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The Canadian Entomologist.

VOL. XI.

LONDON, ONT., SEPTEMBER, 1879.

No. 9

PARASITES OF THE COTTON WORM.

BY PROF. C. V. RILEY, WASHINGTON, U. S.

Among the parasites so far found to attack and destroy *Aletia argillacea* Hübn., aside from two not reared to the perfect state, are the following: Obtained from the egg, *Trichogramma pretiosa* n. sp.; from the larva, *Tachina aletiae* n. sp., and *Sarcophaga sarraceniae* Riley; from the pupa, *Pimpla conquisitor* (Say), *Cryptus nuncius* Say, *Chalcis ovata* Say, and *Cirrospilus esurus*, n. sp.

I append descriptions of the new species, in order that they may be properly referred to by Prof. J. H. Comstock, who is now finishing the report on the Cotton Worm begun by me while connected with the Department of Agriculture.

I. *TRICHOGRAMMA PRETIOSA*, n. sp.—Length about 0.3 mm. Yellow, the eyes red, the wings hyaline. Head wider than the thorax; antennæ 5-jointed, joints 3 and 4 in the ♀ forming an ovate mass and together shorter than joint 2; joint 5 large, thickened and very obliquely truncate; in the ♂ joints 3, 4 and 5 form a more or less distinct, elongate club, beset with long bristles. Hairs of the wings arranged in about fifteen lines. Abdomen not so wide as the thorax, but as long as the head and thorax together; in the ♀ the sides subparallel, and the apical joint suddenly narrowed to a point. Described from numerous specimens reared from eggs of *Aletia argillacea*.

Differs from *Trichogramma minuta* Riley (Third Rep. Ins. Mo., p. 158, fig. 72, ♀) in its smaller size and uniform pale yellow color, and also in the form of the third and fourth joints of the antennæ. As defined and figured by Westwood, the antennæ of *Trichogramma* are 6-jointed. Walker, in his "Notes on the Chalcidæ," pt. vi., p. 105, employing

Forster's characters, says the antennæ are 8-jointed; but an examination of the figure of the type (*Trichogramma evanescens*, l. c., p. 114) shows that one of the joints counted is the "annulus" above the scape, which I do not consider to be a true joint, and that what I have indicated as the apical joint, in agreement with Westwood, is represented in that figure as three coalesced joints. I have proposed the generic name of *Pentarthrum* for *minuta* in MS. now in Mr. Scudder's hands, but until the allied genera are better characterized than at present, it is best to use the old genus *Trichogramma*.

2. *CIRROSPILUS ESURUS*, n. sp.—Length 1.5 mm. Dull black; knees, tibiæ and tarsi yellowish, the posterior tibiæ sometimes dusky. Eyes with scattered, short bristles. Antennæ of the ♂ 9-jointed, with the joints of the flagellum subequal and beset with bristles, the ninth joint small. Antennæ of the ♀ 8-jointed, the fourth and fifth shorter than the second and third, the three apical joints forming a club. Thorax above microscopically punctate; parapsides distinct and elevated; scutellum with a longitudinal, impressed line on each side. Wings hyaline, pubescent, but the cilia short; base of ulna uneven; radius not developed. Abdomen short and sessile, ovate. Described from numerous specimens reared from the pupa of *Aletia argillacea*.

This species shows relationship with the genus *Tetrastichus* Halliday, and may ultimately be referred there. For the present I prefer to place it in the older genus.

3. *TACHINA ALETIÆ*, n. sp.—Length 8 mm. Black; head golden, facial depression silvery, space between the eyes and the frontal stripe about equal to the breadth of the stripe, bristles of the head black, the pubescence behind and beneath the eyes white; antennæ blackish, palpi testaceous. Eyes at a moderate distance apart, thinly pubescent; front moderately prominent; third joint of the antennæ three or four times the length of the second joint. Thorax and the second and following abdominal joints more or less ashy, the thorax with four or five longitudinal black stripes. Wings subhyaline. Legs black, with a piceous tinge; tarsal cushions yellowish. Scutellum and the sides of the first, second and third abdominal joints sometimes tinged with reddish-brown. No strong bristles on the first and second abdominal joints above.

Described from two specimens, reared in November, 1878, from the pupa of *Aletia argillacea*.

MEETING OF THE ENTOMOLOGICAL CLUB OF THE
AMERICAN ASSOCIATION FOR THE ADVANCE-
MENT OF SCIENCE.

The annual meeting was held, as announced, on the 26th day of August, in the Town Hall, in Saratoga, N. Y. The first session began at 12:30 p. m., the President, J. A. Lintner, of Albany, in the chair. The following members were present during the several sessions: Dr. John L. LeConte, S. H. Scudder, C. V. Riley, A. R. Grote, C. H. Fernald, Dr. John G. Morris, Rev. C. J. S. Bethune, Wm. Saunders, J. H. Comstock, E. P. Austin, F. W. Putnam, B. P. Mann, H. F. Bassett, W. S. Barnard, D. S. Martin, E. L. Graef, Dr. J. S. Bailey, and E. H. Pohlman.

The Secretary, Mr. B. P. Mann, read the minutes of the last meeting in St. Louis, Mo., after which the President delivered the following address:

ANNUAL ADDRESS OF THE PRESIDENT.

GENTLEMEN:—

In the remarks which I presented to the Club at our last annual meeting a brief review was given of the progress in American Entomology within the preceding half century. It was shown that within the last few years rapid progress had been made; that the study of insects had enlisted the labors of many earnest and successful workers, and given to them names honored in science both at home and abroad; that many large and valuable collections had been accumulated—several of which contained so large a number of types that their preservation in the future was a matter demanding serious consideration; that the literature had become quite extensive; that much had been done in working out the life-histories of our species and presenting them to the public in their economic relations; and finally, that the importance of the study had at last been recognized here, as long ago it had been in Europe, by a Commission appointed by our General Government for the investigation of some of the insect pests which were the occasion of serious pecuniary loss, poverty, and almost starvation in some portions of our country.

It affords me pleasure to be able to report, that the past year has shown no diminution of interest or activity in our department, but that work in it is being prosecuted with an energy and with results fully up to any other department of Natural Science, if we except those to which Congress and several of our States are extending their liberal aid.

If fewer new species have been described during the year, we may find encouragement in the explanation that we are approaching the period, if not already reached, when a new species may not be claimed as the reward of every entomological excursion. And indeed, there does not seem to be urgent need of descriptions of forms so very far in advance of some degree of knowledge of transformations, habits and relations to the vegetable world.

An evidence of increasing interest is to be found in the frequent inquiries made for instructions in collecting, apparatus for preparation, and books for study. While the first two requests can be promptly met, not so with the last. We are unable to place in the hands of the student the volumes which he requires for naming his collections. This cannot but be the occasion of discouragement to the beginner, and often the cause of diversion of earnest labor to other departments of natural history. A great need of our science at the present is, monographs of the families prepared by specialists, in which descriptions of all the species shall be given (not simply referred to), and accompanied by such synoptical tables and illustrations as will enable the student readily to ascertain the names of any species which has been described.

At our last meeting I stated to you that the names of 281 persons are recorded in the last edition of the Naturalists' Directory who are making Entomology their study in North America, and that it was probable that a full list would extend the number to at least 350. It now appears that half the truth was not told. A list kept by the Secretary of the Cambridge Entomological Club, published in *Psyche*, vol. ii., p. 9 of Advertiser, accompanying the numbers for Sept.-Dec., 1878, contained at the close of last year the names of 762 Entomologists in the United States and Dominion of Canada. I am informed by the Secretary that the list at the present time, without having been subjected to a critical revision, contains 835 names.

As a record of the current literature of any science is virtually a record of the progress of that science, may I ask your attention to a brief notice of some of the publications of the year following our St. Louis meeting.

A work that might serve as a model in the illustration of insects in their relations to the plants upon which they feed or frequent, is one of the unique series by Mr. Glover of *Manuscript Notes from My Journal*, entitled, "Cotton, and the principal Insects frequenting or injuring the

plant." In its twenty-two quarto plates, engraved on copper, is shown the cotton plant in every stage of development from the seed to the mature plant, and in its various conditions as resulting from insect attack or from disease. In association with these figures, twenty-four insects frequenting the plant are represented. Several of the species are illustrated in an agreeable prodigality, giving enlarged views of the egg, the larva at different stages of growth, the pupa, the cocoon, the perfect insect at rest and in flight, its under surface, enlargements of parts, and the more marked varieties of the larva and the imago. Although not so stated, it is believed that the edition of these Notes was no larger than the others of the series, and consequently, that only about fifty societies and individuals have been the fortunate recipients of a copy.

The Natural History of the Agricultural Ant of Texas is a volume of 208 pages and 24 plates, by H. C. McCook, treating at length of the habits, structure and architecture of this interesting insect. The histological details have been worked out from preparations made by Prof. J. G. Hunt.

A volume, upon which Baron Osten Sacken has been for a long time engaged, has recently been completed and published by the Smithsonian Institution. The *Catalogue of the Diptera of North America* prepared by this author and published in 1858 was simply a compilation of published names, not claiming synonymic accuracy. It contained 1,800 species, but many of the number were too imperfectly described for identification. The new Catalogue is of such merit as to deserve more than a passing mention. It is fully up to, and in itself materially advances, our knowledge of the Diptera of our country. Its author modestly regards it as only critical in part—so far as the families have been worked out into monographs, and as still remaining a mere list of reference to earlier writers, in those families which have not been studied, or in which the existing collections are to a great extent still unnamed, as in the *Culicidæ*, *Chironomidæ*, *Cenopidæ*, the group of *Muscidæ calypterae*, and the section *Asilina*. Its critical character may be seen from the statement, that of the 102 species of *Tabanus* enumerated in the old Catalogue, only 36 have been adopted in this.

An admirable feature of this Catalogue is that a large proportion of the species which it records—over 2,000 carefully described and authoritatively labelled species—are contained in the Collections of the Museum of Comparative Zoology at Cambridge, where every possible care is given to

them, and where they are accessible to the student for comparison and study. Most of these are types of Loew and Osten Sacken, or their determinations.

The remarks of the author on synonymy, nomenclature and priority, seem to me to be most excellent and worthy of serious consideration. In an extended discussion of the merits of the descriptions of Diptera of the late Mr. Walker of the British Museum, he characterizes them as so extremely superficial—descriptive rather of the specimen than of the species, that in his opinion, they should be entitled to no claim for priority whenever they cannot be positively identified without an examination of the type specimen. Thus, of twenty-six species of *Dolichopus* described by him, not a single one could be recognized. The question suggests itself, to what extent might this rule be extended to descriptions in the other orders of insects by this author, and in general, to the writings of other authors.

In considering the number of Diptera, Osten Sacken believes, that rejecting those descriptions which will probably prove irrecognizable, the number of described Diptera of North America, north of Mexico, will hardly reach 2,500; that the undescribed material at present in collections, if worked up, would perhaps double the number; and that when the long neglected order shall have received the attention given to the Coleoptera, it will equal if not exceed the latter, numerically.

Reference at the present to studies in the Diptera, naturally suggests the great loss which Dipterology has sustained in the recent death—in April last—of the distinguished Prussian Dipterist, Dr. H. Loew, long known as one of the most eminent cultivators of this branch of Entomology. During the last twenty years he has been engaged in the study of North American Diptera, and at the request of the Smithsonian Institution he has prepared a series of monographs, three volumes of which (Parts i., ii. and iv.) have been published by that Institution. While his removal from his work at this stage of its progress, cannot but be deeply deplored, there is a consolation to be found in the knowledge that it is not to be wholly arrested, but that a worthy collaborator—Baron Osten Sacken—remains to conduct it to a completion, we hope, of the plan proposed.

The series of *Dimmock's Special Bibliographies*, now being published at Cambridge, Mass., will prove to be of eminent service to the student who desires to avail himself of the literature of our insects, so widely

scattered through the various scientific and popular journals, government surveys, and other publications. Two numbers of the series have been issued—the first containing a complete list to date, it is believed, of the Entomological writings of Dr. John L. LeConte, and the second, those of Dr. George H. Horn. A third, of the writings of Mr. S. H. Scudder, is nearly completed. I regret that it has been thought necessary, in this series, to dispense wholly with the use of capitals in all scientific names, even in the family and ordinal divisions, and I believe that many of you will agree with me in claiming for the royalty of science exemption from conformity to an innovation based on mere convenience.

Prof. C. V. Riley and J. Monell have contributed to the Bulletin of the U. S. Geolog.-Geograph. Survey (vol. v., pp. 1-32) a paper entitled *Notes of the Aphididæ of the United States, with Descriptions of Species Occurring West of the Mississippi*. Part I contains extended biological notes on the Pemphiginæ, by Prof. Riley, and Part II, notes on Aphidinae with descriptions of new species, by Mr. Monell. The paper, illustrated by two plates, is a valuable contribution to our knowledge of these exceedingly interesting insects.

A special Report from the Department of Agriculture, entitled, *The Silkworm, being a brief Manual of Instruction for the Production of Silk*, has been prepared by Prof. Riley, and largely distributed by the Department, to meet the demand from various portions of the United States for information upon the important industry of silk-culture. The Manual is quite full in the natural history of the Silkworm, in the methods of culture, and directions for reeling the cocoons. There seems no reason why this industry, properly fostered, may not be made to add materially to the productive resources of our country.

Abstracts of the papers presented by Prof. Riley at the St. Louis meeting of the American Association for the Advancement of Science, have been published in the Proceedings of the Society, and also in a separate pamphlet. Among these are *Notes on the Life-history of the Blister-beetles and on the Structure and Development of Hornia*; *On the Larval Characteristics of Corydalis and Chauliodes*, and *A New Source of Wealth to the United States* [Sericulture].

A Century of Orthoptera, commenced by Mr. S. H. Scudder in 1868, and continued at intervals in vols. 12-20 of Proc. Bost. Soc. Nat. Hist., has been completed during the present year by the publication of the last three decades, in vol. 20, op. cit. The species described pertain to the

Gryllides, Locustariæ, Acridii and Forficulariæ. The several parts as originally published have been reprinted in a pamphlet of 84 pages. Mr. Scudder has also published (*Psyche*, vol. ii., p. 154) a short list of Orthoptera collected in Appalachicola.

Entomological Notes, No. vi., by Mr. Scudder, issued the past year, is mainly a reprint of papers upon the Orthoptera originally published in the preceding year. The accompanying index furnishes a ready means of reference to the species contained in the several papers.

In the Annual Report of the Chief of Engineers for 1878, Prof. Cyrus Thomas reports upon a small collection of Orthoptera made in the Explorations and Surveys of the San Juan region of Colorado. The same volume contains a report by Mr. H. Strecker, on the Hymenoptera, Lepidoptera and Coleoptera from the same region, in which several new species of Heterocera are described, and a few figured.

Of our Entomological serials, the CANADIAN ENTOMOLOGIST continues to sustain its high reputation, and to merit the contributory aid which it is receiving from nearly all of our American Entomologists, and from some of our European friends.

Psyche, the organ of the Cambridge Entomological Club, is near the completion of its second volume. With the commencement of its third volume such improvements are promised as will render it of still higher importance to every student of American Entomological literature.

The *Transactions of the American Entomological Society* have reached the seventh volume. Although the Society has become a section of the Academy of Natural Sciences of Philadelphia, it is proposed to continue the publication of the Transactions as at present as rapidly as the limited means available for the purpose will permit.

The *Bulletin of the Brooklyn Entomological Society* is continued. That of the Long Island Society has been discontinued.

The second volume of the *Butterflies of North America*, by Mr. W. H. Edwards, is in course of publication. It continues to maintain the high reputation which it has commanded, from its admirable delineations of forms and coloring, and the exceedingly interesting new biological details presented.

The *North American Entomologist* is a new candidate for favor and support, of which two numbers have appeared. It is a monthly periodical, published at Buffalo, N. Y., under the editorial charge of A. R. Grote.

It purposes to present articles of value both to the specialist and the agriculturist on the subject of North American insects, together with notices of current entomological literature.

Descriptions of the Noctuidæ have been continued by Prof. A. R. Grote in contributions to the CANADIAN ENTOMOLOGIST and in the *North American Entomologist*. With a diminution in the number of new forms of Noctuæ presenting themselves, Mr. Grote has directed his attention to the Pyralidæ, and has published a paper in the Bull. U. S. Geolog.-Geograph. Survey (vol. iv., pp. 669-705), entitled, *A Preliminary Study of the North American Pyralidæ*, in which a number of new species are described, the species of Botis enumerated, and the venation given of certain genera of the Phycidæ. A supplement to this paper follows in the *North American Entomologist*, No. 2, pp. 9-12.

To the study of the Tortricidæ—a family which has received scarcely any attention in this country since the death of Mr. C. T. Robinson, Prof. C. H. Fernald, of Orono, Me., has been devoting special and earnest attention. He has been able to examine nearly all the material contained in the principal collections in this country, and during the past winter has visited the larger collections in Europe for their study and a comparison with our forms. In England, the Tortricidæ in the following collections were critically examined by him: those of the British Museum, of H. T. Stainton, R. McLachlan, C. J. Barrett and Lord Walsingham; and on the continent, the collections in Brussels, Berlin, Munich, Naples, of Prof. Zeller in Stettin, Dr. O. Staudinger, MM. Deyrolle and Ragenot and the Jardin des Plantes in Paris. The above amount of preliminary work should certainly enable Prof. Fernald, as is his hope, to present us with a rearrangement of this extensive family quite in advance of any heretofore proposed. Prof. Fernald has prepared a synonymical list of our North American species, which is nearly ready for publication.

The work of Mr. V. T. Chambers on the Tineidæ of the United States, has been vigorously prosecuted, as may be seen in his frequent publications in the CANADIAN ENTOMOLOGIST. His papers on *Tineina and their Food-plants*, and *Index to the Described Tineina of the United States and Canada* (Bull. U. S. Geolog.-Geograph. Surv., vol. iv., pp. 107-167), have been appreciatively received as very convenient for reference.

The comparatively small but difficult group of the Pterophoridæ has engaged the attention of Mr. Charles Fish, of Oldtown, Me., and his studies have already made him our best authority in these forms.

From the above references to special studies in several of the families of the Lepidoptera, it will be seen that this attractive Order gives every promise of soon occupying high vantage ground.

In the other Orders—it is quite unnecessary that I should refer in the Coleoptera to the labors of Drs. LeConte and Horn. You all know of their untiring work, which has made the field which they are so thoroughly working almost exclusively their own.

In the Diptera, Mr. C. P. Whitney has published descriptions of a few species of Tabanidæ.

Mr. W. H. Patton has communicated some descriptive papers on Hymenoptera to the CANADIAN ENTOMOLOGIST.

Mr. E. T. Cresson has published a catalogue of North American Apidæ, with descriptions of new species, comprising 108 pages of vol. vii. of the Trans. Amer. Entomolog. Soc.

Some valuable lists of species collected in particular regions have been given us, which are of service in extending our knowledge of Geographical Distribution. Among these, in the Coleoptera, may be mentioned, a list by E. A. Schwarz of 1,457 Florida species (Proc. Amer. Philosoph. Soc., v. 17, pp. 353-472); of 1,246 species from the Lake Superior region by H. G. Hubbard and E. A. Schwarz; by the same, of 1,787 species from the lower peninsula of Michigan (loc. cit., v. 17, pp. 593-666); by Dr. LeConte, of 220 species collected in the Rocky Mountains at an elevation of 6,000 feet and upwards (Bull. Geolog.-Geograph. Surv. Terr., v. 4, pp. 447-480); additions to Messrs. Austin and LeConte's Catalogue of the Coleoptera of Mt. Washington, of 89 species, extending the number to 319, by F. Gardiner, jr. (Psyche, v. 2, p. 211); 316 species from Wallace Co., Kansas, by F. H. Snow (Trans. Kans. Acad. Sci., vol. vi., pp. 61-70); and additions of 435 species to the Catalogue of Kansas Coleoptera, by E. A. Popenoe (ut. cit., pp. 77-86), increasing the number to 1,711.

In the Lepidoptera, Mr. C. E. Worthington furnishes a list of 229 species of Noctuidæ from the vicinity of Chicago, Ill. (Canad. Entomol., v. xi., p. 68); Mr. W. L. Devereaux, a shorter list of species taken in Wayne Co., N. Y. (ut. cit., p. 105); Prof. F. H. Snow, a list of 104 species collected in Colorado, by the Kansas University Scientific Expedition in 1876.

The valuable biological studies of Mr. W. H. Edwards have been

continued with their wonted earnestness. Through the success attained by him in carrying a large number of species of butterflies from the egg through their transformations, he has secured their entire life-histories, several of which have been published during the past year, and others illustrated in the volume of the *Butterflies of North America*. Of the Satyridæ, the larvæ of which are so rarely met with that I may venture to say many members of this Club have not seen a living example, he has reared all of our Eastern species with the two exceptions of *Satyrus Pegale* and *Chionobas semidea*. The interesting experiments in producing change in the imago by the application of cold to the chrysalis have been continued and been duly recorded.

A large number of biological papers have been contributed to our Entomological journals. From those accessible to me at the time of writing I find contributions from the following: C. J. S. Bethune, J. Boll, Robert Bunker, V. T. Chambers, A. J. Cook, Charles Dury, H. Edwards, W. H. Edwards, J. H. Emerton, G. H. French, H. A. Hagen, E. C. Howe, D. S. Kellicott, J. L. LeConte, B. P. Mann, T. L. Mead, C. V. Riley, W. Saunders, C. G. Siewers, Emma A. Smith, F. H. Snow, C. E. Webster, O. S. Westcott, C. E. Worthington, and G. D. Zimmerman—a quite incomplete list of the contributors to this department.

Results of anatomical studies of insects have been published by Messrs. C. F. Gissler, J. D. Hyatt, E. L. Mark, and C. V. Riley.

It would be inexcusable in a notice of biological work to omit reference to what is being done in this direction at the Museum of Comparative Zoology at Cambridge. Under the hand of the eminent Curator of the Entomological Department, Dr. H. A. Hagen, a biological collection of insects has been brought together that is far in advance of any similar collection in the world. It was my privilege recently to give it a partial examination, and when I say that I know not how to express my high estimation of it, I give it but imperfect praise. No one, whose studies have prepared him for the appreciation of such a collection, can examine it without wondering when, where and how the material was obtained. As an illustration of the natural history of species, in their several stages, architecture, depredations, food-plants, diseases, parasites, etc., it is difficult to see how its plan of arrangement can be improved. In consideration of its high value, it is very gratifying to see that such unusual means have been resorted to for its preservation, as, with a reasonable supervision and without the operation of other than the ordinary causes of destruction,

will extend its benefits to our successors in coming centuries. In addition to the biological collection, two others have been arranged: the one comprising the insects of North America, and the other those of the world. Of the number of type specimens contained in these collections, there is not the time at present, nor is it the occasion, for more than simple mention. The student in American Entomology, who aims to be fully abreast of the most advanced progress in his line of study, cannot neglect the means of information which the Collections and Library of the Entomological Department at the Cambridge Museum offer him.

The published results of economic investigations during the year have been quite limited. In consideration of the exceeding importance of these studies, it is painful to have to record the fact of the issue of but one Annual Report of a State Entomologist— that of Cyrus Thomas. This second report of Dr. Thomas, forming the seventh in the series of the Illinois reports, is a volume of nearly 300 pages. In it Dr. Thomas discusses the depredations of some of the Orthoptera, Coleoptera and Hemiptera. Prof. G. H. French, Assistant Entomologist, presents brief descriptions of a large number of diurnal and nocturnal Lepidoptera and their larvæ, with notices of their habits, accompanied by analytical tables for their identification. Miss Emma A. Smith, special Assistant Entomologist, offers the results of original investigations in some species of special economic importance. The publication of this and the preceding Report, without, as is evident, the opportunity of the revision and correction of proof by the authors, is much to be regretted, as serious errors in the nomenclature and elsewhere have thereby been given extensive circulation.

The Annual Report of the Entomological Society of Ontario, making the ninth in the series, contains its usual amount of matter of interest to the entomologist, and of value to the agriculturist and horticulturist.

Several articles treating of insect depredations have appeared in our scientific journals, which cannot now be referred to.

The United States Entomological Commission, continued by an appropriation by the last Congress of \$10,000, is actively engaged in its second year's operations. In its investigations of the Rocky Mountain Locust, its labors have been almost entirely confined to that portion of country designated as the Permanent region, with a view of determining the limits of these permanent breeding grounds, and to obtain the requisite data for the preparation of a map, and a scheme to be recommended to the Gov-

ernment, by which the excessive multiplication of the species in that region, and the consequent migration therefrom, may be prevented. It is understood that the recommendation to the Government will be, that in connection with the authorities in British America, efforts be made to restrain the extensive prairie fires in autumn which are common to that region, and subsequently to burn them in the spring after the hatching of the young locusts. This plan is believed to be feasible, as the breeding grounds are not co-extensive with the so-called Permanent region, but are limited to the richer valleys, plateaus and river borders within it.

The Commission will also, it is understood, in its forthcoming Report, recommend to the Government a scheme for a system of warning and prevention, through the aid of the mounted police patrol of the Dominion Government, and our Signal Bureau and military posts.

Having been favored with a transcript of the subjects to be treated of in the forthcoming 2nd Report of the Commission, and the assignment of subjects to the respective members of the Commission, I have no hesitancy in giving assurance of a volume of unusual interest and value. It is to be hoped that Congress will not repeat the inexcusable blunder of ordering of it an edition by far too small to supply the demand, or for the accomplishment of a main object in its laborious preparation—the diffusion of the needed information among those to whom it could not fail of proving beneficial.

The Commission is also occupied with investigation of the Hessian-fly and the Chinch-bug—each of which are chargeable with annual injuries to the amount of several millions of dollars.

The investigation of the natural history and habits of the Cotton-worm, commenced by the Department of Agriculture last year, has by direction of Congress, been transferred to the Entomological Commission. Prof. Riley has been pursuing its study in Southern Texas and in the Gulf States, aided by special assistants, and it is believed that discoveries have recently been made which will reduce the cost of destroying the larvæ to perhaps a fourth of what it has hitherto been.

Among the special subjects of study which have claimed attention lately, an interesting one has been the pupation of butterflies. Observations made during the past year on the pupation of some of our butterflies have shown us that we have been at fault in accepting the account given of it by Reaumur over a century ago, and received and quoted by

subsequent authors. The most interesting operation in the pupation of the suspensi butterflies is the withdrawal of the chrysalis from the larval skin, the casting off of the skin with its attachment by the terminal legs to a button of silk spun for the purpose by the larva, and the attachment and suspension of the chrysalis by its anal spine to the silk button. Reaumur represented it as accomplished by the chrysalis in its extensions and contractions grasping the larval skin between the segments, and by this means raising itself until it regained the button. Recently Mr. Osborne, an English Entomologist, discovered a membrane serving as a suspensory agent in the change to the pupal state, and for the first, questioned the account given by Reaumur. His observations were confirmed by those of Mr. W. H. Edwards, and followed up by additional observations on large numbers of Nymphalidæ and Danaidæ, some of which have been presented in the CANADIAN ENTOMOLOGIST. There seems to be no question of the existence of such a membrane, and that it consists of the portion of the larval skin lining the region of the rectum, caught upon two knobs conveniently placed for the purpose. Prof. Riley, in a communication to *Psyche* (vol. ii., p. 249) finds other means of chrysalis suspension—the principal one being the shed intestinal canal, and accessory ones, the tracheal vessels of the last pair of spiracles; these Prof. Riley regards as the principal agents in suspension. In opposition to this, Mr. Edwards considers these ligaments as of but little, if any, service, and finds the membrane to furnish all the requisite support. Additional observations are required to reconcile these different views.

The beds of fossil insects recently discovered in the Tertiaries of our western Territories are proving to be wonderfully rich in number of species and condition of preservation. From a single small basin exposed by a railway cut in the vicinity of Green River Station, Union Pacific Railroad, in Wyoming, Mr. S. H. Scudder in *Fossil Insects of the Green River Shales* (Bull. U. S. Geolog.-Geograph. Surv. Terr., iv., No. 4, pp. 747-776) enumerates eighty species, representing all the orders of the Insecta except Lepidoptera. An idea of the richness of these beds may be obtained from the statement, that a two hours' search was rewarded by the collection of fifty new species. We are glad to learn that Mr. Scudder is engaged upon a general work on our fossil insects, which will form one of the volumes of the quarto reports of the Hayden Survey—the beautiful typography and illustration of which causes us to regret the prospective speedy termination of the series. As the Tertiary Shales of the Rocky

Mountain region give every promise of being richer in insect remains than any other country in the world, the material for this volume will be more ample than any other student in fossil entomology has been able to command.

For the evident omission of reference to much valuable work done during the period reviewed, I ask indulgence. The time that I had allotted to the preparation of my sketch was found, too late, to be quite insufficient for the extended bibliographical examinations required for even an approach to completeness. I offer it only as a partial sketch, and as such please accept it.

On motion, the thanks of the Club were tendered to the President for his able and interesting address, with the request that a copy be sent to the CANADIAN ENTOMOLOGIST for publication.

The Club next proceeded to consider the amendment to the Constitution proposed at the St. Louis meeting, and after much discussion, the amendment was adopted in the following form :

1st—No resolution affecting important scientific questions shall be adopted at any meeting of the Club unless there shall be present at least seven members who shall have been enrolled at least one year previous to said meeting.

2nd—When any motion has been carried by the Club, such motion shall not be rescinded at any subsequent meeting unless there shall be present at least seven persons who shall have been enrolled as members one year or more previous to said meeting.

3rd—Five members shall constitute a quorum for the transaction of ordinary business.

The Secretary was instructed to draw up a list of members of the Club, to be embodied in the record of its proceedings, including all those who had been present at previous meetings.

The second meeting was held at 4 : 30 p. m., the President in the chair.

Mr. Grote exhibited specimens of *Pseudohasis eglanterina* sent him by Mr. Jas. Behrens, of San Francisco, who had collected them on the top of Mount Shasta. These differed from the ordinary specimens in being almost entirely black on the upper side. Mr. Grote expressed the opinion that this variation was mainly due to the climatic influences to which they were subjected in this elevated situation.

Dr. J. G. Morris referred to the fact that certain Water Beetles carry with them when they dive a globule of air underneath their bodies, and asked for information as to what purpose it served. Mr. E. P. Austin said that this bubble was retained underneath by the stiff hairs along the abdomen, and as it was known that the air gradually disappeared if the insect remained long under water, it was supposed that the air was gradually inhaled by the insect, which was thus enabled to lengthen its stay under the water.

Mr. B. P. Mann presented a list of the Entomologists of North America, and requested the members to confer with him as to additions and corrections. Some beautiful examples of colored drawings of Noctuae by Mr. Pohlman, of Buffalo, were laid upon the table for the inspection of those present, and were much admired.

Mr. Scudder called the attention of the members to a lepidopterous insect which was doing much damage to the Pines on the Island of Nan-tucket. Previous to the war of 1812 the island was well wooded, but during that struggle the occupants were reduced to such straits for fuel that they had burned every tree. For many years the island had remained in a barren state, but some time ago plantations of Pines were begun, and a broad belt of young trees of *Pinus rigida* from 10 to 20 feet high, with scrub Oaks, now cover a large part of the island. The success of this experiment is seriously threatened by the presence of the insect referred to, which is a Tortrix belonging to the genus *Retinia*, and closely allied to *duplana*, *sylvestrana* and *frustrana* of Europe. The larva affects the tip of each terminal bud and bores its way through this into the twig to the depth of two or three inches, killing the terminal leaves and thus preventing the trees from making any growth. The moth is double brooded and has not been observed in that locality beyond the precincts of the island. Mr. Scudder also presented a plate with enlarged drawings of the insect and its work.

Mr. Comstock had met with the same insect on *P. inops*, and had found that the tips of the branches of the Pines were usually covered with a web. He had also found another species of *Retinia* infesting the twigs of *P. rigida*. This latter bores into the small twigs of the tree, from which there exudes masses of resin. The larva lives within the branch upon the wood, and before pupating forces its way through the mass to the outside.

Mr. Bassett had observed some fifteen years ago about Waterbury,

Conn., that the common White Pine (*Pinus strobus*) was greatly injured at the tips of the branches by *Pissodes Strobi*, but for the last ten years this pest had almost disappeared. Mr. Riley referred to another Tortrix affecting the Junipers on Long Island, *Dapsilia rutilana*, a European species recently imported.

DESCRIPTION OF PREPARATORY STAGES OF ARGYNNIS
EGLEIS, Bois.

BY W. H. EDWARDS, COALBURGH, W. VA.,

A. EGLEIS (♀ *Mormonia* Bois.) syn. *Montivaga* Edw., not of Behr.

I received from Mr. Mead, 18th Aug., 1878, Nevada, several eggs and newly hatched larvæ of this species. The eggs had been obtained by confining a female on Violet, and the female was also sent that I might identify the species. The larvæ became lethargic immediately after leaving the egg, as is the case with all our larger Argynnids whose history is known (at least in the late summer brood). I kept them in a cool room till last of January, when the survivors, three in number, were brought into my study, and left in glass with Violet leaves. By Feb'y 5th they were observed to be feeding. On 18th one passed first moult; on 5th March passed second moult; 16th March, third moult. This larva was shortly after killed by accident. The next one passed third moult 15th April, and the third passed same moult 17th April. I could see no reason why the first larva so far outstripped the other two in growth, as they were treated alike. No. 3 died before next moult. No. 2 passed fourth 26th April; fifth 7th May; 20th May suspended, and made chrysalis 21st May, but died before imago. I was able to get drawings of the last stage of the larva and of the chrysalis, as well as of the egg, which I hope some day to publish. The general history therefore follows that of the large Argynnids, and is considerably unlike that of the *Myrina* group. *Egleis* is a species midway in size between *Myrina* and *Cybele*.

EGG--Conoidal, truncated and depressed at top, rounded at bottom, the height to breadth nearly as 4 to 3, marked by about 18 vertical ridges, one half of which proceed from base to summit, the others about two-thirds the distance, then unite with the long ones; at the summit the

ridges form a serrated rim ; between the ribs are transverse striæ. This egg closely resembles that of *Myrina*, being higher and narrower than in *Cybele* and its allies.

YOUNG LARVA—Length .6 inch ; cylindrical, of even size, the segments well rounded ; color greenish-white ; on segment 2 is a dorsal collar, brown, with bristles ; after 2 on each segment is a cross row of dark brown sub-ovate spots, from each of which spring one or two hairs ; these hairs are long, straight, tapering, and with a rounded knob on end ; head obovate, bilobed, dark brown, shining, a little pilose.

After 1st Moulting—Length .1 inch ; cylindrical, tapering posteriorly from 5 or 6 to end, the segments well rounded ; armed with six rows of black spines, which are stout at base, rising from black tubercles, taper irregularly, and throw out many divergent black hairs ; color grayish, mottled and specked with black ; head obovate, bilobed, the vertices rounded ; black, with black hairs.

After 2nd Moulting—Length .16 inch ; same shape ; the spines shining black, and all from black tubercles except those of the lower lateral row, which have dull orange tubercles ; on 2 are two large dorsal spines, and on either side two tubercles with hairs ; color dark gray, mottled with black ; on either side of medio-dorsal line a gray stripe, and a pale band along base, over feet ; three days after the moulting the gray sub-dorsal lines became broader and coalesced, making a dorsal band, and the space between the dorsal and first lateral spines also became decidedly gray ; head as at previous stage.

After 3rd Moulting—Length .22 inch ; spines as before, except that lower laterals are yellow nearly to top ; all bristles black ; the two spines on 2 same length as other dorsals and somewhat porrected ; color blackish, with dark gray band along dorsum ; the sides between dorsals and first laterals finely mottled with gray.

After 4th Moulting—Length .4 inch ; the spines long, stout at base, lower laterals yellow to tips, and rise from yellow tubercles ; the intermediate spines on 2 and 3 yellow also, those of 2 porrected ; color black-brown mottled with gray-white ; along dorsum two gray lines ; head sub-cordate, not much cleft, the vertices rounded, front flattened ; color dull black, the back of head dull yellow ; face much covered with black hairs.

After 5th Moulting—Length .6 inch, and grew to 1.2 inch at maturity.

MATURE LARVA—Cylindrical, stout, the middle segments swollen ; color dark brown mottled with black, especially on the anterior part of each

segment, and somewhat with gray; along dorsum a double stripe partly confluent and pale yellow, making in effect a distinct band; the dorsal spines dull white, tips black; both lower rows pale yellow, tips black; the bristles short, divergent, and pale; the spines on 2 a little turned forward, but not longer than others; feet and legs pale brown; head sub-cordate, black in front, dull yellow behind, with many short hairs.

CHRYsalis—Length .8 inch; cylindrical, the wing cases much elevated, the outer edges at base flaring; head case square, transversely rounded; mesonotum prominent, compressed, carinated, followed by an angular excavation; the tubercles on abdomen very small, scarcely visible; color dark brown, mottled in shades, and with more or less golden-brown; the wing cases of one shade, dark, glossy.

NOTES ON NOCTUIDÆ.

BY A. R. GROTE, BUFFALO, N. Y.

Hadena passer.

Mamestra passer Guen., Noct. I, 195.

Luceria loculata Morr., B. B. S. N. S., 2, 110.

I have received from M. Achille Gueneé an outline drawing of his *Mamestra passer*, and with the help of his description am enabled to make the above identification. The black marks tying the reniform to the t. p. line are variable, sometimes wanting; the color varies from pale reddish brown to dark brown; the claviform is thick and usually solid, but sometimes open; the lines are usually effaced, but sometimes quite noticeable; the ornamentation is exceedingly simple. The eyes are naked, so that, with several other species referred by Gueneé to *Mamestra*, as I have previously shown, this form should be placed in *Hadena*.

Marasmalus ventilator Grote.

This species must be added to the Texan fauna; Mr. Belfrage sends me a specimen under the number 723, taken May 5.

Anticarsia gemmatalis Hübn.

Collected in large numbers and great variety by Mr. Westcott, Racine, Wis. Also by Mr. Belfrage in Texas (Nos. 724 to 729). It is sometimes quite gray with concolorous reniform; again the reniform is whitish;

sometimes of a tawny brown with concolorous or yellowish reniform; sometimes of a yellowish brown with blackish powdery shades. The transverse posterior line is occasionally wanting, as are the extra-mesial geminate, black and fulvous spots on secondaries. Hardly two specimens are quite alike, but there is no room for suspecting more than one species.

CORRESPONDENCE.

A correspondent calls our attention to an
ENTOMOLOGICAL JOKE.

Packard's Guide to the Study of Insects, p. 302, says of the Noctuelitæ "There is a great uniformity in the genera of this family, which are characterized by their thick bodies, the thorax being often crested, by the stout and well-developed palpi, and the simple and sometimes slightly pectinated antennæ."

The author of a tabular view and key of the more common families of Insects, after stating in his preface that his material has been selected for the most part from Packard's Guide to the Study of Insects and other authors, makes the following astonishing statement as one of the distinguishing characteristics of the Noctuelitæ: "*Thorax often crested by the stout and well-developed palpi.*"

How does Dr. Packard like this emendation? What effect would this have on Mr. Strecker if he should happen to see it just before dinner? Would not the next issue from Reading give us numerous variations on *ne sutor ultra crepidam*?

THE NORTH AMERICAN ENTOMOLOGIST.—Under this title a new Entomological serial has lately been placed before the public, edited by one of our esteemed contributors, A. R. Grote, of Buffalo, N. Y. It is an eight-paged monthly, nicely printed and illustrated by occasional plates. A portion of each number is occupied by scientific papers on Entomological subjects, followed by articles having an economic bearing under the heading of "Fruit and Farm," while the succeeding pages are occupied by very useful "Book Notices." The first three numbers which are before us contain some valuable scientific papers, as well as useful information to agriculturists and fruit-growers. We welcome this new candidate for public favor, and wish it every success. It is published by Reinecke, Zesch & Baltz, of Buffalo, N. Y., at two dollars per annum.