely traceable, the latter entirely lacking in one example. Discal dots linear black, small on secondaries and beneath, much less clear than in *limnata*, as is the case with all other markings. Abdomen pale, second segment in one example having a dark line at side, all other specimens without a trace of lateral black line, extending nearly to tip in *limnata*. A few black dashes centrally and along vein 1 and in type also a row of short black dashes crosses primaries on veins, along outer border of extradiscal pale line. Beneath paler than above, silvery in sheen, a little dusky terminally, the lines above showing through faintly. The pattern of markings in all this group are not easily differentiated by description, though separation is not so difficult as would seem. It flies with *limnata* in the same localities and may yet prove a variety of it, though I do not now believe that it is.

Type—Male is from Victoria, B. C., IV, 4, 03 (Anderson), in the author's collection, and the female type rests in the Brooklyn Institute Museum, having been labeled by Doctor Hulst as the type of *Eup. nimbosa* in error. It bears a locality label "Calif.," without date, but I doubt the correctness of this legend. It is, however, the only perfect female at present known to me. Cotypes, one male in author's collection and two males and a crippled, headless female in the U. S. National Museum.

Eupithecia classicata, new species.

Expanse, 20 mm.

Palpi moderate, dark brown to black, tipped minutely with white, not bushy. Antennæ compressed, ciliate, rather slender, pale gray, barred with black. Front and thorax dark chocolate-brown, the former crossed beneath antennæ with a pale band of milky-brown or *café au lait* color which also tinges the primaries along costa and inner margin, also quite broadly along inner margin of secondaries. Abdomen above of same color, having second segment diffusely black, with tufts on three succeeding segments jet-black tipped with white. The pale-brown here in certain lights assumes a coppery gleam. Collar pure white, and across thorax in front veins a narrow snow white band, losing itself terminally in the patagia, which are tipped with white and rather long for this group. Ground-color of all wings dark leaden, lighter centrally on primaries, and basally on secondaries. Primaries rather extended, apparently crossed by a series of ill-defined narrow black lines sharply angled at costa and retreating basally in a direct course toward inner margin. A single broad jet-black band runs outwardly from costa, sharply angled just in front of discal dot and reaching inner margin about 1 mm. from base. The paler central space includes a jet-black oblique, linear discal dot and is outwardly bounded by the geminate pale line, sharply angled at costa and running in a direct line to inner margin near anal angle. This line and the subterminal white line are not very distinct. Terminal line black. Fringes leaden, mixed with brown. Secondaries show the geminate pale line running parallel to outer margin, bordered on each side at inner margin with a narrow line of black scales. Two other similar lines between these and base fade out halfway across wing. Basally at inner margin is a jet-black patch of scales. A faint linear discal dot. Fringes and terminal as in primaries. Beneath silvery gray, with indications of lines as above, not very clear. Discal dots on all wings, linear distinct black. Abdomen white basally for half its length, the remainder to tip sooty black. Body and legs soiled white.

Type—One male from Huachuca Mountains, Arizona, VII, 07 (Haimbach). It was presented to and remains in the col-

lection of Mr. J. A. Grossbeck, of New Brunswick, who courteously turned it over to me for inclusion in this paper. Though not in first class condition, having no hind legs, the snow-white collar and thoracic line present features quite apart from every other species known to me. Its style of markings suggests the genus *Nasusina* Pears., and it may be found, when perfect specimens are at hand, to belong there.

Mesoleuca actuata, new species.

Expanse, 22 to 24 mm.

Palpi and front dark brown or blackish, the fomer very short, bushy. Collar, vertex, and body above much paler, by a liberal admixture of whitish with pale brown scales. Thorax paler centrally, with its double posterior tufts tipped with white. Primaries, ground-color pale ashen, tinged with yellow-brown and white. Basal line curved regularly outward at centre reaches inner margin nearer the base than on costa. Between this and discal space is a broad band of ground-color, centrally washed with pale roseate brown. About one-third out the internal wavy boundary line of discal space leaves costa with an outward curve, forming above vein 1 a sharp inward tooth, thence to inner margin a little more than one-third out. Base and discal cross-band black, the latter twice as wide costally as on inner margin, and filled with ringlets of paler color, one of which encloses the almost invisible discal dot. In one of my specimens the central band is dark brown. Its external line is very irregular. Leaving costa two-thirds out it makes a sharp outward tooth below it, then after a strong inward curve, two others rounded between veins 2 and 4, the upper smaller and longer. A sweep inward narrows the discal space at this point, where a small scallop is succeeded by a heavy outward protrusion between veins 1 and 2, reaching, with a smaller one, the inner margin about two-thirds out. The discal space is sharply bordered, both externally and in a lesser degree internally, by a geminate clear-white band following its every irregularity. A broken shade line of brownish or gray follows it. Subterminal space whitish or ashen, having at costa a square brownish or gray patch, below which two short jet-black lateral streaks fill in the convolutions internally of the white scalloped subterminal line. Two other small crescents are placed diagonally above these toward apex. Terminal line fine black, cut at veins and often into a series of double dots between veins toward apex. Fringes moderate, gray, darkened somewhat with brown, especially opposite veins. A clear white dot, apparently an emphasis of the subterminal hair-line, is noticeable on all the specimens before me between veins 2 and 3. Secondaries an even pale gray, marked only by the small faint discal dot and a continuation of the irregular white geminate line of primaries, rounded out from costa, wavy, but showing less definitely the double teeth between veins 2 and 4,

reaching inner margin just within anal angle. All wings beneath silver-gray, sprinkled with darker gray scales from base to extradiscal line, sometimes outlining the discal band above and the costal apical patch more clearly. Discal dots small, distinct, black. Abdomen beneath body and legs soiled-white, sprinkled with gray scales, the latter quite heavily.

Type—Male from Yavapai County, Ariz., VIII, 26, is in the collection of J. A. Grossbeck, New Brunswick, N. J., and the type female in author's collection from Chiricahua Mountains, near Douglas, Ariz., VIII, 23, 08. Cotypes are three females from Yavapai County, Ariz., VIII, 26; IX, 2; and IX, 8, in collection of J. A. Grossbeck, and three females from Chiricahua Mountains, Ariz., VIII, 14, 08; VIII, 28, 08; and IX, 1, 08, in author's collection. Easily distinguished by the very irregular outline of the discal space and its white border line.

Coenocalpe franckata, new species.

Expanse, 26 mm.

Palpi short, stout, barely extending beyond front. Antennæ rather stout, strongly compressed, faintly ciliate. Front a little prominent, with broad central roseate band across it, on a clay-yellow ground, the rosy scales extending to vertex between antennæ and at base of patagiæ. Thorax golden-yellow at front and along sides. Centrally clay-yellow fading nearly to white at scutel. Abdomen golden-yellow, with first and second segments pale yellow-white. General color above clay-yellow, shading into golden-yellow costally toward apex and outer margin of primaries and on outer third of secondaries. Along costa these scales deepen in color and become roseate toward base, broken into sections, the indication of pale cross-lines, the first quite near to base, the second one-third out. The third or extradiscal nearly two-thirds out, broad at costa, narrowed by a sharp inward angle along its outer border at vein 7, sweeps boldly outward to vein 4, then merges into the ground-color. A broad band of black scales, faintly continued across costa, covers the end of cell from subcostal region to vein 4 and forms its inner boundary. Outwardly it is limited by a broad black band filling the angle at vein 7 extending from costa in a strong outward sweep, but fading out before reaching anal angle. An irregular cluster of black scales extends from apex, and often joins this band at angle. No terminal line. No discal dots. Fringes on primaries whitish at base, black at tip, below which they are bright pink, fading into white at anal angle. On secondaries a few black scales at apex, then white, running into bright pink at anal angle, faintly checkered with white. Without markings or discal dots. Beneath paler yellowish, the

markings on primaries above reproduced in black, or by bright roseate scales thickly strigate at apex and along costa. Secondaries entirely covered with short roseate strigations, excepting a large snow-white triangular spot near end of cell, and a broad white band, running from inner margin at one-third from anal angle in a slight outward curve, frequently ending at vein 6_1 when it connects by a spur with central spot. In one example a few black scales are scattered about this central spot. Fringes pale, checkered with pink. No discal dots. Body beneath and legs clay-yellow, sprinkled with roseate scales. Abdomen as above.

Types—Two males, received through the courtesy of Mr. George Franck, whose name I have given them. Taken in the Chiricahua Mountains, near Douglas, Ariz., IX, 15, 08, and IX, 20, 08.

This species, about the size of *formosata*, has the stout wing texture, and decided coloring of *seifertii*, while beneath its pattern copies the former, from which it differs in coloring. In *formosata* the secondaries within white line to base are strigate with black, while *franckata* is entirely roseate.

Hydriomena regulata, new species.

Expanse, 26 to 28 mm.

Palpi very long, not stout, black with a few white scales above and at tip, terminal joint long. Antennæ slender, compressed. Front and vertex white, washed with pale sea-green, a clear black line across front below antennæ. Thorax with intermixed scales of white, black, and bluish gray, washed with green along sides, and on patagia. Posteriorly an enormous tuft or cushion of livid scales, their tips curved backward, rises 1 mm. or more in height. Across this centrally a narrow white band runs down over scutel, first and second segments of abdomen dorsally having a narrow jet-black border on each side, and a diffuse bright orange stain, where it crosses second segment. Otherwise these parts are a soiled-white with a sprinkling of black scales, gathered along dorsum into spots basally. Primaries with widely geminate, narrow black lines, marking the divisions. The basal pair barely one-fourth out form a large angle at wing centre, inclining basally as far as vein 1, below which, turning sharply outward, the outer reaches inner margin nearly at centre. The basal portion enclosed, is pale ashen, sprinkled with black scales and washed with sea-green. Intradiscals leave costa nearly half-way out, the inner with broad angle below it run in short waves inclining outward across wing, converging as they reach inner margin, a little more than half-way out. The broad band thus produced shaded heavily with black scales internally, is a bright liver color, and a narrower one of same color, crosses wing to anal angle, outside and parallel with the extradiscal. The extradiscal lines, broadened at costa, and confused below it, leave it three-fourths

out, run in waves outward toward margin, which it approaches closely in a large scallop outward between veins 3 and 4, a smaller receding one between veins 2 and 3, below which it curves basally, thence straight to margin within the much-rounded anal angle. Discal space ashen, sprinkled with black atoms heavily at centre, but with pale blotches at costa, and near inner margin, these washed with dark green. Narrow terminal space ashen, darkened with black atoms and washed with sea-green, a paler patch at apex, above a black dash on vein 6. No discal dots. Terminal line and fringe on all wings dusky. The latter darkened opposite veins. Secondaries dusky, darker terminally. No discal dots. Terminal line and fringes on all wings dusky. The latter apex and along outer margin, showing only the extradiscal line in a black blotch at costa, and faintly across wing. Secondaries pale ashen, showing a double extradiscal waved line running nearly parallel with outer margin and rather near to it. All wings washed with yellow-brown scales, heavily at centre and outer margin of primaries. No discal dots on primaries, on secondaries, minute, black. Body, abdomen beneath, and legs pale ashen, sprinkled with dark-gray atoms.

Types—Two males taken in Chiricahua Mountains near Douglas, Ariz., VIII, 23, 08, and VIII, 22, 08. It has the style of markings of the *sordidata* group, but the soft confused covering of *reflata* and allies.

NOTES.

Eupithecia fumosa Hulst. Two types were recorded by Doctor Hulst under this name, a female from Amherst, Mass., and a male from South Abingdon, Mass. The former is a well-marked *miserulata* Gr., the latter, *coagulata* Guen., a species which Doctor Hulst had not recognized. The name must therefore be dropped from our lists.

Eupithecia bivittata Hulst. The Hulst type in Brooklyn Institute Museum is *sierrae* Hulst. It bears label "Soda Springs, Cal.," which is in Siskiyou County, while the recorded type came from Mendocino County. They are related species, but entirely distinct.

Eupithecia affinata Pears. I am pleased to record the capture of a female of this rare species by Mr. J. A. Grossbeck at New Brunswick, N. J., VIII, 24, 08, at sugar. The unique male type taken at New Brighton, Pa., August 2, many years previously, has heretofore been the only example known to me.

Macaria intextata Walk. (Dyar, No. 3859) should read *interterta* Walk.

Metanema exclsa Str. Under this name is listed *simpliciaria* Grote, as a synonym. It is a separate and distinct species.

NEW CANADIAN MITES.

[Arachnoidea, Acarina.]

By Nathan Banks.

In the following pages I have brought together the descriptions of some new mites from Canada which form part of a considerable collection of Acarina, sent me for identification by Professor Tennyson D. Jarvis, of the Ontario Agricultural College at Guelph, Canada. Several of them represent genera hitherto unrecorded from our country.

Of particular interest are some species of *Lælaps*, three of which are described from the muskrat, groundhog, and chipmunk, all similar to the *L. echidinus* which has recently been taken from rats in California.

Family CHEYLETIDÆ.

Cheyletus longipes, new species.

Pale yellowish. Body about one and one-half longer than broad; with bristles bearing fine, short hairs. Head sub-triangular, with two bristles each side, the anterior one much shorter than the other; on anterior part of the cephalothorax each side are three bristles close together; one on each shoulder, and behind this a sub-lateral row of seven bristles, the last one close to tip. Legs long and slender, the first pair much longer than the others, in fact nearly twice as long as the body, with long bristles as figured, and three at the tip; other legs with a few long bristles near middle of the length, but only very short ones near tip of tarsi. Palpi not very greatly thickened near base, the second joint bearing two bristles above, and one on the outer side below; third joint with two simple bristles, and the claws and comb as figured.

Length, 0.5 mm.

Guelph, Ontario, Canada; on gelatin culture in bacteriological laboratory.

Cheyletiella canadensis, new species.

Dorsum with two broad shields; the anterior one extending back to coxæ III, and bearing above on each side two bristles, one bristle each side between the shields, and one each side on the anterior margin of the posterior shield; tip of abdomen with a long bristle near each outer corner, a smaller one each side near middle, and a long bristle on each shoulder; claw of palpus not very stout, and with a tooth near its inner base, and an inner lobe.

Length, 0.18 mm.

Guelph, Ontario, Canada, on bluebird.

Myobia caudata, new species.

Body about twice as long as broad, broadest behind coxæ IV, plainly constricted behind coxa I and behind coxa II, abdomen behind hind legs broadly rounded. Dorsum with a sub-median row of long, slender bristles, at tip of abdomen a pair of very long bristles arising from small tubercles, in fact longer than the entire body. Legs short and stout, tapering to the tip, each with various short hairs and a few larger bristles, usually near the tip; first pair modified as usual, the claw at tip is rather more curved than in *M. musculi;* claws at tips of other tarsi are rather shorter and more curved than in *M. musculi.*

Length, 0.2 mm.

Guelph, Ontario, Canada, on little brown bat.

Differs from *M. musculi* in more elongate form, slender dorsal bristles, longer bristles near tips of legs, shorter claws, etc.

Family TETRANYCHIDÆ.

Tetranychopsis spinosa, new species.

Body about one and one-fourth times as long as broad, in general sub-globular; the furrow separating the cephalothorax and abdomen is distinct, and on the dorsum of abdomen are two other transverse furrows. Cephalothorax with three spines each side, two of them short and sub-clavate are situated on the margin, the other is twice as long and acuminate. Abdomen with a sub-median row of three long spines each side arising from tubercles, and on margin of abdomen each side are six spines, four long and slender, and usually curved, two others, one behind the long humeral spine, and the other the last of the series, are short and sub-clavate. The legs are long and slender, femur I about one-half the length of body; the basal joints with short thick, mostly blunt-pointed, spines, other joints with slender bristles.

Length, 0.4 mm.

Guelph, Ontario, Canada, on leaves of basswood.

Family GAMASIDÆ.

Liponyssus canadensis, new species.

Pale yellowish. Body elongate; in the female about one and a half times longer than broad, in male nearly twice as long as broad; the dorsal shield nearly covering the entire dorsum, legs of about moderate length; hind legs reaching a little beyond tip of body, both body and legs with many short stout bristles, some each side near tip of body are longer; second pair of legs plainly thicker than other pairs. The peritreme long and slender, very sinuous, nearly reaching to base of coxa I.

Length, 0.6 to 0.7 mm.

Guelph, Ontario, Canada, on English sparrow, red-eyed vireo, meadow lark, and king bird. It differs from the other species of the genus in larger shield, more sinuous peritreme, more spine-like hairs, etc. From *Dermanyssus hirundinis* and *D. passerinus* it differs, aside from the generic characters, in the much longer peritreme.

Sejus macropilis, new species.

Pale yellowish. Body about one and one-half times longer than broad, rather truncate behind. Above with four very large heavy curved spines each side, situate near the margin, the last two close together, the anterior one is the largest; they are minutely spinulate or bristly. At tip of body is a pair of curved stout hairs, more slender than the spines, near each anterior spine is a short stout spine. Legs long and slender, with some short, fine hairs, IV pair with extremely long tarsi; the tibia IV with a very long stout spine similar to those on the body, and a short erect spine near tip of the preceding joint.

Length, 0.3 mm.

From Guelph, Ontario, Canada, attacking *Eriophyes* on large-toothed aspen, July 27.

Celænopsis pedalis, new species.

Female—Pale yellowish. Body about twice as long as broad, tapering each way, but mostly toward posterior end; dorsum with many long, stout bristles, perhaps most numerous on the sides and behind; venter also with long bristles; one at each anterior corner of the sternal plate, two pairs near middle of this plate, and a small one at each posterior corner; three or four each side near bases of the coxæ, two pairs each side on ventral plate, two each side near anus, and several others on outer region of venter and along the margin. Legs slender and long; I fully as long as body, IV next, II rather stouter than the others, all very bristly, especially near tips. The female genital aperture is longer than broad, broadest in front, and its anterior margin bi-convex; the mandibles show an apophysis from the side of the outer finger.

Length, 0.8 mm.

Guelph, Ontario, Canada; taken from the larva of *Pelidnota punctata*, April 1.

Celænopsis latus, new species.

Color yellowish-brown, legs rather paler. Body broad, about one and one-half times as long as broad, broadest in middle, and broadly rounded behind, dorsum smooth, margin with some bristles, two of these on each posterior side are very long. Legs short, leg I very slender, II a little thicker than any of the others, all with hairs, and some very short spines. Sternum with a very stout curved spine or

bristle at each corner, a bristle at base of coxa II, also at IV, and one each side of vulva; vulva not reaching back of coxa III. On ventral plate are three bristles each side; the lateral plates have a few bristles and one each side on anal plate, the anal plate appears closely attached to the postanal plate.

Length, 1.1 mm.

From the beetle *Passalus cornutus*, at Guelph, Ontario, Canada.

Lælaps multispinosus, new species.

Pale yellowish; body rather more than one and a half times as long as broad, very broad behind legs. Body and legs with many short, stout, spine-like bristles, those on the dorsum mostly curved, those on venter longer and straight; sternal plate with two on anterior margin, and three each side, ventral plate with a basal pair and three on each posterior side, anal plate with a median one behind, rest of venter with many similar spines, coxæ I each with two large spines, II with one large spine, III with one short spine, and IV mutic. Legs with many short spines and hairs; tarsus II with two short stout spines just before tip, III and IV with many stout spines.

Length, 1 mm.

Guelph, Ontario, Canada, from muskrat, April 26. Resembles *L. echidinus* from rats (which species occurs in California) but with shorter spines on dorsum, and the hind coxæ unarmed.

Lælaps, pedalis, new species.

Pale yellowish. Body about twice as long as broad, slightly more narrowed in front than behind. Dorsum with many quite fine hairs, those on posterior sides are longer. Venter with quite a number of slender bristles, sternum with a pair in front, and four each side at bases of the coxæ. Legs with many bristles, especially near tips of tarsi, a stouter spine on inner side near tip of palpus. Legs moderately slender, not very long, first pair much shorter than the body, tarsi tapering, except I, which ends bluntly.

Length, 1 mm.

Guelph, Ontario, Canada, on chipmunk, in May. In a general way this species is related to *L. echidinus* and *L. multispinosus*, but all the bristles are fine instead of spine-like; the venter is much like *L. propheticus*, but the ventral shield has more bristles, the hind legs are shorter, etc.

Lælaps propheticus, new species.

Male—Pale yellowish-brown, dorsum with many fine, short hairs, venter with the ventral plate narrowed at base and a large triangular plate each side behind hind coxæ, anal plate broad, but very short,

peritreme long, reaching coxæ I, stigma just behind coxæ III; legs slender, second pair rather thicker than the others, III pair with the intermediate joints slightly produced on the middle behind; tarsus I of even thickness to the tip, other tarsi tapering. Similar to *L. stabulans*, but leg II less stout, and with fine hairs.

Length, 1 mm.

Guelph, Ontario, Canada; from groundhog.

Several have no distinct shields on venter, although some carry a large egg; they are probably nymphs.

Laelaps longiseta, new species.

Pale yellowish. Body nearly twice as long as broad, with many bristles, and on the posterior sides and apical margin are many fine, short hairs; on each humerus is a very long bristle, and a similar long one from near tip of each hind femur. The legs are rather short and with bristles and hairs; leg II of male is heavy, but without apophyses. On the venter are rather fine and slender bristles, a pair at front margin of sternum, one at base of coxa II, and III, and two at base of coxa IV; anal plate large and broad, with many hairs.

Length, 0.9 mm.

Guelph, Ontario, Canada, February 27, from carrion beetle. Readily known by long bristles on humeri, and hind femora.

Gamasus posticatus, new species.

Color yellowish. Body nearly twice as long as broad, broadest at shoulders, concave and tapering in front, broadly rounded behind. Dorsum with a pair of frontal bristles, a long one on each shoulder, and a submarginal row of four each side, the last near tip and shorter than the others; a submedian row of seven shorter and finer hairs, the first the longest, and a few others near shoulders; two each side on the posterior margin near tip, the inner one the longer, and two on the posterior sides. Epistoma with three teeth in front, the median one the longest; legs and palpi slender, all with long spines, leg II thickened, and with a small tooth at tip of third joint beneath, leg IV extremely long, very much longer than body. Sternal plate with a bristle at each corner, and several on venter, especially near the anal opening.

Length, 0.7 mm.; leg IV, 1 mm.

From Guelph, Ontario, Canada, under decaying maple leaves.

Gamasus attenuipes, new species.

Yellow brown. Body of female much broader behind than in front. The shield follows the margin for one-half way when it is cut away quite suddenly, and tapers to the tip; above with many fine, short hairs. Legs extremely long and slender, all with fine hairs; palpi long and slender, last joint showing a thumb inserted near tip. Sternal plate with

three short bristles each side, vulva triangular, as figured, ventral and anal plates united, very broad, with many fine hairs. Stigma above coxæ III; the dorsal shield folds down to include the stigma and the long peritreme.

Length, 1.4 mm.
Guelph, Ontario, Canada; on turnip, January 10.
Distinct by shape of dorsal shield and vulva.

Family ORIBATIDÆ.

Pelops terminalis, new species.

Dark reddish-brown, a pale yellowish spot before the middle. The cephalothorax is short, with narrow lamella each side; a basal trans-lamella, from which arises the spatulate superior bristles; the pseudostigmatic organ is of moderate length, and clavate; abdomen faintly roughened above, each side with two groups of two tiny round dots, two clavate hairs on the anterior lateral edge over the wing, and behind on each side are three clavate hairs, the longer one near tip and lower down than the others. Venter smooth, genital aperture its length in front of the smaller anus, the latter more than its own length from the hind margin; sternal plate with two lines each side. Wings deep, incurved, rounded at tip, legs short and with three unequal claws, the tarsi bearing two or three hyaline spatulate hairs.

Length, 0.5 mm.
From Guelph, Ontario, Canada; under bark of ironwood, March 6. This is the first species in the genus to be recorded from our country; there are eight or ten species in Europe.

Galumna sylvicola, new species.

Pale yellowish. Abdomen elongate, smooth, without hairs. Cephalothorax with a rather broad lamella each side, tipped by a long bristle, no trans-lamella, superior bristles long, erect, distant from pseudostigma; pseudostigmatic organ rather long, capitate, but tip pointed. Wings moderately large, not reaching in front of the abdomen, quite deep and rounded below. Legs rather short, with few hairs, mid and hind femora margined below. Venter smooth, genital opening fully one and one-half times its length in front of the much larger anal opening; sternal plate with three lines each side, none reaching the middle, the hind margin of sternal plate is not as distinct as the lines.

Length, 0.38 mm.
From Guelph, Ontario, Canada, among fallen leaves in the forest, April 28.

Oribatella formosa, new species.

Yellow-brown, a pale yellow spot on base of abdomen. Cephalothorax with a broad lamella each side, and a trans-lamella; each lateral

lamella is divided in two points at tip, the inner one much the shorter, and from between them arises a large, stout, serrate bristle; superior longer, and serrate; pseudostigmatic organ rather short, capitate; beneath, on each side of the cephalothorax in front of leg I is a long spine-like process tipped by a stout, incurved, serrate bristle. Legs of moderate length, tarsi with many hairs, some beneath are large and serrate; patella and tibia I and II each with a prominent thickened hair or bristle near tip. Abdomen plainly longer than broad, broadest behind, with six short stiff, rather thick hairs each side, and two on each wing above, and two each side on posterior margin lower down than the others. Venter smooth, genital opening broader in front than long, nearly twice its length in front of the much larger anal aperture, which is broader behind than in front; sternal plate not separated from venter, and showing three short lines each side; a large tectopedium behind coxa I, with a serrate bristle beneath.

Length, 0.5 mm.

From Guelph, Ontario, Canada; from under bark of various trees, as mountain ash, April 17; Norway spruce, February 27; catalpa, February 14; balsam, February 13.

Liacarus parvulus, new species.

Reddish brown, or more yellowish. Body globose, high; cephalothorax very short and depressed, the lateral lamellæ very small, and terminated by a small hair; no superior bristles visible; the pseudostigmatic organs quite long, clavate at tip; body smooth, no hairs, broader behind than in front; a curved plate behind coxæ I; legs short, three equal claws, the hairs of legs simple, one near tip of penultimate joint very long. Venter smooth; genital aperture one and one-half times its length in front of the slightly larger anal opening; in front of the genital aperture there is a broad transverse plate, concave in front, its outer anterior corners extended; it is thicker than the rest of the skeleton and darker colored; at its sides the sternal plate is divided by a line and dot.

Length, 0.4 mm.

Near *L. nitidus*, but smaller, and no visible superior bristles.

Guelph, Ontario, Canada; from moss on a stump, April 26.

Oribata canadensis, new species.

Yellowish brown. Cephalothorax with a pair of curved anterior bristles; superior bristles, erect, stiff, close to the pseudostigma; the pseudostigmatic organ longer than the width of the cephalothorax, barely thickened at end, straight. Abdomen globose, smooth, with a submedian row each side of eight stiff, erect bristles, and at tip a pair of curved hairs, and at base a pair close together projecting over the cephalothorax. Legs long and slender, with slender hairs, one above

tibiæ and patellæ thicker and more plumose than others; tarsi extremely slender. Venter smooth; sternal plate with a line each side, ventral openings distinctly separate, the genital broader but no longer than the anal.

Length, 0.45 mm.

From Guelph, Ontario, Canada; under bark of ironwood, March 6.

Oribata perolota, new species.

Yellow-brown. Cephalothorax with a pair of small apical bristles, a median pair of quite long bristles, and a superior pair of short erect bristles; pseudostigmatic organ moderately long and clavate. Abdomen a little longer than broad, smooth, bearing above on each side six quite long curved bristles: one near the tip, four near the side-margin, and one sub-median and toward the tip; genital aperture nearly twice its length in front of the very much larger anal opening; anterior sternal plate divided by a complete line, posterior sternal plate indented by the genital aperture, without marks or lines. Legs long and slender, joints slightly nodose, the short middle joint is not swollen; the tarsi with many fine hairs, a few on the other joints, a long one near tip of penultimate joint of leg I; trochanter of leg III prominent, globose; one claw to tarsus.

Length, 0.45 mm.

From Guelph, Ontario, Canada; in corn stubble, April 26. Related to *O. concolor* as figured by Berlese, but he shows more bristles on dorsum.

Oribata neosota, new species.

Dark yellow-brown, legs paler. The cephalothorax is quite long and humped at base and before the tip, the sides irregularly trilobed; a sub-apical projection each side in front, a pair of short fine apical hairs, a curved bristle each side on middle lobe; superior bristles very long and simple; pseudostigmatic organ not very long, sub-clavate. Abdomen longer than broad, nearly smooth, with six curved hairs above on sides and near tip. Legs rather short; behind coxæ I and II are large tectopedia; leg I not near as long as body, leg IV almost as long as body; the middle joint of legs very small and not swollen. Venter smooth; the genital aperture distinctly separated from the scarcely larger anal opening; anterior sternal plate with a line each side, the posterior sternal plate undivided, but deeply indented by the genital aperture.

Length, 0.45 mm.

Guelph, Ontario, Canada; from among forest leaves; April 28.

Cymberemaeus parvula, new species.

Yellowish brown. Cephalothorax blunt in front, punctulate above and reticulated; pseudostigmatic organ of moderate length, clavate; abdomen elongate, flat; a central area separated by a distinct groove from the margin, the central area reticulate, the margin mostly striate, partly reticulate; between the cephalothorax and abdomen there is on each side a prominent projection; on apical margin are four tiny clavate hairs. Venter and sternum strongly granulate; anal and ventral apertures about one-third their length apart. Legs short and thick, with few very short, simple hairs; on leg I the penultimate joint has a long apical process extending over the tarsus; one claw.

Length, 0.35 mm.

From Guelph, Ontario, Canada, under bark of ironwood, March 6.

Family TYROGLYPHIDÆ.

Histiostoma valida, new species.

In general characters and appearance this species is like *H. gracilipes,* described and figured in my Revision of the Tyroglyphidæ, but differs in that the third joint (from the tip) in all legs is twice as long as the penultimate joint, and nearly twice as long as the preceding joint. The tarsi are even more slender than in *H. gracilipes;* the tips of the palpi are also longer than in that species; and I cannot see any hairs on the abdomen.

Length, 0.3 mm.

From Guelph, Ontario, Canada; on horse-manure.

Family ANALGESIDÆ.

Pterodectes armatus, new species.

Similar to *Pt. cylindricus.* Dorsum with two shields; the anterior narrowed in front and indented on the sides, its hind margin distinctly undulate, and with a pair of bristles above; apex of female as in *Pt. cylindricus,* but each lobe has two bristles instead of one. In the male the tip of abdomen is more deeply incised, the lobes broader at tip, and three bristles inward of the large one; from the tip of dorsum there extends back beyond the lobes a rounded, hyaline plate.

Length, 0.5 mm.

Guelph, Ontario, Canada, on various birds; song sparrow, hermit thrush, junco, robin, white-throated sparrow, cedar bird, palm warbler, black and white warbler.

Pterodectes muticus, new species.

Similar to *Pt. rutilus,* but with rather shorter legs; a pair of shorter bristles on cephalothorax. In male the tip of body more deeply in-

cised than in *Pt. rutilus,* and the lobes more divergent, and the largest terminal bristle is longer. In the female the tip of abdomen is divided, but the lobes not divergent, and there is no apical spine, but only an ordinary bristle.

Length, 0.5 mm.

Guelph, Ontario. Canada, on vesper sparrow and phœbe.

Rivoltasia bispinosa, new species.

Female—Body about one and one-half times as long as broad, broadest at the shoulders, the abdomen short and broadly rounded at tip. Beak short, depressed; legs short and stout, tapering from base to tip, leg I about one-half the length of body, leg IV plainly longer than I, each with a few hairs, mostly toward tip, and a long one just before the tip; on each shoulder is a long bristle and at apex of abdomen are two bristles each side, the outer one two-thirds as long as body, and arising from a small tubercle, the inner one is very short. The male has the abdomen ending in two divaricate lobes, each tipped by a slender curved spine and with another shorter spine pointing inwards from its base; a long bristle arises from a bulb-like lobe at outside of the apical spine.

Length, 0.15 mm.

Guelph, Ontario, Canada, on pigeons.

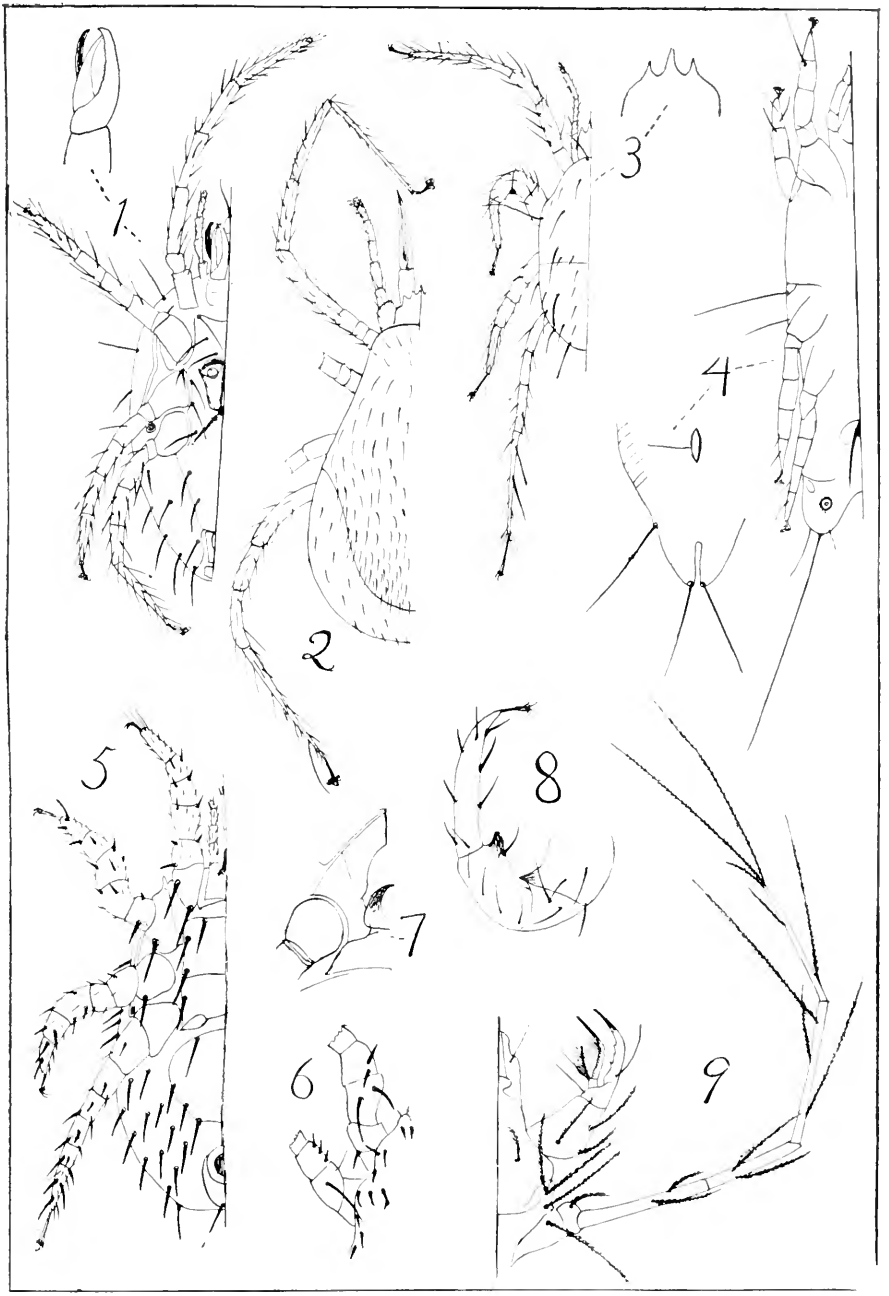
Family LISTROPHORIDÆ.

Listrophorus validus, new species.

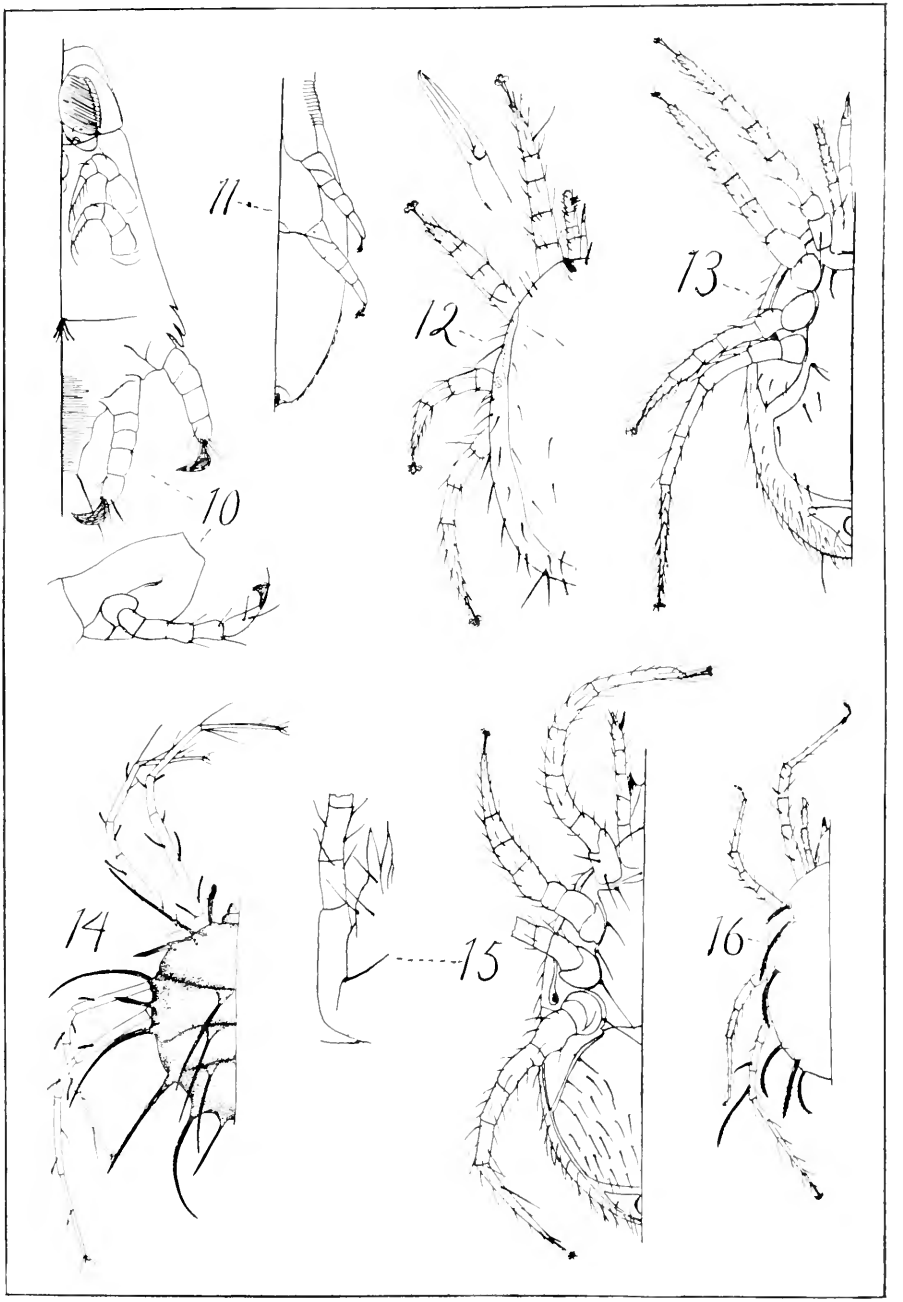
Male—Pale yellowish hyaline, the lobes of the attaching apparatus brownish. Body a little more than one and a half times as long as broad, broadest just in front of the third legs; the anterior end is distinctly truncate, on each side of head beneath is a large curved thin plate, transversely-ribbed or striate, at the base is a ribbon-like strip, striated the opposite way. Anterior legs are slender, usually, at least, folded over body; the posterior legs heavier, all tarsi with a long subterminal bristle. Tip of abdomen narrow, sightly emarginate, with a bristle at each corner. Dorsum with an anterior shield, reaching back beyond coxæ II, back of this shield the abdomen is transversely striate for a short distance, and beyond smooth or much more finely striate; venter coarsely transversely striate. In the female the body is more slender, three times as long as broad, extending much beyond hind legs, and the anterior legs are more prominent, the femur I being quite long and slender.

Length, 0.4 mm.

Guelph, Ontario, Canada, April 26, 1906; taken from muskrat.



NEW ACARINA



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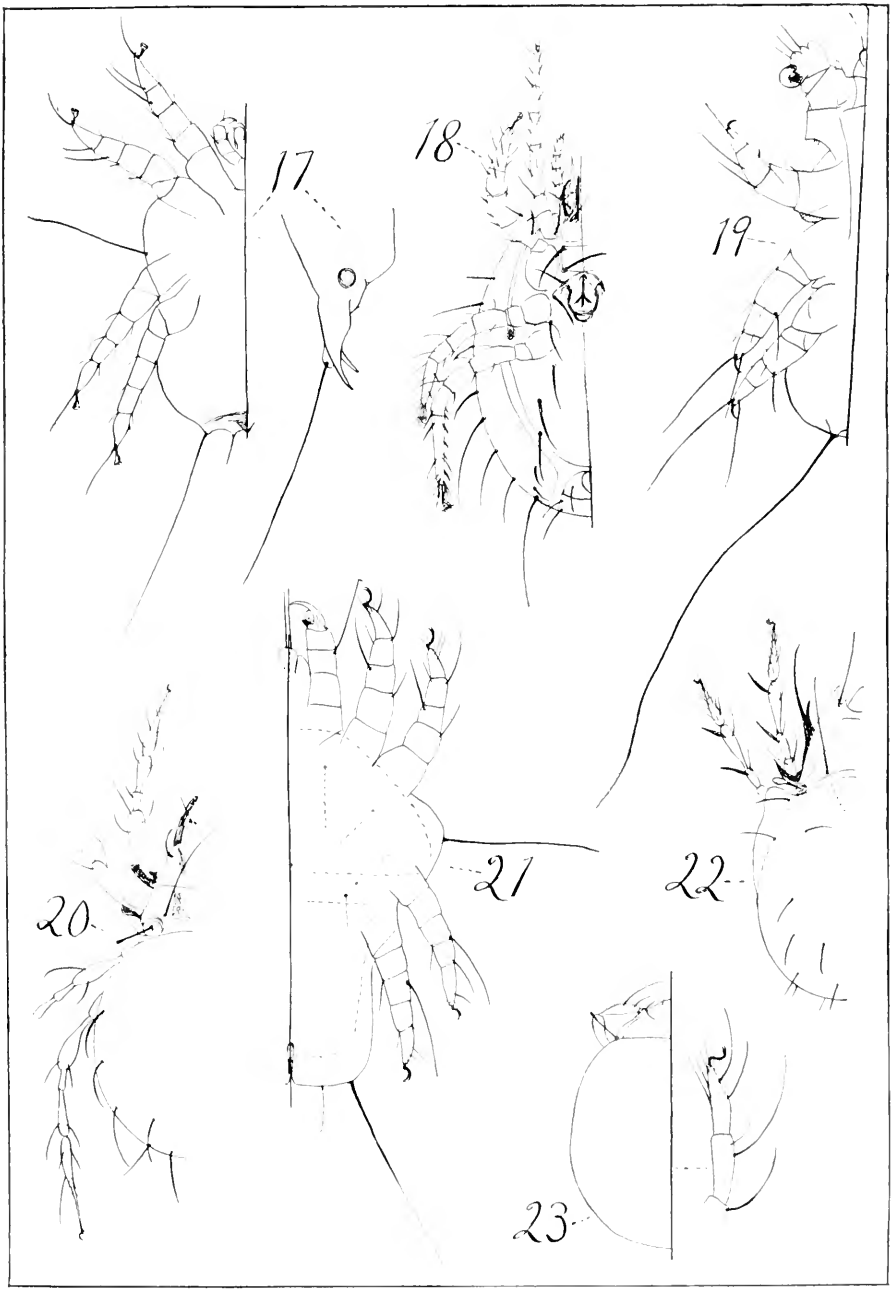

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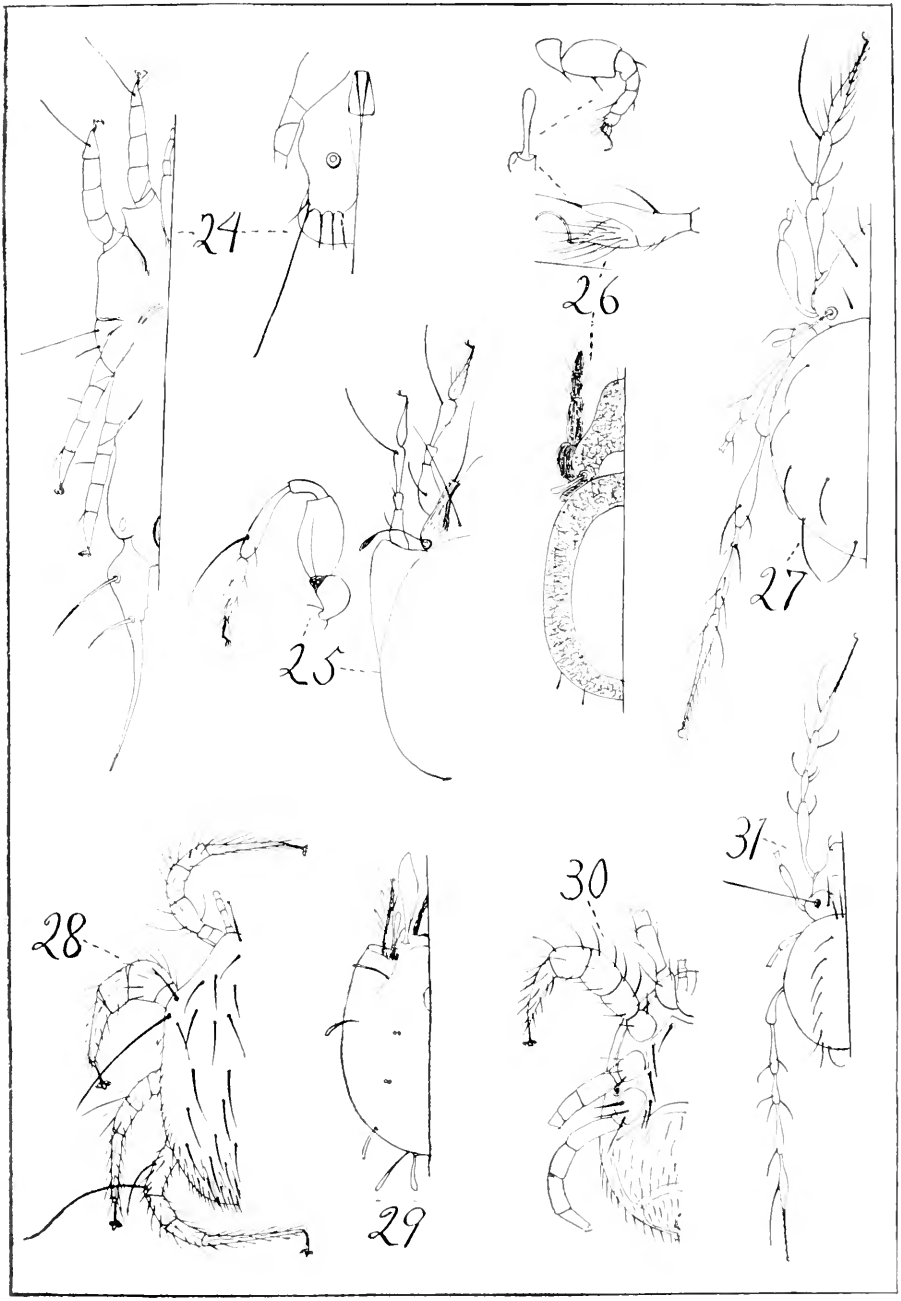

NEW ACARINA

EXPLANATION OF PLATES X TO XIII.

PLATE X.

FIG. 1. *Celaenopsis pedalis.*
2. *Gamasus attenuipes.*
3. *Gamasus posticatus.*
4. *Pterodectes muticus.*
5. *Laelaps multispinosus.*
6. *Laelaps multispinosus*, anterior dorsum.
7. *Gamasus attenuipes*, vulva.
8. *Gamasus posticatus*, leg II.
9. *Cheyletus longipes.*

PLATE XI.

10. *Listrophorus validus*, and head from side.
11. *Listrophorus validus*, female tip of venter.
12. *Liponyssus canadensis.*
13. *Laelaps propheticus.*
14. *Tetranychopsis spinosa.*
15. *Laelaps pedalis*, and mouthparts below.
16. *Sejus macropilis.*

PLATE XII.

17. *Rivoltasia bispinosa.*
18. *Celaenopsis latus.*
19. *Myobia canadensis.*
20. *Oribata neosota.*
21. *Cheyletiella canadensis.*
22. *Oribatella formosa.*
23. *Liacarus parvulus.*

PLATE XIII.

24. *Pterodectes armatus.*
25. *Galumna sylvicola.*
26. *Cymberemaeus parvula.*
27. *Oribata perolota.*
28. *Laelaps longiseta*, dorsum.
29. *Pelops terminalis.*
30. *Laelaps longiseta*, venter.
31. *Oribata canadensis.*

NEW SPECIES OF ANDRENA.

[Hymenoptera, Andrenidæ.]

BY H. L. VIERECK.

The following species are described in anticipation of Mr. W. D. Pierce's forthcoming monograph of the Strepsiptera, in which the proposed names will be used.

Andrena crawfordi, new species.

Female, 10 mm. Ocular distance greater than the occipito-clypeal distance, facial fovea not extending below the antennal line, two-thirds as wide as or a little wider than two-thirds of the shortest distance between the lateral ocellus and nearest point on eye, fovea without a

welt-like space between it and the eye margin, process of labrum triangularly emarginate, clypeus smooth and distinctly punctured, with an inconspicuous median impunctate space, third joint of antennæ as long as fourth plus fifth plus sixth; dorsulum dull, middle metatarsus nearly as broad as the middle tibia, hind tibia dark, its scopa dense enough to obscure the tegument beneath, most of the scopal hairs branched; abdomen with the depression of the dorsal segments indistinct and extending from the apical margin toward the base less than one-half the length of the segment; tegument black, pubescence cinereous, anal fimbria dull golden, foveal pubescence tinged with yellowish in much the same way as the pubescence on the dorsum of the insect, wings hyaline, subcostal vein blackish, rest of the veins more or less brownish.

Male, 9 mm. Tegument of face black, its sculpture partly concealed by pubescence, cheeks rounded, third joint of antennæ a little longer than the next two joints combined; otherwise this sex is sufficiently like its mate to be readily associated.

Type—No. 10034, U. S. National Museum.

Type locality, Dallas, Tex., May 2, 6, 1905, on *Sitilias grandiflora* (Hunter Nos. 105, 265, collected by F. C. Bishopp and W. D. Pierce); ten male paratopotypes April 28 to May 7, 1905, May 8, 9, 1906 (Hunter Nos. 100, 105, 265, on *Sitilias grandiflora,* W. D. Pierce and F. C. Bishopp), also on the same flower by C. R. Jones and F. C. Pratt; nine female paratopotypes on *Sitilias grandiflora,* May 6, 7, 29, 1905, May 8, 1906 (Hunter Nos. 233, 265, F. C. Bishopp and C. R. Jones); also W. E. Hinds. These paratopotypes are all very true to the type. One male and three female paratypes respectively from New Braunfels, Cotulla (on *Corcopsis palmata* at the latter place), (J. C. Crawford), Corpus Christi (on *Sitilias grandflora*) (F. C. Pratt) and Fedor, Lee County (Birkmann), all differ somewhat from the type, e. g., in the labrum of the females, excepting the Fedor specimen, being more truncate than emarginate and in the clypeus in the same specimens being rather more granular between the punctures and in the other or Fedor specimen having a rather flattened abdomen and in the male being somewhat larger.

Andrena sitiliæ, new species.

Female, 13 mm. The size, more ochreous pubescence, yellow tibial scopa and more yellow anal fimbria will serve to distinguish this from *A. crawfordi,* with which it agrees in other respects; apical edge of dorsal abdominal segments pale.

Type—Female, No. 10033, U. S. National Museum.

Type locality, Cotulla, Tex., May 12, 1906, on *Corcopsis tinctoria?* (J. C. Crawford); paratype, Dallas, Tex., on *Sitilias grandiflora* (stylopized specimen), (J. C. Crawford).

A REPORT ON MOSQUITOES AT DUBLIN, NEW HAMPSHIRE, PARTICULARLY ON THE OCCURRENCE OF MANSONIA PERTURBANS WALKER.

[Diptera, Culicidæ.]

By Harrison G. Dyar.

The town of Dublin, New Hampshire, is a small collection of houses in the hilly country near the base of Mount Monadnock, to the east. The adjacent land was in use for farming purposes half a century ago, but has lately been allowed to grow up to a second growth of deciduous trees and conifers. Most of the farms are now occupied as summer places by people resident in the larger cities, Boston, Baltimore, Chicago, etc. The places are consequently not used for farming, but are covered with young forest close up to the houses, which are situated remotely from each other. In the valleys between the hills run small streams, none of any size, but at numerous points are situated small to rather large lakes. The climate is cool, the fauna sub-boreal. The altitude of Monadnock Lake, the largest lake in the region described, is 1500 feet.

Considerable trouble has been experienced by the summer residents with mosquitoes. These people, coming to the region solely for summer vacation, are not disposed to put up with the annoyance of these insects, but in many cases would seek some other place. As the town of Dublin, in common with many other places in New England, depends largely for its prosperity on its popularity with the summer visitors, the mosquitoes prove a serious economic problem. There is here no question of danger to health from diseases transmitted through their bites. The locality is far out of the range of tropical disease carriers, and though two species of *Anopheles* are present, and not uncommon in suitable places, they are not generally diffused enough, nor even sufficiently locally abundant to constitute a serious menace. It is probable that under special conditions malaria could be acquired in Dublin; but in the houses occupied by the summer residents I think there is no danger whatever. The question then resolves itself into a study of the annoying species, particularly those prone to enter houses.

Under these conditions we naturally look first to the house mosquito, *Culex pipiens* Linn., and allies. *Culex pipiens* does not occur in the region. It is an imported European species, frequenting the larger centers of civilization, and in my experience has nowhere penetrated into the country. The only

species of house mosquitoes present in the region is *Culex restuans* Theob., and that is rare, and has not been reported troublesome in any case. The region is far beyond the normal range of *Culex quinquefasciatus* Say or *Aedes calopus* Meig., nor is there any likelihood of these being imported, as Dublin is a three hours ride by train from Boston, where the occurrence of either of these insects is very occasional and dependent upon a chance importation from the south.

The group of woods mosquitoes is well represented in the region. *Aedes stimulans* and its allies, the group of black-legged species such as *Aedes abserratus* F.&Y., *trichurus* Dyar, *lazarensis* Felt, *aurifer* Coq., *auroides* Felt, *fuscus* Osten Sacken, etc., and *Aedes canadensis* Theob., as well as the tree-hole inhabiting *Aedes triseriatus* Say, are all present. The conditions for their breeding are ideal, the rocky and hilly soil holding temporary pools of melting snow water in innumerable places, besides the edges of all the marshes which occur in nearly every valley not large enough to hold a lake. These places are all dry during the summer, but are typical breeding-places for the woods species. The continuous cover of low forest makes excellent camping-ground for the adults and enables them to travel long distances without coming out into the hot fields. It would seem, therefore, that these species should be the principally troublesome ones. Such, however, is not the case. Two causes tend to produce this result. In the first place the woods mosquitoes never leave the shelter of trees for any distance and so do not enter the houses, for the majority of places have at least a small open space about the house. While one might be eaten alive by these insects in the woods, another upon the porch of a house would suffer no special inconvenience. In the second place these mosquitoes rapidly become scarce as the season advances, since they have no second brood after the first emergence in May, or at least but an insignificant after-breeding in the case of *Aedes canadensis* and *A. fuscus*, while the the tree-hole *A. triseriatus* is not an important factor. Thus by August, before which the summer residents have not arrived to any extent, the woods mosquitoes have been greatly lessened in numbers.

There remains, then, but one species as the principal source of annoyance, namely *Mansonia perturbans* Walk. The adults begin to emerge at the end of June and become abundant in July, at the time when the summer visitors begin to arrive. These mosquitoes are largely nocturnal, and do not hestitate to enter houses, coming in freely through the chimneys when

the windows are screened. They bite viciously and are altogether disreputable in their behavior. They are widely dispersed through the shelter of the woods and are very abundant.

From these considerations it appears that the economic problem of the mosquitoes at Dublin, New Hampshire, is essentially concerned with *Mansonia perturbans*. If the nuisance caused by this mosquito were abated, the summer residents would experience little inconvenience from mosquitoes, at least in their residences, and the prosperity of the place would be promoted by the influx of newcomers.

An institution called the Dublin Chemical and Pathological Laboratory is maintained by the summer residents for the conservation of healthful conditions in the community. It is in charge of Dr. E. C. Stowell, of Boston. Dr. Stowell has been much interested in the mosquito problem, and has left no stone unturned to discover the breeding places of *Mansonia perturbans*, not only by personal effort, but by inviting examination by all the leading American students of mosquitoes. The writer first visited Dublin in August of 1908 at Dr. Stowell's invitation and made a cursory examination of the territory. In the spring of 1909 he made a visit of a few days in company with Mr. A. N. Caudell with the intention of making a complete survey, but the season proved to be not far enough advanced and the survey was abandoned. Later Mr. A. Busck was sent there and made extensive studies on the occurrence and specific identity of the woods species. In none of this work, nor at the visits of other entomologists, nor by the labors of Dr. Stowell and his able assistant, Mr. Howe, were any breeding places of *Mansonia perturbans* discovered. The breeding-habits of this species are peculiar. Fortunately they are now known, through the timely discovery by Mr. J. T. Brakeley at Lahaway, New Jersey. Unlike all other mosquito larvæ, those of *Mansonia perturbans* remain all winter in the mud at the bottom of suitable ponds, attached by their air-tubes to the vascular roots of certain species of grass. But few ponds present suitable conditions, so that the supply of these mosquitoes in any given region generally comes from but a single source. This source is not always easy to discover. The writer made a third visit to Dublin in August, 1909, and was able to discover an extensive breeding place of the species. Possibly this is not the only source of the supply of these insects, but it seems to be the only place in which they breed at present in numbers in the immediate vicinity of Dublin.

The locality in question is a small pond, the source of a small stream. The pond has stony shores and was evidently formerly of some depth. It is now bordered with woods and has been extensively filled by leaves and mud. It is also at least half overgrown with a layer of grass, interspersed with small bushes of *Myrica*. The grass forms a dense carpet with its thick root-stocks and dense vascular roots, through which, here and there, appear small spaces of water with pond-lily leaves. The whole layer is strong enough to support a man walking on it, though it is very springy, and if one stands still, water appears upon the surface and one sinks slowly. It was in the watery spaces among this grass carpet that the egg-boats of *Mansonia perturbans* were found, and to the roots below the larvæ are attached. It is essential for such a pond to remain in an undisturbed condition for it to make an ideal breeding place. Several other ponds were seen with similar grass coating, but in most of them the layers had been thickened by time and so densely grown up with sphagnum or even bushes of considerable size that breeding of this mosquito was no longer possible. A very large swamp has been formed by the damming of a stream to furnish power for an electric-light plant. At the upper end of this swamp a large area, many acres, of this grass occurs, forming an ideal breeding place, but, owing to the changes in the level in the water brought about by its use in the electric-light works, the proper conditions seem to have been destroyed. In August the water was a foot below its normal level, so that all the open spaces in the grass were dry and covered by a hard crust. Oviposition at present is therefore impossible here. However, it is not impossible that in a rainy season (the present season is a dry one) this marsh might be permanently flooded and breeding conditions reestablished.

I am inclined to the view that practically all of the *Mansonia perturbans* so troublesome to the inhabitants of Dublin came from the small pond above described. Another pond with typical conditions was shown me by Dr. Stowell, but it is so small that no large numbers of *perturbans* are likely to be produced from it. If this view is correct, the adult mosquitoes must habitually fly at least 3 miles from their breeding place. I do not regard this supposition as at all improbable. It is of course possible that there are other breeding places in the vicinity not at present discovered. In fact I expect that similar ponds will be found in the more distant vicinity when the area of exploration has been extended.

As a remedy for the mosquito plague in Dublin, therefore,

the draining of this pond should suffice. The complete drainage is not necessary. Lowering the water level 2 feet would probably completely destroy the breeding conditions. If, after this were done, *Mansonia perturbans* should be again found in numbers, it would mean that another breeding place remained undiscovered in the vicinity. It would not be a difficult task to discover this, for breeding places in the right condition for this species are few and easily recognized, now that the conditions are understood.

The following is a list of the species of mosquitoes taken at Dublin, N. H., by Mr. Busck, Dr. Stowell, and the writer:

Anopheles quadrimaculatus Say.
Anopheles punctipennis Say.
Uranotaenia sapphirina Osten Sacken.
Culex dyari Coquillett.
Culex restuans Theobald.
Culex territans Walker.
Mansonia perturbans Walker.
Aedes stimulans Walker (*abfitchii* Felt).
Aedes fitchii Felt & Young.
Aedes canadensis Theobald.
Aedes fuscus Osten Sacken.
Aedes abserratus Felt & Young.
Aedes lazarensis Felt & Young.
Aedes auroides Felt.
Aedes trichurus Dyar (*cinereoborealis* Felt & Young).
Aedes aurifer Coquillett.
Aedes hirsuteron Theobald (*pretans* Grossbeck).
Aedes n. sp.*
Aedes triseriatus Say.
Wyeomyia smithii Coquillett.

POSTSCRIPT.

This report was submitted to Dr. Stowell, who commented as follows: "I think you rather understate the amount of house annoyance caused by the woods species during June. They annoy on the verandas and come into the house, as I think Mr. Busck will corroborate. But as a cause of discomfort they cease to be important after the fourth of July, except on very still, warm nights. As they decline in importance, the *Mansonia perturbans* appears and almost at once becomes a fierce and obnoxious pest. The first one captured this year, you remember, was on June 25, at my house. Its principal hours for activity are from 7 to 9 in the evening and just before dawn, say from 3 to 5 A.M."

*This will be described in a forthcoming paper with Mr. F. Knab.

TWO NEW SPECIES OF THE GENUS TESTRASTICHUS.

[Hymenoptera, Eulophidæ.]

By J. C. Crawford.

Tetrastichus asparagi, new species.

Female. Length 2 mm. Belongs to the group of *T. hylotomæ* Ashm.; dark blue green; face finely reticulate and with scattered punctures; antennæ with one ring joint; joints 1-3 of flagellum almost equal, the first slightly longer and about as long as the pedicel; third flagellar joint hardly longer than wide and about as long as the first joint of club; mesothorax finely longitudinally rugulose, the median furrow failing anteriorly; middle lobe of mesonotum with a single indistinct row of punctures on each side; metathorax roughened, median and lateral carinæ strong; metathorax at median carina much longer than postscutellum; coxæ, trochanters, and femora, except apices, green, the rest of the legs reddish testaceous.

Amherst, Mass., reared from eggs of *Crioceris asparagi* by Dr. H. T. Fernald.

Type.—Cat. No. 12676, U. S. Nat. Mus.

This species is very closely related to *T. hylotomæ*, but has shorter antennæ. In the female of *T. hylotomæ* the third joint of the flagellum is twice as long as wide, and distinctly longer than the first joint of the club, the first joint of the flagellum is one and one-half times as long as the pedicel; the median furrow of mesonotum is distinct to the anterior margin.

Tetrastichus hunteri, new species.

Female. Length 1.75 mm. Belongs to the group of *T. hylotomæ* Ashm.; dark olivaceous green; face finely rugulose; antennæ with one ring joint, joints 1-3 of flagellum almost equal, the first slightly longer and about as long as the pedicel; third joint of flagellum hardly longer than wide and about the length of the first joint of club; mesothorax finely longitudinally rugulose, sericeous, median furrow very distinct to anterior margin; middle lobe of mesonotum with two rows of punctures along each side; metathorax with shallow thimble-like punctures, median carina strong, lateral carinæ not distinct; metathorax at median carina hardly longer than postscutellum; legs, except knees, apices of tibiæ and the tarsi greenish or black.

Natchez, Miss., reared from the larva of *Anthonomus grandis* Boheman.

Type.—Cat. No. 12677, U. S. Nat. Mus.

Named in honor of Mr. W. D. Hunter, U. S. Department of Agriculture, Bureau of Entomology.

Easily distinguished from *T. hylotomæ* and *asparagi* by the dark legs.

NUPTIAL COLORS IN THE CHRYSOMELIDÆ.

[Coleoptera.]

By Frederick Knab.

Among certain forms of Chrysomelidæ the imago takes on an entirely different appearance with the attainment of sexual maturity. Either new colors are added to the existing pattern or there is a complete change in coloration. These colors are not acquired as the result of the more or less gradual chitinization and pigmentation which follows eclosion ("Aussfärbungsprozess" of the Germans) but make their appearance only with the development of the sexual powers. This maturing of the sexual powers may be a matter of months and often it only comes about with the advent of another season, for most Chrysomelidæ are single-brooded and do not become sexually mature until after they have hibernated or aestivated. Perhaps it would be more exact to say that the physiological changes which determine sexual activity take place during the resting period (hibernation or aestivation).

One of the most striking examples of color-transformation of this character has been studied by Caulfield in a northern species of Cassidini; its significance, however, appears to have been wholly overlooked. The beetle in question is *Physonota helianthi* Randall. The difference between the parent beetles and the new generation produced from them is so great that Caulfield very naturally concluded the insect to be double-brooded and dimorphic.* But further observation demonstrated that this insect is single-brooded and in the course of time completely changes its appearance.† The beetles which appear in the spring or early summer are brilliant golden green and so they remain until they copulate, lay their eggs, and finally die. The offspring of these golden green parents are wholly different in appearance. After emergence the pronotum and elytra are shining creamy white with translucent marginal portions and with five black spots upon the pronotum; soon, with the progressing chitinization, the elytra change to a dull blackish color with irregular ivory spots and blotches upon them. In this sober garb the beetles may be found upon their food-plant during the later part of the summer and in the autumn; they feed but little and show no sexual desires, and it is in this state that they go into hibernation. When the beetles reappear in the following spring they have assumed the

*Can. Ent., vol. 16, p. 227 (1884).

†Can. Ent., vol. 19, p. 73 (1887).

brilliant green coloration of their parents and they are then active and intent upon reproduction. Dr. Dinmock and the writer have corroborated Caulfield's observations by rearing the beetles from the eggs and carrying them through to the following season.

Transformations of a similar character have been observed in certain species of European Cassidini, but their correlation with the physiological changes of the reproductive period appears never to have been suspected. A much less obvious case is that of another American cassidid, *Chelymorpha argus* Lichtenstein. This beetle at first shows an ochreous yellow ground-color above, and it is not until it issues from hibernation and is ready to reproduce that it shows the characteristic dull red ground-color. Incidentally it may be mentioned that at Winnipeg, Manitoba, the writer found a race of *Chelymorpha argus* which is ochreous yellow when sexually mature.

Similar changes occur in certain Chrysomelini when sexual maturity is acquired. A striking case is that of *Zygogramma signatipennis* Stål, which the writer found abundant upon a large composite plant at Cordoba, Mexico. During the winter months the beetles could be found but sparingly upon their food-plant and appeared to be very inactive. At that time the ground-color of the elytra was a dull creamy white. With the advent of warm weather and the rains the beetles became abundant; they were now active and many pairs were observed in copulation. The ground-color of the elytra had now changed to bright green-gold. In certain of our native species of *Calligrapha* the ground-color of the elytra is at first creamy white, and this takes on a silvery luster when the beetle becomes sexually mature. In *Calligrapha rhoda* Knab the contrast is enhanced by the addition of red to the elytral pattern with sexual maturity; this change takes place in a still more striking manner in *Calligrapha rowena* Knab. As these beetles have been described in a previous article it would be superfluous to go into the details of coloration.

Tower in his book on evolution in the genus *Leptinotarsa*,* proposes names for certain Mexican forms of this genus which he claims to be new. He states that these species show colors in life which disappear after the death of the insect and that these colors are of specific value. Doubtless in these cases also the colors in question are correlated with the sexual functions, for in all the cases previously cited, the nuptial colors

*An Investigation of Evolution in Chrysomelid Beetles of the Genus Leptinotarsa. (Pub. No. 48, Carnegie Institution of Washington, 1906.)

disappear with death, as they are said to do in these species of *Leptinotarsa*. Unfortunately Tower has not specified what these colors are and how they are distributed. Should these colors prove to be of the physiological character indicated, persons studying these beetles at different seasons would naturally conclude that the differences in coloration were of specific value; or even the same individual, in ignorance of their true nature, would be led into error.

Cases of nuptial colors occur in certain species of Halticini, although they appear to be much less frequent in this group than in the Cassidini or Chrysomelini. A conspicuous example is *Disonycha quinque-vittata* Say, a common species upon willows in many parts of North America. These beetles, when found in the late summer have pale yellow elytra with narrow black longitudinal stripes. When the beetles emerge from hibernation the following spring the elytra show in addition a large amount of crimson, disposed in broad stripes in the intervals between the black lines. A Mexican halticid, *Homophæta abdominalis* Chevrolat, which the writer found common at Cordoba, develops nuptial colors. During the winter months these beetles were frequently found upon their food-plant. They then had dull bluish black elytra, while the pronotum and most of the legs were a pale ivory-yellow. When the season of sexual activity arrived, with the rains and the warm weather, the pronotum and the legs changed to a delicate rose-red, while the elytra showed a peculiar blue sparkle.

No indications of nuptial colors have been found in the two great groups of Camptosomata and Eupoda. While it is true that our knowledge of the biology of these groups is very incomplete, these groups, and particularly the one first mentioned, stand apart in many ways and one can hardly expect close correspondence in the more specialized traits. What does cause surprise is that the Hispini, which are so intimately linked with the Cassidini, show none of the remarkable color-changes so frequent in the latter group. But this may be due wholly to our incomplete knowledge, and perhaps, when the tropical forms have been investigated, this phenomenon will be found among the Hispini also.

These notes demonstrate how meager is our knowledge of the biology of this important group of beetles. Our literature of economic entomology abounds with more or less extended notices of the injurious species, yet it is rare to find an original observation recorded. The accounts are mostly borrowed from earlier authors, and such additions as are made, from scattered records and without critical knowledge, are, more often than not, inaccurate and misleading.

THE IDENTIFICATION OF CULEX CYANEUS FABRICIUS.

[Diptera, Culicidæ.]

By Frederick Knab.

Theobald assumed that the *Culex cyaneus* of Fabricius is identical with Williston's *Haemagogus splendens*.* Although it is evident that Theobald had not gone beyond a cursory perusal of the original description, this identification was generally accepted. To the writer the original description seemed to conflict with this identification in that it indicates a mosquito with uniformly white sides of the abdomen. This type of coloration is characteristic of the Sabethini and so are the long legs indicated by Fabricius. Very few mosquitoes of the metallic blue color of *Culex cyaneus* are known, and in view of the recent large collections of Culicidæ it seems improbable that Fabricius had before him a species that has remained unknown to subsequent workers. In considering these points Dr. Dyar and the writer thought that most probably the mosquito in question was identical with *Sabethoides nitidus* Theobald (=*S. confusus* Theo.) and published this opinion;† however, until the type had been examined, this identification could not be more than tentative. The opportunity to definitely identify this mosquito came in 1908, when Mr. Busck visited Copenhagen, where the type is preserved in the Royal Zoological Museum.

Mr. Busck examined the type at our request and what he found showed that our determination was incorrect. The specimen has a much swollen proboscis, while in *Sabethoides nitidus*, and also in *Haemagogus*, the proboscis is slender. The abdomen is blue above, silvery below, not banded, and this indicated a sabethid; but Mr. Busck, who examined the specimen with a hand-lens, could find no setæ on the metanotum. Moreover, he found that on the front legs, the only ones remaining, the claws are toothed near the middle, a condition we had not found in any of the many sabethids we had studied. Yet we could not find that there was a blue culicine with swollen proboscis, and it seemed inconceivable that Fabricius had a mosquito which has since remained unknown. A review of all the blue mosquitoes with reference to the proboscis led inevitably to *Sabethes*, and as in the Fabrician type the middle legs, which in that genus bear the characteristic ciliation, were missing, it seemed probable that *cyaneus* belongs to

*Monograph Culicidæ, vol. 2, p. 238-241 (1901).

†Proc. Biol. Soc. Wash., v. 19, p. 168 (1906).

Sabethes. Two points, however, the toothed claws and the absence of metanotal setæ, threw a doubt upon such identification. It seemed reasonable to suppose that Mr. Busck, in his examination with a hand-lens, had failed to find the delicate setæ on the metanotum; but that still left the toothed claws to be accounted for. In this extremity we applied to Dr. Böving, of the Copenhagen Museum, and he kindly reexamined the type. The points ascertained by Dr. Böving are as follows: (1) Metanotum undoubtedly with setæ; (2) antennæ plumose, the joints long, as in Sabethes; (3) palpi very short, hardly one-fifth the length of the proboscis—intact, without trace of breakage; (4) claws of the fore legs undoubtedly toothed, each claw with a small but distinct tooth near the middle; (5) wing with the posterior cross-vein nearer the apex of the wing than the anterior cross-vein; (6)wing with the scales of the veins broad, obliquely truncate. To these characters must be added the following, determined by Mr. Busck in his examination of the type: (7) Abdomen blue above, silvery below—no trace of banding; (8) proboscis much swollen apically; (9) wing with the second marginal cell very much longer than the second posterior cell. All these characters fitted *Sabethes loculpes* Rob.-Desv., as known to us, perfectly, with the one exception of the toothed claws. As the Fabrician type is undoubtedly a sabethine, and we had only female specimens of *Sabethes* before us, it seemed practically certain that the Fabrician specimen is the male of *Sabethes loculpes*. It is true that in the descriptions of male *Sabethes* available to us the front claws are stated to be simple. These descriptions, however, are by Theobald, an author who had, in our experience, proved to be unreliable in such details. While everything pointed to an error in Mr. Theobald's statement, the question could not be considered settled until a male *Sabethes* had been examined by someone else.

The opportunity came with Dr. Howard's visit to Europe the past summer, and at our request he examined the material in the British Museum. Dr. Howard, with the use of the compound microscope, found that in the male of *Sabethes loculpes* the claws of the front feet have a small tooth at about the middle. Thus the question is settled beyond a doubt: *Culex cyaneus* Fabricius is identical with *Sabethes loculpes*, upon which Robineau-Desvoidy founded his genus, and with *Culex remipes* Wiedemann. It should therefore be known as *Sabethes cyaneus* Fab. Fabricius did not mention the most obvious character of the species, the ciliate middle legs, be-

cause, without a doubt, the specimen already had those legs missing when it came into his possession. Wiedemann had the type before him when he prepared his *Aussereuropäische zweiflügelige Insekten* and in such cases he gave supplementary notes, in addition or correction of the short Fabrician diagnosis; that he does not mention the ciliation of the middle legs is further proof that those legs were missing at that time.

It may appear strange that Wiedemann failed to recognize the identity of *Culex cyaneus* Fabricius and his *Culex remipes*, described in the same volume. The description of *Culex remipes* was, however, added in the third supplement (Fernere Nachträge) of the first volume of the above named work, and it was drawn up at a later period when he no longer had the Fabrician type before him.

DESCRIPTION OF A NEW SPECIES OF EUCLEA WITH ITS LARVA.

[Lepidoptera, Cochlidiidæ.]

By Harrison G. Dyar.

Euclea vericrux, new species.

Chocolate brown, the high tuft at the base of the abdomen somewhat redder. On the fore wing a straight, narrow silver line runs from the costa subapically; it is continued by a roseate brown shade, diffuse within to vein 2, where it returns at a rounded angle to beneath the cell; here it is joined by a narrow silver mark, which forms a cusp-shaped point on vein 1 and reaches the inner margin at its basal fourth. The space outside this line is dark brown, within it, blackish-shaded except costally, where is a roseate shade. Discal mark elongate, dark brown, followed by a brown triangular spot at the end of the subapical silvery line. A yellow shade filling the upper half of the subbasal silvery line. Fringe blackish. Hind wing chocolate brown. Expanse, 22 mm.

One female, Vera Cruz, Mexico, bred from larva collected by Mr. F. Knab.

Type—No. 12628, U. S. National Museum.

Allied to *Euclea diversa* Druce, *baranda* Schaus, and *retroversa* Dyar, most nearly to the latter. The two former have round discal dots. From *E. retroversa* the present species differs in the shape of the subbasal silver line, which is produced into a point on vein 1 instead of crossing this vein in an arc.

LARVA.

Stage IV.—Shape and structure of *Euclea delphinii* Boisduval. Horns thick, the subdorsals of joints 3-5 moderate; of 6 adnate to that of 5, small; of 7 and 9 adnate to 8, which is nearly as large as the horns of 3-5; of 10 adnate to 11; of 11-12 large; of 13 rather small. Anterior subdorsals stained bright orange red, red in the tips and bases of the subdorsals of joints 3-5, 8, 11-12; a square spot between 6-7 and another 9-10; a dorsal line the whole length, red; dorsum else filled in with dark blue. Sides leaf-green; lateral horns green. Depressed spaces (1) rounded, visible. Skin clear-granular. The spines are pale and weak. Length, 6.0 mm.

Stage V.—As before. Cores of the subdorsal horns bright red; subdorsal ridge white, the color broken on joints 6-7 and 9-10, forming elliptical spaces around the horns, showing distinctly on 7-9. Upper half of lateral space yellow-green; the rest, including the lateral horns, clear green. Dorsum all purple filled; a narrow dorsal red line. Depressed spaces (1) round, yellowish. Length, 6.0 to 7 mm.

Stage VI.—As before. Subdorsal horns light red on joints 3-5, 8, 11-12, in distinct, white-edged, elliptical islands. Dorsum dull purple-filled, with pale red dorsal line.

This larva died. Another specimen sent by Mr. Knab was the same, except that the horns and dorsal line were orange yellow instead of red and the markings not white-edged. Dorsum pale greenish, purple-filled. Length 7 to 9 mm.

Stage VII.—Horns orange yellow, the dorsal space purple-filled; dorsal line yellow, reddish edged; depressed spaces (1) whitish. The color in the subdorsal ridge is in islands about groups of horns. Lateral spaces green, including the lateral horns. Patches of clatropes on the lateral horns of joints 6-13 at the tip, slightly on the anterior aspect, the patch on joint 12 small, the other patches rather large elliptical. The purple of the dorsal space shows in a line below the subdorsal ridge. Elongate elliptical, rather thick, the ends subtruncate. Dorsum rounded from joint 5 anteriorly and 11 posteriorly, the sides nearly perpendicular. Subdorsal horns on joints 3-5 subequal, of 6 and 7 small, of 8 intermediate, of 9 and 10 small. The horn of 6 is approximate to 5, that of 10 to 11. Horns of 11 and 12 subequal to those of 4-5; of 13 intermediate to the lateral horns and colored like them. Lateral horns of 3-4 and 6-12 rather long, equal. Dorsum purple-blue between the marks and in a line below the subdorsal ridge. A red dorsal line, yellow-centered, forming cross-bars on the depressed spaces (1) on joints 4-5 and 11-12; other depressed spaces whitish and adnate to the dorsal line, the outline of which is a little irregular. Subdorsal horns bright red, in a broad yellow band on the ridge, broken at 6-7 and 9-10 with an intervening red dot, incised more or

less between all the horns. Upper half of lateral space yellow-green, lower half and lateral horns, with subdorsal horn of joint 13, clear green, unmarked, the depressed spaces obscure. A slight green line along subventral edge. Skin sparsely clear-granular. Length, 8 to 12 mm.

Stage VIII.—Elliptical, rather long, the sides parallel, arched at the ends, thick and narrow; dorsum arched slightly, the sides rounded perpendicular. Dorsal space dark blue, only a narrow area left between the dorsal line and subdorsal ridge. Dorsal line crimson-red, expanding irregularly in all the widenings of the dorsal blue space, forming cross-bars in the largest widenings on joints 4-5 and 11-12; a square crimson patch breaking the subdorsal band on joints 6-7 and 9-10. Subdorsal ridge yellow, roundedly widened at each horn, the yellow edged with blue below as well as above and around the crimson spots. Sides yellowish green. Depressed spaces unmarked, the dorsal (1) only faint whitish. Skin densly clear-granular. Horns stout, thick and rather short, the subdorsals of 5 and 11 longest, those of 6 and 10 smallest, else no marked difference; subdorsal ridge yellow, with a red tint in the longest horns; lateral horns green. Cervical shield blackish, cut by greenish, with a red shade around. Large caltrope patches on the lateral horns of joints 6-11, the horn of joint 12 shortened, with a patch of brown end-spines above it; a similar patch on the subdorsal horn of joint 13, which is also short. A nearly complete yellow bridge between the subdorsals of joint 12. Later the dorsal depressed spaces appear as pale blue dots in the livid purple dorsal space. Length, 11 to 16 mm.

Cocoon.—The larva spun a brown cocoon between leaves, refusing ground.

Food plants.—The first larva found by Mr. Knab was upon an unknown plant, but it readily ate orange. The second one was on *Solanum torvum,* but was bred on rose.

Actual date of issue, October 5, 1909.

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WASHINGTON.

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OCTOBER-DECEMBER, 1909.

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PROCEEDINGS

OF THE

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VOL. XI OCTOBER–DECEMBER, 1909 No. 4

MEETING OF JUNE 10, 1909.

The 232d regular meeting was held at the Saengerbund Hall, 314 C Street, N.W., the Society being entertained by Mr. A. L. Quaintance.

President Heidemann presided and there were present Messrs. Burke, Caudell, Clemons, Dyar, Gahan, Gill, Heidemann, Hopkins, Knab, Phillips, Popenoe, Quaintance, Schwarz, Smythe, Ulke, and Viereck, members, and Messrs. Peairs, Snodgrass, and Wall, visitors.

In the absence of the recording secretary, the corresponding secretary was asked to act in his place.

An invitation of Mr. J. M. Lawford to meet at his home in Baltimore for a July meeting was presented to the Society. It was decided not to hold summer meetings, and the invitation was accepted for the regular October meeting. The corresponding secretary was instructed to write Mr. Lawford to find out if this would be convenient for him.

Mr. Caudell presented a paper entitled "Some Notes on Orthoptera," in which he discussed the validity of varietal names, no one of which bears the specific name as a varietal name also. He cited several cases of this kind and proposed changes. The paper caused considerable discussion, which was engaged in by Messrs. Snodgrass, Knab, Schwarz, Gill, and Hopkins. Dr. Hopkins objected to the use of subgeneric names. Dr. Gill cited numerous cases in which old genera had been combined into a single genus.

Mr. Banks's paper on "New American Pseudoscorpions" was read by title.

Dr. Phillips introduced Mr. Snodgrass, who exhibited his drawings on the anatomy of the honey bee, *Apis mellifera,* and explained them. Much of the work done previously on this subject has been found to be incorrect or incomplete.

Dr. Hopkins congratulated Mr. Snodgrass on his work, which he considered as an advance over anything on bee anatomy that had been done previously. He thought that the detailed drawings were very valuable, but that it was probable that the interpretation would not be accepted by all workers on anatomy. The paper was further discussed by Messrs. Caudell, Quaintance, Gill, and Phillips.

Dr. Hopkins exhibited living specimens of *Chermes* forming galls on the flower buds of the red spruce, *Picea rubens,* and a colored drawing of the galls.

The following papers were accepted for publication:

ON THE BEE-GENUS CENTRIS.

[Hymenoptera, Anthophoridæ and Euglossidæ.]

By C. Schrottky, *Puerto Bertoni, Paraguay.*

In Zeitschr. Hym. Dipt., vol. v (1905), pp. 23-26, I pointed out the systematic position of this genus in a paper entitled "Was ist unter der Gattung *Centris* Fabr. zu verstehen?" As it seems, my views have been misunderstood by several recent American writers; therefore I think it useful to review briefly the history of this genus.

It was created by Fabricius for a number of mostly American bees. Although its type species, *Centris dimidiata,* stands and always stood with the Euglossidæ, the genus has been removed to the *Anthophoridæ,* because, perhaps, people thought otherwise in older times than we do. Surely none of the later anthophorid *Centris* has "clypeo gibbo, ... tibiis posticis incrassatis, compressis, ciliatis" as true englossid *Centris* have. It is only too clearly seen that the later monographers, Frederick Smith (1874), Heinrich Friese (1900), and with them the greatest part of the recent apidologists, follow the footsteps of Lepeletier blindly without even becoming aware of the mischief they introduce thus in entomology.

Lepeletier was the first who gave to *Centris* the wrong limits

in the Anthophoridæ in his Histoire Naturelle (1841). Spinola very soon protested against this interpretation of the Fabrician genus, but his voice was not heard. In "Historio Fisco y Politico de Chile," Fauna, vol. VI, p. 167, Spinola gave a full argumentation against Lepeletier's views and showed that the genus *Eulema* Lepeletier (euglossid) falls into the synonymy of *Centris* Fabricius, and that *Centris* Lepeletier must be called *Hemisia* Klug (anthophorid). It is possible that Frederick Smith, when he monographed these genera, overlooked the remarks of Spinola, though they were repeated elsewhere. After that it had scarcely been touched till Della Torre's Catalogue, where it stands as Smith left it. In the last years I already used the names correctly, but in the quotations of my papers by Friese, Ducke, Strand, and others the wrong names always reappear. The consequence is that one who is not specialized in these groups quotes correctly *Centris* among the Euglossidæ and describes an anthophorid, etc., as Mr. J. C. Crawford does in "Some Costa Rican Bees," (Trans. Amer. Ent. Soc. XXXII, 1906, p. 157-163). The names must stand as follows:

Family ANTHOPHORIDÆ.

Genus HEMISIA Klug, 1807.

Syn.: *Centris*, Latreille, Lepeletier, Smith, Friese, Ducke, Fox, Cockerell, Crawford, etc., *nec* Fabricius!

Family EUGLOSSIDÆ.

Genus CENTRIS Fabricius, 1804.

Syn.: *Eulema*, Lepeletier, Mocasary, Friese, Ashmead, etc.
Syn.: *Euglossa*, Friese, Ducke, Strand, etc., partim.

A CORRECTION.

Basilodes arizona French.

I gave as a synonym of this species (Proc. Ent. Soc. Wash., XI, 24, 1909) *Plusia acantha* Druce. It should have been *Plusia arianda* Druce, with the same reference. A clerical error in copying is responsible for the mistake.

HARRISON G. DYAR.

THE LIFE HISTORY OF AN ORIENTAL SPECIES OF COCHLIDIIDÆ INTRODUCED INTO MASSACHUSETTS (CNIDOCAMPA FLAVESCENS WALKER).

[Lepidoptera, Cochlidiidæ.]

By Harrison G. Dyar.

(Plate XIV.)

CNIDOCAMPA FLAVESCENS Walker.

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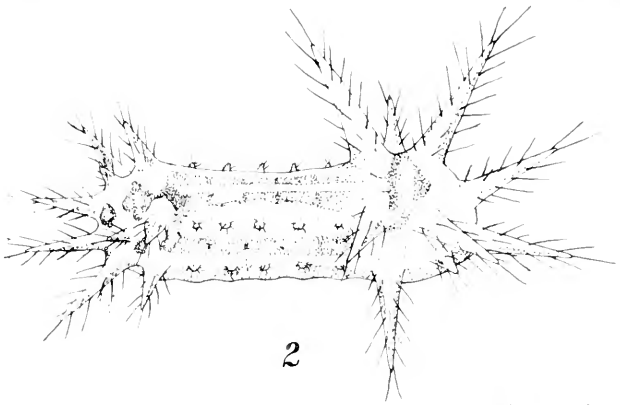
Special structural characters.

Dorsal and lateral spaces broad, subventral space narrow, contracted. Ridges very slight, the subdorsal ridge indicated by the change in direction in the slope of the body, which is rounded gradually; lateral and subventral ridges more distinct, approximate. Outline from above somewhat dumb-bell shaped, the central area being a little constricted and the ends from which the long horns arise enlarged. The effect is heightened by the coloration, the purple band being enlarged over the extremities. Warts produced into fleshy prominences, unequally



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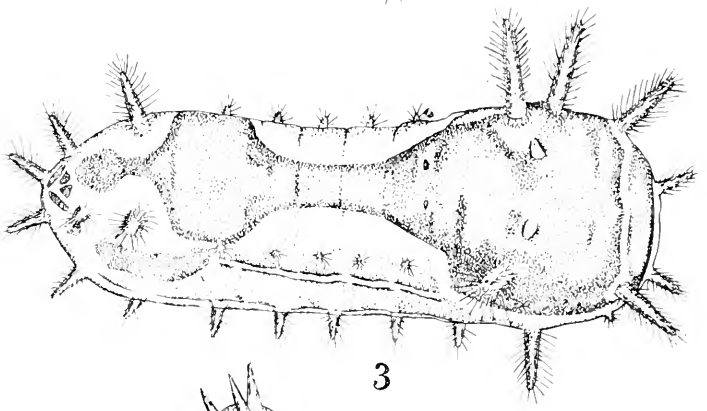

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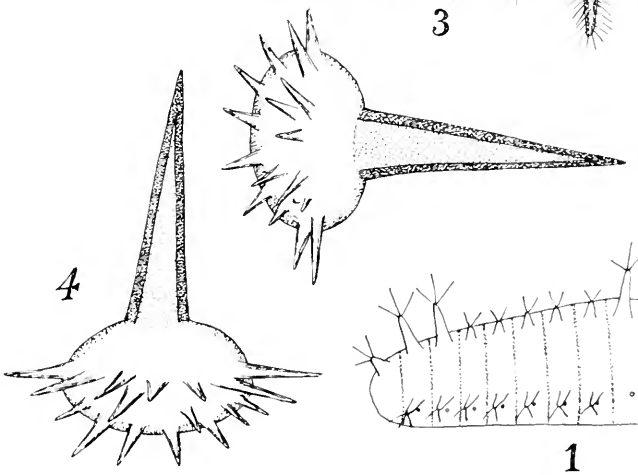

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LARVA OF CNIDOCAMPA FLAVESCENS WALK.

elongated; in stage I bearing a few slender setæ; after the first molt, the subdorsal and lateral rows covered with numerous urticating spines, the subventral row rudimentary, represented by two weak setæ. Of the subdorsal row, the "horns" on joints 3 to 5 and 11 to 13 are long, those on joints 6 and 10 rudimentary, the ones on joints 7 to 9 much shorter than the long ones and equal to each other. Of the lateral row, the horn of joint 5 is absent, of 3 much shortened, while those of 4 to 11 are longer than the others. Depressed areas very feebly developed as slight irregular pits, partially free from skin-spines; the dorsal row (1) paired, the subdorsal (2) smaller, scarcely distinguishable; of the lateral rows, the lateral (4) is large, reniform, oblique, forming a distinct shallow pit, the lower intersegmental lateral (6) very small and close to (4). In the contracted subventral space the two large rows (7 and 8) are minute, but in a common elliptical depression.

At the last molt the length of the horns is considerably reduced, while the coloration becomes fully developed. The small, detachable skin-spines, or caltropes, occur in patches on the lateral horns of joints 6 to 12 and on the subdorsal horn of joint 13. No detachable spine patches are present.

The larva falls in "Type 2" (Dyar & Morton, Journ. N. Y. Ent. Soc., III, 146, 1895), but forms a separate section. The "end-spines" being lacking, throws it with the generalized forms of *Euclea* and with *Adoneta*, but the subdorsal horn of joint 8 is not differentiated as in all these. In the horn-structure it more nearly approaches *Sibine*, in which, however, the horn-formula is different, for the subdorsals of joints 6 to 10 are there uniformly suppressed, whereas in the present type those of 6 and 10 only are suppressed, those of 7 to 9 being fairly well developed. There is also a peculiar irregularity of development of the long horns at the extremities.

AFFINITIES, HABITS, ETC.

The genus *Cnidocampa*, with its one species, *flavescens*, is a somewhat isolated form of peculiar development. It appears most nearly related to *Miresa*. In the adult of this genus the antennæ of the male are pectinated on the basal third, while the larvæ (of the two species known to me, *albipuncta* Herrich-Schaeffer and *argentifera* Walker) possess long end-horns, short side-horns, the central subdorsals (joints 6 to 10) suppressed, end-spines apparently undeveloped. *Cnidocampa* has lost the pectinations on the antennæ of the adult, and is thus a modified form of *Miresa*. The larva, however, is less specialized than *Miresa*, having the subdorsal horns of joints

7 to 9 distinct, although essentially of the same type. The coloration of the *Cnidocampa* larva is less specialized than that of *Hiresa,* its purple and green suggesting our *Sibine,* though the pattern of dumb-bell shape is unlike anything found in America. It is, however, apparently not an unusual device in Asia, the figure of the larva of *Orthocraspeda trima* Moore showing a similar pattern. There is, however, no close relation between *Orthocraspeda* and *Cnidocampa* structurally, either as larva or adult.

The young larva of *Cnidocampa* is without defined coloration, the pattern being gradually developed during ontogeny, without any sudden changes. This indicates a primitive condition, and undoubtedly the coloration is of an ancient type, as shown by its appearance in *Orthocraspeda,* a phylogenetically much older form. It is of a warning nature, the bright and conspicuous markings being accompanied with well-developed urticating spines upon the fleshy horns.

The larvæ spin hard cocoons upon the twigs of the trees upon which they have been feeding, usually in the forks of the smaller twigs. These cocoons overwinter, and the adults issue in the spring. The time of emergence varies with the latitude. Fernald found them to emerge in Massachusetts in the latter part of June and first of July; Fixsen records their emergence in Korea from the 18th to 26th of July. Some specimens overwintered at Washington, brought as larvæ from Massachusetts and placed upon trees in the open, emerged June 1, while others from north China, also overwintered at Washington, emerged the last of May. The species is generally single-brooded, but it may be double-brooded in the more southern part of its range. The early emerging specimens at Washington produced larvae which matured, spun, and issued the same season, producing adults again in August. The range of the species, as given by Leech, is Amurland, Japan, Korea, central and north China. The species is easily exported, as the hard overwintering cocoons not infrequently occur upon fruit or ornamental trees and their peculiar appearance does not suggest that they are the work of an insect. Pryer remarks on their resemblance to birds' eggs, while Dickerson thinks that they look like leaf-buds. Either simile appears to me rather far-fetched. The general mottled coloration rather resembles that of bark, especially upon knotted twigs with patches of lichen, though there does not seem to be any very special adaptation for concealment, the exceedingly hard nature of the cocoon itself rendering such a thing superfluous.

The cocoons have been found introduced upon fruit trees in Hamburg, Germany (Kraepelin), San Francisco, California (Dept. Agriculture), and New York (Joutel); but in Massachusetts they were introduced in sufficient numbers so that the species reproduced and became established in a small district in Dorchester in the suburbs of Boston. The place is entirely built up to houses, but there are many open spaces with trees and shrubbery, as well as trees along the streets. A park of considerable extent (Franklin Park) is in the close vicinity. Conditions are therefore favorable for the continued existence of this interesting species in America; but unfortunately Dr. H. T. Fernald, in an excess of economic zeal, which we consider premature, destroyed large numbers of the cocoons, for fear that the insect might become a pest. What effect this action has had upon the continuance of the species we do not know. It is to be hoped that the moth has not been exterminated. Some thirty of the cocoons were allowed to emerge in the open in Washington and many eggs and young larvæ were subsequently observed. All, however, died in the third or fourth stage, probably because the location was too dry and open. The climate can scarcely have been too warm, considering the distribution of the species in Asia. I have several times observed young Cochlidian larvæ to die when placed upon trees in the open that I had thought favorable to them, but which proved to be dry and sunny. The moths, in ovipositing, doubtless avoid such situations. The eggs laid at Washington, while deposited by moths issuing at large, were necessarily laid in the vicinity of the place where I had placed the cocoons, and it was evidently an unsuitable one.

The eggs are laid singly upon the undersides of the leaves, and the larvæ live in the same situations, not moving greatly, yet passing from leaf to leaf occasionally. They eat at first the parenchyma of the leaf from beneath in little patches, later the whole leaf from the tip, all as in the manner usual in the family. Eight stages occurred in my specimens. The larvæ do not feed in the first stage. The adults rest with the tip of the abdomen against the support, the legs extended, in the manner of our *Natada nasoni* Grote and other Cochlidians. Their period of flight is short, as no nourishment is taken in the adult state.

The species appears to be common in its home. Graeser found the cocoons "sehr gemein" at Blagoweschtschensk, Amurland, where he found cocoons on all deciduous trees, especially on birches, in all the gardens and in the forest;

while du Buysson reports: "une année, M. l'abbé de Joannis en re ut trois mille cocoons, récoltés par des gamins." One reason for the apparent abundance is the conspicuousness of the cocoons, and it may be that the three thousand cocoons that the abbé's sharp-eyed boys collected represented practically all the specimens of this species in the place, which would not be a large number. The principal parasite appears to be *Chrysis shanghaiensis* Smith, which parasitized one-tenth of the cocoons above referred to. This species seems not to have been imported into America with its host.

The peculiar cocoons are one of the most noticeable features of the life history. Placed conspicuously upon the branches of the tree, their grotesque coloration at once attracts attention. In spinning the cocoon the larva, after selecting a suitable position, spins a few supporting threads; but the anterior ventral surface of the larva itself furnishes the main support for the first film. The larva bends backward and spins back and forth across its thoracic feet, gradually creeping upon the film as it forms. When the outside film is complete the larva strengthens it, continually turning about. The thread is dark brown; but during construction the larva voids an opaque white fluid from its anus which gives the white ground color. The peculiar brown markings are caused by bands of thick silk through which the white fluid has not penetrated before the whole solidified.

CRITICISM OF PREVIOUS DESCRIPTIONS.

Graeser's description of the larva is very brief, and mentions only the coloration, so that one can not tell therefrom whether the larva belongs to the spined or smooth types. This is especially important in this case, since the structure of the antennæ of the male adult is deceptive.

My description was made from inflated larvæ in which the color is largely lost. I failed to note the caltrope spines, which were largely removed in the specimens.

Dr. Fernald's description is rather long, but made from larvæ taken from the cocoons, whose shape and colors both were abnormal.

Fernald and Summers give full descriptions of the egg and larval stages, with reproductions of photographs of several of the stages. The locations of the horns are not accurately described, to which the photographs add little, as many of them are badly out of focus. The figures of the large larvæ, especially those of the sixth stage, are good and give a very characteristic representation of this curious insect. The authors failed to notice the caltrope spines.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Elliptical, flattened,, yet moderately thick, shining, colorless, transparent like a drop of water, the skin minutely hexagonally reticulate. Size 1.8 mm. × 1.2 mm. Laid singly on the back of a leaf.

Stage I.—Elliptical, the dorsum flattened, concave, the sides sloping, of normal *Euclea*-shape. Horns conical, the subdorsal row present on joints 4, 5, 11, and 12 large, the others subequal. Colorless; whitish, shining, the middle portion yellowish; skin smooth; setæ on the horns black. Subdorsal horns of joints 3-5, 11-13 three-haired, those of joints 6-10 two-haired; horns of the lateral row on joints 3, 4, and 12, three-haired, those of joints 6-11 two-haired. The short horns are even and regular, none adnate to others, the one on joint 8 not larger than the adjoining ones. Length, 1.3 mm. Duration of the stage, one day.

Stage II.—Entirely translucent whitish, with a green tint from the food. Subdorsal horns on joints 3-5, 11-13 large stout, subequal, those on 5 and 11 the longest; of the lateral horns those on joints 4 and 12 are longer than the others; all the horns stout, rounded, many-spined, the spines black-tipped. Length, 1.3 to 2.5 mm. Duration of the stage, four days.

Stage III.—Elliptical, rounded, the dorsum arched, venter flat, no angles between the back and sides; subdorsal horns of joints 3-5 equal, long, longer than the width of the body, well spined; horn of joint 6 minute; those of 7-10 small, about spherical, spined; of 11 and 12 stout, conical, about half as long as those of joint 3, spined; of 13 about like 3, long, the pair divaricate posteriorly. Lateral horns of joint 3 short, conical; of 4 long, slender, nearly as long as the subdorsal of 3; of 6 very small; of 7-10 small; of 11 slender but about as long as the subdorsal on the same joint; of 12 as long as the subdorsal of 3. No spine patches nor caltropes. Translucent olivaceous green, the spines on the horns black; a narrow white subdorsal line on joints 6-10; a broad faint yellow band in the subdorsal ridge, waved in its upper edge by the horns and faintly white-edged; a broken whitish line in the middle of the lateral space; a faint opaque band along the lateral ridge. The larva appears more flexible and elongate than most Cochlidians. Length, 2.5 to 4.3 mm. Duration of the stage, three days.

Stage IV.—Subdorsal horns of joints 3-5 equal, long, those of joints 4-5 divaricate in a square; of 6 and 10 minute; of 7-9 small; of 11 half as long as that on 5; of 12, half as long as that of 11; of 13, as long as that of 3, slender. Lateral horns of joint 3 small; of 4 and 12 long, as long as the subdorsal of 3; of 6 minute; of 7-9 moderate; of 10 smaller; no horn on joint 5, the spiracle placed higher than on the other segments. Translucent greenish; dorsal line absent,

replaced by a slight dark shade; the yellow band in the subdorsal ridge irregular, most distinct in joints 7-9, replaced by a bridge between the subdorsal horns of joint 4 and forming rings about the bases of the subdorsal horns of joints 11 and 12. Lateral white line present centrally in the lateral ridge, yellow, tending to ring the horns and joining the subdorsal line at the ends. Horns well spined, the spines black. Skin smooth, shining, sparsely granular. Depressed spaces indicated by intersegmental hollows only, not defined. Length, 4.3 to 7 mm.; another specimen, 4.9 to 6.6 mm. Duration of the stage, four days.

Stage V.—Subdorsal horns of joints 3-5 equal, long, erect; of joint 6 minute; of 7-9 small; of 10 still smaller; of 11 moderate; of 12 small; of 13 long, but shorter than those of 3-5. Lateral horn of joint 3 small; of 4 long; of 5 absent; of 6 very small; of 7-9 small; of 10 very small; of 11 moderate; of 12 long. Translucent yellowish; an opaque band in the subdorsal ridge of joints 7-9 with a bridge at joint 4, making the dorsal space sole-shaped, containing a central white line in a purple shade; a broad yellow line along the lateral ridge; a waved white line in the lateral space. The horns appear dark from the dense black spines. Of the depressed spaces, the addorsal-intersegmental (1) show centrally as dark dots below the skin, widening the purple dorsal line; on the sides obscure pale dots (4) segmentally, posteriorly, and two in line (5 and 6) above the bases of the lateral horns. Length, 7 to 10 mm.; of another specimen, 6.6 to 10.5 mm. Duration of the stage, four to six days.

Stage VI.—Elongate, the sides parallel, a little concave centrally, joints 3-5 enlarged, 11-13 less so; dorsum evenly rounded, no ridge at the subdorsal angle; subventral space contracted. Subdorsal horns of joint 3 moderate; of 4-5 long; of 6-10 minute, those of 6 and 10 smallest; of 11 moderate; of 12 short; of 13 about like the subdorsal of 3. Lateral horns of joint 3 small; of 4 longer than the subdorsal of 3; of 6-9 small, of 9 the smallest; of 10 moderate; of 11 long like that of 4, longest of any of the posterior horns. Translucent olivaceous, the horns yellowish, black-spined, with yellow cores; an opaque yellow bridge on joint 3, crossing the subdorsal horns to the lateral horns, thence to the lateral horn of joint 4, joining the yellow lateral band, then narrow from the lateral horn of joint 12 to the subdorsal horn; a yellow bridge on joint 4 between the subdorsal horns; a spot in the base of the subdorsal horn of joint 5, joining its core; subdorsal band on joints 6-10, tapering to a point in 6 and 10; a core-spot in the horn of 11 narrowly joining that of 12. Dorsum of joints 4-6 dull brown-red infiltrated, of 7-12 blackish olivaceous with a dorsal median submaculate bright blue line, from 5 posteriorly to 8. Skin wrinkly-shagreened in clear curved ridges. Dorsal depressed

spaces (1) forming transverse whitish lines between the blue band and subdorsal band; a narrow whitish lateral line cut by depressed spaces (4), the lateral space narrow, livid-infiltrated on each side of the white line, the line itself replaced by bright blue on joints 6-11; Depressed spaces (5 and 6) level, forming glandular dots at the bases of the lateral horns against the yellow band. Later the infiltration of red in the dorsal space is more distinct and occurs also on joint 10; blue spots laterally on joints 4, 5, 10, and 11 and a white line along the ventral edge. Length, 10 to 14 mm.; in another specimen, 10.5 to 13.5 mm. Duration of the stage, four to five days.

Stage VII.—Subdorsal horns of joints 4 and 5 long, stout, conical; of 3 smaller about two-thirds as long; of 6 small; of 7-9 distinct, longer than wide; of 10 small; of 11 similar to those of 4-5 but not so long; of 12 half as long as that of 11; of 13 slender, longer than that of 11, nearly equal to those on 4-5. Lateral horns of joints 3 small, conical; of 4 longer, equal to the subdorsals of 3; of 6 small; of 7-9 large; of 10 small; of 11, three-fourths as long as that of 12; of 12 slender, as long as the subdorsal of 13. Horns yellow-cored, black-spined. Elliptical, the sides parallel, three times as long as wide, the middle a little contracted; dorsum arched, sides slightly sloping, subventral region moderately retracted. Some caltrope-spines at the bases of the subdorsal horns of joint 13 and the lateral horns of 12. Dorsum infiltrated with red to the lateral horns on joints 3-6 and 10-11 in narrow dorsal and lateral spaces, else darkly livid, cut by a blue dorsal line on joints 6-10 and lateral white one on 6 posteriorly to 10 anteriorly; a yellow transverse line on joint 3 to the lateral horn, a bridge between the subdorsals of 4, a spot touching the cores of the horns on 11, a bridge between the subdorsals of 12 and another on 13; the whole of the lateral ridge broadly yellow. Subventral space colorless, with a white subventral edge line. Diffuse blue lateral patches on joints 4, 5, 6, 10, and 11. Skin wrinkly-shagreened. Depressed spaces slight, with glandular centers indicated laterally by colorless dots, not shown dorsally. Length, 14 to 18 mm.; another specimen, 13.5 to 19 mm. Duration of the stage, five to seven days.

Stage VIII.—Subdorsal horns of joint 3 short; of 4 longer; of 5 longest; of 6 and 10 minute; of 7-9 very small; of 11 like that of 4; of 12-13 small, about like those of 3. Lateral horns of joint 3 very small; of 4 like the subdorsals of that joint; of 6-10 a little smaller; of 11 and 12 equal to the subdorsal of 12. Horns greenish yellow, the spines yellow with black tips. A little bunch of caltropes at the bases of the subdorsal horns of joint 13 and the lateral of 12 above, pale brownish. Dorsum dark purple in dumb-bell shape, the anterior widening the larger; widened at the lateral horns on joints 3-5 and 10-13, marked with bright blue in the incisures and in lateral spots

on the widenings. The rest bright yellow, except a narrow band in the lateral space and the subventral area, which are translucent greenish. Lateral line and subventral edge yellow. Depressed spaces slight, the dorsal (1) glandular centers showing pale, paired; lateral (4) more distinct, showing centrally as a yellowish dot in a translucent area, yellow-edged below. A yellow bridge on joints 3 and 4; triangular dots on 5; a broken bridge on 11; continuously yellow to 12-13, forming a pattern like a grill between the horns of these segments. Skin clear-granular, the granules irregular in shape, shagreened. Joint 2 purplish; the cervical shield green with several black spots. Head within the hood, largely black. Creeping disk honey yellow. Length, 18 to 24 mm. Duration of the stage, seven days.

At the end of the stage the larvæ became slightly more livid in color, left the leaves, and traveled upon the branches of the tree to find a fork or crotch, where the cocoon was spun.

Cocoon.—Elliptical, rounded, smooth, hard, and dense, firmly attached upon one side to the bark of the tree. White and gray-brown, marked in a peculiar pattern. Usually there are several broad brown streaks radiating from each pole of the cocoon, but the colors may also be variously intermixed, or even nearly uniform gray. The moth emerges by a circular lid, of which there is no sign from the exterior.

Food-plants.—Various deciduous trees and shrubs. Gribodo records pear and rose. Kraepelin found the cocoon on maple. Pryer found them on birch, elm, *Celtis*, and Japanese persimmon. Fernald found the Norway maple the preferred food, but also pear, apple, cherry, and less commonly willow, birch, oak, elm, blackberry, beech, poplar, mountain-ash, buckthorn, and rose. My larvæ fed readily on wild cherry, though the liberated moths did not oviposit on this tree, but on maple, rose, and cultivated plum.

EXPLANATION OF PLATE XIV.

FIG. 1. Larva of *Cnidocampa flavescens*, stage I, diagrammatic.
2. Young larva of same, stage V.
3. Mature larva.
4. Caltrope spines of mature larva, greatly enlarged.

DESCRIPTION OF ANOTHER UNIDENTIFIED NOTODONTIAN LARVA.

[Lepidoptera, Notodontidæ.]

By Harrison G. Dyar.

This larva is supposed to be that of *Hyparpax perophoroides* Strecker, but no adults have been bred. Two specimens were given to Mr. S. C. Brimley at Raleigh, North Carolina, by a negro who had found them. Mr. Brimley inflated the larvæ and presented one to the National Museum, from which this description has been made.

Larva.—Head elliptical, higher than wide, distinctly exceeding joint 2, flattened before and on the sides, becoming thin at the vertex, which is shallowly notched; heavily reticulated and mottled with red-brown, so that the greenish ground color appears only upon the clypeus, along median suture, and in a stripe extending upward from the ocelli. Mandibles green, brown on the sides and tip. Width, 3 mm. Body cylindrical, somewhat compressed at the sides; joints 2 to 4 rise gradually dorsally; joint 5 is produced into a high erect horn, as high as the diameter of the body, bearing tubercles *i*, which are very large, smooth, brown cones, and form a bifurcate tip to the horn. Joint 12 very slightly enlarged dorsally, its tubercles *i* somewhat hypertrophied, forming low cones, well separated dorsally. Tubercles *i* on all the joints slightly enlarged and chitinized with large dark setæ, the other tubercles small or invisible, but many of the setae large and dark. Sides of the thorax green, the color extending narrowly upon joint 5 and on the anterior lateral base of the horn; a dorsal red-brown stripe, narrowing regularly posteriorly, edged with whitish and dotted and streaked with this color; cervical shield formed of slight subdorsal elevation contained in the red-brown band and cut by green anteriorly. Subventral region of the thorax dotted with brown, the thoracic feet brown. Body green, densely mottled with red-brown in confluent streaks, leaving green markings in a somewhat complicated pattern, as follows: A ring around the horn just below its tip; oblique, ill-defined, subdorsal streaks on joints 5 and 6, cut by a geminate linear brown dorsal line; on joint 7 the streak is pronounced, beginning at the dorsal line and running to the foot of joint 8, edged above by a heavy brown line that passes over onto joint 8 on the level of tubercle *iii*, where it loops up sharply obliquely to enclose tubercle *i*, and then down again, the included finger-shaped marking being whitish green; this brown line continues along joints 9 and 10 on the level of tubercle *iii*, where it is lost; feet and subventral areas of joints 6 and 10 heavily brown mottled, of joints 7 and 8 very slightly so; a green subdorsal oblique line, the pair

forming a V-shaped mark, begins on joint 9 posteriorly and runs to the posterior edge of joint 11 laterally, being broken at the incisures; there is also a narrow dorsal line of the same color from joint 9 to joint 13, which is indicated on joint 8 by a pear-shaped small orange blotch between the points of the lateral finger-shaped processes; sides of the horn posteriorly heavily brown mottled, as well as a subventral patch on joint 6 and the area about the spiracle of joint 11. Anal feet small, slender, divergent, brown-mottled. The area around the spiracle of joint 5, especially at tubercles *iii* and *iv*, is roundly protuberant, causing a collar-like appearance of this joint when seen from above.

As compared with the larva of *Hyparpax aurora* Smith & Abbot, the general pattern of coloration is similar. The head is larger in the present insect and distinctly exceeds joint 2. The hump on joint 5 is here produced into a horn, but the humps on joint 12 are the same in both. The sides of the thorax are green in both, with brown dorsal stripe. The subdorsal white markings in *aurora* are all broadened and rounded, filled with brown mottlings, whereas in the present species they are narrowed, clear of filling, and obliquely placed. In *aurora* the rounded white subdorsal markings adorn the abdomen for the entire distance between the two dorsal humps, whereas in the present species these markings are obsolete on joint 6, then brought out strongly in the peculiar finger-shaped mark on joint 8, finally replaced posteriorly by the broken V-shaped line.

Except for its bizarre pattern, the larva might readily be taken for a species of *Schizura*, as is indeed the case with *Hyparpax aurora*.

DESCRIPTION OF THREE NEW AMERICAN MOSQUITOES.

[Diptera, Culicidæ.]

By Harrison G. Dyar and Frederick Knab.

Wyeomyia intonca, new species.

Male.—Prothorax, mesonotum, and scutellum clothed with blackish scales with blue and bronzy reflections; abdomen with the venter white, separated from the dark dorsum in a straight line; occiput clothed with dark scales; proboscis of moderate length, dark-scaled; mid tarsi with the tip of the second, the third to fifth joints white, except for a narrow area along the upper side; fore and hind tarsi dark. The genitalia have the outer angles of the side pieces produced in the form of a long arm, twice as long as the basal part of the side piece, each with three distinct tubercular areas bearing dense hair tufts; clasp filament rather long, but slender and simple, with angularly expanded tip.

Type—No. 12744, U. S. National Museum.

One male, Empire, Canal Zone, Panama, March 2, 1909, bred from a larva in the water in the leaves of a Bromeliaceous plant on a fallen tree on the bank of the Comacho River (A. H. Jennings).

The species is nearly allied to *W. circumcincta* D. & K., but differs in the coloration of the tarsi and in the male genitalia. The female presumably has all the tarsi black.

Wyeomyia rolonca, new species.

Male.—Occiput, prothorax, mesonotum, and scutellum clothed with dark scales; abdomen with the colors separated on the sides in a straight line; proboscis long and slender, expanded at the tip; mid tarsi with a narrow white line on the first joint below, the stripe becoming wider distally, the third to fifth joints distinctly white below; hind tarsi with the fourth and fifth joints white below, narrowly interrupted at the tip of the fourth, a small white spot at the base of the third joint. The male genitalia are of the type commonly found in the Bromelia *Wyeomyiæ*, the clasp filament with long slender stem its tip expanded and trilobed, the mid lobe broadly expanded, the side lobes each narrow, with sharp, pointed tips; the mid lobe is crossed by a corrugated area bearing a row of spines, and from the lower termination of this area a minutely pilose filament projects.

Type—No. 12745, U. S. National Museum.

One male, Upper Pequini River, Panama, March 24, 1909, two miles up the Rio Juanita, bred from a larva in the water

in the leaves of an arboreal *Bromelia* in which the larvæ of *Anopheles cruzii* were also found (A. H. Jennings).

The species is allied to *H. eclaeocephala* D. & K. and *H. hapla* D. & K., but differs in the coloration of the tarsi. The female presumably has the tarsi marked as in the male.

Aedes thibaulti, new species.

Male and Female.—Proboscis moderate, clothed with black scales; palpi short in the female, longer than the proboscis in the male, black-scaled; claws of the tarsi toothed; legs black, the femora white beneath at the base, the tips narrowly white; abdomen black-scaled above, with lateral triangular basal segmental white marks, but without dorsal banding, except narrowly in the male; mesonotum clothed with black scales on the disk, the sides with golden yellow scales, broadly on the frontal half, narrowly behind, forming a conspicuous angulation of the median dark band; occiput clothed with black and yellow scales intermixed, the dark scales forming a sublateral patch on either side.

In the male genitalia the side pieces are long and slender, with both subapical and subbasal lobes, the latter bearing setæ but without a large distinct spine; clasp filament slender, with a long terminal spine. Harpes rather small, their margins thickened and revolute, but without the usual terminal teeth. Harpagones with thick columnar stem which bears an apical prolongation clothed with minute pile. The terminal filament thus arises from a short separate limb, not as long as the pilose branch; the filament is short, broadly rounded with an inner rounded projecting lobe. The unci are unusually distinct, forming a basal cylinder, but not strongly chitinized. Basal appendages small, rounded, setose.

Type—No. 12746, U. S. National Museum.

One male and one female, Scott, Arkansas, April 27, 1909 (J. K. Thibault, Jr.).

The species falls in the table with *Aedes aurifer* Coquillett, but differs in the pattern of coloration of the mesonotum, while the male genitalia are of a very different type.

MEETING OF OCTOBER 14, 1909.

The 233d meeting of the Society was delightfully entertained by Mr. Lawford at his residence, 718 N. Howard street, Baltimore, Md., on the evening of October 14, 1909, and there were present Messrs. Barber, Burgess, Busck, Crawford, Dyar, Heidemann, Howard, Knab, Lawford, Poponoe, Schwarz, Uhler, and Viereck, members, and Messrs. A. H. Jennings and T. H. Jones, visitors.

The first paper of the evening was by Mr. Busck, entitled "Notes on Microlepidoptera," and was read by title.

NEW MICROLEPIDOPTERA FROM NEW MEXICO AND CALIFORNIA AND A SYNOPTIC TABLE OF THE NORTH AMERICAN SPECIES OF HELIODINES STAINTON.

BY AUGUST BUSCK.

Gnorimoschema princeps, new species.

Labial palpi, face, and head light whitish ochreous. Antennæ with dark brown annulations. Thorax whitish ochreous. Fore wings whitish ochreous with very striking black longitudinal heavy streak from base of costa to the middle of the cell, immediately continued in a similar black streak beginning just above and touching the end of the first and reaching to the end of the cell. Both streaks are slightly concave on their upper sides. No other ornamentation. Cilia ochreous white. Hind wings light, whitish fuscous. Venation typical.

Mar expanse, 17 mm.

Habitat—California. From coll. Bentenmüller.

Type—No. 12682, U. S. National Museum.

A striking species reminding in its ornamentation somewhat of *Plutella interrupta* Walsingham.

Gnorimoschema atriplex, new species.

Second joint of labial palpi light ochreous, sprinkled with a few black scales externally; brush large, spreading; terminal joint short, thickened with scales, ochreous, mottled with black. Antennæ ochreous, annulated with black. Face, head, and thorax light ochreous. Fore wings light ochreous, suffused with somewhat deeper ochreous and sparsely sprinkled with black scales. The black dusting is irregular, densest along the costal edge and on the tip of the wing and forming three or four small blackish dots on the middle of the wing

Hind wings ochreous white. Abdomen ochreous. Legs ochreous, sprinkled with black scales.

Alar expanse, 15 mm.

Food plant: *Atriplex canescens.*

Habitat—San Bernardino County, California. May. A. Koebele coll. and bred.

Type—No. 12700, U. S. National Museum.

Venation and oral parts typical.

Gnorimoschema faustella, new species.

Labial palpi dark brown; inner side whitish; tuft slightly tipped with white; terminal joint with an indistinct white annulation near base. Face whitish. Head and thorax dark brown. Fore wings dark brown with costal apical and basal part of dorsal edge blackish and with dark brown cilia; three blackish-brown obscure round spots, one on the fold, one in the middle of the cell and one at the end of the cell. Hind wings dark fuscous. Abdomen above dark brown with tip of each joint ochreous; underside light ochreous brown. Legs blackish brown with narrow ochreous annulations on the tarsal joints.

Alar expanse, 16 mm.

Habitat—Beulah, New Mexico, 8,000 feet altitude. July. T. D. A. Cockerell coll.

Type—No. 12699, U. S. National Museum.

Venation and oral characters typical; nearest to *Gnorimoschema pedmontella* Chambers.

Gnorimoschema chiquitella, new species.

Labial palpi white, second joint barred externally with black, terminal joint with a black annulation before the tip. Antennæ white, annulated with black. Face and head grayish white. Thorax white, dusted with black. Fore wings white, evenly and freely dusted with black atoms, each of the long scales, characteristic of the genus, being white at base and the extreme tip, with a black band across the middle. Hind wings light silvery fuscous, cilia ochreous white. Abdomen dark gray above; anal tuft and underside whitish. Legs white, freely dusted with black; tarsi with black annulations.

Alar expanse, 8 mm.

Habitat—Mesilla, New Mexico. C. N. Ainslie, coll.

Type—No. 12683, U. S. National Museum.

The smallest described American species of this genus; in coloration very much like *Gnorimoschema tetradymiscella* Busck, though not so strongly suffused with black and less than half the size. Venation and oral characters typical of the genus.

The species described by me as *Gnorimoschema graphicella* (Proc. Wash. Ent. Soc., IX, p. 86, 1908) is found under more careful study to have been placed generically on its superficial resemblance to this genus. It should be known as *Recurvaria graphicella*.

Gelechia depuratella, new species.

Second joints of labial palpi ochreous white, with a few brown scales on the exterior side; brush even, furrowed, rather short; terminal joint white, sprinkled with dark brown scales. Antennæ white, suffused with blackish brown, towards the tip annulated with brown; first joint long, blackish brown with white tip. Head, thorax, and patagia ochreous white. Fore wings ochreous white suffused with light yellow, especially on apical half; on the middle of the cell is a large oblique blackish spot, nearest costa at its basal end and followed by a small blackish dot at the end of the cell; just above it the costal edge is sprinkled with black and at apical third is a small blackish costal spot; the extreme tip of the wing is sprinkled with black. Cilia white. Hind wings whitish fuscous, darkest towards the tip and with a few black scales in the apical cilia. Abdomen ochreous white. Legs white, sparsely sprinkled with brown scales; anterior and middle tarsi annulated with blackish brown.

Alar expanse, 17 mm.

Habitat—Mesilla, New Mexico. C. N. Ainslie, coll.

Type—No. 12788, U. S. National Museum.

A very striking species, reminding in coloration of *Gnorimoschema collinusella* Chambers.

Gelechia dromicella, new species.

Second joint of labial palpi light ochreous, with a brown central cross-band, including the brush deep black; brush rather long, nearly even-furrowed; terminal joint deep black, slightly sprinkled with ochreous. Tongue long and robust, light ochreous. Face and head iridescent ochreous fuscous. Thorax and patagia light ochreous brown. Fore wings with the fuscous white ground color obscured by evenly overlaid dark fuscous scales; extreme base of costa black; through the center of the wing from base to apical third is a black streak, interrupted on the middle of the cell by a pure white spot. At apical third is a transverse, poorly defined, pure white fascia, hardly reaching either margin; outside of this fascia the apical part of the wing is strongly suffused with blackish fuscous. Cilia whitish fuscous. Hind wings iridescent whitish fuscous; cilia light ochreous fuscous. Abdomen above light ochreous fuscous, strongly iridescent; underside light dull ochreous with two marginal dark

brown streaks. Legs blackish fuscous sprinkled with ochreous; tarsi with narrow ochreous annulations.

Alar expanse, 15 mm.

Habitat—Placer County, California, September. A. Koebele, coll.

Type—No. 12792, U. S. National Museum.

Nearest to *Gelechia trophella* Busck in pattern and coloration, yet very distinct from this species and easily recognized by the peculiar black-marked palpi.

Gelechia fulmenella, new species.

Labial palpi dirty white, mottled with fuscous, especially on the apical joint; second joint thickened but nearly smooth; brush short, compressed, not furrowed; terminal joint as long as second. Face light iridescent fuscous. Head and thorax blackish brown. Fore wings blackish brown with bold oblique white fascia across the middle of the wing and with a zigzag white fascia across the apical part of the wing; the central fascia is nearest the base on the costal edge and its edges are uneven, especially the outer one; the apical fascia begins as a broad white costal spot at apical fifth, which is connected with a broad oblique dorsal spot by an outwardly oblique narrower white streak. A few white scales around the apical edge. Cilia brown. Hind wings light fuscous. Abdomen dark fuscous. Legs blackish with narrow white tarsal annulations.

Alar expanse, 15 mm.

Habitat—Argus Mountains, California. April. A. Koebele, coll.

Type—No. 12697, U. S. National Museum.

A very distinct species nearest *Gelechia lugubrella* Fabricius, differing in the form and position of the fasciæ. Hind wings with 3 and 4 short-stalked; 6 and 7 approximate at base, nearly parallel in their course.

Gelechia periculella, new species.

Labial palpi purplish black mottled with ochreous especially on the inner side of second joint; brush short, even, spreading, but hardly furrowed; terminal joint more than half as long as second. Face iridescent fuscous. Head and thorax brownish black. Fore wings brownish black with a purple sheen and with a few scattered white scales. At apical fourth is a white zigzag fascia line, an incomplete W. Cilia whitish fuscous. Hind wings dark fuscous with lighter cilia. Legs purplish black; tarsi with narrow ochreous annulations.

Alar expanse, 22 mm.

Habitat—Humboldt, California. July. H. S. Barber, coll.

Type—No. 12698, U. S. National Museum.

A large species of the black and white group nearest *confinuella* Zeller.

Gelechia nanodella, new species.

Labial palpi light ochreous, terminal joint liberally sprinkled with black; brush on second joint well developed, narrowly furrowed; terminal joint nearly as long as second. Antennæ ochreous fuscous with black annulations. Face and head light ochreous; thorax darker ochreous sprinkled with black. Fore wings with the whitish ochreous ground-color partly obscured by black, brown and dark fuscous scales; the pattern is obscure and ill defined, but in perfect specimens can be made out two oblique dark streaks on the basal third of the wing in the cell and a blackish costal spot just before apical third, preceding a light ochreous costal spot, which is the beginning and most apparent part of an indistinct, narrow, outwardly angulated ochreous fascia; this fascia is vaguely limited basally by a broad dark shadow of the same angulated form. Cilia ochreous, sprinkled with fuscous. Hind wings light ochreous fuscous. Abdomen ochreous fuscous with lighter anal tuft. Legs ochreous, sprinkled with black and with tarsal annulations.

Mar expanse, 14 mm.

Habitat—San Diego, California. May. L. E. Rickseeker, coll.

Type—No. 12684, U. S. National Museum.

Received from Mr. Wm. D. Kearfott, in whose collection are additional specimens.

A typical *Gelechia* of obscure appearance, reminding somewhat of *Gnorimoschema larvernella* Chambers. Hind wings with veins 6 and 7 stalked; 3 and 4 connate or barely separate.

Gelechia malindella, new species.

Labial palpi light ochreous, sprinkled with black; second joint with short, even, slightly furrowed brush; terminal joint nearly as long as second. Antennæ ochreous with narrow black annulations. Face ochreous, iridescent. Head and thorax light ochreous, slightly sprinkled with black. Fore wings light, whitish ochreous, evenly sprinkled with single black atoms; three small black costal spots, one near base, one before the middle, and one before the apical third of the wing; a slightly indicated series of small black terminal dots around apex. Cilia light ochreous. Hind wings rather dark fuscous. Abdomen ochreous fuscous. Legs ochreous, dusted with black; tarsi annulated with black.

Mar expanse, 15 to 17 mm.

Habitat—Mesilla, New Mexico. C. N. Ainslie, coll.

Type—No. 12685, U. S. National Museum.

A very distinct species nearest and quite similar to *Gelechia lindenella* Busck, which, however, is a darker species with larger costal black spots. Both species have veins 3 and 4 slightly separate and 6 and 7 connate in the hind wings.

Gelechia inaequalis, new species.

Second joint of labial palpi with well developed, furrowed brush; ochreous white, tipped with black and brick-red scales; terminal joint much shorter than second, blackish with an ochreous red annulation around the middle. Face light ochreous. Head and thorax dark reddish ochreous, each scale tipped with black; on the anterior part of the thorax are two small ill-defined triangular black spots. Basal third of the fore wings light rosy ochreous, mottled with yellow and black; this part is sharply edged by a large, slightly oblique, velvety black costal streak, which reaches beyond the fold and is continued by reddish brown scales to the dorsal edge. Apical two-thirds of the wing has the same ground-color as the basal part, but is strongly overlaid with bluish black so as to appear much darker; on the middle of the wing is a small yellow dot, preceded by black scales and at the end of the cell is a larger yellow spot with black scales above and below; at the apical third is a small deep black costal spot, followed by rosy. Cilia reddish, with ochreous tips and sprinkled with black atoms. Hind wings light ochreous fuscous. Abdomen and legs light ochreous; tarsal joints annulated with black.

Alar expanse, 13 mm.

Habitat—Mesilla, New Mexico. C. N. Ainslie, coll.

Type—No. 12686, U. S. National Museum.

This species also occurs in Mexico, and Mexican specimens are in the U. S. National Museum.

Gelechia leucanieella, new species.

Second joint of labial palpi orange yellow with well-developed furrowed tuft; terminal joint yellow, sprinkled with black. Antennæ black with very narrow yellow annulations. Face, head and thorax unmottled light orange yellow; patagia black. Ground-color of the fore wings appears to the naked eye bluish black; under a lens it is seen that only the tips of the scales are black, while the bases are ochreous and the middle part bluish; at apical third is a costal yellow spot which is faintly connected with an opposite dorsal yellow spot by a slight transverse fascia; on the cell near the base are two small yellow dashes followed by black scales. Hind wings dark fuscous. Abdomen above yellow on the first three joints and with light ochreous and

tuft, otherwise dark fuscous. Legs ochreous, strongly mottled with black and with black tarsal annulations.

Alar expanse, 12 mm.

Habitat—San Diego, California. May. L. E. Ricksecker, coll.

Type—No. 12687, U. S. National Museum.

Received from Mr. W. D. Kearfott, who has additional specimens.

A pretty species, recognizable by the yellow head and thorax; it will find its place next to *G. abdominella* Busck; the peculiar coloration of the abdomen found in the type specimens of the latter species is not present in many additional specimens since obtained and must have been due to some accident, probably produced by the chemicals in the killing bottle. *Gelechia leucanicella* has veins 6 and 7 in the hind wings stalked, 3 and 4 connate, and vein 6 in the fore wings out of the base of 7.

Gelechia paraplutella, new species.

Labial palpi creamy white; extreme base of second joint and the terminal joint sprinkled with black scales; brush well developed, furrowed. Antennæ deep black. Face and head creamy white. Thorax light clay-yellow, patagina black. Fore wings blackish fuscous with entire dorsal part below the fold light reddish yellow; in faded specimens this color becomes yellowish white. Hind wings light fuscous. Abdomen dark fuscous with light anal tuft. Legs ochreous on their inner sides, heavily barred with black externally; tarsi with broad black annulations.

Alar expanse, 11 to 12 mm.

Habitat—San Diego, Cal. May and July. L. E. Ricksecker, coll.; Los Angeles, California, June, Dyar and Caudell, coll.

Type—No. 12688, U. S. National Museum.

A very distinctly marked species near the preceding. Vein 6 in the fore wing is out of the base of 7; 6 and 7 of the hind wings are approximate, and 3 and 4 connate.

Gelechia sedulitella, new species.

Labial palpi blackish brown, mottled with white on their inner sides; tuft on second joint short, furrowed; terminal joint as long as second. Face, head, and thorax blackish brown with bluish iridescence, especially on the face. Fore wings dark brown, mottled with lighter brown, black and white; basal third unmottled, rather darker than the rest of the wing and limited by a narrow indistinct blackish oblique streak across the wing. A series of five tufts of raised scales parallel with

the dorsal edge; beyond the last of these tufts, which contains some white scales, is a thin oblique pure white line from the tornus towards apex. Apical part and cilia rather freely dusted with white. The ornamentation, especially the tufts and the white line, is easily destroyed by rubbing, and flown specimens are determined with difficulty. Hind wings light bluish fuscous, darker towards the edges and with dark brown cilia. Abdomen blackish brown above; underside ochreous white, mottled with brown. Legs blackish brown with narrow ochreous tarsal annulations.

Mar expanse, 13 to 14 mm.

Habitat—Placer County, California. August and September. A. Koebele, coll.

Type—No. 12696, U. S. National Museum.

Described from six apparently bred specimens of Mr Koebele's careful mounting. Hind wings with veins 3 and 4 slightly separated; 6 and 7 connate.

Gelechia lophosella, new species.

Tuft on second joint of labial palpi rather short, compressed, furrowed; light ochreous, strongly sprinkled with black; tip of tuft black; terminal joint long, heavily scaled, compressed; black, sprinkled with ochreous and with an ill-defined ochreous annulation at the base. Face and head light ochreous, sprinkled with dark fuscous. Thorax blackish fuscous; fore wings blackish fuscous, with poorly defined ornamentation; near the base is a small tuft of brown and black scales; on the middle of the cell is a similar tuft of raised scales; and obliquely below on the fold is a somewhat larger tuft, edged with light brown; at the end of the cell are two small, nearly confluent tufts of black scales, surrounded by light brown; at apical fourth is a conspicuous white costal spot and the edge of the wing has a few scattered white scales before the cilia. Hind wings rather dark fuscous. Abdomen dark fuscous. Legs ochreous, broadly barred and annulated with black.

Mar expanse, 12 mm.

Habitat—San Diego, California. May. L. E. Rickseeker, coll.

Type—No. 12689, U. S. National Museum.

Received from Mr. W. D. Kearfott, in whose collection are additional specimens. Fore wings with 6 separate; hind wings with 6 and 7 short-stalked; 3 and 4 connate. An obscurely marked species, recognizable by its raised scales.

Heliodines albaciliella, new species.

Second joint of labial palpi and cheeks below the eyes white; terminal joint black, sprinkled with white; antennæ purplish black, lighter brown at the tips. Face, head, and thorax metallic greenish

black; collar tipped with light ochreous. Fore wings bright reddish orange, with five nearly equidistant metallic blue costal spots, broadly edged with deep black basally, and with three similar blue metallic dorsal spots, also edged with black basally opposite the intervals between the first four costal spots. Extreme base of costa and a narrow edge of dorsum to the first dorsal spot black; a narrow edge around apex from the last costal to the last dorsal spot black. Cilia dark gray. The first and second costal spots do not touch the edge. Hind wings purplish black with ochreous white cilia contrasting markedly with the dark wing. Entire underside of the body and the legs strongly metallic coppery green.

Mar expanse, 15 mm.

Habitat—Cimarron, New Mexico. September. C. N. Ainslie, coll.

Type—No. 12690, U. S. National Museum.

A remarkably fine species, much larger than any of the described American species of the genus, nearest to *extrancella* Walsingham, but with additional metallic costal spots, without the white costal and dorsal spots and at once distinguished by the light color of the cilia of the hind wings.

The described American species of this genus may be separated by the following synoptic table:

North American Species of Heliodines.

1. Fore wings with snow-white costal spot before cilia ..... *extrancella* Wlsm.
   Fore wings without any white markings ..... 2.
2. Fore wings with a complete transverse fascia ..... *metalliccella* Busck.
   Fore wings without fascia ..... 3.
3. Ground-color of fore wings gray with a single costal orange spot ..... *unipunctella* Wlsm.
   Ground-color red or orange ..... 4.
4. Basal half of costal edge black ..... *sexpunctella* Wlsm.
   Basal half of costa not black ..... 5.
5. Fore wings with six metallic costal spots ..... *albaciliella* Busck.
   Fore wings with less than six costal spots ..... 6.
6. Fore wings with two dorsal metallic spots ..... *bella* Chambers.
   Fore wings with one dorsal metallic spot ..... *tripunctella* Wlsm.

Bucculatrix sporobolella, new species.

Face, peeten, and lower part of the tuft white; upper part of tuft dark gray with a few white hairs. Thorax white mottled with fuscous. The white ground-color of the fore wing nearly obliterated by overlaid ochreous fuscous scaling and with black markings; at basal third is a

very oblique, black costal streak and before apical third is another larger black costal streak, which attenuated reaches to apex and which is partly edged above with white scales; below and between these costal streaks is a longitudinal black streak on the fold, basally wider, and curving abruptly downwards, without, however, reaching the dorsal edge. Entire wing, but more especially the apical part and the base of the cilia, dusted with black atoms. Cilia dark fuscous, with two black crossbars. Abdomen dark fuscous above, underside silvery white. Legs silvery ochreous with narrow black tarsal annulations.

Alar expanse, 8 mm.

Food plant: *Sporobolus auroides.*

Habitat—Cimarron, New Mexico. Collected and bred by C. N. Ainslie.

Type—No. 12691, U. S. National Museum.

A typical *Bucculatrix* of the *pomifoliella* group. Cocoon pure white, slender, pointed spindle-shaped, evenly ribbed. Length 8 mm.

Bucculatrix koebelella, new species.

Face iridescent white. Tuft ochreous fuscous, mixed with white. Thorax ochreous fuscous. Fore wings with the white ground-color largely obscured by ochreous fuscous scaling and blackish ornamentation. A blackish fuscous streak from base along the fold is followed by a short black streak below the middle of the wing; a blackish fuscous oblique streak from basal third of the costa and a black longitudinal spot just before apex. The interval between the fold and the costal black streak is nearly or quite pure white; the rest of the wing evenly suffused with ochreous fuscous. Cilia ochreous, with an indistinct black crossbar. Hind wings light fuscous; cilia ochreous. Abdomen light iridescent fuscous, with ochreous anal tuft. Legs silvery fuscous, with ochreous hairs and indistinct black tarsal annulations.

Alar expanse, 8 mm.

Food plant: *Artimisia californica.*

Habitat—Los Angeles, California. March. A. Koebele, coll.

Type—No. 12692, U. S. National Museum.

Described from a large bred series in the exquisite mounting of Mr. Koebele.

Bucculatrix albertiella, new species.

Face and eye caps white, dotted with dark ochreous. Tuft reddish ochreous. Antennæ white, with dark brown annulations. Thorax white, dotted with dark ochreous. Fore wings ochreous white, overlaid with bright brownish ochreous and evenly dusted with black

atoms. The brownish supercolor is arranged in four poorly defined areas, a basal, two broad oblique costal shades, and an apical with narrow intervals of whitish ochreous. Just above the middle of the dorsal edge and below the fold is a prominent tuft of raised black scales; at the apex are a few black scales. Cilia light golden ochreous with a thin black cross-line. Hind wings iridescent whitish fuscous, with light straw colored cilia. Abdomen light ochreous above; underside silvery. Legs ochreous mottled with black and with black tarsal annulations.

Alar expanse, 8 mm.

Food plannt: *Quercus agnifolia.*

Habitat—Alameda, California. May. A. Koebele, collected and bred.

Type—No. 12693, U. S. National Museum.

Cocoon pure white, rather bluntly rounded at the ends, evenly ribbed; length, 6 mm.

Socorypha chrysocomella, Dietz.

Trans. Am. Ent. Soc., XXXI, p. 43, 1905.

This gaily colored little species, which has hitherto been known only from the unique type, was collected in numbers this summer on *Sporobolus auroides* in New Mexico by Mr. C. N. Ainslie, July 23. Mr. Ainslie writes:

> I was at my wit's end to get any of them; they came up out of the sod of *Sporobolus* on sunny forenoons and kept going with the most dizzy motion; although there might be a dozen flickering about before me—up the blades and across and down again—it was always the merest accident when I got one; sweeping ruined them and holding the net inverted proved of no avail. The moths then sulked and did not come up. I never had a harder job than taking this series.

By a mistake of the similar names, the writer made (Can. Ent., XXXVIII, p. 348, 1906) this species a synonym of *Ethmia albistrigella* Walsingham instead of *chrysurella* Dietz, described as a *Brackenridgia (Paraclemensia)*. This latter is an *Ethmia* and must sink as a synonym of the earlier *albistrigella* Walsingham. The present species is a very different insect, which may be included in a genus with *mediostriatella* Clemens, as done by Dr. Dietz, though there are some differences in the venation of the two species. The type of the genus has all veins present in the fore wings and all veins present and separate in the hind wings, while the present species has vein 2 in the fore wings obsolete and veins 5 and 6 in the hind wings stalked.

Acrolophus occidens, new species.

Male.—Labial palpi curved, ascending, reaching vertex; first joint as long as second and third together, with evenly rounded brush; second joint also with a brush, continued slightly up over the equally long, smooth third joint. The form of the palpi is intermediate between those described for the genera *Eulepiste* and *Neolophus* Walsingham. The scales of palpi, head, and thorax are brownish fuscous, tipped with white. Antennæ ochreous fuscous. Fore wings grayish ochreous, overlaid with black, brown, and white scales. There is an oblique, ill-defined dark shade, edged with white, from apical fourth of costa to the middle of dorsum, nearly parallel with the terminal edge; on the apical fourth of the wing are four or five small black dots and outside of these the wing is strongly overlaid with white scales. Hind wings dark fuscous; abdomen dark fuscous, with white bands on the upper side. Legs ochreous, mottled with fuscous and with indistinct black tarsal annulations.

Alar expanse, 22 mm.

Habitat—San Diego, California. May. L. E. Ricksecker, coll. Additional specimens are in the collection of Mr. Kearfott.

Type—No. 12694, U. S. National Museum.

This species is very close in size, pattern, and form of the palpi to *Acrolophus* (*Eulepiste*) *kearfotti* Dyar, but is much paler, lacks the costal black spots, and has the clear cut oblique dash of *kearfotti* replaced by the less defined oblique fascia; the abundant white dusting, especially on the apical part, is also lacking in Dr. Dyar's species. All these color differences might, however, be individual in this group, where the color and markings are quite variable, but the claspers of the male genitalia are very different and the two species are undoubtedly amply distinct.

I am unable to retain as distinct the several genera erected on the secondary sexual characters of the various forms of palpi in this group. This view is shared by Lord Walsingham and Mr. Durrant, and will be further elaborated in their forthcoming part of Dr. Godman's Biologia Centrali-Americana.

Acrolophus leopardus, new species.

Labial palpi of the same form as in the preceding species; ochreous white, mottled with fuscous, especially exteriorly. Antennæ light fuscous. Face and head white. Thorax ochreous white, sprinkled with fuscous. Patagina fuscous. Fore wings ochreous white, dotted with small blackish brown spots in rather regular transverse rows. Across the outer end of the cell is an interrupted, poorly defined

blackish brown oblique streak, parallel with the terminal edge; on the apical part of the wing the dark spots are larger and arranged in rows between the apical veins. Hind wings dark fuscous. Abdomen dark fuscous. Legs ochreous, tarsi with black annulations.

Mar expanse, 17 to 18 mm.

Habitat—San Diego, California. July. L. E. Ricksecker, coll.

Type—No. 12695, U. S. National Museum.

A small very distinct species nearest to *Acrolophus* (*Neolophus*) *punctatus* Busck, lacking, however, the bluish-black dusting and differing also in the unmottled head and palpi and the spotted wing-pattern.

Acrolophus crescentella Kearfott.

Amydria crescentella Kearfott, Can. Ent., XXXIX, p. 9, 1907.

This species is nearest *Acrolophus* (*Eulepiste*) *cressoni* Walsingham.

—Referring to the classification of *Lithocolletis* recently proposed by Miss A. F. Braun, and which he had criticized at a former meeting of this Society, Mr. Busck showed a letter just received from the eminent authority on Microlepidoptera, Mr. Edward Meyrick, of England. Mr. Busck referred to his own views, already published (Proc. Ent. Soc. Wash., XI, 99-102), and was disappointed to find from the present letter that Mr. Meyrick did not agree with them.

The letter was in part read to the Society by Dr. Dyar, as follows:

"My criticism of your argument would be that it is of no effect, because you have based it on an assumption of phylogeny (which may or may not be correct, but certainly is doubtful, and very probably incapable of proof) instead of on an observed structural fact of indisputable phylogenetic importance. In other words, it is proved that the group with the additional vein is older than the typical group; you assume that the flat-larvæ group has arisen from beneath this older group, whereas this is not proved and until you can show the connecting links you have no right to use it in definition. It is now generally admitted that a new type of structure associated with habits, such as those of the flat-larvæ group, may arise by a sudden mutation and need not involve the existence of a prolonged ancestry, showing gradual change and divergence, and therefore this group may in my opinion have

originated above instead of below this older type and anyone holding the contrary view must prove his case.

Your argument about the *Cycnodioidea* is open to the same defect."

Mr. Busck said he prized highly the friendly criticism of an authority like Mr. Meyrick, whose excellent work was the foundation of the modern classification of the Microlepidoptera. He was anxious to have these contrary views, privately communicated, made known, so as to get as fully elucidated as possible the important principles underlying the concrete examples under discussion. He wished to present them without comment at present, except for the statement that he still held the opinions expressed in the above-mentioned paper and hoped shortly to present additional evidence in substantiation of them.

Dr. Howard said that the two types of larvæ found in the genus, the flat and the round, were very distinct, and he thought Mr. Busck's classification to be the more natural one.

Dr. Dyar said that there was always danger in relying upon any single character, however good in general, and he thought that this might apply to the larvæ in this instance.

Mr. Busck, however, pointed out that the division of the genus by the flat and round larvæ was not founded upon a single character, but was marked in all stages, even the adults having a different pattern of coloration, as he had already shown. The venational difference relied upon by Miss Braun and supported by Mr. Meyrick consisted only in the coalescence of veins already stalked, and is simply a character of specialization, without fundamental importance.

Mr. Schwarz assumed the chair and the President read a paper on "Two New Aradidæ."

TWO NEW SPECIES OF NORTH AMERICAN ARADIDÆ.

[Hemiptera, Aradidæ.]

By O. Heidemann.

Nannium pusio, new species.

Body small, elongate-ovate, color dark brown. Head as long as broad with two short ridges at its posterior part; apical process rather short, feebly emarginated at tip, extending hardly half way to the first antennal joint; antenniferous processes prominent, sharply pointed; postocular part of head rounded, with a small tooth at each side; antennæ about as long as head and thorax united; basal joint abruptly thickened towards apex and somewhat bent outwardly; second joint shorter and less thick; third the longest and cylindrical; terminal joint pyriform, as long and thick as basal one, with short, whitish bristles at tip; rostrum reaching base of head. Surface of pronotum rather coarsely granulated, at disk, anteriorly, two large tubercles and a transverse trisinuate ridge at the posterior part of pronotum; a small tooth on each side of anterior margin just below the head; the anterior margin much narrower than the posterior one; both margins nearly truncate; the anterior lateral marginal angles prominently lobiform and somewhat reflexed, the posterior part of lateral margins broadly rounded, the edge finely serrate. Scutellum triangular, with a sharp ridge down the middle and two small, transverse ones at the base forming a T-like figure. Corium extending a little beyond the middle of second abdominal segment; the surface finely wrinkled, with the nerves prominently raised; the inner margins of corium arcuate-emarginate, apex obtuse. Membrane dark brown, except the basal portion, which is pale. The connexivum brown, with the posterior margins of the segments lighter and a little thickened. The sides of abdomen rounded in the female; subparallel in the male, which has the outer apical angles of the last four abdominal segments quite prominent. Genital lobes of the female triangular; those in the male are somewhat narrow at base and oblique truncate at apex. Legs short, finely granulate, femora dark brown with the knees pale; tibia dark brown towards the tip.

Fig. 3.—*Nannium pusio.*

Length, female, 3.4 mm., width across abdomen 1.2 mm.; male, 3.2 mm., width 1 mm.

Two females and one male, Cincinnati, Ohio (C. Dury). *Type*—No. 12710, U. S. National Museum.

This species may rightly be referred to the genus *Nannium* (sub-family Brachyrhynchinæ), with which it has the prin-

cipal characters in common, namely, the spiracles of the posterior abdominal segments are placed near the lateral margins. The genus *Nannium* was originally described by Dr. E. Bergroth,* who based his genus on three South American species. Later on, another species has been described by Dr. G. C. Champion† from Guatemala, Central America. Now it is interesting to add also a North American species, found as far north as Cincinnati, Ohio, to this genus *Nannium*, hitherto only known from tropical and semi-tropical regions.

This neat little species resembles *Nannium parvum* Bergr., but it appears somewhat stouter and the segments of abdomen are equally long in the middle, while in the other species the fifth abdominal segment is decidedly longer than the preceding segments.

I am indebted to Dr. C. Dury for kindly presenting me with three specimens of this new species, which he had found by sifting earth from near an old decaying tree-stump in the vicinity of Cincinnati, Ohio.

Aradus borealis, new species.

Body broad, ovate, dark brown and finely granulate. Head closely set into the thorax, hardly longer than broad, two deep impressions at basal part, a longitudinal ridge at the inner side of each eye, with a small tubercle in front; apical process of head broad at base, considerably tapering towards the tip, extending a little beyond the base of second antennal joint; antenniferous processes prominent, straight at the outside and very acute at the tip, reaching near to the apex at the basal joint of the antennæ. Eyes globular, protruding sideways somewhat beyond the anterior margin of pronotum. Antennæ stout, finely granulated, as long as head and thorax taken together; basal joint extremely short; second joint one-third longer than the two apical ones united, gradually narrowing toward the base and slightly bent outwardly; third joint cylindrical, longer than the terminal one, which is thinner and whitish at tip. Rostrum touches the mesosternum; first joint longest, extending to the base of head; the second joint reaches the

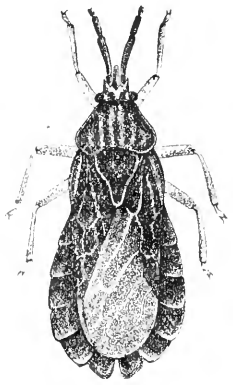

FIG. 4.—*Aradus borealis*.

*Diagnoses of Some New Aradidæ, by E. Bergroth (The Entomologist Monthly Magazine, vol. XXXIV, p. 100, 1898).

†Biologia Centrali-Americana, p. 84, 1897-1901.

coxæ of front legs. Pronotum finely granulated and transversely wrinkled, nearly twice as broad as long; anterior margin half the width of the posterior margin, the latter strongly sinuate in the middle, the lateral margins abruptly reflexed, feebly rounded posteriorly, then gradually narrowing toward the anterior margin; at the disk of pronotum six longitudinal, strong ridges of equal distance, the two middle ones reaching the anterior margin; those at the sides are abbreviated, the much shorter ones near the lateral margins curved inwardly. Scutellum cordate, nearly twice as long as broad at base, with a strong upturned edge. Hemelytra rather long, the membrane extending to the last genital segment, and the corium reaches the apical margin of the fourth abdominal segment; the exteriorly recurved flaps at base of corium not very dilated. Abdomen brownish, with a sharp carina in the middle; fifth abdominal segment trisinuate at apex, in the middle subequal in length to the sixth; first genital segment twice as long as the second; genital lobes large, obliquely truncate, and considerably apart.

Length, female, 7.4 mm.; width across abdomen 3 mm.

Two females, Mount Washington, New Hampshire, 1874 (Blanchard); Marquette, Michigan, June 26 (Hubbard and Schwarz).

Type—No. 12711, U. S. National Museum.

This species belongs to a group of the Aradidæ which have short and very stout antennæ. In general appearance it has a strong resemblance to the species *Aradus niger* Stål. It differs, however, in having a larger body and the genital lobes are quite differently shaped. The male is still unknown.

Dr. Howard asked if any aradids were known to bite warm-blooded animals, Messrs. Schwarz and Heidemann saying that none were known with this habit, Mr. Heidemann adding that many were known to feed on fungi.

Mr. Uhler said that in the spring of the year he has frequently found great numbers of *Neuroctenus simplex* Uhler on newly-cut pine, not, however, feeding. He thought that they were in fungi as a good hiding place, and that often he had found aradids under the scales of pines sucking moisture, where he could not see the slightest trace of fungus.

—Dr. Howard then read a paper entitled "Notes on a Flying Trip to Russia," exhibiting many photographs to illustrate various places visited, and commenting on the collections of insects seen.

NOTES ON A FLYING TRIP TO RUSSIA.

By L. O. Howard.

In the course of one of my European trips, taken for the purpose of perfecting the organization for the introduction of the European parasites of the gipsy and brown-tail moths, I had occasion to visit St. Petersburg, Moscow, and Warsaw, in the latter part of May last. Only four days were spent in Russia, and most of the time was devoted to the purpose of the visit, but some very brief notes were taken about Russian entomologists and Russian collections, which may be of interest to the Entomological Society of Washington.

The meeting rooms of the Entomological Society of St. Petersburg are in the building of the Ministry of Agriculture. Formerly they were on the third floor, but have recently been moved to the first floor. The society is now housed in one large room. The furniture is fine and old, and there is a long table about which the members sit at the meetings. There are closed cabinets and books around the walls of the room. The collections are not extensive, and do not seem to have been well cared for. At the time of my visit things were very much in confusion and certain cabinets had not been moved down from the third floor. With the help of Mr. George Jacobsen and an assistant I searched everywhere in the new room and the old for the collection of insects made by Nietner in Ceylon and sent to Motschulsky for determination, but without success. Mr. Jacobsen assured me that he had seen the collection in the cabinet of the society, and that when matters were more settled he would find it and would loan me any of the specimens I might desire to see.

On the occasion of my first visit to the Ministry of Agriculture I had the pleasure of meeting for the first time Professorsor Porchinsky, a tall, fine looking gentleman with extremely cordial manners. He was on the point of starting on an expedition, and his rooms were in great confusion owing to his expected prolonged absence. He is very familiar with the work of the American entomologists, and especially of the economic entomologists.

The building of the St. Petersburg Academy of Sciences is a very large but very plain stone building, yellow-washed. The main exhibit collections are on the second and third floors in one enormous gallery. The zoological collections are very fine—many beautifully mounted groups illustrative of the life history and habits of very many Russian-Siberian mammals

and birds. Possibly the most striking exhibit is the famous hairy mammoth of the Lena. On the ground floor the interminable dark corridors are lined with cases of alcoholic specimens of fishes, reptiles, and marine invertebrates. The laboratory rooms are apparently all on the ground floor. The entomological department is large, and consists of a series of communicating rooms with windows on one side. The cases are arranged along the unlighted walls and in transverse stacks, the passages between the cases being narrow but abundantly lighted by hanging electric bulbs, which can be turned on whenever it is necessary to examine cases or labels. The insect exhibit is in the gallery above the main zoological department. It is contained in upright glass cases, each protected from light by a curtain drawn by a spring which closes a spiral on a rod above.

The personnel of the entomological department is very interesting. The Director of the Zoological Department is an entomologist, Professor Nassunow. He is a tall, distinguished man, of apparently sixty; speaks no English. He is an authority on the Coccidæ, and presented me with his papers. The Academy apparently has no collection of Coccidæ, and Professor Nassunow keeps his own collection at his home, so that I did not see it. The well-known orthopterist Adelung was not at the museum at the time of my visit, although connected with the department. George Jacobsen in Coleoptera, Kusnezov in Lepidoptera, Mordwilcko in the Aphididæ, and Oshanin in the Heteroptera, were all there and were all fine, cordial men. Kusnezov is a bright, handsome fellow of about thirty-five, and is just completing a monograph of the Lepidoptera of Siberia. He was in America at the time of the Zoological Congress, and speaks some English. George Jacobsen, a short, active, rather near-sighted man of about the same age, is a coleopterist and a capital fellow: speaks some German. Oshanin is a short, gray-bearded man about seventy, a delightful companion, knows a little English, and is anxious to get Palearctic Hemiptera. He told me that the museum has only about thirty North American species. He has been a correspondent of Uhler and Van Duzee. Mordwilcko is a stout, short, black-haired man, with a black beard, of from thirty-five to forty, speaks nothing but Russian, and is anxious to get a complete set of North American Aphididæ.

The collection of the society is very rich in many directions. I was particularly interested to find a large series of Arnold Förster's named species, and to find further from an examin-

ation of these species that the genus *Poropaca* is represented by black species quite as figured. *Centrobia* proved to be entirely different from *Trichogramma*.

A great feature of the entomological collection is the occurrence of the results of many Asiatic expeditions. It has the Lepidoptera collections of the Grand Duke Mikaelovitch, and has also in Lepidoptera the collections of Eversmann, Wocke, Ersboff, Ménétries, Alpheraky, Leder, Heidemann, Hertz (made on the Mammoth Expedition), Bremer, and Kristoff; in Diptera, the collections of Kowartz, Eversmann, and Jaroschevsky; also Osten-Sacken's European collection, and a collection bought by him in Italy. In the Hymenoptera they have all of the F. Morawitz collection, as well as the collection of Jaroschevsky, and in part the collections of Kokujev, R. du Buysson's Vespidæ, Ruzsky's Formicidæ. In Hemiptera they have parts of the collections of B. Jakovlev, Melichar, O. Reuter, and Oshanin. In Orthoptera they have part of the Saussure collection, part of the Brunner von Wattenwyl collection, and also the collections of Eversmann, Adelung, and part of the Zubovsky collection. In Coleoptera they have the Ménétries collection, part of the Motschulsky collection, and part of the Semenov. They have also the collections of A. and F. Morawitz, of Solsky, Blessig, Rybanov, and George Jacobsen.

As above stated they have the material from very many expeditions—from all the polar expeditions, from Schmidt (1862) down to Toll (1902-5). It is very rich in central Asiatic collections. It has all the material from the Przewalsky, Kozloff, Roboroffski, and Berezofski expeditions, the latter to Mongolia, and of the Potanin and Pebzoff expeditions to Thibet; also many others. The determined material of the expeditions of Schrank, Mark, Radte, and Middendorf to Turkestan are also there.

I was informed that Professor Menzbier, at the University of Moscow, has some of Motschulsky's types, and that Charles Oberthür, at Rennes, possesses more. Also that there are some in the Moscow Society of Natural History; others in the Mannerheim collections in the university at Helsingfors.

The collections of the Academy are all admirably cared for, and form a marked contrast to the condition of the cabinets at the St. Petersburg Entomological Society.

At Moscow I visited the zoological museum of the university, but was not able to get to the collection of the society. The museum of the university is not good, and the insect col-

lection is poor. Professor Kojevnikoff, who was in this country at the Zoological Congress, is in charge, and has an assistant preparator. Nothing of Motschulsky's is there. The principol feature of the insect collection is a very large unnamed collection from Turkestan. Professor Kojevnikoff kindly offered to send the Parasitica to Washington for study and naming, but I hastened to assure him that we had our hands full for some years to come in this direction.

Driving out from Moscow to Petrovsky, about nine or ten miles away, I found an admirable agricultural college with a very fine man in charge of zoology, in the person of Professor N. Kulagin. Kulagin is a man of perhaps fifty, compact form, brown hair, close-cut beard, enthusiastic, and an admirable worker. The school is a large one, having nearly a thousand pupils. Kulagin has a very good exhibit collection showing the life histories of the principal insect pests of Russia. He gave me some specimens and many papers. He is the editor of the Russian Bee Journal, and is a trained morphologist and embryologist. I took luncheon at his house with his family and friends. He has a charming wife and two boys, one thirteen and one ten. In his collections he has in one carton a series of Scolytids and Bostrichids named by Motschulsky.

At Warsaw, where I spent part of the day Sunday, May 30, I visited the University of Warsaw to see Professor Mitrozhunof and Professor Stschelkenovtzev, but found them both absent—one in St. Petersburg and the other gone on a collecting expedition with some students. The servant of Mitrozhunof, whose name was Gregory Subotin, was very agreeable and communicative, and I took a photograph of himself and his family and one of the old university buildings now used for offices. The entomological museum of the university is not good. The specimens are rather poor and badly preserved. There is no light, and the collection is housed in a building not intended for a museum. There were some good exhibit pieces of life history in alcohol, several cabinets of cartons of insects, but those of which I could see the labels were entirely Coleoptera. The general case exhibit of insects showed the specimens badly mounted, and faded in spite of the bad light.

Mr. Schwarz commented on the work of Motschulsky and his methods of publication and the briefness of many of his descriptions, especially in the Études Entomologique.

Mr. Uhler remarked that the description of Hemiptera were very good.

—Mr. Schwarz exhibited a number of balls composed of solidified sandy clay which were lately brought from Egypt by the well-known anthropologist, Dr. A. Hrdlicka, who found them during his excavations of the ancient Egyptian tombs near Lisht, the locality being about 30 miles south of Cairo, about 3 miles west of the Nile Valley, and near Fayum, made famous by the recent palæontological discoveries. The balls, which are manifestly the indirect work of large coprophagous scarabæid beetles, vary somewhat in size and shape; some are quite spherical, while others are more or less flattened; all of them are quite hard. The largest ones measured more than 9 centimetres, the smallest ones less than 7 centimetres in diameter. They occurred not infrequently in the desert sand at a depth of from 18 inches to 3 feet. According to Dr. Hrdlicka the particular region where the balls occurred is a perfect desert and was always so, but the cultivated area is only a few hundred feet away. The particular spot has been frequented by camels ever since the introduction of this Asiatic animal into Egypt. Upon sawing open some of these balls the dung pellet buried by the beetles could be easily distinguished (it was not in the middle of the surrounding sand ball, but always on one side, although every trace of the original vegetable matter had disappeared. In some of the opened balls the mummified larva (apparently half grown) was found; others did not contain anything, and it is supposed that the larva either dried up when still quite young or that the egg failed to hatch. The shape of the larva indicates a species of the group Coprini, and if the size of the dung pellet and that of the ball itself be an indication it would seem that the whole is the work of specimens belonging to the genus *Heliocopris*. The age of these balls cannot be determined; they may be very ancient, or they may have been formed in recent times; at any rate, it is safe to say that in the dry soil and dry climate of the Libyan Desert they would remain unchanged in the ground for an indefinite period.

Professor Uhler remarked that on the island of Jamaica, West Indies, he frequently found, in light soil, the balls

made by *Phanæus sulcatus* Dru. They occurred at a depth of about 1 foot or deeper and were considerably smaller than those exhibited by Mr. Schwarz.

Mr. Busck said that in Santo Domingo he had found such balls about 1½ inches in diameter.

The following papers were accepted for publication:

TWO NEW SPECIES OF ALEOCHARINÆ FROM CALIFORNIA.

[Coleoptera, Staphylinidæ.]

By A. Fenyes, *Pasadena, Cal.*

GNATHUSA, gen. nov.

Related to *Ocyusa* Kr., but with entirely different labrum, mandibles, and ligula; possibly related also to *Tricolpochila* Brnh. Winged.

Labrum strongly transverse, apparently trilobed and on the middle lobe with 3 equidistant teeth. Mandibles extremely long, thin, curved, acutely pointed, sickle-shaped, both with an oblique, sharp, rather long tooth behind the middle, before the tooth crenulated. Inner lobe of the maxillæ from apex to middle with comb-like teeth, in basal two-thirds with finer spines; outer lobe at apex membranous, with fine hair-like spines. Maxillary palpi rather long, four-jointed, joint 2 shorter than 3; 3 club-shaped; 4 small, aciculate. Mentum transverse, slightly emarginate. Ligula very short, one-half as long as the first joint of the labial palpi, split in two lobes to the base. Labial palpi moderate; joint 1 the longest and the thickest; 2 very short, about one-third as long as 1; 3 about twice as long as 2. Mesosternum between the middle coxæ—seen from below—above the plane of the metasternum, entering about two-thirds between the coxæ, its apex pointed, free, overlapping the metasternal process. Metasternum pointed behind, meeting the lower surface of the mesosternum about half way between the middle coxæ; the latter but little separated. Legs rather short; front tarsi shorter than the tibiæ, joints 1-4 gradually slightly decreasing in length, 5 as long as 3 and 4 together; middle tarsi shorter than the tibiæ, joint 1 longer than 2; 2-4 about equal in length; 5 a little longer than 1 and a little longer than 2 and 3 together; hind tarsi shorter than the tibiæ; joint 1 about as long as 2 and 3 together; 2-4 about equal; 5 about as long as 1.

It was with some hesitation that I prepared the above generic description, as I thought that such a conspicuous, rather

common species might have been discovered and made known long ago; but I have failed to find any genus in the literature at my disposal which would even approach this most remarkable member of the Aleocharinæ subfamily. It is barely possible that the genus has been placed by a previous author in some other staphylinid subfamily; if so, it certainly ought to be transferred to the Aleocharinæ, as the position of the antennæ and the form of the anterior and posterior coxæ do not admit of any other interpretation.

The size and form of the mandibles and the extraordinary, toothed labium (provided I interpreted correctly my dissected specimen) are, to my knowledge, unique in the subfamily.

Gnathusa eva, spec. nov.

Robust, stout, subparallel, moderately shining, with somewhat coarse, sparse pubescence. Head black; prothorax scarcely a little paler, elytra piceous black, sometimes almost black. Abdomen black. Antennæ entirely reddish brown. Femora piceous; tibiæ and tarsi reddish brown. Antennæ rather short, scarcely as long as head and prothorax together, strongly incrassate toward apex; joint 1 moderately elongate; 2 much longer than 3; 4 square; 5 and 6 about equal; 7-10 gradually strongly wider, 10 more than twice as wide as long; 11 oval, blunt, scarcely as long as 9 and 10 together. Head large, but little narrower than the prothorax; extremely finely, sparsely punctate; eyes about as long as the tempora; genæ entirely margined. Prothorax a little narrower than the elytra, strongly transverse, a little more narrowed in front than behind, with a faint longitudinal basal channel and a basal foveola; finely, sparsely punctate, with 3 to 4 black marginal bristles; epipleuræ not visible from the side. Elytra a little longer than the prothorax, outer hind angles feebly emarginate; roughly granulosely punctate, a little more densely than the prothorax. Abdomen broad, wider at about the middle; segments 3-5 transversely impressed at base, before the impressions with a bisinuate bead; segment 7 scarcely longer than 6; finely, very sparsely punctate toward tip, with marginal bristles.

Length 2.6 mm.

Tahoe City, California; taken in abundance by sifting, also in evening flight.

Bolitochara unicolor, spec. nov.

Elongate, moderately narrowed in front and behind, moderately convex; somewhat shining, with long, fine, sparse, decumbent pubescence; winged. Entirely dark to pale reddish yellow, joints 1-3 and 11 of the antennæ scarcely paler. Antennæ a little longer than head

and prothorax together, strongly incrassate toward apex; joints 2 and 3 subequal; 4 longer than wide; 5 about square; 6-10 gradually thicker, 10 almost twice as wide as long; 11 a little longer than 9 and 10 together, oval, pointed at tip. Head narrower than the prothorax, almost longer than wide, sides subparallel; moderately densely, a little coarsely punctate; eyes small; tempora almost twice as long as the eyes; genæ entirely margined. Prothorax narrower than the elytra, but little wider than long, widest before the middle; sides toward apex rounded, toward base slightly sinuate; base a little wider than apex; hind angles almost rectangular; with a transverse basal impression and two very faint, parallel, longitudinal channels in the basal half; moderately densely, a little coarsely, asperulately punctate. Elytra scarcely one-fourth longer and a little wider than the prothorax, together wider than long, outer hind angles moderately emarginate; rather sparsely, very coarsely, granulately punctate. Abdomen broad, widest in the middle, narrowed in front and behind; in the middle as wide as the elytra; segments 3-5 strongly transversely impressed at base; rather sparsely, very coarsely punctate, behind a little more sparsely and more finely so. There are no sexual characters on the elytra nor on the abdomen.

Length 3 mm.

Type—No. 10592, my collection.

Fifty specimens from Tahoe City and Tallac, California, sifted under decaying vegetable matter; taken also in evening flight. I have also specimens in my collection taken in the San Bernardino Mountains at Sugar Pine, Summerdale, and Mohawk, all in California.

The mouthparts are those of other species of the genus *Bolitochara*. The species is unique in our fauna on account of its uniform color and the lack of sexual characters of the male.

I found my specimens under deep layers of decaying leaves in the coniferous forests around Lake Tahoe. They were feeding probably on minute fungi. Although winged, they show an unmistakable tendency toward becoming apterous in the course of time. The rather abbreviated elytra, the dilated abdomen, and the pale uniform color may be mentioned as proof of this tendency.

DESCRIPTION OF THE LARVA OF EUSTROTIA CADUCA GROTE.

[Lepidoptera, Noctuidæ.]

By Harrison G. Dyar.

Larvæ found feeding upon the leaves of the yellow waterlily at Hyattsville, Maryland, proved to be of this species. The larvæ are not aquatic, except that they have to swim from the leaves to ground when fully grown and seeking a place for pupation.

The eggs are of the shape of one-third of a sphere, the base broadly flat, low-domed, with 40 vertical ridges at the margin, diminishing irregularly to the vertex; cross-striæ faint and fine. Pale green. Diameter 0.7 mm. Laid usually singly on the back of a leaf.

The young larvæ are slender, translucent pale green without markings, the spiracles white, that of joint 12 large. Stages II to VI were under observation upon the plants at the time of finding.

The mature larva has the head flat before, held flat, the vertex not within joint 2, slightly bilobed, rounded, pale green, translucent, with a few pale red-brown subangular spots. Body subcylindrical, flattened; the thoracic feet small, the abdominal ones with long plantæ, the pair on joint 13 spreading. Smooth, translucent pale green; dorsal, subdorsal and stigmatal whitish green lines running to the eye, with a series of pale red-brown angular dots below the subdorsal line, one on each segment posteriorly. Under a lens the dorsal and subdorsal lines remain, the stigmatal disappears, and only four linear waved lines are seen, two in the lateral space, one stigmatal and one subventral, which are so fine as to be not obvious to the eye. Tubercles and setæ minute. Spiracles black-edged. Antennæ large, well jointed.

The larvæ turned red at maturity and entered earth, spinning a slight web.

A NEW TORTRICID OF ECONOMIC IMPORTANCE IN THE HAWAIIAN ISLANDS.

[Lepidoptera, Tortricidæ.]

By August Busck.

Amorbia emigratella, new species. Male and female.

Female.—Basal joint of labial palpi short, ochreous; second joint long, porrected, rust-red, with a violaceous sheen on the tip; terminal joint short, reddish brown, shaded with black. Face behind the palpi short-scaled, whitish; head reddish brown, mixed with ochreous and with a short pointed frontal tuft. Antennæ reddish brown, simple. Thorax and patagia uniformly dark brown. Fore wings with base of costa strongly arched; costal and dorsal edges nearly parallel; apex squarely pointed; termen slightly sinuate below apex, thence evenly rounded; ochreous brown, shading into light ochreous on the terminal third; the edge between two colors is not sharply drawn, but the limits are still quite distinct, the lighter color occupying the area below a straight line from basal fourth of the dorsal edge to apex. From just before the middle of costa runs an indistinct, dark bluish-gray band obliquely outward towards tornus, but fades out in the ochreous part of the wing and is even interrupted in the brown costal part; parallel with this is another similarly colored, but less distinct streak at apical third, also disappearing in the light portion of the wing. On the dorsal edge at basal fourth and at the middle are two short dark gray streaks, parallel with the costal streaks. The entire wing is finely mottled with a close transverse apparently darker striation, which is produced by transverse rows of slightly elevated scales. These markings are of varying intensity in different specimens, some showing hardly any trace of the darker cross-bands and having the ground-color lighter and nearly unmottled except for the fine transverse striation caused by the slightly raised rows of scales. Hindwings light straw-yellow, with the apex mottled with dark brown and black and with the costal cilia absent and abruptly beginning again just before the tip of the wing. Cilia straw-white. Underside of the forewings reddish ochreous, with a blackish terminal line before the cilia. Abdomen light yellow. Legs straw-yellow; the anterior and middle legs shaded with reddish brown exteriorly and with the tarsi faintly annulated.

Alar expanse, 27-29 mm.

Male.—Of considerably smaller size and of a general lighter color. Forewings nearly uniformly light ochreous without the darker basal and costal shade. The first costal dark streak is represented by a dark bluish brown triangular spot, terminating in a nearly black dot;

the second costal streak is replaced by a faint, curved, dark line, emitted from a small bluish brown costal spot. The transverse striation caused by the rows of slightly raised scales is apparent. The antennæ are pectinated.

While the two males from Hawaii before me do not exhibit much variation, a similar range of variation as is found in the females may be expected in the males.

Alar expanse, 20-23 mm.

Habitat—Tantalus and Makiki, Oahu, Hawiian Islands, Otto H. Swezey, collector.

Type—No. 12777, U. S. National Museum.

The types of this very distinct species were bred by Mr. Otto H. Swezey, assistant entomologist of the Hawaiian Sugar Planters' Association, who writes as follows, under date of October 26, 1909:

> This tortricid is quite a pest in the Hawaiian Islands. The larvæ are leaf-rollers on many kinds of plants, shrubs, and fruit-trees, often so numerous as to defoliate the trees and sometimes attacking the fruit as well. It is an introduced species here which has been present for several years. No one here knows where it came from, nor has anyone learned its identity.

The species has long been known to the writer from Mexico and has undoubtedly been introduced from that country to Hawaii within comparatively recent years. In the National Museum are specimens from Jalapa, Santa Rosa, Orizaba, Vera Cruz (Wm. Schaus coll.), and Mexico City (R. Müller coll.), Mexico, and from Costa Rica (Wm. Schaus). The species comes nearest the darker and larger North American species, *A. cuncana* Walsingham.

The genus, which is characteristic of America, has veins 7 and 8 in the forewings stalked in the female, coincident in the male, but is, aside from this secondary sexual character, amply defined by characters common in both sexes, the venation and form of the hindwings, and the raised scales of the forewings.

NEW PARASITIC HYMENOPTERA.

By J. C. Crawford.

Superfamily ICHNEUMONOIDEA.

Family BRACONIDÆ.

Glyptocolastes bruchivorus, new species.

Female.—Length 2.5 to 4.5 mm.; reddish-brown; the metathorax darker, at times fuscous; the apical margin of segments 2 and 3 of abdomen sometimes dark; head finely lineolate and rugulose, more distinctly so on post-vertex; the antennæ brown, reaching about to apex of second abdominal segment; mesothorax rugose, obscuring the parapsidal furrows; a small spot on outer side of parapsidal areas smooth except for a fine reticulation; scutellum at base separated from mesonotum by a transverse row of deep pits; scutellum finely reticulate and with a few small punctures; post-scutellum with a transverse row of deep pits; metathorax, including the posterior face, rugose, the rugæ arranged in irregular reticulations; metathorax with a median longitudinal carina, on each side of which at base is an area with only fine reticulations; mesopleuræ finely reticulate above, with a few longitudinal striæ; wings almost hyaline, the nervures dark-brown; first recurrent nervure joins the first submarginal cell some distance before its apex; the second transverso-cubital nervure obsolescent; the legs more yellowish than the rest of the insect; first segment of abdomen with two longitudinal carinæ, converging toward the apex; the surface of that segment with numerous longitudinal rugæ, as is the second segment; the oblique lateral furrows of the second segment much more oblique and indistinct than in *G. texanus* Ashm.; the basal ends of these furrows connected by an indistinct curved line, which curves toward the apex of the abdomen; beyond this curved line the second segment of the abdomen, in addition to the longitudinal rugæ, is finely reticulate; the longitudinal rugæ becoming weaker toward apex of segment, which is narrowly smooth and shiny; the third and following segments finely reticulate, with narrow, smooth apical margins; the third with fine longitudinal rugulæ; ovipositor short, about half the length of abdomen.

Male.—Similar in size and structure to the female, but more finely stained with fuscous.

Victoria, Texas.

Parasite of *Bruchus prosopis*.

Type—No. 12816, U. S. National Museum.

Glyptocolastes texanus Ashmead.

Since Doctor Ashmead never published a detailed description of *Glyptocolastes texanus*, the following description is given for the purpose of comparison with the above new species:

Female—Length 2.5 to 3 mm.; black or obscurely brownish-black; head above insertion of antennæ and back of ocelli transversely striate; mesothorax finely reticulate, the parapsidal furrows indicated by a coarser sculpturing of the surface; the surface rugose only at apex of mesonotum where the parapsidal furrows join each other; scutellum finely reticulate; metathorax coarsely irregularly rugose, except a patch on each side at base, which is finely reticulate; pleuræ finely reticulate, with a few longitudinal striæ; elevated carinæ of first abdominal segment becoming indistinct on apical third of segment, the whole segment longitudinally striate; second segment longitudinally striate, becoming weaker toward apex, which is broadly smooth and shiny; between the striations, the surface reticulate; the oblique furrows on the base of the second segment extend from the base backward for about half the length of the segment; segments beyond the second, except for a narrow strip at base, which is finely reticulate, smooth and shiny; the ovipositor much longer than the abdomen.

Male.—Similar in size and structure to the female.

The type material came from San Diego, Texas. Bred from mesquite (*Prosopis glandulosa*), where it was probably parasitic on *Bruchus prosopis*.

Superfamily CHALCIDOIDEA.

Family TORYMIDÆ.

Physothorax russelli, new species.

Female.—Length 1.5 mm.; head and thorax green with more or less red, blue, and purple reflection; face above insertion of antennæ almost entirely red and blue; antennæ brown; head and thorax finely reticulate and with rather close and very large punctures; postscutellum back of cross furrow without punctures; pleura coarsely reticulate and without any punctures; metathorax smooth, except the indistinct reticulation; wings hyaline, very highly iridescent; legs brown, tarsi lighter; abdomen æneous, the first segment purplish; the whole abdomen, with the exception of the first segment, very finely reticulate; ovipositor about as long as the entire insect.

Habitat—Cutler, Fla.

Two specimens bred from fruit of *Ficus aurea*, February 10, 1909, by H. M. Russell.

Type—No. 12582, U. S. National Museum.

Family CHALCIDIDÆ.

Chalcis belfragei, new species.

Female.—Length 4.5 mm. Black; head and thorax closely umbilicately punctured; antennæ black, scape with the basal half light yellowish; antennal fossa wide, extending to anterior ocellus, the carinate sides curved, converging strongly above; mesonotum, including scutellum and postscutellum medially, red; wings subhyaline, tegulæ light yellow; front and middle legs light yellow, their femora basally red; hind coxæ black with a red blotch beneath; hind femora red, the bases and apices of the hind femora, the tibiæ and the tarsi light yellow, the tibiæ with the bases and a median annulus yellow; hind femora near base beneath with a dentiform angle followed by about nine small blunt teeth; abdomen beyond the first segment strongly pubescent, especially on the sides; apical margin of the second segment finely punctured, the rest of the segment more coarsely punctured, except a small median basal area which is smooth.

Male.—Unknown.

Texas, Belfrage collector, 9 specimens.

Type—Cat. No. 12780, U. S. National Museum.

Chalcis slossonæ, new species.

Female.—Length 6 mm. Black; head and thorax coarsely, closely umbilicately punctured; antennæ black, the antennal fossa very deep and broad, extending to anterior ocellus, the heavily carinate sides straight, almost parallel; the distance between the eyes and the fossa not greater than the length of the first joint of the funicle; depressed apical margin of the scutellum broad, emarginate; mesosternum with the anterior margin reflexed medially and with two saw-like teeth, widely separated; wings dusky; tegulæ light yellowish; front and intermediate legs with the femora black, apices of femora, tibiæ, and tarsi light yellowish; the tibiæ medially with a large black spot on the rear side; hind legs as follows: coxæ red, the upper side black, femora red, tips yellow, lower apical margin black; tibiæ yellow, the base and a median annulus black; tarsi yellow, tips black; hind coxæ below with a tubercle on the inner margin; hind femora on the outer side with small punctures and with an immense red tooth on the lower margin near base, beyond are about nine small black teeth; abdomen black, the sides with more or less reddish; second segment finely punctured apically, basally with a row of large punctuures.

Male.—Length 5 mm. Similar to the female; hind coxæ with more black and lacking the tubercle; large tooth on hind femora black.

Habitat—Biscayne Bay, Florida. Mrs. A. T. Slosson, collector.

Type—Cat. No. 12779, U. S. National Museum.

Family ELASMIDÆ.

Elasmus setosiscutellatus, new species.

Female.—Length about 2 mm. Above black, the head and metathorax greenish, the pleuræ and hind coxæ above showing greenish or purplish in certain lights; face coarsely punctured; antennæ dark brown; mesonotum including the scutellum covered with black bristles; postscutellum with a small yellow spot; tegulæ black, wings hyaline, veins light, the dark bristles making them appear dark; legs very dark brown, with black bristles, the tips of the anterior femora and tibiæ and the anterior tarsi light; apical spurs of all tibiæ white.

Male.—Length about 1.5 mm. Similar to the female except in secondary sexual characters.

Habitat—Dallas, Texas; 12 specimens bred from heads of sorghum (Paul Hayhurst).

Type—Cat. No. 12787, U. S. National Museum.

This species in color comes near to *nigripes* How., *pullatus* How., and *atratus* How., but is at once separated from all of them by the scutellum being covered with bristles.

Superfamily PROCTOTRYPOIDEA.

Family SCELIONIDÆ.

Telenomus coloradensis, new species.

Female.—Length 1 mm. Black, shining; head transverse, as broad as the thorax; face smooth, back of ocelli finely punctured; pubescence of eyes rather conspicuous; antennæ black, scape about as long as pedicel, together with joints 1 to 3 of funicle; pedicel slightly longer than first joint of funicle, which in turn is longer than the second, this longer than the third; fourth joint short; club 5-jointed, the first joint transverse, joints 2-4 subquadrate, the fifth conical; mesonotum finely punctured and pubescent; scutellum impunctate, shiny; poscutellum with an anterior border rugoso-punctate, back of this smooth, shiny, except laterally, where it is punctured; metathorax vertical, medially smooth; wings slightly yellowish, veins yellow; legs black, knees, anterior tibiæ in front, all tibiæ at bases and apices, and tarsi yellowish; abdomen smooth, shiny, first and second segments at bases longitudinally striate, the second segment at least one and one-half times as long as wide; the following segments showing slightly.

Male.—Length 1 mm. Similar to the female; first segment of the abdomen not much longer than wide; antennæ hardly as long as the body, joints 1-3 of flagellum about equal, the second slightly longer.

Type locality—Colorado Springs, Colorado (Dr. A. D. Hopkins collector).

Host—Eggs of *Notolophus oslari*.

Type—No. 12781, U. S. National Museum.

Most closely related to *T. koebelei* Ashmead, which, however, has the postscutellum entirely rugoso-punctate.

A NEW CHALCIS FROM CHINA.

[Hymenoptera, Chalcididæ.]

By J. C. Crawford.

Chalcis koebelei, new species.

Female.—Length about 6 mm. Black, head and thorax coarsely umbilicately punctured, the lower part of face rugoso-punctate; face below antennæ medially almost impunctured, smooth and shiny; clypeus and labrum smooth, shiny, the former with a few punctures; the malar space less coarsely sculptured than the face, the carina at its front running almost to eye, then turning abruptly backward to join the carina at the rear; depressed apical margin of scutellum deeply emarginate; tegulæ yellow; wings slightly dusky; front margin of mesosternum medially strongly elevated into a process armed with two sharply pointed teeth, set close together; legs black and deep yellow; the front and middle legs beyond the middle of the femora yellow; hind femora apically yellow, the outer side at base yellow; hind tibiæ and tarsi entirely yellow; hind femora on lower margin near base with a triangular tooth followed by a series of about a dozen smaller teeth, these gradually decreasing in size toward apex of femur; femora on inner side finely but distinctly punctured; first segment of abdomen smooth except a small area on each side with punctures; following segments closely punctured, second segment along apical margin finely punctured.

Male.—Unknown.

Habitat—Hong Kong, China (Koebele), four specimens.

Type—Cat. No. 12790, U. S. National Museum.

In one specimen the upper margin of the hind femora is yellow, connecting the basal and apical yellow spots.

HYMENOPTERA FOR THE NEW JERSEY LIST OF INSECTS, AND OTHER HYMENOPTERA.

By H. L. Viereck.

Inasmuch as the third edition of the New Jersey List of Insects is shortly to go to press, the following names are proposed now, in order that they may be included in that paper.

Apanteles (Foerst) Ashm.

Type—Microgaster obscurus Nees.

Agrees with the diagnosis given below for *Parapanteles*, except that the exserted portion of ovipositor is more than half as long as the abdomen, or at least conspicuously exserted. *Urogaster* Ashm., being congeneric with *Apanteles* (s.s.), must be placed in the synonomy with this genus.

Apanteles (s. s.) forbesi, new species.

1900. *Urogaster forbesii* Ashm. MS. in Smith's Insects of New Jersey (1899).

Female.—3.5 mm. long; face without a tubercle or carina, ocular distance about as great as the occipito-clypeal distance, malar space distinct, shortest distance from eye to mandible nearly one-half the length of first joint of flagel; areola with a petiolarea behind it or merely with a transverse ridge a little above its middle, basal area with a median longitudinal ridge, basal area ill-defined; first dorsal abdominal segment with its rugose plate at least twice as long as wide at apex and nearly parallel sided, the sides converging somewhat beyond the middle, posterior half of this segment with most of its middle third occupied by a shallow ovoid depression in which there are rugæ, black portion of second dorsal segment forming a segment of a circle, four to five times as wide at apex as long down the middle, its edges rather rugulose, third dorsal segment apparently twice as broad at base as long down the middle, rugulose along the basal margin, its surface otherwise shining and distinctly sparsely pitted; exserted portion of ovipositor nearly one and one-half times as long as first joint of posterior tarsi; mostly black, tegulæ and most of anterior and middle legs translucent yellowish, their coxæ black, hind legs with black coxæ, reddish femora and trochanters, their tibiæ and tarsi yellowish to brownish and more or less infuscated without contrastingly colored bands, abdomen black above excepting the membranous portion, which is very dark brown; wing membrane faintly brownish, almost colorless, stigma brown, its boundary and the costa beyond very dark brown, radius, cubitus, and vein beyond latter brownish, other veins yellowish.

Male.—Sufficiently like the opposite sex to be readily associated, areola hardly divided as in type female; second dorsal abdominal plate a little wider posteriorly than anteriorly, about three times as wide at apex as long down the middle.

Type—No. 12748, U. S. National Museum.

Type locality—Algonquin, Ill.

Other localities—Riley County, Kansas, September 10, 1885 (Marlatt); Ames, Iowa, June 6, 1890; one male paratype bears the number 14487, but no data.

Apanteles (s. s.) harti, new species.

1900. *Urogaster hartii* Ashm. MS. in Smith's Insects of New Jersey (1899).

Female.—Compared with the description of *A. forbesi* given above this differs as follows: 2 mm. long; rugose plate of first dorsal abdominal segment hardly longer than wide at apex, almost quadrate, its sides not or hardly converging beyond the middle, fovea extending from basal third to a little beyond middle third, apical fourth of this segment depressed and longitudinally ridged, plate of second dorsal abdominal segment rugulose throughout, third dorsal segment indistinctly sculptured, exserted portion of ovipositor about as long as first and second joints of hind tarsi combined; coxæ of hind legs black or blackish, hind femora and tibiæ brown, blackish, the latter yellowish toward base, hind tarsi and tibiæ similarly colored, wing membrane and stigma opalescent, boundary of latter, costa, and sides of the incomplete areolet more or less brown or brownish, other veins opalescent or almost colorless.

Male.—Very like the female, plate of first dorsal abdominal segment with its sides converging beyond the middle, anterior and middle legs mostly brownish, middle tarsi excepting apical joint yellowish, almost whitish. Cocoons white and solitary.

Type—No. 12754, U. S. National Museum.

Type locality—Washington, D. C., U. S. Dept Agric. No. 374 [illegible], reared from *Pyrausta nelumbialis* Sm., July 7, 1882.

Parapanteles Ashm.

Metathorax mostly smooth and with an areola; ovipositor not exserted, or at least not prominently protruding.

Type—*Apanteles aletiae* Riley.

Cryptapanteles, n. n. for Apanteles Ashm. nec. Foerst.

Metathorax without an areola; plate of second dorsal abdominal segment rugose, wider at base than long down the middle, third dorsal abdominal segment smooth or at least not mostly rugose or striated, ovipositor concealed or at most not conspicuously exserted.

Type—(*Apanteles emarginatus* Riley) nec. Nees=*C. rileyanus*, n. n.

Heterospilus bruchi new species.

Related to *H.* (=*Caenophanes*) *chittendeni* Ashm., from which it differs as follows:

Female.—Antennæ 23-jointed: enlarged portion of vein between stigma and cubitus or first abscissa of basal vein, blackish in part and twice as long as the rest of this abscissa; sculptured portion of third dorsal abdominal segment nearly divided by a very shallow transverse furrow, basal third or a little more than the basal third of the fourth dorsal abdominal segment longitudinally striated like the basal two-thirds of the third dorsal segment.

Male.—Antennæ 22-jointed; sufficiently like the female to be readily associated therewith; dorsum of specimens more or less blackish.

Type—No. 12586, U. S. National Museum.

Type locality—Forbing, Louisiana, Hunter, No. 1450 (B. 7. I. 3).

Seven female paratopotypes, Hunter No. 1450 and 1700, only one of the latter, which is marked I. 1. parasite *Bruchus*, Nov. 20, 1907; five male paratopotypes, three Hunter No. 1450, two Hunter No, 1700, with same data as given above; two male paratypes, Hunter No. 1450, parasite *Spermophagus robiniæ*, Forbing, La., B. 7. 1, 3, Sept. 18, '07. 1, 3, 6, '08, Oct. 18, '08.

Boethus daeckei, new species.

Male.—6 mm. long. Compared with description of *B. œnigmaticus* Vier., 1905 (Ks. Ac. Sci., Biol. Papers, p. 314), this species differs as follows:

Tubercles of clypeus not prominent, giving the clypeus a narrowly, slightly emarginate appearance; mesopleura without a shallow puncture-like impression in the middle near the posterior margin, apical fourth of primaries with most of their membrane colorless, abscissa of cubitus beyond transverse cubitus nearly twice as long as the latter, transverse median vein in primaries interstitial, transverse median vein in secondaries broken where the lower or basal third joins the middle third; thyridia of second dorsal abdominal segment not encroaching on the middle third of the blackish portion of this segment; anterior or lower margin of face black like the rest, clypeus, membranous portion of second and first dorsal abdominal segment, third dorsal abdominal segment apically, mandibles excepting toward tip and along lower and upper margins, anterior femora apically, anterior tibæ and first joint of anterior tarsi, yellowish translucent, anterior tarsi beyond first

joint and middle tibiæ basally, brownish; tegulæ and middle portion of postscutel almost yellowish translucent.

Type—No. 12794, U. S. National Museum.

Type locality—Essington, Pa., July 7, 1907. (V. A. E. Daecke).

Paniscus ocellatus, new species.

Female.—16 mm.; tegument pale castaneous to castaneous, orbital margin yellowish, tips of mandibles and edge of ocelli more or less blackish; wings faintly cloudy, transparent, stigma and costa pale, translucent, other veins mostly brownish or almost black; anterior ocellus elliptical, transverse, the shortest distance between the anterior ocellus and the lateral ocellus nearly twice the shortest distance between the anterior ocellus and the nearest point on the eye; antennæ 59-jointed, cylindrical, the joints well defined, the fifth to penultimate subequal and longer than wide at base, the apical joint rounded, subconical, a little longer than the penultimate; discocubital vein with a trace of a stump, recurrent vein interstitial with the second transverse cubitus, areolet quadrangular, metathorax transversely wrinkled above and with a parenthesis-shaped carina on each side; abdomen shining and with a bloom-like pubescence that is conspicuous only in certain lights, the rest of the body very similarly pubescent, the pubescence pale, seemingly tinged with golden.

Male.—Very like the female, but with a yellow face and 56-jointed antennæ; male paratopotype with a distinct stump of a vein.

Type—Female and male and paratopotype, No. 12320, U. S. National Museum.

Type locality—Wellington, Kans., E. G. Kelley, collector, Webster, No. 5431, U. S. Department of Agriculture, Bureau of Entomology.

Pimpla (Epiurus) nigrifrons, new species.

Differs from *inquisitoriella* in the face of the male being black beneath the antennæ, in the ovipositior being a little longer than the abdomen, and in both sexes having the polished border of the dorsal abdominal segments distinctly transversely striate. Female, 6 mm; male, 7 mm.

Type—No. 12274, U. S. National Museum, 2 females, 6 males.

Type locality—

Female (Gip. Moth Lab. 1410), paratype, 55 mm., with ovipositor as long as abdomen and with the third dorsal abdominal segment provided with a longitudinal furrow like fovea; two male paratypes (Gip. Moth Lab. 1410), 5-6 mm.

TWO NEW SPECIES OF MEXICAN TINEIDS.

By August Busck.

Ethmia mulleri, new species.

Labial palpi and face blackish fuscous. Tongue ochre-yellow. Antennæ blackish, basally with white annulations. Head white. Thorax white with posterior tip black. Fore wings pure white with a costal longitudinal streak from base to apex dark slate-colored; at the extreme base of the dorsal edge is a deep black round dot and on the wing are six similar black round dots, placed in pairs in two longitudinal rows of three dots each; the first pair at basal fourth, with the upper dot slightly nearer the base of the wing than the lower dot; one pair on the middle of the cell and one pair just beyond the end of the cell; in both these latter pairs the upper dot is placed obliquely to and further out than the lower. Along the terminal edge is a row of six black marginal dots. Cilia white. Hindwings light slate-colored with white cilia and in the male with a strong yellow hair pencil at the base of the costa. Abdomen dark fuscous with second joint above and terminal joint ocher-yellow. Legs dark slate-colored with yellow tarsal annulations.

Alar expanse, 21-22 mm.

Habitat—Tehuacan, Mexico, July, September (R. Müller).

Type—No. 12810, U. S. National Museum. Cotype in Museum Walsingham.

A clear-cut species, nearest in color and size to the European *Ethmia scvpunctella* but with the six spots placed differently and further distinguished by the male costal tuft. In the American series it comes next to *Ethmia hagenella* Chambers.

It gives me pleasure to name this pretty species in honor of the collector, Mr. R. Müller, who has added very many Mexican Lepidoptera to our collections.

Stenoma loxotoma, new species.

Labial palpi long, evenly covered, reaching above the vertex; second joint thickened with appressed scales, slightly ruffled anteriorly towards apex; ocher-yellow at base, blackish above, whitish gray at the tip; terminal joint smooth pointed, whitish gray shaded to blackish fuscous anteriorly. Antennæ, male, shortly ciliated (1) gray with indistinct darker annulations; basal joint thickened with scales. Face whitish. Top of head tufted, the long scales from each side meeting in the middle; whitish gray on the sides, darker gray at tip of tuft.

Thorax dark gray with a long slender appressed tuft of black hairlike scales reaching back over the first abdominal segment. Forewings with costa straight to apical third, there sharply deflexed, apex bluntly pointed, termen rounded, dorsal edge straight; color brownish gray with narrow ochreous edges and with three transverse, oblique, nearly parallel, narrow lines; the first from basal fourth of costa somewhat undulated to apical third of dorsal edge; the second also somewhat curved from about the middle of costa to just above the anal angle and the third, which is nearly straight from just before the deflexion of the costal edge to the middle of termen. Cilia short, dark fuscous. Hind wings over 1, triangular with rounded apex and anal angle bright ochre-yellow. Underside of all wings bright ochre-yellow. Legs ochre-yellow; first pair with the anterior side of the tarsi gray and heavily scaled as in some noctuids; posterior tibiæ with long smoothly appressed hairs above; the first tarsal joints similarly thickened with shorter hair. Abdomen ochre-yellow with rich chestnut-brown bars above, one on each joint.

Mar expanse, 43-50 mm.

Habitat—Orizaba, Mexico, June (R. Müller, coll.); Vera Cruz, Mexico (H. Schwarz, coll.).

Type—No. 12809, U. S. National Museum. Cotype in Museum Walsingham.

This species would, on account of the striking wing form and the peculiarly thickened front tarsi, fall in Zeller's genus *Loxotoma*, which I, however, am unable to consider a good genus. The family Stenomidæ, which is a primitive family from which the family Oecophoridæ has probably developed, exhibits a very wide range of specific specialization, but has differentiated itself into very few tenable genera. The transition of the various forms of the wings and of the numerous secondary sexual characters, tufts and fringes, exhibited in this family, is so gradual as to defy generic division, while the venation is remarkably uniform throughout the family. It seems at the first study impossible to place a species like the present or the similarly shaped type of the genus *Loxotoma* (*elegans* Zeller) in the same genus with the superficially very different typical *Stenoma* species; but if the recognized generic characters are compared one by one, they will be found to be identical and the present species is, for example, undoubtedly quite as close to *Stenoma tristrigata* Zeller as to *Loxotoma elegans* Zeller, though the former could not be placed in Zeller's genus *Loxotoma*.

A NEW SPECIES OF ACROBASIS.

[Lepidoptera, Pyralidæ.]

By Harrison G. Dyar.

Acrobasis feltella, new species.

Fore wing of male with a small patch of black scales beneath subcostally. Wings dark gray, the inner band beyond the subbasal patch of raised scales very broad, creamy white, shading to orange below, especially wide in its lower part. In the male the basal space and all of the thorax are white; in the female, these parts are gray. Discal dots joined. Outer line wavy-crenulate, defined by an outward creamy shade. Hind wing light at the base in the male, entirely fuscous in the female. Expanse, 14-17 mm.

One male, one female, Warner, New York, July 7, 1909 (New York State collection), sent for identification by Dr. E. P. Felt.

Type—No. 12680, U. S. National Museum.

The specimens were bred from larvæ boring in the petioles of hickory. The species is similar to *Acrobasis nebulella* Riley, but differs by the conspicuous character of the inner pale band.

MISPRINTS.

Page 43, line 13 from top, for "trichanters" read "trochanters."
Page 44, line 29 from the top, for "females" read "female."
Page 44, line 32 from top, for "fovæ" read "fovea."
Page 44, line 36 from top, for "pygidum" read "pygidium."
Page 44, line 37 from top, for "Fig. 1" read "Fig. 2."
Page 46, line 30 from top, for "pedical" read "pedicel."
Page 46, line 31 from top, for "ocherous" read "ochreous."
Page 49, line 31 and 32 from top, after "brownish," strike out from "tarsi" to "brownish."
Page 51, line 24 from top, for "Berkman" read "Birkman."
Page 119, line 34 from top, for "from" read "form."
Page 120, line 15 from top, for "top" read "tip."
Page 123, lines 24 and 25 from top, read "Palpi short, barely visible beyond front; above dusky slate, tip and beneath white."
Page 123, line 26 from top, after "rounded," insert comma.
Page 124, line 32 from top, for "of" read "or."
Page 127, line 28 from top, for "Say" read "Tay."
Page 136, line 25 from top, take out first comma.
Page 137, line 23 from top, for "Ggmasus" read "Gamasus."
Page 150, top of page, for "TESTRASTICHUS" read "TETRASTICHUS."

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