PSYCHE,

ORGAN OF THE

CAMBRIDGE ENTOMOLOGICAL CLUB.

VOL. 2.

1877—1879.

EDITED BY GEORGE DIMMOCK AND B: PICKMAN MANN.

CAMBRIDGE, MASS.
CAMBRIDGE ENTOMOLOGICAL CLUB.
1883.

It is recommended that this volume be bound in the following order: — Title-page; text and systematic index, p. 1-309; PSYCHE ADVERTISER (covers, including Entomological items, advertisements, &c.), except the reprints from Dimmock's Special bibliographies; reprints from Dimmock's Special bibliographies; Alphabetic index; Correction of errors detected.

The issues of PSYCHE ADVERTISER were as follows, each issue going out with the PSYCHE of corresponding date: — Jan.-Feb. 1877, [4] p.; March-April 1877, [4] p.; May-June 1877, [4 p.]; July-Aug. 1877, 8 p.; Sept.-Oct. 1877, 8 p.; Nov.-Dec. 1877 [erroneously dated "Sept. & Oct., 1877"], 8 p.; Jan.-Feb. 1878, 8 p.; March-April 1878, 10 p. (including, on p. 3-6, nos. 1-59 of the bibliography of the entomological writings of John L. LeConte); May-Aug. 1878 [erroneously dated "March & April, 1878"], 16 p. (including, p. 3-9, LeConte, nos. 60-149 [end]); Sept.-Dec. 1878 (p. 3-6, George H. Horn's entomological bibliography, nos. 1-53), 12 p.; Jan. 1879 (p. 7-9, Horn, nos. 54-80 [end]), p. 1-2, 5-8; Feb. 1879 (p. 3-6, Samuel Hubbard Scudder's bibliography, nos. 1-43), 12 p.; March 1879 (p. 3-6, Scudder, nos. 44-87), 12 p.; April 1879 (p. 3-6, Scudder, nos. 88-132), 12 p.; May-June 1879 (p. 3-6, Scudder, nos. 133-183), 12 p.; July 1879 (p. 3-6, Scudder, nos. 184-225), 12 p.; August 1879 (p. 3-6, Scudder, nos. 226-274), 12 p.; Sept.-Dec. 1879 (p. 3-6, Scudder, nos. 275-311 [end]), p. 1-6, 3-4.

The date of issue of each issue (single or compound numero) is given at the bottom of the last page of the succeeding issue; nos. 65-68 were issued 9 April 1880; the Alphabetic index was issued 7 April 1882: pages 297-300 (of the Systematic index) were received from the printer 16 Feb. 1883; pages 301-304, 31 Aug. 1883; pages 305-308, 3 Nov. 1883; the rest was put to press 20 Dec. 1883.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., Jan. and Feb., 1877. [Nos. 33–34.

Introduction to the Second Volume.

PSYCHE enters upon its second volume having twice the size with which it began in May, 1874. The BIBLIOGRAPHICAL RECORD steadily improved in completeness and convenience of use as the editor gained experience. Carefully prepared systematic and alphabetic indexes placed the contents of the first volume within easy reach of everybody.

The continuance of the BIBLIOGRAPHICAL RECORD requires as much time and labor as Mr. Mann can devote to the work. Mr. Dimmock takes charge of the rest of PSYCHE.

PSYCHE is devoted principally, aside from the BIBLIOGRAPHICAL RECORD, to articles upon the habits, general anatomy and physiology of Arthropoda, and communications upon these subjects are solicited from competent observers. Synoptical tables for the determination of North American Insects[1] will be given occasionally. Descriptions of new species will be given only when they are needed to supplement other articles.

The BIBLIOGRAPHICAL RECORD will contain, as heretofore, a descriptive list of all writings upon Entomology published in North America, and of all foreign writings upon North American Entomology. It will include a selection from foreign writings upon general Entomology which are of importance to North American entomologists.

The CAMBRIDGE ENTOMOLOGICAL CLUB was incorporated March 9, 1877, under the laws of the Commonwealth of Massachusetts. Its members are chosen without local limitation; its field of action is wherever Entomology is scientifically pursued.

[1] See Vol. I, p. 162–163.

Subscribers to PSYCHE are entitled to borrow from the Library any work which could be replaced in case of loss, upon compliance with the simplest conditions practicable. In every way the Club will be actuated by the most liberal motives.

A Permanent Publication Fund has been established by the Club, but it is yet too small to insure the continuance of the publication of PSYCHE. The Club does not hesitate to ask the friends of Entomology to contribute to this Fund, believing that the BIBLIOGRAPHICAL RECORD is too important to deserve discontinuance. Should this fund be secured, North American Entomologists will have the satisfaction of possessing a current analysis of the literature of their own department *more carefully prepared and more promptly issued than any which the students of other departments possess.*

The second volume of PSYCHE will extend from January, 1877 to December, 1879. The subscription price in North America is three dollars for the volume; foreign subscriptions are the equivalent of fourteen shillings sterling; which must be paid in advance to the editors.

Address: *Editors of* PSYCHE,
Cambridge, Massachusetts,
U. S. A.

The Tube-Constructing Ground-Spider of Nantucket.

In my rambles over the Island of Nantucket, I frequently noticed circular holes in the ground and sometimes stopped to probe them with a blade of beach grass or a slender twig; astonished to find how straight and deep they were, and once or twice "feeling a bite" at the end of my probe, I determined to ferret out the spider which I was sure inhabited them. I started out one morning in the middle of September, armed with an old hoe and a brass shoe-horn, which proved the most serviceable of tools, to a point where I had seen an unusual number of holes. Selecting a good sized hole in the sand, with no plant near by, I first tested its depth and then, leaving the grass-blade in the tube, dug a deeper hole about a decimetre distant, and scraping away the sand from the first hole laid it open from top to bottom. I was rewarded by the discovery at the bottom of the tube — a depth of nearly two decimetres — of an enormous spider guarding a cocoon of eggs nearly as large as herself. Although I worked all day and laid open more or less perfectly some dozen holes, securing a spider in nearly every one, this proved to be my greatest prize, as no other specimen possessed an egg-cocoon. The general result of these excavations and captures enables me to present a somewhat full account of the history of the species, although many points still need to be investigated.

The soil of Nantucket is always more or less sandy. This spider digs its holes in almost any open place, but it seems to prefer the sandiest spots and to choose not indeed the loosest soil but the flat spots in the neighborhood of the sand-dunes by the sea-shore; it is exceedingly common about Coatue; it may be found in the loose sand of the dunes themselves, but in such cases ordinarily seeks the protection of a bunch of beach grass. My only excavations have been upon and in the neighborhood of these sand-dunes, but the holes probed in other parts of the island in the firmer soil proved nearly or quite as deep. The holes are always cylindrical, perfectly simple and very nearly, generally quite, vertical; at the summit they are funnel-shaped to a scarcely perceptible extent, the narrowest portion being at from a quarter to half a centimetre from the surface of the ground, in the holes of the full-grown insects; below this they increase pretty regularly and very slightly in diameter to a depth of from $1\frac{1}{2}$ to nearly 5 decimetres, the largest being nearly 20 millimetres in diameter; only one spider is found in a single tube. The accompanying table gives the size of the only five of which I took careful measurements. The figures are in millimetres.

No.	*Depth.*	*Width at top.*	*Width near middle.*	*Width at bottom.*
1	167	10	19	22
2	263	9	12	14
3	270	15	18	26
4	205	13	16	19
5	103	4	7	10

The "width at top" was taken at the very mouth of the tube, no notice being taken at the time of the slight diminution in diameter just below the mouth. Nos. 3 and 4 were in rather looser sand than the others, and in the middle of the upper half of No. 3 the diameter was only 9.6 mm. No. 5 was occupied by a spider partially grown, but perhaps would have been deeper if a short root of some plant had not lain in the way of any further direct progress. No. 1 was occupied by the female with egg-cluster, and was considerably enlarged at the bottom to allow for the additional burden. The holes are large enough to allow the spider to turn itself around, for a specimen made to enter a hole head foremost was dug out and found head upward.

Holes were found only two millimetres in diameter at the top and correspondingly shallow, from a quarter to a half a decimetre deep; the shallowest, therefore, scarcely reach the moister sand which lies beneath the surface. All the tubes are lined throughout with silk, but this is only apparent in the smallest holes; the silk is invariably more abundant in the superficial layer of dry soil, where it is doubtless more needed; examination with a lens shows that it continues to the bottom of the deepest holes also. The portion surrounded by dry sand may, with care, be removed uninjured; even here, however, the web has no rigidity, and though grains of sand and splinters and fragments of grass-blades adhere to it, it collapses as soon as it is removed, being unable to support its own weight. At the edge of the opening of the tube, little straws and sticks are not infrequently interwoven with the silk, apparently to form a better protection, and, in a road through the woods, I once found a hole where the entrance was marked by a little pile of sticks crossing each other at all angles, but leaving the opening perfectly circular, surrounded by a raised rampart nearly twenty millimetres high.

In excavating the tubes, I took pains to examine carefully the debris at their bottom, and to remove this until I was sure I had reached the virgin sand. In one I found a matted, soggy mass of insect remains mingled with sand; among other things I noticed a large-winged locust, apparently a Trimerotropis, a medium-sized Carabid, and a Necrophorus; in another the only recognizable object was the shard of a small lamellicorn beetle; in a third (a small hole) only a little fly; in a fourth the remains of a Lycosa itself, perhaps fragments of the cast-off skin of the proprietor; while in a fifth, the bottom was filled to the depth of twenty millimetres or more with numerous insects mingled with sand, among which I could distinguish five or six Carabidae of different species, other beetles and a sand-wasp. These remains were always buried in the sand, never lying loose upon the surface; from their nature, as well as from the increasing size of the tubes in passing downward, it would seem as if most, though certainly not all, of the insects eaten had fallen into the tube. Judging from the number of spiders seen outside their holes, and from the sluggishness at night of specimens I had imprisoned for some time, the spiders are apparently diurnal, and not nocturnal.

On teasing one of these spiders with a straw moved up and down gently in its hole, and at the same time gradually withdrawn, the spider may be made to come very near the surface of the ground, but in no instance did I succeed in coaxing one within sight. While poking at one, a little fellow in a tube about a couple of decimeters off came up to the top of his burrow, evidently to see what all the disturbance was about, and remained crouching, so that the front of his head and his bent legs were just on a level with the ground. When one is removed from its hole it will feign death, but when put at bay it shows a vicious ferocity; raising the whole anterior part of its body, with jaws wide apart and front legs threateningly raised, it will jump at objects thrust near it, and strike them forcibly and repeatedly with its fangs.

As already remarked, I kept several of these spiders for a time. One of them was a female I had dug out of her hole at Coatue, with about twenty young on her back; these mostly adhered to her abdomen, but at times ran all over her, even upon the smooth surface of her denuded cephalothorax. Occasionally they would leave the mother, wander about and then return; jarring the vessel in which they were kept did not disturb them, whether on or off their mother's back, nor could I induce them by any device to return to their mother before they chose. It is plain that they leave the mother early and immediately make burrows for themselves, for I found living in minute tubes spiders no larger than those still remaining upon their mother's back. I did not measure these young spiders, but they could not have exceeded two millimetres in length, and evidently were at most but a few weeks old.

Most of my experiments in feeding were made with this mother; she would capture and eat an unlimited number of flies. They were always caught by a rapid movement of the the first (and occasionally the second) pair of legs and of the palpi, sweeping the victim in toward her cheliceres; once between these, there was no escape; they were squeezed until the juices could be seen to exude, were turned over and over, squeezed again, and finally dropped. To see what the creature would do if an insect came in her way while she was feeding, I put other flies into the enclosure, after she had been sucking one for twenty minutes. In an instant she was on the alert, raising herself partially upon her legs and placing the front pair and palpi in position; at the first opportunity another fly was seized and stowed away beside the first; a third and fourth were shortly added and the whole horrid mass rolled over and over for fresh squeezes for an hour or more. When these were dropped I offered her some more, and although her appetite must have been appeased, she seized them with the same avidity, attacking them much as if she were possessed of some venomous spite against them, all astir if she missed one, and never tiring of fresh prey. Again she enfolded four carcasses in her capacious jaws, but the attempt at a fifth caused her to drop one, which she did not seek to regain. She squeezed them only a short time (proving that she was not very hungry), then dropped them, and the young ones ran down their mother's legs, and after foraging for a while found them; whether they were attracted by the odor of food, or some signal was given by the mother, I cannot say, but they had been remaining quiet, almost immovable, upon her back for nearly twenty-four hours, and only now left her protection. After this they roamed and returned at will and without concert, and once I saw the mother with a freshly caught fly in the grasp of her deadly cheliceres, while one of the little ones was seated upon the lower end of the fly sharing in the meal.

After eating, the spider cleans its jaws by thrusting the tips of the palpi between the tips and the apical claws of the cheliceres, parting the cheliceres at the same time; and then closing all, draws them out again to repeat the process indefinitely.

The specimens found by me in September, are of four sizes — the full-grown, the medium sized, the small ones and those just hatched. The sizes of the holes correspond. The difference however between the two larger sizes is not great, nor is that between the two smaller, and in either case they run together to a certain extent; it seems probable therefore that the spider is double-brooded and hibernates quite young and when nearly mature.

This spider has been referred to the genus Lycosa, though it differs from it in the greater length of the lowest row of eyes, resembling in this respect a Pirata. The species of the latter group, however, have very different habits, being found by the borders of ponds and running over the surface of the water.

A description of the species, which appears to be new, is appended.

Lycosa arenicola nov. sp. Cephalothorax high and squarely appressed in front, pretty strongly compressed anteriorly, though convex on the sides, being three quarters as high as broad; posterior half expanded and depressed, sloping from the centre regularly and rapidly in every direction except in front, and leaving the hind border regularly rounded; the whole blackish castaneous, castaneous in a longitudinal median band, which is broad on the anterior and narrow on the posterior half, smooth, and covered, but not profusely, with short, delicate, silky, recumbent, gray hairs, mingled with coarser and fulvous hairs on the very face and around the eyes; the anterior half, and especially the crown, with long, black, curving, slender, erect bristles, directed forward and rather sparsely scattered over the surface, least abundant and shortest on the lower half of the sides. Sternum nigro-castaneous with long, distant, erect, black, bristly hairs. Lowest series of eyes of equal length with the middle series, the middle eyes of the lowest series slightly larger than the outer ones, not more than half the diameter of those of the middle or upper series; eyes of lowest series midway between the lower margin of the cephalothorax and the middle series, and twice as far from the former as their own width; whole ocellar field of about equal breadth and height. Mandibles black, the inner surface and inner border of front surface covered scantily with long black hairs, the rest of the front and outer surface with short fulvous, mixed with a few long black hairs; longer than their common breadth, the extremity with three triangular pointed teeth on either side of the closed fang; the latter pretty strong, nearly half as long as the mandible, black, growing blackish castaneous toward the tip. Legs and palpi luteo-castaneous, the first two pair of legs a little duskier, the whole covered with short recumbent ashen-gray hairs (giving the legs a grayish-brown appearance) and scattered long black hairs, the former supplanted by short blackish-gray hairs on the lower surface and the lower half of the sides of the tibiæ and tarsi of the first two pair of legs, and on the under surface of the tarsi of the last two pair of legs and of the apical half of the palpi; a few black, straight, spinous bristles are scattered over all the femora and tibiæ. Abdomen ashy clay-brown above, with a few scattered black hairs, and a conspicuous black or blackish, irregular median band, extending from near the base to the very tip, sub-continuous in a narrow median stripe, and as a whole made up, on different segments, of transverse subcrescentic spots twice as broad as long, convex forward, with furcate lateral tips; the broadest of these, from one third to one fourth the width of the abdomen, occurs just in advance of the middle of the abdomen, and there is but one large crescent in front of and distant from this, but midway between them is a transverse crescentic line; on the posterior half of the abdomen, the median line is sometimes obliterated, and the contiguous crescents, becoming united at their tips, enclose paler spots. Beneath, the abdomen is nigro-fuscous, and on the sides bears a very broad, obliquely-curving blackish band, extending from the middle of the sides at the base to the vulva, becoming faint and narrow toward the latter. [Description from about a dozen females.]

Measurements of a large specimen. Length 22 mm.; of cephalothorax 10 mm.; breadth of same in front 5 mm.; of same behind 6.5 mm.; height of cephalothorax 3.5 mm.; length of abdomen 12.8 mm.; breadth and height of same 8.2 mm.; length of mandibles 4.75 mm.; of claw 2.2 mm.; of palpi 10.5 mm.; of first pair of legs 25 mm.; of second pair 23.5 mm.; of third pair 21.5 mm.; of fourth pair 28 mm.

The young on the parent's back differ from the adult in having a broader dorsal stripe upon the abdomen, giving them the appearance of being dark above, with silvery sides; they are about as long as the last joint of the third pair of legs.

The egg cocoon is an irregularly spherical mass, 8 mm. in average diameter, of a pale bluish gray color, smooth in some parts, rough in others; it is attached by a thick silken cord to the abdomen of the mother, being grasped by the hinder pair of mammillæ. *Samuel H. Scudder.*

BIBLIOGRAPHICAL RECORD.

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

(*Continued from Vol. I, page* 216.)

The **Proceedings of the American Academy of Arts and Sciences,** vols. ix and xi (ser. 2, vols. i and iii) contain nothing entomological; vol. x (ser. 2, vol. ii) contains No. 716.

* 716. S. H. Scudder. Historical Sketch of the Generic Names proposed for Butterflies: a Contribution to Systematic Nomenclature. p. 91–293. [April, 1875.]

Decision, founded upon historical evidence and given canons of systematic nomenclature, concerning the validity of each name proposed for a genus of butterflies and the species to be considered as typical of each genus; discussion of some principles of nomenclature; attempt to fix the dates of Hübner's different works and of Doubleday and Westwood's Genera of Diurnal Lepidoptera. Discusses about 1104 names; Acentrocneme (Feld.) and Lethites appear for the first time as generic names.

The **Proc. Bost. Soc. Nat. Hist.** [See Rec., Nos. 173–182], vol. xvii, from p. 257, contain Nos. 717 to 728.

* 717. S. H. Scudder. Notes on Orthoptera from Northern Peru, collected by Prof. James Orton. p. 257–282. [March, 1875.]

Enumerates 46 species, including two not from Peru. Describes *Gryllo-*

talpa maranona = 1 n. sp. Gryllides; Steirodonopes, *S. bilobata, Orophus peruvianus, Phylloptera tripunctata*, Anallomes, *A. unipunctata, A. maranona*, Coelophyllum, *C. simplex, Meroncidius transvittatus, Leptotettix tessellata, Conocephalus infuscatus, Orchelimum Ortoni* = 3 gen., 10 n. spp. Locustariae; *Astroma hastata, Mastax nigra, M. Gundlachii* (from Cuba), Hippacris, *H. crassa, Zonocerus? bilineatus, Machaerocera nigromarginata, Prorhachis, P. granulosa*, (Aeolacris), *Elaeochlora Brunneri*, Aplatacris, *A. colorata, Ommatolampis leucoptera, O. aptera, O. nigroguttata, Phaeoparia curtipennis, Acridium (Osmilia) Saussurei*, Euparnops, *E. caeruleum*, Cornops, *C. bivittatum, Coelopterna Stålii, Tettigidea cuspidata* = 6 n. gen., 18 n. spp. Acrydii; *Bacteria nigripes, B. exigua, Phasma radiatum* = 3 n. spp. Phasmida; *Panchlora signifera* = 1 n. sp. Blattariae; *Thermastris Dohrnii*, Neolobophora, *N. bogotensis* (from Bogota) = 1 n. g., 2 n. spp. Forficulariae; in all = 10 n. gen., 35 n. spp.

* 718. P. R. Uhler. List of the Species of Hemiptera and Neuroptera, obtained by Prof. James Orton, in Northern Peru. p. 282–286. [March, 1875.]

Enumerates, with descriptive and geographical notes, 9 species of Heteroptera and describes *Pachycoris discrepans* = 1 n. sp.; 6 species of Homoptera and describes *Carineta socia* = 1 n. sp.; 1 Neuropteron and 1 Pseudo-Neuropteron.

* 719. Charles V. Riley. Description of a new species of Agrotis. p. 286–288. [March, 1875.]

Describes *Agrotis Morrisoniana* n. sp.

* 720. S. H. Scudder. Description of some Labradorian Butterflies. p. 294–314. [March, April, 1875.]

Gives detailed descriptions of *Brenthis Triclaris* (= "*Arg. Lais*"), *B. Chariclea* (= *Arg. Boisduvalii* = "*Arg. Oenone*"), *B. Freija* (compared with *B. Montinus*), *B. polaris, B. Frigga, Agriades Aquilo* (=? *Polyommatus Franklinii*).

* 721. P. S. Sprague. On the Species of Coleoptera described by Mr. J. W. Randall. With Notes by E. P. Austin. p. 373–385. [May, June, 1875.]

Remarks upon the state of entomology in the year 1837, and attempts to identify the species of Coleoptera described by Mr. Randall in the Journal of the Boston Society of Natural History, vol. II, 1838; synonymical list of all the (nominally 84) species.

* 722. S. H. Scudder. A Century of Orthoptera. Decade II. — Locustariae. p. 454–462, fig. 1–5. [July, 1875.]

Describes Stålia, *S. foliata* (fig. 3–5) from Old Calabar, Lirometopum, *L. coronatum* (fig. 1–2) from New Granada, Belocephalus, *B. subapterus* from Florida, *Orchelimum nigripes* from Texas, *Xiphidium strictum* from Texas, *X. antipodum* from New Zealand, *X. meridionale* from Brazil, *X. ictum* from Mexico and Guatemala, *X. gossypii* from Southern United States, *X. nemorale* from Iowa = 3 n. gen., 10 n. spp.

* 723. S. H. Scudder. Spharagemon, — a Genus of Œdipodidæ; with a Revision of the Species. p. 467–471. [July, 1875.]

Describes Spharagemon, *S. Bolli*, *S. balteatum*, *S. cristatum* = 1 n. g., 3 n. spp.; synopsis of the (6) species, with synonymy and references.

* 724. S. H. Scudder. A Century of Orthoptera. Decade III. — Acrydii (Pezotettix, Caloptenus). p. 472–478. [July, 1875.]

Describes *Pezotettix olivacea*, *P. acutipennis*, *Caloptenus ponderosus*, *C. robustus*, *C. devorator*, *C. deletor*, *C. helluo*, *C. glaucipes*, all from Texas; describes *C. fasciatus* and *C. minor* from Nebraska; in all = 10 n. spp.

* 725. S. H. Scudder. Revision of two American genera of Œdipodidæ. p. 478–485. [July, 1875.]

Describes Encoptolophus, *E. parvus* from Texas, *Tragocephala brevipennis* from California, *T. cubensis* from Cuba = 1 n. g., 3 n. spp.; enumerates 3 spp. of Encoptolophus and 4 spp. of Tragocephala, with synopses and synonymy; dimorphism and geographical variations of *T. viridifasciata* = *virginiana* + *infuscata*.

* 726. T. Thorell. Notice of some Spiders from Labra dor. p. 490–504. [July, Aug., 1875.]

Enumerates 10 species identified, with descriptive and geographica notes; describes *Epeira Packardii*, *Linyphia Emertonii*, *Clubiona frigidula* *Gnaphosa brumalis*, *Lycosa furcifera*, *L. fuscula*, *L. labradorensis* = 7 n. spp.

* 727. J. H. Emerton. On the Structure of the Palpal Organs of Male Spiders. p. 505–507, fig. 1–2. [Aug., 1875.]

Notices the contents of some previous writings upon the subject; figures the organs as seen in Mygale and Epeira, and describes these and others.

* 728. S. H. Scudder. A Century of Orthoptera. Decade IV. — Acrydii. p. 510–517. [Aug., 1875.]

Describes *Chloealtis brunnea*, *Amblytropidia subhyalina*, *Gomphocerus virgatus*, Psoloessa, *Ps. texana*, *Ps. ferruginea*, *Ps. maculipennis*, *Arphia simplex*, *A. conspersa*, *A. luteola*, from Texas; describes Phlibostroma, *Ph. pictum* from Nebraska; in all 2 n. g., 10 n. spp.

* 729. The **Proc. Bost. Soc. Nat. Hist.**, vol. xviii, contain the following, and Nos. 730 to 744.

a. Custodian's Report on the Collection of Insects [statement of accessions and of work done] (by A. Hyatt), pp. 6, 12–14, 339. *b. Vanessa cardui* probably indigenous to the American continent (by S. H. Scudder); not found in the Hawaiian Islands and probably not in Tahiti in 1840 (by

Dr. Chas. Pickering), p. 201–202. *c.* The hind wings of cockroaches and earwigs are folded in repose in a very complex manner (by S. H. Scudder), p. 236. *d.* The presence of white ants in New England threatens us with dangers (by H. A. Hagen), p. 242. *e.* *Syritta pipiens* and *Chrysophanus americana* engage in the cross fertilization of the dandelion, upon which flowers *Colias philodice* and *Pieris rapae* are also noticed (by G. Dimmock), p. 401.

* 730. H. A. Hagen. Synopsis of the Odonata of America. p. 20–96. [Aug. — Oct., 1875.]

"A complete list of all species hitherto described or known to me" [the author] (except the subfamily Agrionina), with localities and synonymy. Enumerates "480" (about 258 N. A.) names, about 90 of which apply, however, to species of which no descriptions have ever been published, some of these names being nearly twenty years old, and at least 15 to species never described and not known to the author!

* 731. S. H. Scudder. On Fossil Insects from Cape Breton. p. 113–114. [Oct., 1875.]

Notice of a fossil Odonat larva, possibly that of *Haplophlebium Barnesii*, and of some previously found related fossils.

* 732. H. K. Morrison. Notes on the Noctuidæ. p. 114–126. [Oct., 1875.]

Describes *Dicopis electilis*, *Agrotis digna*, *A. infracta*, *A. manifesta*, *A. oblata*, *A. praefixa*, *Mamestra repentina*, *M. ectypa*, *M. rugosa*, *Segetia mersa*, *Nonagria laeta*, *Heliophila pertracta*, *Caradrina derosa*, *Cucullia luna*, *Chariclea pretiosa*, *Schinia media*, Polenta, *Tarache obatra*, Homophoberia, *H. cristata* = 2 n. gen., 18 n. spp.; describes *Syneda graphica* var. *media* n. var.; re-describes *Agrotis claviformis*, *Caradrina tarda*; *Agrotis gilvipennis* = *A. chardinyi*; *Mamestra rufula* and *M. brassicae* = *M. lubens*; *Anthoecia spraguei* = *A. arcifera*.

* 733. C. R. Osten Sacken. Note on some Diptera from the Island Guadalupe (Pacific Ocean), collected by Mr. E. Palmer. p. 133–134. [Nov., 1875.]

List of 12 species of Diptera [11 determined only as to genus], *Micromus* (*Berotha*) *flavicornis* [found also in the U. S.], and one undetermined species each of Psocus, Aphidae, Psyllidae and Ophion, recorded for future reference.

* 734. C. R. Osten Sacken. On the North American Species of the Genus Syrphus (in the narrowest Sense). p. 135–153. [Nov., 1875.]

Geographical distribution of the genus; detailed comparison of *S. torvus* and *S. rectus*, with the supposition in view that they may be seasonally dimorphic forms of one species, identical with *S. topiarius—vitripennis—ribesii* of Europe [see Rec., No. 683]; analytical table of the 10 species described in the present paper. *S. torvus*, *S. rectus*, *S. contumax*, *S. amalopis* = 4 n. spp. Notes on synonyms or insufficient descriptions of other species; correction of the article cited in Rec., No. 157.

* 735. S. H. SCUDDER. Notice of a small collection of Butterflies made by Mr. Roland Thaxter, on Cape Breton Island. p. 188–190. [Jan., 1876.]

List of the (14) species taken, remarks on *Argynnis Cybele*, *Rusticus Scudderii*, *Chrysophanus Epixanthe*, *Eurymus Philodice*, *Limochores Taumas*.

* 736. B. P. MANN. Monstrosities in Anisopteryx vernata [and pometaria]. p. 201. [Feb., 1876.]

Describes a female of *A. pometaria* as having partially developed wings and pectinated antennæ. [See Rec., No. 7.]

* 737. H. K. MORRISON. Descriptions of New North American Noctuidæ. p. 237–241. [April, May, 1876.]

Describes *Agrotis perpolita*, *A. Fauna*, *A. Olivia*, *A. comosa*, *A. hero*, *A. personata*, *A. orthogonia*, *Segetia proxima*, Homoglaea, *H. hircina*, *Taeniocampa revicta*, *Homoptera penna* = 1 n. g., 11 n. spp.

* 738. S. H. SCUDDER. A Century of Orthoptera. Decade V. — Forficulariæ (Exotic). p. 251–257. [May, 1876.]

Describes *Cylindrogaster nigra* from Para, *Labidura auditor* from Natal, *Chelisoches comprimens* from Africa, *Ancistrogaster arthritica* from Brazil, *Forficula variana* from Liberia, *F. vellicans*, *F. luteipes*, *F. variicornis*, *F. hirsuta*, *Labia arcuata* from Brazil = 10 n. spp.; proposes the generic name Chelisoches in place of Lobophora preoccupied.

* 739. S. H. SCUDDER. A Century of Orthoptera. Decade VI. — Forficulariæ (N. American). p. 257–264. [May, 1876.]

Describes *Neolobophora volsella* from Mexico, *Thermastris chontalia* from Nicaragua, *Spongophora forfex* from ?, *Ancistrogaster gulosa*, *Forficula vara*, *F. tolteca* from Mexico, *F. exilis* from Texas, *F. aculeata* from U. S. and Cuba ?, *Labia rotundata* from Mexico, *L. brunnea* from Cuba = 10 n. spp.; amends the description of genus Neolobophora.

* 740. S. H. SCUDDER. Description of Three Species of Labia from the Southern United States. p. 265–268. [May, 1876.]

Describes *Labia guttata* from Texas, *L. Burgessii* from Florida, *L. melancholica* from Texas = 3 n. spp.

* 741. S. H. SCUDDER. Orthoptera from the Island of Guadalupe. p. 268–271. [May, 1876.]

Describes *Gryllus insularis*, *Acridium vagum* (also from California), *Trimerotropis vinculata* (also from California and Mexico), *T. lauta* = 4 n. spp.

* 742. S. H. SCUDDER. Critical and Historical Notes on Forficulariæ; including Descriptions of new Generic Forms and

an Alphabetical Synonymic List of the Described Species. p. 287–332. [July—Oct., 1876.]

Explanation and tabulation of the synonymy of the group; examination of all the generic names previously proposed for members of the family, to determine their validity and proper use. Treats of 36 generic names; establishes Anechura, Carcinophora, Labidophora (in place of Platylabia excluded), Typhlolabia = 4 new genera. Enumerates 251 species, with synonymy and localities.

* 743. S. H. Scudder. On the Carboniferous Insects of Europe and America. p. 358–359. [Dec., 1876.]

The insect faunas of Europe and America were as intimately related in Carboniferous times as now.

* 744. A. R. Grote. Notes on Noctuæ from Florida. p. 414–417. [Jan., Feb., 1877.]

Describes *Perigea Icole*, *Heliophila pilipalpis*, *Lygranthoecia scissa*, *Phurys glans* = 4. n. spp.; enumerates 13 spp. collected in Florida by R. Thaxter, *Eriopus granitosa* and *Ophideres materna* being new to this country; notes on the habits of Ophideres.

* 745. **S. H. Scudder.** Entomological Notes. III. From the Proceedings of the Boston Society of Natural History. 8vo. pg. 34, with one plate containing 17 groups of figures. [June, 1875.]

a. Description of the Larva and Chrysalis of Papilio Eurymedon Boisd., of California. p. 1–2.

[From vol. xiii, p. 221–222 (April, 1870), where the species described is said to be *P. Rutulus*, but is referred to in the index, p. 434, as *P. Eurymedon.* (See Errata, p. 428.)]

b. On the Synonymy of Thecla calanus. p. 3–7.

[From vol. xiii, p. 272–276 (Aug., 1870).] Describes *Th. calanus* and *Th. Edwardsii* n. sp., with synonymic notes.

c. On Asymmetry in the Appendages of Hexapod Insects, especially as illustrated in the Lepidopterous Genus Nisoniades. (with Edward Burgess.) p. 7–31, plate.

[From vol. xiii, p. 282–306, plate (Aug., Nov., 1870).] Mentions cases of asymmetry in several classes of animals; describes the kind of asymmetry found in the abdominal clasps of males of Nisoniades. Characterizes by these appendages, which are figured, 16 (*N. Lucilius* Lintn., *N. Icelus* Lintn., *N. Terentius*, *N. funeralis*, *N. Ovidius*, *N. Ennius*, *N. Propertius*, *N. Tibullus*, *N. Horatius*, *N. Virgilius*, *N. Plautus* = 11 new) species of Nisoniades; figures the appendages of *Phora microcephala?*; synonymical notes.

d. [Same as Rec., No. 4. (Jan., 1874.)] p. 32–33.

e. [Same as Rec., No. 8. (March, 1874.)] p. 33–34.

* 746. **S. H. Scudder.** Entomological Notes IV Reprinted from the Proceedings of the Boston Society of Natural History, Vol. XVII, 1874–5. Boston 1875 8vo. pg. 91, fig. 1–5. [Aug., 1875.]

Title, p. 1. Reprint of the articles cited in this Record, Nos. 179, 181, 717, 720, 722, 723, 724, 725, 728, occupying, respectively, pp. 2–7, 7–10, 11–36, 37–57, 57–65 (with fig. 1–5), 66–70, 71–77, 77–84, 84–91.

* 747. **S. H. Scudder.** Entomological Notes V Reprinted from the Proceedings of the Boston Society of Natural History Vol. XVIII, 1875–76 Boston 1876 8vo. pg. 72. [Nov., 1876.]

Title, p. 1. Reprint of the articles cited in this Record, Nos. 731 ["Remarks on some Remains of Insects occurring in Carboniferous Shale at Cape Breton"], 735, 738, 739, 740, 741, 742, occupying, respectively, pp. 2–3, 3–5, 6–12, 12–19, 20–23, 23–26, 27–72.

* 748.[1] **C. Stål.** Recensio Orthopterorum. — Revue critique des Orthoptères décrits par Linné, De Geer et Thunberg. 1–3. Stockholm, Norstedt. 8vo.

[The enumeration of species is not meant to be complete.]

1. 1873. pg. 4, 20, 154. [Sept., 1874.]

Title; dedication. Introduction; nomenclature resp. laws of priority; difficulties in characterizing systematic groups; nomenclature of veins and areas of wings. Systematization of the family Acridiodea; defines synoptically 11 (5 N. A.) subfamilies, in 8 of which 112 genera are defined synoptically, 8 of which genera include 23 (3 N. A.) subgenera; enumerates 110 (24 N. A.) (51 [15 N. A.] new) genera and subgenera and 267 (38 N. A.) (41 [11 N. A.] new) species. The new genera and the N. A. species are : Ochrophlebia [Phymatidae]; Prionolopha, Oncolopha, *Dictyophorus reticulatus*, Taeniopoda, *T. superba*, *T. picticornis !*, *Rhomalea colorata*, Zoniopoda, Hermistria, *H. pulchripes !*, Coscineuta, *C. virens*, Tetrataenia, Taeniophora, Rhytidochrota, Goniaea, Phaeoparia, Coptacra, Traulia, (Schistocerca [s. g. Acridium]), *A. (S.) americanum*, *A. (S.) pallens*, *A. (S.) columbinum*, (Osmilia [s. g. Acridium]), *A. (O.) flavolineatum*, (Stropis [s. g. Acridium]), Orbillus, Cirphula, Vilerna, (Sphodromerus, Euryphymus [s. g. Calliptenus]), (Tylotropidius, Trigonophymus, Dichroptus, Melanoplus [s. g. Pezotettix]), *P. (M.) femur rubrum*, *P. (M.) Borckii*, Tristria, Stenopola, (Oxyblepta [s. g. Stenopola]), Arnilia, *A. cylindrodes*, Leptysma, *L. marginicollis*, Tropidopola [Acridiidae]; Machaeridia, *Achurum acridodes*, Mermiria, *M. Belfragii !*, Syrbula, *S. Montezuma*, *S. leucocerca !*, Ochrilidia, *Truxalis brevicornis*, *T. angusticornis !*, (Orphula [s. g. Truxalis]), Amblytropidia, Scyllina, *S. viatoria*, Primnia [Truxalidae]; *Tragocephala viridifasciata*, *T. sordida*, *T. costalis*, Arphia, *A. sulphurea*,

[1] Record revised by Mr. S. H. Scudder.

A. sanguinaria!, Camnula, *C. tricarinata*, *Hippiscus discoideus*, Psophus, Pycnodictya, Cosmorhyssa, Prionidia, Heteropternis, *Oedipoda carolina*, *O. Belfragii!*, *O. punctata!*, *O. venusta*, *O. trifasciata*, Trilophidia, Psinidia, *Ps. fenestralis*, *Ps. capito!*, *Ps. fuscifrons!*, Trimerotropis, *T. maritima* [Oedipodidae]; Pompholyx [Pneumoridae]; *Hymenotes compressus* [Tettigidae].

2. 1874. pg. 4, 8, 121. [Jan., 1875.]

Title; dedication. Interlocking of characters in Locustina; defects of the dichotomo-synoptic method of systematization; need of the formation of small genera; difficulties in the description of species. Systematization of the family Locustina; defines synoptically 5 (3 N. A.) subfamilies, in 4 of which 105 genera are defined synoptically; enumerates 93 (16 N. A.) (31 [6 N. A.] new) genera and 150 (22 N. A.) (28 [6 N. A.] new) species. The new genera and the N. A. species are: Dinarchus, Arantia, Ducetia, Elimaea, Caedicia, Polichne, Aphidna, *A. alipes*, *Hormilia tolteca*, *Scudderia curvicauda*, Theudoria, Turpilia, *T. punctata!*, Phrixa, *Ph. nasuta!*, *Amblycorypha oblongifolia*, *Microcentrum laurifolium*, *Philophyllia guttulata*, Peucestes, *P. dentatus*, *P. coronatus!*, Posidippus, Frontinus, Aegimia, *A. cultrifera!* [Phyllophoridae]; Mustius, Cleandrus, Cratylus, Onomarchus, Sathrophyllia, Tarphe, Termera, Tanusia, Parysatis, Tetragonomera, Pleminia, *P. repanda!*, *Meroncidius atrispinus!*, *Liparoscelis pallidispina*, *L. nigrispina*, Teleutias, *Cocconotus DeGeeri*, *C. tricornis* [Pseudophyllidae]; Vestria, *Conocephalus ensiger*, *C. triops*, *Xiphidium fasciatum*, *X. cinereum*, *X. agile*, Subria, Teuthras, Thysdrus, Terpandrus [Conocephalidae].

3. 1875. pg. 4, 10, 105. [Nov., 1875.]

Title; dedication. Proposal of a radically new system of Phasmidae; a natural classification must be made, and appreciated, by fineness of systematic tact and instinctive comprehension of natural relations, rather than by dependence upon characters. Systematization of the family Gryllidae; enumerates 8 (2 N. A.) genera and 13 (3 N. A.) species, viz.: *Nemobius fasciatus*, *Oecanthus niveus*, *O. bipunctatus*. Systematization of the family Phasmidae; defines synoptically 100 genera; enumerates 86 (12 N. A.) (54 [6 N. A.] new) genera and 106 (14 N. A.) (45 [7 N. A.] new) species. The new genera and the N. A. species are: Myronides, Phraortes, Carausias, Dixippus, Clitumnus, Hyrtacus, Stheneboea, (Medaura [s. g. Stheneboea]), Candovia, Macella, Gratidia, Entoria, Promachus, Oxyartes, Menexenus, *Phantasis planula*, Lamponius, *L. Guerini*, Caulonia, Libethra, *Diapheromera denticrus!*, Sermyle, *S. mexicana*, *S. Saussurii!*, Dyme, Calynda, *C. bicuspis!*, *Bostra dorsuaria!*, *B. podagrica*, *Clonistria Bartholomaea*, Phanocles, Hirtuleius, Clitarchus, Anchiale, Vetilia, Arphax, Calvisia, Sosibia, Orxines, Candaules, Sadyattes, Hermachus, Asprenas, Neanthes, Canachus, Obrimus, Tisamenus, Pylaemenes, Datames, Dares, Canuleius, Agathemera, Autolyca, *A. pallidicornis!*, Decidia, Stratocles, *S. cinctipes!*, Phocylides, *Phasma Menius*, Prexaspes, Isagoras, Planudes, *Metriotes Diocles*, Damasippus, *D. Westwoodii!*, Leosthenes, Phalces, Macynia, Chitoniscus.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., March-April, 1877. [Nos. 35–36.

Experiments on the Vitality of Insects.

The following experiments are given just as recorded in my note book on the spot, and may give a rough idea of the relative vitality of a few insects of different orders.

Polistes pallipes St. Fargeau. A male was beheaded at four in the afternoon. He was as lively as ever, with the peculiar motions of the species, at eight in the evening of the same day.

From another male I removed the abdomen at four in the afternoon. Five different times within five minutes after the operation he lapped moistened sugar, as if nothing had happened. After taking food he cleaned his legs with his maxillæ several times. In twenty minutes he was again fed; a drop of dissolved sugar being placed near, but not touching his mouth-parts; he protruded his labium at once, and lapped the sugar vigorously, in the usual manner. In forty minutes he fed again, and in three hours and a half after the operation he fed eagerly again and again, seeming to relish his food as much as if not mutilated. At half past nine in the evening, or five and a half hours after the loss of his abdomen, he was evidently dying; the mandibles were set together, he lay on his back, and the tarsi were twitching convulsively, while a female Polistes which was beheaded at four in the afternoon of the previous day was as lively as ever. One would have supposed that the male without abdomen would have outlived the decapitated female.

The female referred to was beheaded at four in the afternoon of the day previous, and was living twenty-four hours afterwards, being lively, standing on her legs and opening and shutting her wings. At nine in the evening, or twenty-eight hours after decapitation, she had fallen on her side, with the wings feebly opening and shutting. At ten o'clock the next morning, or forty-one hours after decapitation, she was still alive, moving her legs, and thrusting out her sting when touched.

Pelopoeus coeruleus (Linn.). A female which had been de-antennized was soon after beheaded (at twenty minutes past two in the afternoon). She continued to sting vigorously, and buzzed as if in pain. At half past nine in the evening she was still alive, opening and shutting her wings, but was less lively than was a female *Polistes pallipes*, beheaded at the same time. The Pelopoeus died the next morning.

Ichneumon otiosus Say, or an allied species. On decapitation it remained very lively, cleaned its wings and legs, the power of co-ordination in its wings and legs remaining. It did not walk, since the eyes and antennæ had been removed. The next morning it was partially benumbed by the cold, but became more lively upon being warmed by the sun. It died at about six in the afternoon, having lived from twenty-five to twenty-seven hours. Another species of Ichneumon lived from twenty-four to thirty-six hours after decapitation.

Musca domestica Linn. A female beheaded at eight in the evening flew about in a tumbler and finally out of it, being very lively. She was alive and vigorous at seven o'clock the next morning, cleaning her fore-legs, but not flying when touched. She was lively and flying about at half past nine in the evening, but died about eight o'clock the next morning.

The abdomen was removed from another female at eight in the evening. She flew about within the glass in a lively and natural way, rubbing her face with her fore-legs for half an hour after the operation, and seemed much more lively than her headless sister, who remained still at the bottom of the tumbler. She was lively at ten in the evening, but was found dead at seven o'clock the next morning.

Agrotis subgothica Haw. One was beheaded at forty minutes past nine in the evening. It was lively at the night of the fourth day, flying about when disturbed, but at seven in the morning of the fifth day it was found nearly dead, slight movements of the feet and abdomen being perceptible.

Harpalus caliginosus (Fabr.), beheaded at eleven and a half o'clock in the morning was alive at half past nine in the evening. It lived from fifteen to twenty hours.

Clytus robiniae Forster. After being beheaded it lived twenty-four hours.

Hylobius pales Herbst. After being beheaded it lived nearly three days.

Leptinotarsa decemlineata Say. On decapitation it lived two and a half days. *A. S. Packard, Jr.*

The Effect of a Few Common Gases on Arthropods.

Carbonic Dioxide, CO_2. This gas acted differently upon the several individuals, even of the same species. Coleoptera generally grew weak gradually, and became motionless in from eight to sixty seconds. Oniscus required a much longer time. Such insects as recovered did so slowly, appearing as if intoxicated and stiff in the joints. The following table will give an idea of the comparative time required for the stupefaction and recovery of a number of species of Coleoptera.

Species.	*Motionless in*	*Remained in Gas*	*Recovered at end of*
Platynus atratus	15 s.	1 m.	5 m.
Pterostichus caudicalis	6 s.	2 m.	10 m.
Staphylinus maculosus	20 s.	1 m.	2 m. 30 s.
Conosoma basalis	20 s.	1 m.	2 m. 35 s.
"	20 s.	1 m.	3 m. 35 s.
"	20 s.	1 m.	4 m. 20 s.
"	20 s.	1 m.	4 m. 50 s.
"	20 s.	1 m.	6 m. 20 s.
"	20 s.	5 m.	11 m.
"	20 s.	5 m.	12 m.

Specimens of Oniscus, as may be seen by the following tabular statement, behaved very differently in this gas, nor could I discover any difference due to the adult or immature condition of the specimens. They were seized at first with twitchings of the limbs, then rolled up in their customary way, sometimes unrolled and rolled up again, finally became motionless, and if not left too long in the gas recovered with a similar but inverted order of symptoms. The annexed table will best illustrate this.

No.	*Twitchings began at end of*	*Motionless at end of*	*Remained in Gas*	*Began to move again at end of*	*Crawled off at end of*
1 young	1 m.	5 m.	10 m.	22 m.	50 m.
2 adult	1 m. 30 s.	4 m.	5 m.	20 m.	25 m.
3 young	5 m.	8 m.	10 m.	25 m.	40 m.
4 adult	5 m. 15 s.	50 m.	20 m.	died	——
5 "	42 s.	8 m.	30 m.	"	——
6 "	1 m. 15 s.	20 m.	30 m.	"	——
7 "	1 m.	9 m.	30 m.	"	——
8 "	1 m. 15 s.	25 m.	30 m.	"	——
9 "	1 m. 15 s.	13 m.	30 m.	"	——
10 "	45 s.	4 m.	5 m.	45 m.	55 m.

Carbonic Dioxide, CO_2, and Oxygen, O_2. In a mixture of seventy-five parts by volume of carbonic dioxide and twenty-five parts of oxygen, a specimen of *Anisodactylus lecontei* Chd. was rendered motionless in thirty seconds, remained in the mixture three minutes, and recovered fully at the end of three and three quarters minutes. In a mixture of sixty-six parts of carbonic dioxide and thirty-four parts of oxygen, the following results were obtained.

Species.	*Motionless in*	*Remained in Gas*	*Fully recovered at end of*
Pterostichus caudicalis	1 m.	5 m.	7 m.
Elaterid larva	20 m.	35 m.	37 m.
Zygogramma elegans	1 m. 15 s.	5 m.	6 m. 15 s.

Specimens of Oniscus treated with the latter mixture continued to move much longer than was usual with the same species when treated with pure carbonic dioxide, as the following table will show.

No.	*Began twitching*	*Motionless in*	*Remained in Gas*	*Began to move again at end of*	*Crawled off at end of*
1	1 m. 15 s.	25 m.	50 m.	died	——
2	2 m.	35 m.	50 m.	"	——
3	1 m. 45 s.	50 m.	50 m.	1 h. 30 m.	3 h. 10 m.
4	1 m. 45 s.	20 m.	50 m.	1 h. 20 m.	2 h. 50 m.
5	2 m.	kept twitching	50 m.	——	80 m.

Carbonic Monoxide, CO. This gas, so poisonous to man, was tried on a few species of insects with the following results.

Species.	*Motionless in*	*Remained in Gas*	*Moving again in*	*Flying or Crawling at end of*
Harpalus pensylvanicus	20 s.	10 m.	11 m.	18 m.
" "	15 s.	1 m.	1 m. 30 s.	3 m.
Pieris rapae	8 s.	1 m.	1 m. 30 s.	2 m.
" "	18 s.	5 m.	5 m. 10 s.	5 m. 45 s.
" "	1 m.	10 m.	10 m. 10 s.	14 m. 30 s.
" "	25 s.	30 m.	35 m.	38 m.

I omitted, unfortunately, to note the sex of the *Pieris rapae* used, and sex may have considerable to do with the very different time required to prostrate the first two and the last two specimens. They all rubbed their probosces about their legs while recovering, and several of the species which were immersed in carbonic monoxide exhibited a slight tendency toward paralysis of the posterior limbs during recovery.

Hydrogen, H_2. *Pieris rapae* was rendered motionless by immersion in the gas in thirty seconds. It was taken out at the end of five minutes, and began to move at the end of eight minutes. At the end of ten minutes it was flying in a weak manner. *Harpalus caliginosus* was rendered motionless in forty seconds, was removed in five minutes, moved its feet and antennæ at the end of six minutes, acted as if very weak for ten or twelve minutes more, but crawled off, apparently as well as ever, at the end of that time.

In a mixture of eighty parts of hydrogen and twenty parts of oxygen, and in a mixture of fifty parts of hydrogen and fifty parts of oxygen, *Pieris rapae* showed no signs of weakness at the end of thirty minutes.

Oxygen, O_2. *Silpha noveboracensis* Forst. (*S. marginalis* Fab.) became slightly more active upon being placed in oxygen. The sexes copulated, and did not seem to be disturbed by the change of atmosphere. *Staphylinus maculosus* remained in oxygen three days without any apparent change in health or habits.

A spider placed in oxygen began to show signs of weakness in about forty minutes, and at the end of an hour was so weak as to be scarcely able to turn over when placed on its back. Upon removal to the air it soon recovered.

Nitric Oxide, NO. *Carabus serratus* became unable to crawl the moment it was put in this gas, and in about ten seconds was perfectly motionless. It never recovered, although removed at the end of fifteen seconds. Oniscus never survived an immersion of forty to sixty seconds in this gas. All insects killed by nitric oxide became rigid, while the joints of those killed by carbonic dioxide were not stiffened.

It is quite evident from the preceding experiments that carbonic dioxide, alone or mixed with air, is poisonous to insects. Carbonic monoxide mixed with air was not tested, but probably is not poisonous, acting only by suffocation. This is the more likely on account of the similarity of its effects to those produced by hydrogen, which is not poisonous, as is shown by insects living in a mixture in which it was substituted for the nitrogen of the air. Again it is probable that carbonic monoxide, which poisons vertebrates by solidification of the red blood corpuscles and rendering them incapable of performing their work, would have no effect, except that of suffocation, on insects, whose respiration is performed by direct contact of the air with the muscles, without the intervention of blood corpuscles. Oxygen seems only to stimulate insects, although in some cases it may produce death in a short time. Nitric oxide evidently acts as a quick poison, from the action of which insects do not recover. *Geo. Dimmock.*

Proceedings of the Club.

§ 13. Appendages homologous with Legs. When exhibiting a specimen of *Dictyopteryx signata*, which has two pairs of gills on the under side of the head, Dr. Hagen said that Pictet figures the head of *Nemura cinerea*, which has two pairs of gills on the under side of the head and three on the thorax. Dr. Hagen considers the first two to represent or to be the remains of the legs belonging to the rings of the head. He said further, in connection with Dr. Packard's remarks, given below, that the female organs of Odonata are pleural (as are the legs); in Neuroptera and Hemiptera the female parts are homologous with the sting of the bee; the cerci are connected with gills. *(Jan. 9, 1874.)*

Dr. A. S. Packard, Jr., in making a communication, since published by him in the American Naturalist, vol. viii [see Psyche, vol. i, Rec., No. 266], said he had shown that the spring of Isotoma is a pair of abdominal legs, homologous with the bee's sting. As hexapod insects thus have (morphologically) abdominal feet, they are not to be separated from the spiders. *(Jan. 9, 1874.)*

§ 14. Mimicry. Referring to the distinction between the epidermic and hypodermic colors of insects, which he had pointed out in the American Naturalist, vol. vi, p. 388–393, Dr. Hagen said that all colors which are concerned in mimicry are hypodermic, these being the only colors which are under the control of the insect. The markings upon the elytra of Cicindela are hypodermic. *(Mar. 13, 1874.)*

§ 15. Tachina parasitic on Phasmidae. Mr. C. R. Osten Sacken mentioned that Mr. H. L. Moody had raised two specimens of a Tachina from *Diapheromera femorata*, in the abdomen of which they were parasitic, and said that Liebow had found four or five larvæ in the abdomen of *Bacillus Rossii.* *(April 9, 1875.)*

§ 16. Is Aletia argillacea winter-killed every year? Mr. H. K. Morrison said he did not think it was true that the imago of the Cotton-worm (*Aletia argillacea*) was killed every winter by the cold, and that the loss was made up annually by the immigration of other individuals from South America. Dr. H. A. Hagen joined in expressing his disbelief of this supposition, and said that Mr. Boll had obtained specimens in Texas. *(May 14, 1875.)*

§ 17. Finding of Coleoptera. Mr. E. P. Austin said he had captured specimens of *Clivina elongata* and of *Oxytelus rugosus* at Cambridge commonly lately. *(May 14, 1875.)*

§ 18. Moulting of the Larva of Pleocoma. Mr. C. R. Osten Sacken exhibited a larva of the coleopterous genus Pleocoma, communicated to him by Dr. Leconte. The larva had recently undergone moulting, some portions of the old skin being still adherent about the head. The peculiarity noticed in this connection consisted in the fact that the structure of the mandibles after moulting was very different from that before it. The larva has been described and figured since in the Trans. Amer. Entom. Soc., Vol. v [see Rec., No. 324].

§ 19. PROTRUSILE ABDOMINAL APPENDAGES OF MOTHS. MR. B. P. MANN read extracts from a letter of Fritz Müller to Chas. Darwin, published in NATURE, vol. x, No. 241, p. 102 (June 11, 1874), respecting the presence and character of abdominal appendages in several Glaucopid moths, similar to those described by Mr. H. K. Morrison in PSYCHE, vol. i, p. 21–22, as found in the male *Leucarctia acraea.* *(Febr. 12, 1875.)*

MR. H. K. MORRISON showed a specimen of *Chamyris cerintha*, which has an appendage, whose use is problematical, at the base of the abdomen beneath. *(April 9, 1875.)*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 16.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. PICKMAN MANN.

The **Bihang till Kongl. Svenska Vetenskaps-Akademiens Handlingar,** Band 2, contains Nos. 749 and 750.

* 749. C. STÅL. Recherches sur le système des Blattaires. No. 13. pg. 18. [April, 1874.]

Attempt to make a more natural limitation and a more solid characterization of the tribes and genera in Brunner's system of Blattariae; discussion of the characters used. Describes synoptically four and indicates other "tribes" [with family names]; describes synoptically 36 (Liosilpha, Cyrtilia, Molytria, Melanozosteria, Zonioploca, Cosmozosteria, Eurycotis, Homalosilpha, Phoetalia, Byrsotria, Blaptica = 11 new) and mentions other genera.

* 750. C. STÅL. Recherches sur le système des Phasmides. No. 17. pg. 19. [March, 1875.]

A rational system of Phasmidae has been lacking hitherto; an entirely new grouping, supposed to be natural, is proposed here. Describes synoptically 37 (Clonaria, Echetlus, Bostra, Clonistria, Phryganistria, Arrhidaeus, Hoploclonia, Acanthoclonia, Orobia, Donusa = 10 new) genera. Describes *Clonistria Bartholomaea* from St. Bartholomew Island, West Indies = 1 N. A. n. sp.

The **Bih. K. Svensk. Vet.-Akad. Handl.**, Band 3, Nos. 1–6, contains nothing on N. A. insects; No. 14, consists of No. 751.

* 751. C. Stål. Observations Orthoptérologiques. pg. 43. [1875.]

1. Sur une systématisation nouvelle des Phasmides. p. 3–21.

Gives in an abridged form the principal features of his system of Phasmidae [see Rec., No. 748: 3]; remarks upon the artificiality of previous systems.

2. Sur le système des Acridiides. p. 21–24.

Mentions the most important modifications which are to be made in the system of Acridiidae proposed in his "Recensio Orthopterorum" [see Rec., No. 748: 1]; Acridiidae cannot be classified by the length of their antennæ or of the antennal joints. List of genera which have an apical spine on each margin of the upper side of the posterior tibiæ, and of those which have this spine only on the outer margin.

3. Diagnoses d'Orthoptères nouveaux. p. 24–43.

Describes Rubellia, Gyrtone, Charilaus [Phymatidae]; Munatia, Euthymia, Gergis, Hysia, Cratippus, *Pezotettix nigrovittatus* from Mexico [Acridiidae]; Lilaea, Methone [Thrinchidae]; Thericles, Erucius [Mastacidae]; Erianthus [Choroetypidae]; Diophanes, Diyllus [Pseudophyllidae]; Eppia [Decticidae] = 16 n. gen., 1 N. A. n. sp.; describes 40 n. spp. Distinguishes synoptically Scopiorus, Cyrtophyllus and Diophanes from the other genera of Pseudophyllidae.

The **Bih. K. Svensk. Vet.-Akad. Handl.**, Band 4, No. 5, consists of No. 752.

* 752. C. Stål. Observations Orthoptérologiques. 2. pg. 58. [1876.]

a. Les Genres des Acridiodées de la Faune Européenne. p. 3–35.

Criticism of previous systems; importance of the systematic characters taken from the form, position and direction of the temples; explanation of these characters; synopsis of the (9) subfamilies and (35) European genera of Acridiodea. Describes Duronia (n. subg. Phlaeoba), Egnatius (n. g Truxalidae), and several (about 11 new) species.

b. Aperçu des Genres des Acridiodées de l' Amerique du Nord. p. 36–47.

Synopsis of 31 N. A. genera of Acridiodea. Describes Diponthus [Acridiidae], Orphula [Truxalidae] = 2 n. gen. describes several n. spp.

c. Sur Anostostoma et quelques Genres voisins. p. 47–53.

Anostostoma is a genus of Gryllodea, but some of the species which have been referred to it are Locustina; the difference between Locustina and

Gryllodea is expressed principally in the form of the anterior coxæ. Synopsis of 9 genera belonging to 4 subfamilies, related to Anostostoma; describes Mesomedes, Onosandrus = 2 n. gen. Anostostomidae; describes several new spp.

d. Diagnoses d'Orthoptères nouveaux. p. 53–58.

Describes Protomachus [Phymatidae]; Aristia, Mazaea [Acridiidae]; Arethaea [Phyllopteridae]; Psyra, Elbenia, Arnobia, Phygela, Furnia, *Amblycorypha Uhleri*, *A. parvipennis* [Phyllophoridae] = 9 n. gen., 2 Texan n. spp.; describes 8 n. spp.

The **Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar**, Årg. xxx (1873), contains No. 753; Årg. xxxi (1874), contains nothing upon N. A. entomology.

* 753. C. Stål. Orthoptera nova. No. 4, p. 39–53. [Jan., 1876.]

Describes Acanthoplus, Trigonocorypha, Stilpnochlora, Philophyllia, Eurycorypha, Plangia, Amblycorypha, Ctenophlebia, Anaulacomera, Plagiopleura, Plagioptera, Scudderia, Pyrrhicia, Hormilia, Burgilis, Holochlora, Mirollia, Terpnistria [Phaneropteridae]; Phyllomimus, Scopiorus, Phyllostachys, Brisilis, Cocconotus, Leptotettix, Bliastes, Ischnomela, Liparoscelis, *L. pallidispina* and *L. nigrispina* from Mexico, Trichotettix, Stenotettix, Moristus [Pseudophyllidae]; Oxyprora, Pyrgocorypha [Conocephalidae] = 32 n. gen., 2 N. A. n. spp. Locustina. Describes Monistria, Zonocerus, Aularches, Taphronota, Maura [Phymatidae]; *Truxalis acrtdodes*, from Mexico [Truxalidae]; Colpolopha, Elaeochlora, Procolpia, Alophonota, Ischinacrida, Oxyrrhepes [Acridiidae]; Coelopterna [Coelopternidae,] = 12 n. gen., 1 N. A. n. sp. Acridiodea.

The **Öfvers. K. Vet.-Akad. Förh.**, Arg. xxxii (1875), contains Nos. 754 to 757.

* 754.[1] Anton Stuxberg. Nya nordamerikanska Lithobier. No. 2, p. 65–72. [Apr., 1876.]

Describes *Lithobius monticola*, *L. pusio*, *L. paradoxus*, *L. obesus*, *L. Kochii*, *L. megaloporus* from California, *L. eucnemis* from New York, *L. Saussurei* from Mexico = 8 n. spp.; gives synonymy of *Lamyctes fulvicornis* from New York.

* 755.[1] A. Stuxberg. Genera et species Lithobioidarum. No. 3, p. 5–22. [Apr., 1876.]

Characterizes 6 (6 N. A.) (Eulithobius, Neolithobius, Pseudolithobius, Hemilithobius, Archilithobius = 5 new) subgenera of Lithobius, with reference to their relative rank and order of differentiation in time. Enumerates 109 (23 N. A.) spp. Lithobius, formed into 12 groups, 3 spp. Henicops, 2 (1 N. A.) spp. Lamyctes, in a table which shows the distribution of the species amongst 30 divisions of the earth's surface; another

[1] Record made with the assistance of Mr. William Holden.

table gives the percentage of species occurring in each of these divisions. Gives synonymy of 6 (3 N. A.) spp., and a list of 26 writings cited.

* 756.[1] A. Stuxberg. Lithobioidæ Americæ Borealis. Öfversigt af Nord-Amerikas hittills kända Lithobiider. No. 3, p. 23–32. [Apr., 1876.]

Gives a descriptive list of the previous writings upon the subject, and a synonymical list, with habitats, of all the (24) known N. A. species of the family.

* 757. O. M. Reuter. Capsinæ ex America boreali in Museo Holmiensi asservatæ. No. 9, p. 59–92. [Oct., 1876.]

Describes *Miris* (*Lobostethus*) *affinis*, *Trigonotylus pulcher*, Callimiris, *C. Uhleri*, *C. tarsalis*, Trachelomiris, *T. oculatus* [Miraria]; Pallacocoris, *P. suavis* [Miridiaria]; Clivinema, *C. villosa* [Clivinemaria]; Callichila [n? subg. Resthenia), *Resthenia atripennis*, *R. nigricollis*, *R. maculicollis*, Oncerometopus, *O. nigriclavus*, *O. ruber*, Lomatopleura, *L. caesar* [Loparia]; *Phytocoris eximius*, *Ph. breviusculus*, *Ph. tibialis*, *Ph. puella*, *Ph. pallidicornis*, Neurocolpus, Compsocerocoris, *C. annulicornis* [Phytocoraria]; *Lygus Belfragii*, *L. vitticollis*, *L. Carolinae*, *L. prasinus*, *L. fasciatus*, *L. convexicollis*, *Systratiotus americanus*, *Poeciloscytus basalis*, Poecilocapsus (g. & subg.), Metriorrhynchus (subg. Poecilocapsus), *P.* (*M.*) *affinis*, *P.* (*M.*) *marginalis*, Callicapsus, *C. histrio*, Euarmosus, *E. Sayi* [Capsaria]; Sixeonotus, *S. insignis*, Cyrtocapsus [Bryocoraria]; Sericophanes, *S. ocellatus*, Semium, *S. hirtum*, Cyrtopeltocoris, *C. albo-fasciatus*, Trichia, *T. punctulata*, Engytatus, *E. geniculatus*, Hyaliodes, Parthenicus, *P. psalliodes*, Ilnacora (g. & subg.), *I.* (*I.*) *divisa*, Corinala (subg. Ilnacora), *I.* (*C.*) *Stålii*, Ceratocapsus, *C. lutescens*, *C. punctulatus* [Cyllecoraria]; Strongylotes, *S. saliens*, Rhinacloa, *Rh. forticornis*, *Psallus guttulosus*, Episcopus, *E. ornatus*, *Phoenicocoris pubescens*, *Plagiognathus grandis*, *Atomoscelis seriatus*, *Agalliastes suavis* [Plagiognatharia] = 28 n. gen., 50 n. spp. of Cimicidae, subf. Capsina; gives a synopsis of the (21) species of Resthenia known to the author; enumerates 67 species.

The **Annals of the Lyceum of Natural History** [of New York], vol. xi, as far as p. 154, contain Nos. 758 to 760.

* 758. H. K. Morrison. Notes on North American Lepidoptera. p. 91–104. [Feb., 1875.]

Describes *Edema Packardii*. *Acronycta pudorata*, *Agrotis acclivis*, *A. montana*, *Mamestra curta*, *M. promulsa*, *Plusia laticlavia*, *Anarta membrosa*, Eutricopis, *E. nexilis*, *Telesilla vesca*, Eucalyptra, *E. bipuncta* = 2 n. gen., 11 n. spp.; re-describes Edema, *Scopelosoma devia*; notes on *Acronycta brumosa*, *Adita chionanthi*, *Mamestra adjuncta*, *Plusia formosa*, *P. Hochenwarthi*, *P. parilis*, *Calocampa* spp.

[1] Record made with the assistance of Mr. William Holden.

* 759. A. R. Grote. On a New Species of Anarta and on an allied Genus, with a note on the Genus Adita. p. 107–109. [May, 1875.]

Describes *Anarta nivaria*, Agrotiphila = 1 n. g., 1 n. sp.; note on *Agrotiphila montana* and *Adita chionanthi.*

* 760. A. R. Grote. Note on a name in Entomology proposed by the late Coleman Townsend Robinson. p. 128–129. [May, 1875.]

Describes *Siparocera nobilis* n. sp. [Pyralides], type of the (new) genus.

* 761. The **Twenty-Fifth Annual Report on the New York State Museum of Natural History,** by the Regents of the University of the State of New York [for the year 1871], contains the following. [Dated 1873; received Sept., 1874.]

a. Insects added to the Museum, p. 16. *b. Sporendonema muscae* (= *Empusa muscae*) grows spontaneously in the State, commonly, in autumn, causing the death of the flies it attacks, upon the dead bodies of which it is found (by C. H. Peck), p. 89.

* 762. The **Twenty-Sixth Annu. Rep. N. Y. State Mus. Nat. Hist.** [for the year 1872], contains the following, and No. 763. [Dated 1874; received Nov., 1876.]

a. Report of work done upon the entomological collections (by James Hall), pp. 9, 12. *b. Stilbum ramosum* was found growing spontaneously at Sterling, in September, upon dead larvæ of insects buried in rotten wood (by C. H. Peck), p. 78.

* 763. J. A. Lintner. Entomological Contributions —— No. III. p. 117–192, fig. 1–14. [Same as Rec., No. 26.]

I. On the Larva of Eudryas unio Hubn. and allied forms [description, food-plant (*Epilobium coloratum*), comparison with *E. grata*, *Alypia 8-maculata* and *Psychomorpha epimenis*], p. 117–124, fig. 1–5. II. Transformations of some Bombycidae [*Platysamia Cecropia*, *Callosamia Promethea*, *Actias Luna*], p. 125–128. III. Descriptions of the Larvæ of some Bombycidae [*Parorgyia parallela*, *Apatelodes angelica*, *Coelodasys unicornis* (fig. 6), *Platycerura furcilla* (fig. 7), *Dryocampa rubicunda*, *Tolype velleda*; food-plants, transformations], p. 129–134. IV. Descriptions of the Larvæ of some Noctuidae [*Acronycta americana*, *A. morula*, *Ceramica picta*, *Cucullia convexipennis*, *C. asteroides*, *Catocala* sp.; food-plants, transformations], p. 135–141. V. Notes on some New York Bombycidae [*Callimorpha Lecontii*, *Arctia Arge*, *Spilosoma virginica*, *S. latipennis* (re-described), *Euchaetes oregonensis*, *E. collaris*, *Halisidota caryae*, *Orgyia leucostigma*, *Empretia stimulea*, *Phobetron pithecium*, *Lithacodes fasciola*, *Nadata gibbosa* (fig. 8), *Notodonta* sp. (fig. 9, 10), *Edema albifrons*, *Cerura borealis* (fig.

11), *Telea Polyphemus, Actias Luna, Hemileuca Maia, Gastropacha americana, Clisiocampa americana, Ctenucha virginica, Scepsis fulvicollis*; food-plants; descriptions of larvæ, cocoons *et al.*; biographies; inappropriate names; association of larvæ of different species; occasional abundance of usually rare species], p. 142–156. VI. Notes on some New York Noctuidae, etc. [*Diphtera deridens* (fig. 12), *Acronycta americana, A. hastulifera, A. oblinata, Agrotis tricosa* n. sp., *Hadena lignicolor, H. adjuncta, Cucullia florea* (re-described), ? *Chariclea exprimens, Chamyris cerintha, Plusia balluca, P. aeroides, Scoliopteryx libatrix, Catocala parta*; *Mesographe stramentalis*; *Nematocampa filamentaria, Ennomos magnaria, Amphidasys cognataria, Abraxas ribearia*; food-plants; descriptions of larvæ, cocoons *et al.*; biographies; synonymy of *Agrotis subgothica, A. tricosa* and *A. herilis*; notes on the seasons of 1858 and 1859 (comparative abundance of various Lepidoptera)], p. 157–167. VII. Descriptions of new species of Cucullia [*C. Speyeri* (fig. 13, 14), *C. serraticornis*; comparative descriptions of the "orbicular" spot in 11 other species of Cucullia; some synonymy in the genus; list of the 7 N. A. spp.], p. 168–176. VIII. Observation of some New York Rhopalocera for the year 1871 [calendar of 46 spp., until July 7], p. 177–178. IX. Dates of Collection of some New York Heterocera for the year 1872 [calendar of 196 spp. for 1872 and prior], p. 179–184. X. Description of a convenient Insect Case [from the Fifth Annual Report on the Insects of Missouri, 1873] (by J. A. Lintner), p. 185–188, fig. Index, p. 189–192.

* 764. The **Nat. Can.** [see Rec., Nos. 248–254], vol. vii, contains the following, and Nos. 765 to 776.

a. A new silkworm has been found in Turdistan [? Turkistan], p. 32. *b.* Notice of Crotch's Check List [see Rec., No. 43] [objections to the changes in nomenclature proposed in the List (see Rec., No. 433)], p. 61–62; of the Rapport du Ministre de l'Agriculture pour 1874 [see Rec., No. 788], p. 63; of Candèze's Les Moyens d'Attaque et de Défense chez les Insectes [Bruxelles, 8vo. pg. 32], p. 92–93; of the Report of the Entom. Soc. Ontar. for 1874 [see Rec., Nos. 626–638], p. 121; of Grote's Check List of Noctuidae [see Rec., No. 345], p. 378; of Hentz's Spiders of the United States [see Rec., No. 790], p. 378. *c.* Faune Entomologique du Canada [the part already printed (360 pages) delivered to subscribers on demand], p. 94. *d.* Letter to Dr. Migneault [delicacy and originality of form of *Tingis arcuata*], p. 95–96. *d.* Obituary notice of Francis Walker (from Petites Nouvelles Entomologiques), p. 184. *e.* Quelques zéros d'omis [the order Diptera comprises much more than 20,000 to 25,000 species], p. 192. *f.* *Attacus polyphemus* found in St. Maurice Co., Quebec, p. 377–378.

* 765. L. Provancher. Les Ichneumonides de Québec. [Cont. from Rec., No. 249.] pp. 20-26 [Feb., 1875], 48–53 [March], 74–84 [March], 109–121 [May], 138–149 [June], 175–183 [July], 263–274 [Sept.], 309–317 [Nov.], 328–333 [Dec., 1875].

Gives synoptical tables to distinguish 71 species of Ichneumon, 10 Ischnus, 1 Stilpnus, 9 Mesoleptus, 14 Tryphon, 2 Alomya, 5 Exochus, 2 Ctenis-cus of the Quebec fauna; enumerates 114 species; describes *Ichneumon pilosulus*, *I. mellicoxus*, *I. calcaratus*, *I. stadaconensis*, *I. varipes*, *I. vagans*, *I. cinctipes*, *I. signatipes*, *I. bifasciatus*, *I. indistinctus*, *I. aequalis* ["*œqualis*"], *I. placidus*, *I. lobatus*, *I. quebecensis*, *I. lacrymans*, *I. scutellatus*, *I. nitidus*, *I. erythropygus* ["*erythopygus*"], *I. fortis*, *I. hesitans*, *I. marianapolitanensis*, *I. mucronatus*, *I. lineolatus*, *I. caudatus*, *I. humilis*, *I. inflatus*, *I. cervulus*, *I. decoratus*, *Ischnus pyriformis*, *I. lentus*, *I. ruficornis*, *I. placidus*, *I. exilis*, *I. scutellatus*, *I. impressus*, *I. parvus*, *Stilpnus Canadensis*, *Mesoleptus micans*, *M. depressus*, *M. maculosus*, *M. variabilis*, *Tryphon canaliculatus*, *T. humeralis*, *T. canadensis*, *T. laurentianus*, *T. sanguineus*, *T. tardus*, *T. annulatus*, *T. moyeni*, *Alomya pulchra*, *A. abdominalis*, *Cteniscus concolor* = 52 n. spp.

Addenda et Corrigenda to former articles: gives synoptical tables to distinguish (6) species of Polysphincta, (14) Bassus, (17) Limneria, (28) Cryptus, (30) Phygadeuon, (14) Mesostenus, (2) Nematopoda, (18) Mesoleptus, (20) Tryphon, (5) Atractodes, of the Quebec fauna, comprising an addition of 57 species to the list; cites in addition 34 species; describes *Polysphincta rufopectus*, *P. cingulatus*, *Arenetra quebecensis*, *Orthocentrus canadensis*, *Bassus fuscitarsus*, *B. pulchripes*, *Leptobatus canadensis*, *Campoplex luctuosus*, *Limneria excavata*, *L. ruficoxa*, *L. plena*, *L. ruficornis*, *L. pallipes*, *L. basilaris*, *L. sericea*, *L. clavata*, *L. sessilis*, *Cryptus cinctus*, *C. brevicornis*, *C. ruficoxus*, *Phygadeuon maculatus*, *Ph. rectus*, *Ph. insignis*, *Ph. annulatus*, *Ph. ruficornis*, *Ph. 4-carinatus*, *Ph. ovalis*, *Ph. apicatus*, *Ph. rufipes*, *Ph. ornatus*, *Ph. nigrovariegatus*, *Mesostenus rufipes*, *M. pallipes*, *M. nigricornis*, *M. sericeus*, *M. annulatus*, *M. tarsatus*, *M. albicoxus*, *M. ruficoxus*, *M. apicalis*, *Nematopodius canadensis*, *N. coxatus*, *Baryceros rhopalocerus*, *Mesoleptus incompletus*, *M. longipes*, Posocentrus, *P. Huardi*, *Tryphon clypealis*, *T. dufresnei*, *T. excavatus*, *Polysphincta pleuralis*, *Ecthrus caudatus*, *Cryptus caudatus*, *C. occidentalis*, *Phygadeuon mellinus*, *Hemiteles mandibularis*, *Catocentrus dilatatus*, *Mesoleptus erectus*, *Orthocentrus pleuralis*, *Westwoodia fumipennis*, *Podogaster radiolatus*, *Pezomachus quebecensis*, *Plectiscus pleuralis*, *Megastylus politus*, *Phytodietus gracilis*, *Atractodes mellipes*, *A. fusiformis* = 1 n. g., 66 n. spp.; *Ephialtes manifestatus* Linn. (vol. v, p. 449) should read *E. tuberculaus* Fourcroi.

* 766. F. X. Bélanger. Microlépidoptères. p. 46–48. [March, 1875.]

Remarks upon habits of Tineidae; means of protecting woollen stuffs and furs from their ravages; list of the (20) species in the collection of the museum of the Université Laval; 12 species are mentioned by name as new.

* 767. L. Provancher. La Mégachile guenille. p. 58–61. [March, 1875.]

Habits of *Megachile centunculus*.

* 768. L. Provancher. Chasse aux Insectes nuisibles. p. 171–173. [July, 1875.]

Insects are best attacked *unguibus et rostro*; *Caloptenus spretus* is to be attacked directly in Le Sueur Co., Minnesota, in 1875.

* 769. L. Provancher. La Doriphore à 10 lignes ou Chrysomèle de la Pomme de Terre. p. 173–175, fig. 19. [July, 1875.]

Doryphora 10-lineata has reached Toronto, but has not reached Quebec, statements to the contrary notwithstanding; the climate of Quebec may be too rigorous for it; premiums should be offered for its destruction; precautions taken against it in Europe are superfluous.

* 770. L. Provancher. Une Excursion à St. Hyacinthe. pp. 205–219 [Aug., 1875], 232–247 [Sept., 1875].

Annotated list of 31 Hym., 5 Lep., 6 Dip., 20 Col., 4 Hom., 9 Het., 4 Orth., 2 Ps.–Neur., 5 Neur., found at or near St. Hyacinthe, some new to the locality, especially *Ammophila gracilis*, *Attacus luna*, *Doryphora 10-lineata*, *Cicada rimosa*, others new to science [see Rec., No. 771].

* 771. L. Provancher. Description de Plusieurs Insectes nouveaux. p. 247–251. [Sept., 1875.]

Describes *Mantispa Burquei*, *Aeschna Yamaskanensis*, *Xorides canadensis*, *Mesostenus rufipes*, *Ichneumon Clopini*, *Ischnus variegatus*, *Mesoleptus Sancti-Hyacinthi* = 7 n. spp., taken upon the excursion cited in Rec., No. 770.

* 772. L. Provancher. Insecte nommé. p. 288. [Oct., 1875.]

Re-describes *Cicada dorsata*; gives a list of the (8) species in the au thor's collection.

* 773. L. Provancher. Clef Generale aux Ichneumonides de Québec, jusqu'a ce jour connus. p. 333–353. [Dec., 1875.]

Nomenclature of veins and cells of wings; synoptical table to distinguish the (58) genera of the Quebec fauna already known, comprising 386 species, 239 of which have been described as new in vols v–vii of Le Naturaliste Canadien, and 147 of which were previously described; diagnoses of each of the genera are given, with references to the volumes of Nat. Can. in which the species are treated of.

* 774. L. Provancher. Identification des Sujets d'Histoire Naturelle. p. 354–357. [Dec., 1875.]

Sketch of difficulties experienced in identifying described species, owing to the dispersion of the descriptions; recommendation that descriptions should have to be published in certain publications in order to acquire a claim to recognition.

* 775. L. Provancher. Association Américaine pour l'avancement de la science. p. 359–360. [Dec., 1875.]

Notice of meeting of Entom. Club A. A. A. S., at Buffalo, in 1875; locusts as food for man.

* 776. L. Provancher. Les Urocerides de Québec. p. 368–376, fig. 31. [Jan., 1876.]

Characterizes the family; gives a synoptical table to distinguish the (5) genera of the Quebec fauna, which are characterized also; enumerates and describes 13 species, including *Xiphidria canadensis*, Xiphidion, *X. canadensis*, *Phylloecus bicinctus* = 1 n. g., 3 n. spp.

* 777. The **Nat. Can.**, vol. viii, contains the following, and Nos. 778 to 787.

a. Appointment of J. T. Humphreys as State Entomologist of Georgia, p. 94. *b.* Insects cause at least $200,000,000 of damage per annum [where?], p. 95. *c.* Occurrence of *Limacodes pithecium* at Lavaltrie, Berthier Co., Quebec; *Gordius aquaticus* parasitic on Gryllus, p. 339–341.

* 778. L. Provancher. Petite Faune Entomologique du Canada. — Les Orthoptères [corr.], Orthoptera. pp. 13–26, fig. 1–2 [Feb., 1876], 52–62, fig. 3 [Feb.], 72–81, fig. 5–8 [March], 106–116, fig. 11–13 [April], 134–143 [May, 1876].

Characters and peculiarities of the order and families of Orthoptera; about 6500 species are known, of which about 118 are North American; distinguishes synoptically 6 families, 18 genera, 37 species; describes the species; *Caloptenus sanguinolentus*, *C. parvus*, *Acridium rugosum*, *Chloëaltis canadensis* = 4 n. spp. Describes the stridulating organs of Gryllus; *Gordius aquaticus* parasitic on Gryllus; use of Acrididae as food.

* 779. L. Provancher. Fréquence et Disparition des Insectes. p. 30–32. [Feb., 1876.]

Fertility of insects; natural limitations to their increase; periodicity of their appearance. List of insects particularly abundant in 1875 at Cap Rouge: *Chrysomela elegans* on *Bidens cernua* and Dahlia; *Entilia sinuata* on Dahlia; *Eysarchoris carnifex* and *Epicauta cinerea* on Leguminosae; *Pentatoma juniperi* on Sonchus ["laitron"]; and 6 others.

* 780. L. Provancher. Étude de l'Histoire Naturelle. Lecture faite à l' Institut Canadien de Québec, le 13 Janvier 1876. p. 33–52. [Feb., 1876.]

Enumeration of (French) vulgar names given to insects; economic importance of insects. [For correction: few of the United States employ a salaried entomologist; Dr. Fitch's labors were estimated at $50,000 per annum. *B. P. M.*]

Nos. 33–34 were issued June 8, 1877.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., May–June, 1877. [Nos. 37–38.

Cocoon-making and Egg-laying of Spiders.

In the afternoon of May 26, I found, on the under side of a stone, a female *Herpyllus ater* at work on a nearly finished cocoon. She was so attentive to her work that she merely stopped while the stone was rolling over, and then went on as before. The spider had been enclosed in a bag of silk large enough for her to move about in easily, and the cocoon was in the upper part against the stone. A circular portion of the bag attached to the stone had been thickened by the spider, and this circular patch formed one half of the cocoon. The eggs, about forty in number, were beneath the centre of this circle and supported by threads passing under them from one point in its rim to another. When discovered the spider was completing the lower half of the cocoon by threads crossing in all directions under the eggs and attached to those first spun from the rim of the cocoon.

The finished cocoon of *H. ater*, although the spider remains clinging to it, shows no trace of a thin bag like the one described above. I found that the portions adhering to this unfinished cocoon had nearly disappeared by drying before I reached home, so that, from this cause and by the motion of the spider about the cocoon, the whole bag may be easily destroyed, even if not taken away purposely by the spider.

The same evening I found in an old Solidago top, near her web, a female *Epeira strix*, with the abdomen much distended. I took her home and kept her in a glass for three days. On the fourth night she got out of the glass, climbed up on my bureau, and, when I first noticed her next morning, she was making her cocoon under a projecting portion of the looking-glass frame. She had already made a bunch, apparently hollow, of the fine wrinkled silk often found inside of spiders' cocoons. She attached her spinnerets to the silk already spun, then drew them away six or eight millimetres, spinning out a short band of fine threads which she attached again near the starting point thus making a short loop. She then made other loops, moving a short distance at each stroke, without following any regular direction, until tired; then rested a few minutes, and went on with another part of the cocoon. After half an hour the spider rested beneath the cocoon, with the opening of her ovaries under the centre, and discharged her eggs upwards between the threads into it. The eggs were very soft and flexible, and formed, with a small amount of liquid, a jelly-like mass; which became spherical as soon as it found room in the cocoon. The lower part protruded between the loose threads without flowing through. In a minute the eggs were all laid, and the spider began immediately to strengthen the lower part of the cocoon.

Several times I have had females of *Epeira patagiata* and *Epeira* (*Argiope*) *riparia* lay their eggs in bottles; but, although the cocoons were made, and, in the case of *E. riparia*, finished even to the smooth outside, the eggs were laid loose in the bottle. The reason seems to be that, owing to the narrowness of the bottle, after the spider had made the first part of the cocoon, she could not get into a proper position to discharge her eggs into it. *J. H. Emerton.*

List of Noctuidae taken about Newton, Mass.

The following list of Noctuidae, collected for the most part by myself, in Newton and vicinity, during the last few years, may be of interest. For the identification of a large number of my specimens I am indebted to the kindness of Mr. A. R. Grote. I have several species still undetermined, which I will add as soon as I learn their names.

For the sake of conciseness, the following abbreviations are used :

c. = common.	b. a. = on baked apples.	Mh. = in March.
n. = not.	l. = at light.	Ap. = in April.
r. = rare.	q. = at rest.	My. = in May.
t. = rather.	s. = at sugar.	Jn. = in June.
u. = uncommon.	w. = in —— woods.	Jl. = in July.
e. = early.	coc. = cocoon on or under.	Au. = in August.
g. = late.	lrv. = larva found on.	Sp. = September.

Leptina ophthalmica. R. l. Jn.
“ *Doubledayi.* One q. Jn.
Pseudothyatira cymatophoroides. T. c. l. s. Jn.
“ *expultrix.* T. c. l. s. Jn.
Habrosyne scripta. N. u. s. Jn.
Eutolype Rolandi. R. l. Ap.
Dicopis muralis. R. l. Ap. My.
“ *Thaxterianus.* L. Ap. 14.
Raphia frater. N. c. l. Jn. Jl.
Charadra deridens. R. l. s. Jn. e. Jl.
“ *propinquilinea.* L. Jn. 4.
Harrisimemna sexguttata. R. l. Jn. Lrv. Syringa, Sp.
Apatela occidentalis. N. c. l. Jn. Lrv. Ulmus.
“ *lobeliae.* T. r. l. Jn. Lrv. Quercus.
“ *spinigera.* T. r. l. My. Jn. Au.
“ *innotata.* One l. Jn.
“ *americana.* C. Lrv. Acer and Betula.
“ *dactylina.* T. r. Jn. Lrv. Betula and Salix, Sp.
“ *luteicoma.* Jn. Lrv. Fraxinus, Sp.
“ *brumosa.* C. s. l. My. Lrv. Salix and Betula, Sp.
“ *noctivaga.* N. c. s. My. Jn.
“ *afflicta.* R. l. Jn. Coc. under Juglans.
“ *clarescens.* C. Jn. Lrv. *Pyrus malus.*
“ *ovata.* N. u. in Quercus w. g. Jn.
“ *hamamelis.* C. Jn. in Quercus w. Lrv. Castanea.
“ *dissecta.* T. r. s. l. Jn.
“ *albarufa.* R. l. e. Jl.
“ *exilis.* R. l. Jn.
“ *sperata.* N. u. l. Jn.
“ *lithospila.* Q. in Juglans w. g. Jn.
“ *oblinita.* C. l. Jn.
“ *lanceolaria.* R. l. Au.
Jaspidea palliatricula. N. u. l. Jn. Coc. under stones in Quercus w.
Polygrammate hebraicum. R. l. Jl.
Microcoelia fragilis. R. l. Jl.
“ *diphteroides.* C. l. s. Jn.
Agrotis dilucida. Type l. Au. 10.
“ *perattenta.* N. c. l. s. Jn. Jl.
“ *phyllophora.* R. l. Jn.
“ *baja.* C. s. l. Au.
“ *Normaniana.* T. r. s. l. Au.
“ *haruspica.* R. l. Au.
“ *c-nigrum.* C. l. s. Jl. Au.
“ *bicarnea.* C. l. s. Jl. Au.
“ *subgothica.* C. s. l. Au.
“ *tricosa.* C. s. l. Au.
“ *herilis.* C. s. l. Au.
“ *plecta.* C. l. s. My. Jn.
“ *sexatilis.* T. r. l. b. a. Au.
“ *badinodis.* R. l. s. Au. Sp.
“ *collaris.* R. s. Au.
“ *geniculata.* C. l. Au.; generally poor.
“ *tessellata.* C. Jn. Jl.
“ *decolor.* R. s. g. Jn.
“ *versipellis.* R. l. Jl.
“ *redimacula.* N. u. l. Au.; b. a.
“ *pitychrous.* R. l. Au.
“ *manifestolabes.* R. l. My.
“ *monochromatea.* R. l. Jn. 5.
“ *muraenula.* R. s. Au. Sp.
“ *Bostoniensis.* T. r. l. Sp.
“ *fumalis.* R. s. Au.
“ *messoria.* Swarming l. s. Au.
“ *velleripennis.* C. l. s. Au.
“ *gladiaria.* T. r. l. Sp.
“ *venerabilis.* C. l. Au. Sp.
“ *volubilis.* C. l. s. Jn.
“ *stigmosa.* C. l. Jn.
“ *annexa.* One s. e. Oct.
“ *ypsilon.* C. l. s. Ap. Au. Sp. Oct.
“ *clandestina.* C. Jl. Au.
“ *brunneicollis.* T. r. l. Au.

Agrotis alternata. R. s. Au.
" *cupida.* R. l. Au.
" *clariformis.* R. l. My.
" *lubricans.* C. l. Jn. Jl. Au.
" *pressa.* R. s. Jn. 15–27.
" *prasina.* C. l. Jn. Jl. Au.; q. in Quercus w.
" *occulta.* N. c. l. s. Jn.
Adita chionanthi. L. Au. 7.
Mamestra purpurissata. C. l. Au.
" *latex.* N. c. l.; q. in Quercus w.
" *adjuncta.* C. Jn.
" *grandis.* R. l. Jn.
" *subjuncta.* C. l. Jn. Jl.
" *atlantica.* C. l. s. Jn.
" *vicina.* C. l. g. My. Jn.
" *legitima.* T. r. l. Au.
" *lilacina.* L. Jl. 15.
" *assimilis.* R. s. l. Jn. 19–Jl. 10.
" *trifolii.* C.
" *detracta.* N. c. Jn. 20-Jl. 15.
" *lorea.* C. l. Jl. Au.
" *rosea.* N. u. l. My. 25–Jn. 15.
" *vindemialis.* R. l. Jn. Jl. 8.
" *renigera.* C. Au.
Dianthoecia meditata. C. l. Au.
" *modesta.* N. u. l. My. Jn.
Hadena loculata. R. l. Au.
" *devastatrix.* C.
" *sputatrix.* C.
" *congermana.* R. s. l.
" *suffusca.* R. l. Au.
" *arctica.* C.
" *Bridghami.* R. l. Jl.
" *vultuosa.* C. l. Au.
" *lignicolor.* C. Jl.
" *vulgaris.* R. l. Jl.
" *verbascoides.* C. Jl.
" *sectilis.* R. l. Jl.
" *cariosa.* R. l. Jn. 15–Jl. 12.
" *inordinata.* T. r. l. Jn.
" *finitima.* C. l. Jn.
" *diversicolor.* R. l. Au. Sp.
" *mactata.* R. s. Au.
" *miselioides.* C.
" *arna.* N. u. s. l. Jn.
Perigea xanthioides. R. l. Jn. Au.
" *luxa.* R. l. Jl.
" *fabrefacta.* B. a. Sp. 21.
Dipterygia scabriuscula. R. l. s. Au. Sp.
Hyppa xylinoides. C. My.; Lrv. under boards, Ap.

Valeria Grotei. R. l. Ap. My.
Chytonix iaspis. R. l. Jl.
Homohadena badistriga. Q. Jl. Lrv. Lonicera.
Copipanolis cubilis. R. l. Mh. Ap. My.
Actinotia ramosula. C. My. Au.
Morrisonia evicta. T. r. l. My.
" *vomerina.* N. u. l. My.
Callopistria mollissima. T. r. s. Jn.
" *monetifera.* R. l. s. Jn.
Prodenia commelinae. R. s. Au.
" *ornithogalli.* R. l. Jl.
Trigonophora periculosa. R. l. q. in Quercus w. Jl. Au.
Euplexia lucipara. C. l. My. Jn.
Brotolomia iris. N. u. l. s. Jl.
Nephelodes minians. T. r., almost always in poor condition, Au.
" *violans.* Like the last.
Tricholita semiaperta. R. l. Au.
Helotropha reniformis. C. l. Au.
" *atra.* R. s. Jl.
Gortyna purpuripennis. R. l. My. Jn.
" *sera.* C. Jl. Au.
" *nictitans.* C. Au.
" *immanis.* N. c. l. Au.
" *nitela.* R. l. Sp.
" *nebris.* C. l. Sp.
" *speciosissima.* R. l. Sp.
" *cerussata.* R. l. Sp.
" *rutila.* R. l. Sp.
" *purpurifascia.* N. u. l. Sp. Oct.
Achatodes zeae. R. l. Jl.
Arzama obliquata. R. l. Jn.
Amolita fessa. R. l. Jl.
Platysenta atriciliata. R. l. Jn.
Arsilonche henrici. C. l. My. 5–Jn. 10.
Heliophila pallens. C. Jn. Jl. Au.
" *Harveyi.* C. Jn. Jl. Au.
" *phragmitidicola.* C. Jn. Jl. Au.
" *adonea.* C. Jn. Jl. Au.
" *commoides.* C. Jn. Jl. Au.
" *unipuncta.* C. Jn. Jl. Au.
" *pseudargyria.* C. Jn. Jl. Au.
Caradrina miranda. C. l. Jn.
Pyrophila pyramidoides. C.
" *tragopoginis.* C. s. Jl.
Orthodes infirma. T. r. s. Jl.
" *cynica.* C. s. Jl.
Pseudorthodes enervis. R. l. Jl.

Graphiphora oviduca. C. s. l. My.
" *incerta.* R. b. a. Ap.
" *alia.* C. l. Ap. My.
Crocigrapha Normani. N. u. l. My.
Calymnia orina. T. r. l. q. Jl. Au.
Ipimorpha pleonectusa. R. l. Au.
Orthosia helva. R. s. Au.
" *ferrugineoides.* C. l. s. Sp. Oct. Flying about Pinus before dark in November.
" *infumata.* R. l. Au.
Glaea viatica. At Wellesley, Mass. (Denton.)
" *sericea.* R. l. and on Pinus Oct.
" *apiata.* R. l. Oct.
" *pastillicans.* R. s. Oct.
" *carnosa.* At Jamaica Plain, Mass.
Jodia rufago. R. b. a. Ap.
Eucirroedia pampina. C. l. s. Sp.
Xanthia togata. C. l. Sp.
Scopelosoma devia. R. s. Ap.
" *Morrisoni.* C. s. l. Ap.
" *Walkeri.* C. s. Ap. Sp.
" *vinulenta.* R. l. Ap.
" *tristignata.* T. r. l. s. Ap.
Scoliopteryx libatrix. C. s. Ap. My. Jn. Jl. Au. Sp. Oct. Lrv. Populus.
Lithophane disposita. N. u. s. Ap.
" *petulca.* C. s. Ap. Oct.
" *Bethunei.* C. l. s. Ap. Oct.
" *fagina.* R. l. Ap.
" *cinerea.* C. l. s. Mh. Ap. My. Sp. Oct. Lrv. Rosa and *Negundo aceroides.*
" *pexata.* R. s. l. Ap. Oct.
" *Thaxteri.* R. l. s. My. Oct.
Anytus sculptus. C. l. Sp.
Calocampa nupera. C. l. s. Ap. My. Sp. Oct.
" *cineritia.* R. b. a. l. Ap. My.
" *curvimacula.* T. r. l. s. Ap. My. On Pinus in Oct. Lrv. eats Iris.
Lithomia germana. R. l. Sp.
Xylomiges confusa. C. l. My.
Cucullia convexipennis. R. l. Jl.
" *asteroides.* R. l. Jn.
" *intermedia.* C. l. Jn.
Crambodes talidiformis. R. l. Jl.
Nolaphana Zelleri. C. l. s. Ap. My. Jn.
Anomis erosa. One l. Au.?
Aletia argillacea. R. l. Sp.
Marasmalus ventilator. T. r. l. Jn. Jl.
" *histrio.* N. u. l. Jn.
Ingura abrostoloides. R. l. Jl.
" *dilineata* (fide Morrison). R. l. Jl.
Calpe canadensis. R. l. Jl.
Telesilla cinereola. C.
Abrostola ovalis. T. r. l. Jn. Au.
Plusia purpurigera. R. l. Jn. Jl. Lrv. *Thalictrum cornuti.*
" *aerea.* C. l. Jl.
" *balluca.* R. l. Au.
" *contexta.* T. r. l. Jn. Jl.
" *Putnami.* N. u. l. Jn. Jl.
" *formosa.* At Wellesley, Mass. (Denton.)
" *precationis.* C.
" *octoscripta.* R. l. Sp.
" *viridisignata.* R. l. Au.
" *epigaea.* R. in meadows, Jl.
" *simplex.* C.
Lelipolys perscripta. At Wellesley, Mass. (Denton.)
Rhodophora florida. T. r. l. and on Primula.
Tamila nundina. R. l. Jl.
Lygranthoecia brevis. R. l. Au.
" *arcifera.* R. l. Sp.
" *Spraguei.* R. l. Au.
" *marginata.* C.
Melaporphyria immortua. T. r., flies by day in meadows, Jn.
Pyrrhia exprimens. N. u. l. Au.
" *angulata.* R. l. Jl.
" *illiterata.* R. l. Au.
Tarache candefacta. C. l. Jn.
" *erastrioides.* C. l. Jn.
Chamyris cerintha. C. l. Jn. Jl.
Eustrotia obaurata. R. l. Jn.
" *synochitis.* C. l. My. Jn.
" *carneola.* C. l. My. Jn.
" *apicosa.* C. l. My. Jn.
" *muscosula.* C. l. My. Jn.
" *concinnimacula.* C. l. My. Jn.
Lithacodia bellicula. C. in meadows, Jn.
Exyra Rolandiana. (See below.)
Prothymia rosalba. T. r. l. and in meadows, Jn. – Jl.

Drasteria erechtea. C.
Euclidia cuspidea. T. r. s. l. My. Jn.
Melipotis limbolaris. R. in roads; l. Jl.
Parthenos nubilis. T. r. q. l. s. Jn. Jl.
Catocala epione. C. q. and flying by day in and on the borders of woods.
" *desperata.* R. q. Au.
" *retecta.* T. r. q. s. Au.
" *flebilis.* R. q. l. Au.
" *insolabilis.* T. r. l. s. Au.
" *residua.* R. s. Au.
" *obscura.* T. r. l. q. s. Au.
" *tristis.* Locally c. q. Au.
" *relicta.* R. s. Sp.
" *unijuga.* R. q. Au.
" *Briseis.* R. l. s. Au. Lrv. Salix Jn. 29.
" *concumbens.* C. q. l. s. Jl. Au.
" *amatrix.* C. q. l. s. Jl. Au.
" *cara.* C. l. s. q. Au.
" *coccinata.* R. q. Jl. Au. Sp.
" *ultronia.* N. u. l. q. Au.
" *parta.* C. l. s. q. Lrv. Salix and *Populus dilatata* Au.
" *ilia.* C. q. Lrv. Quercus Au.
" *innubens.* R. l. Au.
" *cerogama.* T. r. q. s. Au.
" *palaeogama.* N. u. q. s. Jl. Au.
" var. *phalanga.* R. q. Au.
" *habilis.* C. s. l. Au.
Catocala antinympha. C. q. s. l. Jl. Au.
" *badia.* T. r. l. Au.
" *serena.* R. s. Jl.
" *polygama.* T. r. l. s. q. Au.
" *formula.* R. q. Au.
" *grynea.* C. s. l. Jl. Au.
" *praeclara.* R. q. l. s. Jl. Au.
" *fratercula.* R. q. Au.
" *gracilis.* C. q. Au.
" *amica.* C. q. Jl. Au.
" *lineella.* C. q. Jl. Au.
Panopoda rufimargo. T. r. l. s. Jn. Jl. Lrv. Quercus.
" *carneicosta* R. l. Au.
Phoberia atomaris. C. in open woods and l. Ap. My.
Pseudolimacodes niveicostatus. R. l. Jl.
Parallelia bistriaris. C. l. Jn.
Poaphila quadrifilaris. C. l. and in meadows, Jn.
Zale horrida. T. r. l. s. My. Jn.
Homoptera edusa. T. r. My. — Nov.
" *Saundersii.* R. s. Au.
" *lunata.* T. r. My.— Nov.
" *minerea.* R. l. q. My. Jn.
" *calycanthata.* R. l. Jn.
" *unilineata.* R. s. My.
" *obliqua.* T. r. Jn.
Ypsia aeruginosa. N. u. q. l. My. Jn.
" *undularis.* R. l. q. Jn.
Spargoloma umbrifascia. T. r. l. Jn.
Homopyralis tactus. C. s. l. Jn. Jl.

The new species mentioned in the above list is described as followed by Mr. Grote, in a letter.

"*Exyra Rolandiana* n. sp. ♂, ♀. Several specimens reared by Mr. Roland Thaxter belong to a form allied to *E. fax* Grote, but are larger, the ♂ expanding 22, the ♀ 18 mm. The fore wings are deep purple in the male, with a cellular yellow spot; a large yellow patch extends from the median vein to the internal margin, divided indistinctly on the median space exteriorly by the median shade. The base of the wing is in both sexes of a more brilliant purple red. The female shows the yellow markings of the male, but the wing is almost blackish beyond the base, not purple. Fringes concolorous with the wing, not tipped with orange as in *E. fax.* Hind wings above and all wings beneath immaculate, in the male slaty blackish, in the female black. Thorax, head and fore femora orange red or purple; anal tuft of the male reddish. Abdomen like the hind wings; antennæ yellowish. This appears to be a larger and more highly colored form than *E. fax*, which Mr. Ridings brought from Georgia. — *A. R. Grote.*"

The larvæ of *Exyra Rolandiana* may be found in the smaller leaves of *Sarracenia purpurea*, in this vicinity, as soon as the snow is off the ground, early in the spring, apparently having moulted two or three times; they are then of a dull reddish brown and about six mm. long. As soon as the weather grows warmer, they increase in size rapidly, and, having eaten the leaf in which they have hibernated, betake themselves to the larger leaves, which they begin to eat, after having made a hole near the base to let the water out, and after having spun a close web over the mouth. The larva reaches its full growth about the first of May and later, when it is about 20 mm. long, of a dull carmine or brown color, lighter, sometimes white, between the segments. The cocoon is spun in the leaf, of loose white silk, the larva changing to a pupa a few days after spinning. The imago appears early in June. There is a good deal of variation in the color of the females, some being much brighter than others. The following are the extreme measurements of both sexes: males 26–20 mm., females 21–16 mm. In its habits it resembles *E. semicrocea*, generally backing down towards the bottom of the leaf, when disturbed, and using its wings in ascending. I notice that the frenulum at the base of the wings is very long in this species, and, as well as I could see, the moth seems to use it when crawling up the leaf. This species is very delicate and difficult to rear. I have observed four varieties of ichneumon which prey upon the larva, but they have not been determined. *Roland Thaxter.*

Proceedings of the Club.

§ 20. What are the Causes of Assembling among Insects? Some of the phenomena of "assembling" among insects were mentioned. This is for sexual purposes sometimes, but not always. Insects are sometimes attracted from great distances, so that many individuals of a species which is not common may be drawn together at one place. Insects are sometimes attracted to their mates who are in such situations as to preclude the possibility that they could have been seen, as for instance, in a pocket. It is evident that scent is sometimes the means by which insects are attracted, individuals being drawn to objects which possess peculiar odors similar to those of their natural food, although these objects are in no way suited for such food. It would be interesting to ascertain how far Silphidae scent their natural food, carrion. Insects are often cheated. Lampyridae are attracted to a candle, although it far outshines their mates. The antennæ of male mosquitoes vibrate on the sounding of certain notes, these notes being the ones produced most often by the wings of the female; thus the male can find his mate. Pectinated antennæ seem adapted especially to well-developed functions; yet Hepialus, which has not pectinated antennæ, is conjectured to be sensitive to the presence of its mate. Bombycidae and Tineidae are the principal moths which assemble. *(Jan. 9, 1874.)*

B. Pickman Mann.

§ 21. A Card Catalogue of Illustrations. Mr. S. H, Scudder exhibited a series of figures of Orthoptera, cut from plates and books and mounted upon sheets of paper of a uniform size, so that they could be arranged in the manner of a card-catalogue. *(Febr. 13, 1874.)*

§ 22. Beetles which infest Elm-trees. Mr. H. G. Hubbard exhibited specimens of some beetles which infest elm trees, viz.: *Magdalinus armicollis*, with four species of parasites; *Saperda trilineata* with one parasite; *Synchroa punctata*, exceedingly abundant; and *Buprestis* (*Anthaxia*) *viridicornis.* Most of the Saperdas transformed in the wood; all the Synchroas in the bark. *(March 13, 1874.)*

§ 23. Attitudes in which some Wasps are supposed to sleep. Mr. S. H. Scudder exhibited a wasp (*Ammophila gryphus?*) which rests at night by seizing a blade of grass with its jaws and holding itself extended either with or without the use of its middle and hind feet.[1] The usual position of the wasp, under these circumstances, is such that the thorax is held nearly vertical, the abdomen being more or less elevated toward a horizontal position. Many specimens were seen at different times acting in this manner.

[1] The specimen is preserved in Mr. B. P. Mann's collection as No. 3106, and is figured in Morse's First Book of Zoology, p. 94, fig. 91.

Mr. B. P. Mann said that on June 16, 1872, he found a specimen of a wasp[1] (*Odynerus?* sp.) which had seized hold of the end of a horizontal twig of *Quercus alba* with its jaws, and by that means supported its body in a horizontal position, the head facing inward towards the tree, with the antennæ laid together along the upper surface of the twig. This was just at sunset, and the question recorded at the time was: was the insect taking this position of rest for the purpose of passing the night so? Mr. Mann drew attention also to a communication by Mr. F. G. Sanborn, in the Proc. Bost. Soc. Nat. Hist., xii, p. 98, upon an *Ammophila gryphus* which "was clasping a small oak twig with its mandibles and feet, the body elevated one-fourth of an inch above the twig, and the head directed toward its extremity." Mr. Sanborn had told him that he thought this might be a case of tetanus; but the case is shown still more not to be an anomalous one by a statement which Westwood (Mod. Class. Insects, ii, p. 136) quotes from Latreille, that in the night, or during bad weather, *Foenus jaculator* "fix themselves by their jaws to the stalk of different plants, and are then almost in a perpendicular position."

(Oct. 9, 1874.)

§ 24. Prof. Zeller's Review of Edwards' Butterflies of North America, Vol. I. Dr. H. A. Hagen called attention to a review of the first volume of Edwards' Butterflies of North America, by Prof. Zeller, in Stett. Entom. Zeit. [see Rec., No. 367], and stated the views of Prof. Zeller in the determination of some species. He considers *Parnassius Smintheus* as doubtless *P. Delius* var. *intermedius*; he disbelieves in the generic rights of *Neophasia Menapia*; *Pieris Beckeri* is *P. chloridice*; *P. castoria* is *P. napi* var. *napaeae*. *Anthocharis* (not *Anthocaris*) *Cooperi* is *A. Angelina* Boisd., whose name has priority. *Colias Keewaydin* is probably *C. Chrysotheme*, but Prof. Zeller may have judged from specimens of *C. Ariadne*, determined by Mr. Edwards, which Dr. Hagen sent as *C. Keewaydin*. The difference of *C. Meadii* from *C.*

[1] Preserved in his collection as No. 2002.

Myrmidone seems doubtful. *Argynnis Edwardsii* is surely a good species, against Staudinger's opinion. *Grapta Faunus* is *G. c-album* var. *b.* *(Dec. 11, 1874.)*

§ 25. Extent of the North American Faunal Region Southwards. Dr. H. A. Hagen called attention to the circumstance that none of the Agrionina, Gomphina or Cordulina found in America were found either in Europe or in Asia. He said that although, when he wrote his Synopsis of the [Pseudoneuroptera and] Neuroptera of North America, he had considered the fauna of the Antilles and of Central America a part of the North American fauna, he had since found these faunæ to be more closely connected than he knew them to be then. He had found that some southern forms of insects go northwards as far as Long Island, Nantucket, and the south shore of Cape Cod. [See Psyche, vol. i, p. 64; Proc., § 2.] *(March 12, 1875.)*

§ 26. Attachment of Pollinia to Insects. Dr. H. A. Hagen spoke upon the possibility of error in the description of some insects, occasioned by the attachment of foreign substances to them, and cited as an instance a case of the attachment of the pollinia of Asclepias to the tarsi of the intermediate legs of a Mantispa, which he had described without being aware of their true nature. *(April 9, 1875.)*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 32.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 781 to 787 are from **Nat. Can.**, vol. viii.

* 781. L. Provancher. Les [corr.] Phryganes. p. 81–87. [March, 1876.]

Habits of Phryganid larvæ; manner in which their cases are constructed; swarming of *Macronema zebratum.*

* 782. L. Provancher. Une Pluie d' Insectes. p. 125–127. [April, 1876.]

Fall of a multitude of *Capnia pygmaea* upon the snow at Rivière du Loup, Témiscouata Co., Quebec, March 27, 1876; description; habits; vernacular name.

* 783. L. Provancher. Petite Faune Entomologique du Canada. — Troisiéme Ordre. — Les Névroptères. Neuroptera. pp. 177–191 [June, 1876], 209–218 [July], 264–268 [Sept.], 309–315, fig. 19–20 [Oct., 1876.][See Rec., No. 787.]

Characters and peculiarities of the order and families of Neuroptera [including Pseudoneuroptera]; about 10,000 species are known, of which nearly 130 are found in Quebec; distinguishes synoptically 16 families and (in 4 families) 15 genera and 44 species; describes the species; *Psocus canadensis*, *Ps. trifasciatus*, *Pteronarcys rectus*, *P. bicarinatus*, *P. flavicornis*, *Perla quebecensis*, *P. hieroglyphica*, *P. marginipes*, *P. navalis*, *P. riparia*, *P sulcata*, *P. naica*, *Nemoura nigritta*, *Cloë quebecensis* = 14 n. spp.; describes and figures the neuration of the wing of Odonata.

* 784. L. Provancher. Un autre Parasite sur le Corps Humain. p. 244–245. [Sept., 1876.]

Ixodes bovis? extracted from a tumor in the umbilical region of a girl; description and habits of the genus.

* 785. L. Provancher. L' Exposition de Philadelphie. pp. 246–256 [Sept., 1876], 277–288 [Sept.], 318–320 [Oct.], 341–352 [Nov., 1876], 371–384 [Jan., 1877]. [Concluded in vol. ix, pp. 27–32 (Jan., 1877), 50–64 (Feb., 1877).]

Present dispersion of *Doryphora 10-lineata* in Quebec; its habits and vernacular names; means against it. Ornamental and remarkable Brazilian insects. Preparation of raw silk. List of (6) insects captured in Philadelphia, (1) at Portland, and (5) at Upper Bartlett, N. H.

* 786. L. Provancher. Additions aux Ichneumonides de Québec. pp. 315–318 [Oct., 1876], 327–328 [Nov., 1876].

Describes *Coleocentrus rufus*, *Phygadeuon niger*, *Ph. Cressoni*, *Cteniscus rufus*, *Tryphon Clapini*, *Paniscus rufulus*, *Atractodes singularis* = 7 n. spp.; adds 1 genus and 9 species to the previous list [see Rec., No. 773].

* 787. L. Provancher. Faune Canadienne. — Les Insectes. — Névroptères. p. 321–327 [Nov., 1876].

[Cont. from Rec., No. 783.] Characters of Lestes and Agrion; synopsis of their (9) species, which are described; *Agrion canadense* = 1 n. sp. [Cont. in vol. ix.]

* 788. **P. Garneau**. General Report of the Commissioner of Agriculture and Public Works of the Province of Quebec for the year ending on the 30th of June 1874. — Printed by order of the Legislative Assembly. — Montreal: 1874. 8vo. pg. 4, clxxv, 162.

Contains No. 789.

* 789. D. N. St. Cyr. Entomology of the County [corr.] of Champlain. p. 115–117. [Feb., 1875.]

List of a 38 Coleoptera and 21 Hemiptera collected on a trip.

* 790. **N. M. Hentz.** The Spiders of the United States. — A Collection of the Arachnological Writings of Nicholas Marcellus Hentz, M. D. Edited by Edward Burgess, with Notes and Descriptions by James H. Emerton. Boston: Boston Society of Natural History. 1875. — *Also entitled:* Occasional Papers of the Boston Society of Natural History. II Boston: Printed for the Society. 1875. 8vo. pg. xiii, 171, with 21 plates. [Dec., 1875.]

Titles; Preface [origin, purpose and plan of this volume; sketch of Hentz's life; List of the Writings of Prof. Hentz]. Reprint of "all" [the important part] of Hentz's arachnological writings, viz.: from Am. Journ. Science and Arts, xxi, p. 99–109 (1832); do., xli, p. 116 (1841); Bost. Journ. Nat. Hist., iv, pp. 54–57, 223–231, pl. 7–8 (1842), p. 386–396, pl. 17–19 (1844); do., v, pp. 189–202, pl. 16–17 (1845), p. 352–370, pl. 21–22 (1846), p. 443–479, pl. 23–24, 30–31 (1847); do., vi, pp. 18–35, 271–288, pl. 3–4, 9–10 (1850); Proc. B. S. N. H., xi, p. 103–111, with two plates; Journ. Acad. Nat. Sci., ii, p. 53–55 (1821). Treats of 40 genera and 254 species.

"Before his time, with the exception of a few accidental descriptions scattered through the works of writers, for the most part European, nothing relating to North American Spiders had been published." "As little progress since, as before, Hentz's time has been made."

* 791. **Dr. Henri de Saussure.** Synopsis of American Wasps. — Solitary Wasps. — [Smithsonian Miscellaneous Collections. — 254 —] Washington: Smithsonian Institution. December, 1875. 8vo. pg. xxxv, 392, with four plates (i–iv), containing 31 figures. [Dec., 1876.]

Title; advertisement; dedication [to Mr. Edward Norton, translator of the work from the French], p. i–iv. Preface [account of the author's previous writings on Vespidae and of the materials used as basis for this work], p. v–ix. Introduction [problems of philosophical zoology for the solution of which entomology is particularly adapted; comparative merits of relative and absolute descriptions of species; relative constancy of structural and colorational characteristics; rules of nomenclature; "in insects in general, the female represents the type of the species;" preparation of specimens for the cabinet; determination of insects], p. xi–xxiii. Analytical Table [of contents; synopsis of the classification adopted], p. xxv–xxxv.

Synopsis of the 3 subfamilies of Vespidae; description of 177 (3 Masaris, 23 Zethus, 1 Discoelius, 24 Eumenes, 5 Montezumia, 6 Monobia, 2 Nortonia, 1 Rhynchium, 6 Symmorphus, 29 Ancistrocerus, 70 Odynerus [sens. strict.], 1 Epiponus, 1 Leptochilus, 4 Pterochilus, 1 Alastoroides, 3 doubtful) species of America north of the Isthmus of Panama and catalogue (with diagnoses of many species) of 136 (1 Trimeria, 1 Gayella, 30 Zethus, 1 Labus, 1 Discoelius, 29 Eumenes, 17 Montezumia, 4 Monobia, 1 Symmorphus, 10 Ancistrocerus, 34 Odynerus, 1 Epiponus, 1 Ctenochilus, 1 Alastoroides, 1 Alastor, 3 doubtful) species of South America, besides 13 species from both Americas or of doubtful or foreign origin, including 25 N. A. and 12 S. A. n. spp., comprised in 2 subfamilies and 20 genera; the following names of groups or genera seem to be new: Antezumia, Metazumia, Pseudozumia, Nortonia, Pachodynerus, Epiponus [in place of Epipona]; special observations upon the affinities, geographical distribution, classification and determination of the species of Odynerus [sens. lat.], with synoptical tables.

* 792. **S. H. Scudder.** Notice of the Butterflies and Orthoptera, collected by Mr. George M. Dawson, as Naturalist of the B. N. A. Boundary Commission. 8vo. pg. 5. [Sept., 1875.]

Localization of the region in which collections were made; comparison of the butterfly faunæ of this region and that of the Yellowstone [see Rec., No. 179]. List of 22 butterflies and 15 Orthoptera, with notes on abundance, seasons, habitat and varietal characters. Describes *Pezotettix Dawsoni, Gomphocerus clepsydra, Arphia frigida, Tettigidea acadica* = 4 n. spp.

* 793. **John C. Wise, Warren Smith** and **Allen Whitman.** The Grasshopper, or Rocky Mountain Locust, and its Ravages in Minnesota. — A Special Report to the Hon. C. K. Davis Governor of Minnesota. — Five thousand copies ordered printed. — Saint Paul: The Pioneer-Press Company. 1876. 8vo. pg. 50, with eight figures. [Feb., 1876.]

Title; list of writings and other sources from which information was obtained; record of invasions of *Caloptenus spretus* since 1819 and particularly of invasions of Minnesota; years, seasons and places of invasion and departure; amount of devastation caused; characteristics, relationships and descriptions (with figures) of *C. spretus, C. femurrubrum, C. differentialis, C. bivittatus, C. atlanis*; growth, habits, native breeding-grounds, oviposition and food of *C. spretus*; natural and artificial means of destruction of the locusts; climatic influences; enemies; parasites.

* 794. **John S. Pillsbury, Chas. V. Riley** and **Pennock Pusey.** The Rocky Mountain Locust, or Grasshopper, being the Report of Proceedings of a Conference of the Governors of several Western States and Territories, together with

several other gentlemen, held at Omaha, Nebraska, on the 25th and 26th days of October, 1876, to consider the Locust Problem; also a Summary of the best means now known for counteracting the evil.— Saint Louis: 1876. 8vo. pg. iii, 58, fig. 1–8. [Jan., 1877.]

Preface. Proceedings [list of members of the conference; addresses by Gov. John S. Pillsbury and Pennock Pusey of Minnesota, Cyrus Thomas of Illinois, Gov. Samuel J. Kirkwood of Iowa, Gov. John L. Pennington of Dakota Territory, Gov. C. H. Hardin and C. V. Riley of Missouri, ex-Gov. Robert W. Furnas, A. D. Williams and C. D. Wilber of Nebraska, Gov. Thomas A. Osborne of Kansas, and remarks by others, embracing statements of the importance of the "locust problem," means for its solution and the history of locust invasions; memorial to Congress; letter to the President of the United States], p. 1–36. Practical Considerations and Suggestions for the repression of the Rocky Mountain Locust (*Caloptenus spretus*, Thomas) [description, oviposition, transformations and habits of the locust, its enemies and parasites; means against it in its various stages; describes *Anthomyia calopteni* n. sp.], p. 37–58, fig.

* 795. **U. S. Entomological Commission** [C. V. Riley, A. S. Packard, Jr., Cyrus Thomas]. Circular No. 1. 8vo. pg. 4. [May, 1877.]

Queries regarding the migrations, appearance, habits and devastations of *Caloptenus spretus*, with directions for making replies.

* 796. **U. S. Entom. Comm.** Circular No. 2. 8vo. pg. 4. [May, 1877.]

Statement of the plans of each Commissioner; area and divisions of the subject assigned to each; petition (by C. V. Riley) for information regarding the natural history, insect enemies and parasites of *Caloptenus spretus* and other locusts and the remedial measures employed against the locusts in their various stages.

* 797. **Bulletin of the United States Entomological Commission.** [Department of the Interior. U. S. Geological and Geographical Survey of the Territories. F. V. Hayden, in charge.] Destruction of the young or unfledged Locusts. **No. 1.** Washington: 1877. 8vo. pg. 12. [May, 1877.]

Title; Preface [announcement regarding the proposed publications of the commission]. Enumeration of artificial and natural means of destroying the young or unfledged locusts; quotation of laws passed by the States of Missouri, Kansas and Minnesota to provide for the destruction of grasshoppers and their eggs.

* Supplement to Bulletin No. 1. 8vo. pg. 2. [May, 1877.]

Summary of means for the destruction of young locusts.

* 798. **Bull. U. S. Entom. Comm.** [See Rec., No. 797.] On the Natural History of the Rocky Mountain Locust, and on the Habits of the young or unfledged Insects as they occur in the more fertile country in which they will hatch the present year. **No. 2.** Washington: May, 1877. 8vo. pg. 15, fig. 1–11, map. [May, 1877.]

Description, oviposition, hatching, transformations and habits of *Caloptenus spretus*; map of the country that will suffer most severely, showing the eastern limit of injury the present year.

* 799. The **Trans. Amer. Entom. Soc.** [see Rec., Nos. 318–331], vol. v, from p. 119, contain the following, and Nos. 800 to 817.

Title, p. i. List of Papers, p. iii–iv. Index, p. 293–300. Each plate has a page of explanation. [Figures 26 and 27 of Plate I, illustrating the sexual characters of *Calosoma Sayi* ♂ and *Elasmocerus terminatus* ♂ ♀, respectively, seem to correspond to nothing in the text.]

* 800. E. T. Cresson. Descriptions of New Species of Mutilla. p. 119–120. [March, 1875.]

Describes *Mutilla peculiaris*, *M. tecta*, *M. erudita*, *M. pacifica*, *M. Arota* from California, *M. Edwardsii* from Oregon, *M. Ursula* from Texas and Oregon = 7 n. spp.

* 801. G. H. Horn. Notes on the Species of Rhipiphorus of the United States. p. 121–125. [Sept., 1875.]

Defines synoptically and describes 8 spp.; *Rh. bifoveatus* from Illinois = 1 n. sp.; notes on structural characters and sexual differences. Synonymy of some of Dejean's names.

* 802. G. H. Horn. Synonymical Notes and Descriptions of New Species of North American Coleoptera. p. 126–156, with eight figures. [Sept., 1875.]

Defines synoptically the (14) species of Amara proper, (4) [subg.] Bradytus, (5) Patrobus, (3) Trechus, (1) Scaphidium [4 varieties], (6) Ips, (2) Pityophagus, (4) Perimegatoma, (5) Onthophagus, (4) Ligyrus, (5) Strategus [with figures], (6) Zonitis of America north of Mexico, also 3 species of Anisodactylus from California and Oregon; describes as new: *Amara insularis* from Cal., *A.* (*Bradytus*) *Putzeysii* from Newfoundland, Perimegatoma [n. g. Dermestidae], *P. falsum* from Cal., *P. variegatum* from Cal. and Oreg., *Onthophagus velutinus* from Lower Cal. and Ariz., *Dialytes Ulkei* from Md., *Gyascutus californicus* from Cal., *Chalcophora Fulleri* from Tex., *Buprestis* (*Ancylochira*) *connexa* from Oreg. and Owens' Valley, Scotobates [n. g. Tenebrionidae, in place of "Centronopus"], Cordylospasta [n. g., Meloidae], *C. Fulleri* from Nev., *Epicauta Batesii* from Ga. and Fla., *E. oregona* from Oreg., Gnathospasta [n. g. Meloidae], *G. mimetica* from Tex., *Cantharis* (*Lytta*) *mutilata* from Ariz., *Zonitis vittipennis* from Ariz., *Cistela Thevenetii* from Cal., *C. variabilis* from Cal. = 4 n. gen., 17 n. spp.; notes upon synonymy or geographical distribution of about 110 species; suggests the restoration of the generic name Oedudes (Thoms.) [Cerambycidae.]

* 803. J. L. LeConte. Notes on Cicindelidæ of the United States. p. 157–162, with five figures. [Sept., 1875.]

Describes *Omus Hornii* from Cal., *Cicindela Wapleri* from Miss., *C. nevadica* from Nev., *C. politula* from Tex., *C. striga* from Fla., *C. maga* from La., *C. hirtilabris* from Fla. = 7 n. spp.; notes on varieties, races and geographical distribution of 6 other species.

* 804. J. L. LeConte. Notes on the Rhysodidae of the United States. p. 162–168, with four figures. [Sept., 1875.]

Defines 2 spp. Rhysodes and 2 spp. *Clinidium*; describes *Rh. hamatus* from Cal., *C. calcaratum* from Vancouver I. and Oregon = 2 n. spp.; complexity of affinities between Rhysodidae, Cupesidae and other families, indicating the primordial character of the former families; affinities of Trictenotoma.

* 805. J. L. LeConte. Descriptions of New Coleoptera of the United States with notes on geographical distribution. p. 169–176. [Nov., 1875.]

Describes *Dyschirius salivagans* [see Rec., Nos. 601, 605, 606] from Utah, *Holciophorus serripes* from Cal., *Zalobius serricollis* from Cal., *Dacne picea* from Cal., Hypodacne [n. g. Erotylidae], *H. punctata* from Atlantic District, *Triphyllus elongatus* from Alaska to Cal., *Cyphon robustus* from N. Y., *Eucinetus strigosus* from Penn., *E. punctulatus* from Mich., *Dictyoptera rubripennis* from Col., *D. dimidiata* from Cal., *D. ruficollis* from Col. and Oreg., *Elaphidion alienum* from Ariz., *Purpuricenus magnificus* from Ariz., *Leptura anthracina* from Oreg., *Tanarthrus salicola* [see Rec., Nos. 601, 605, 606] from Utah, *Mecynotarsus candidus* from S. C., *M. elegans* from Fla., *Xylophilus impressus* from Tex., *X. ater* from Tex., *X. nebulosus* from Penn. and La., *X. subfasciatus* from Atlantic District, *X. brunnipennis* from S. C., Ills., Tex., *X. ventricosus* from Southern States = 1 n. g., 24 n. spp.; notes on distribution or synonymy of 6 other species.

* 806. G. H. Horn. Revision of the United States species of Ochodæus and other Genera of Scarabæidæ. p. 177–197, with four figures. [March, April, 1876.]

Describes the specific and sexual characters, and defines synoptically the (8) species of Ochodaeus [with figures], (3) Macrodactylus, (15) Dichelonycha, (3) Coenonycha, (6) Trichius, (1) Gnorimus, with bibliography, synonymy and habitats of the species; describes as new: *Ochodaeus Ulkei* from Nev., *Macrodactylus uniformis* from Ariz., *Dichelonycha canadensis* from Canada, *D. Crotchii* from Cal., *D. clypeata* from Cal., Coenonycha, *C. socialis* from Guadalupe I., *C. ovipennis* from Nev., *Trichius texanus* from Tex. and Fla. = 1 n. g., 8 n. spp.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., July–Aug., 1877. [Nos. 39–40.

On the Structure of the Head of Atropos.

The inner lobe of the maxillæ of the Psocidae has always been described, so far as I can learn, as a simple, unjointed, horny stem. Thus Burmeister[1] says it is a slender horny piece like a fish bone, which lies deeply imbedded in the base of the jaw, is sharply separated from the galea, and, when the mouth is closed, often projects near the labium. Westwood[2] describes the same part as a long, slender, curved, horny process, arising from the base, and longer than the maxillæ, and figures the same (fig. 59.4, p. 18) as a nearly straight and simple unjointed rod, with a bifid tip. Latreille also gives a similar account of its structure. The special monographers of the family seem never to have given any general outline of the structure common to the group, but have limited themselves to those features wherein its members differ from one another; I cannot find any allusion by them to the special composition of the maxillæ.

A specimen before me, found in a mass of clay lately taken from an interglacial deposit near Toronto in Canada, but which, was probably accidentally introduced after the removal of the deposit, is remarkably free from discoloration and the grayish particles usually accompanying mounted specimens of Atropos. This specimen shows a structure of the inner lobe different from that hitherto described, and repeated examinations of fresh specimens have left no doubt that the structure has been

[1] Handb. d. Entom., ii, 722.

[2] Modern Class. Ins., ii, 17. It may be remarked that Westwood correctly describes the outer maxillary palpus as four jointed, although he figures it with six joints.

misunderstood. Instead of forming a single, simple, rod-like process, this inner lobe is three or four times as long as has been presumed and is two-jointed, the apical joint lying, when the organ is at rest, beside the basal joint, which is attached to the maxilla at the extreme base of the latter; the basal joint is directed backward and lies almost directly beneath the basal portion of the apical joint. The two portions of the inner lobe which lie, when at rest, behind the base of the maxilla are the parts which have been overlooked; the cause of the oversight is that they are less corneous than the distal half of the apical joint, and that they connect with the maxilla almost directly below the tendinous attachments of the muscles of the head to the inner base of the jaws, with which, from the transparency and minute size of the creature, they may readily be confounded in an object mounted for the microscope; the distal half of the apical joint has therefore been taken for the entire inner lobe.

This same structure, first seen in Atropos, appears also in Rhyopsocus, recently described by Dr. Hagen from Kerguelen Island, of which he says[1] "the long horny stem straight, bifid on tip, exterior branch [of the bifid tip] a little longer." I have not been able to examine any mounted Psocina, to see whether the inner lobe is similarly constructed in the other branch of the family, but it hardly seems possible that it can be otherwise; for it is not easy to conceive how a bifid, corneous rod could be used, if simply attached as a process to a maxilla moving at right angles to the longer axis of the process. As a jointed organ, capable of being bent upon itself, it could be thrust suddenly forward to spear any object with the tines of its microscopic fork. It is, however, curious that, when at rest, the two joints are folded so closely together, that in more than twenty mounted specimens which I first examined they were in almost precisely the same position, and in no instance was the portion of the apical joint which crossed the maxilla removed outwardly so far as to lie wholly beyond it. This led me at first to doubt whether the parts I saw behind the maxilla really belonged to this inner lobe, but in every case where the parts were not ob-

[1] Bull. U. S. Nat. Mus., iii, 53.

scured, their direct connection could be unmistakably traced: this appearance is due simply to the invariable assumption by these organs of their natural attitude of rest. Having therefore followed these bifid stems to the maxillæ, writers have been content to leave them there, and have not traced them in their more transparent parts, which were first clearly seen by me in the specimen from Toronto. In specimens afterwards mounted under pressure to separate the parts, the true character of the inner lobe of the maxilla was proved beyond a doubt; for the jointed stem, still preserving its connections throughout, became elbowed, and the apical joint was thrown so far to one side as not to cross any part of the maxilla.

The eyes of Atropos differ remarkably from those of other Psocidae. As is well known, the Atropina generally are distinguished from the Psocina by the absence of ocelli; and in many forms throughout the family (especially in the males, as Dr. Hagen informs me), the compound eyes appear to be only an agglomeration of simple ocelli, each facet being strongly convex, and the whole mass resembling a bunch of grapes. This is the case also in the specimen of Rhyopsocus referred to, which is a female, and is believed by Dr. Hagen to belong to the Atropina; so that the characteristic of Atropos now to be mentioned is not shared by all the other members of the Atropina. The eyes of Atropos are extremely simple, and indicate a low organization; generally their form and composition are extremely difficult to make out because of the amount of pigment in the field where they are situated; but in the specimen from Toronto the eyes are unusually distinct and uninjured, so that their structure is perfectly clear; they consist merely of a row of three simple, equal, contiguous ocelli, on either side, placed in a straight, oblique line next to the outer margin of the under surface of the head just behind the middle, the outer one upon the margin itself; the line is directed toward the base of the mandibles, and the whole row is as long as the second antennal joint. This is the simplest form of eye which is known to me in a perfect insect; indeed it would be difficult to imagine anything much simpler. *Samuel H. Scudder.*

The Larva of Chauliodes.

I have never seen more than two specimens of the larva of the genus Chauliodes; one was taken in the spring of 1871, the other Oct. 21, 1877. The first one was found in an oval cavity under a stone in moist sand, and was preparing to pupate. It changed to a pupa two days afterwards; I therefore had but little opportunity to note its habits, but even those two days in which something might be learned of the habits of an active larva in its native element, availed nothing in this instance. The larva was already in a semi-torpid condition, and moved very little. When disturbed, it would move by thrusting forward its head and thorax and contracting its abdomen, reminding one of the movements of an earth-worm. I did not suspect that I had a larva whose field for active operation was the water, nor did I know that it was so near its pupal change. I took it to be some sluggish larva that lived on the land, and, after vainly endeavoring to get it to feed, I left it to its own devices, and within the time mentioned it pupated. In the second day of its pupal condition it worked its way into some earth with which I provided it. It must have done this by wriggling and boring with its head, for the legs, though free, have but very little motion, not enough to be available in such work. On the morning of the twelfth day from its pupation it appeared at the mouth of the gallery which it had made, and before evening the imago was developed, and proved to be *Chauliodes pectinicornis*.

I presume that the second specimen is of the same species, but possibly it is different. I netted it while dredging for Tritons, and have it now alive. Having provided it with suitable quarters I hope to rear it. I have found it an active and interesting insect. Its movements in the water, other than by walking, are always backwards, and are performed by a downward and forward sweep of the tail. The larva will propel itself in this manner at a good rate of speed. Sometimes when it is resting near the surface of the water, lazily drifting about, or resting upon some object in the water, apparently the most sluggish of insects, if a slight stir is given to the water near it, two or three smart strokes of its tail send it to a safer region. At another time it will be singularly apathetic, and may be touched lightly without alarming it. I have fed it every day with two or three house flies, securing them by the legs with forceps, and holding them to the larva; it will generally seize them at once, but if the position in which they are presented allows them to touch the larva before it has seized them, the larva will back off from them with a stroke or two of the tail. I have known it to seize a fly by a leg or a wing and hold it, but it prefers to take them by the body, and once secured there is no escape.

An extended description is not desirable in this place, but a short synopsis of its characteristics will enable any observer to recognize the larva.

Each of the two specimens that I have mentioned was about thirty-five millimetres long, rather slender, narrowing very moderately from the middle of the body to the head, and more strongly in the opposite direction to a narrow final segment. The head is large and prominent, the body moderately flattened and somewhat appressed. The mandibles are rather large and strong, nearly straight and strongly toothed on the inner edge at the tip. The mandibles are usually widely extended when the larva is walking about at the bottom of the vessel. On each side of each segment after the thoracic one, there is a slender whitish filament, which is a little longer than the body is wide at its widest part. From the posterior edge of the terminal segment there arise two filaments, contiguous at their base, long, blackish, very contractile, and rather thicker than those of the sides. These filaments are undoubtedly respiratory organs, and are usually directed upwards, so that their tips reach the surface of the water. There is a long, stout, bifurcated pro-leg just beneath these filaments. The color of the head is chestnut brown; that of the body rather light brown, with a black interrupted medio-dorsal line, and, on each side, a much narrower and more obscure similar line. The legs are rather stout, of moderate length, and honey yellow.

Henry L. Moody.

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 48.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. PICKMAN MANN.

Nos. 807 to 817 are from **Trans. Amer. Entom. Soc.** vol. v.

* 807. G. H. HORN. Notes on the Coleopterous fauna of Guadalupe Island. p. 198–201. [April, 1876.]

Location and climatic relations of the Island; notes on the faunal (Coleopterous) regions of west coast of N. A.; list of the 23 species collected by Palmer in 1875, with a list of the previously known habitats of the species; describes *Calosoma Palmeri,* Coelotaxis, *C. punctulata, C. muricata* = 1 n. g., 3 n. spp. [see *Coenonycha socialis* n. sp. in Rec., No. 806]; defines synoptically the (4) genera of Coniontini, viz.: Coniontis, Coelotaxis, Coelus, Eusattus.

* 808. W. H. EDWARDS. Description of new species of Diurnal Lepidoptera, found within the United States and British N. A. p. 202–208. [April, 1876.]

Describes *Colias Eriphyle* from British Columbia, *Argynnis Carpenterii* from New Mexico, *Euptychia Henshawi* from Ariz. and N. Mex., *Thanaos Alpheus* from N. M., *Hesperia Comus* from Tex., *H. Nereus* from Ariz., *H. Zampa* from Ariz. = 7 n. spp.; remarks upon the criterion of species and upon Scudder's undefined generic names of Hesperidae. Describes *Papilio Hippocrates* var. *Oregonia* n. var. from the Columbia River.

* 809. J. L. LECONTE. On the Affinities of Hypocephalus. p. 209–218. [Nov., 1876.]

Full description of the family and generic characters, and discussion of their significance. Bibliography of the genus. "This insect cannot properly be considered a member of any of the families, or even series of families of Coleoptera, as at present constituted," but "it is related to several of the series" and "represents a fragment of a very old fauna," of which the existing forms of insects contain a greater number of survivals than any other land animals, and can be recognized and separated, and are so numerous "that we will have a quite respectable mass of material for the partial reconstruction of the insect-fauna of past ages; especially if studied in connection with geographical distribution; — we would have by this depuration the evolutions of the present geological age more distinctly separated and defined in our systems of classification; and we would also be able to ascertain their proper connection (ideal or genetic, or both) with those which existed in past time." [See Rec., Nos. 580, 804.]

* 810. G. H. HORN. Description of a new species of

Dacoderus from the island of Santo Domingo. p. 219. [Nov., 1876.]

Describes *Dacoderus dominicensis* n. sp., compared with *D. striaticeps*; bearing of its occurrence on geographical distribution.

* 811. G. H. Horn. Synopsis of the species of Cymatodera and Trichodes of the United States. p. 220–232, fig., with fig. 1–17, 27, 28 of pl. i. [Nov., Dec., 1876.]

Defines synoptically 17 and describes the 20 species of Cymatodera; known, with bibliography; defines synoptically the (6) species of Trichodes describes as new: *Cymatodera Xanti* from Cape San Lucas, *C. Belfragei* from Texas, *C. oblita* from Arizona, *C.* ——— and *C.* ——— from Texas, *Trichodes illustris* (fig.) from Arizona = 6 n. spp. Figures the special characters of *Elasmocerus terminatus*.

* 812. G. H. Horn. The sexual characters of North American Cicindelidæ with notes on some groups of Cicindela. p. 232–240, fig., with fig. 18–26 of pl. i. [Dec., 1876.]

"The present paper is the first of a series in which the sexual characters of each genus in our fauna will be fully exposed, and noticing at the same time any special characters whether sexual or not, likely to prove useful to the systematist." Describes the sexual characters of the family and of Amblychila, Omus, Tetracha, Cicindela; habits of Amblychila; defines synoptically several closely similar species of Cicindela. Describes *C. Schauppii* n. sp. from Texas. Figures the special characters of *Calosoma Sayi*.

* 813. G. H. Horn. Notes on some Coleopterous Remains from the bone cave at Port Kennedy, Penna. p. 241–245. [Dec., 1876.]

Palæontologic significance of the present geographical distribution of some Coleoptera; describes *Cychrus Wheatleyi*, *C.* (*minor*), *Pterostichus* sp., *P?* sp., *Cymindis aurora*, *Chlaenius punctulatus*, *Dicaelus alutaceus*, *D.* sp., *Choeridium? ebeninum*, *Phanaeus antiquus*, *Aphodius precursor* = 11 n. spp. obtained from masses of clay found in a cave containing mammalian remains belonging to the Post-Pliocene period.

* 814. G. H. Horn. Synoptic tables of some Genera of Coleoptera with notes and Synonymy. p. 246–252. [Dec., 1876.]

Defines synoptically the (9) species of Elaphrus, (7) Notiophilus, (4) Blethisa, (10) Carabus, (1) Perigona, (3) Pogonus, (3) Hydrocharis, (8) Tropisternus, from own MSS. and those of G. R. Crotch, with generic and specific synonymy of several Carabidae, Dytiscidae and Hydrophilidae; adds *Anthrenus claviger*, *A. scrophulariae*, *Aglenus brunneus*, *Pyanisia opaca*, *Zophobas morio* to the list of N. A. Coleoptera, and excludes *Dytiscus latissimus*. [See Rec., No. 802.]

Trans. Amer. Entom. Soc., vol. v.

* 815. G. H. Horn. Revision of the species of Chlaenius of the United States. p. 253–276. [Dec., 1876.]

Adaptation, for the determination of the species of our fauna only, of the synoptic tables given by Chaudoir (Annali Mus. Civ. Stor. Nat. Genova, 1876) for the determination of all the (more than 400) species of the world; defines synoptically 42 species of Chlaenius, 1 Brachylobus, 3 Anomoglossus; describes *Ch. interruptus* from Oreg., *Ch. maxillosus* from Fla., *Ch. texanus* from Tex., *Ch. floridanus* from Fla., *Ch. flaccidus* from Tex., *Ch. Chaudoiri* from Tex. and Mexico = 6 n. spp.; describes 36 not new species of Chlaenius; bibliography and synonymy of all the (46) species.

* 816. Rev. Henry C. McCook. Notes on the architecture and habits of Formica pennsylvanica, the Pennsylvania Carpenter Ant. p. 277–289, with three plates (ii–iv). [Dec., 1876.]

Describes a formicary and its inhabitants, the habits of the ants and the destruction they occasion.

* 817. W. H. Edwards. New Species of Diurnal Lepidoptera. p. 289–292. [Dec., 1876.]

Describes *Argynnis Alcestis* from Northern Ills., Iowa and Col., *Chrysophanus Nais* from Southern Cal. and Ariz., *Hesperia Deva* from Ariz. = 3 n. spp.

* 818. The **Annales de la Societe Entomologique de Belgique,** T. xvi (1873), contain the following (in the Comptes-rendus des Séances), and Nos. 819 to 822.

a. Monstrosities observed in Coleoptera (by A. Preudhomme de Borre), p. xviii–xix, fig.; p. lviii; (by Léon Desguin) p. cxliv, fig. *b.* Discussion upon the definition of faunæ and of their limits and more especially of the limits of the European fauna (by E. Candèze), p. xiii–xiv, (by Edmond de Sélys-Longchamps) p. xxii–xxv, (by W. Roelofs) p. xxv–xxix, (by A. Preudhomme de Borre) p. xliii–liii. *c.* Reflections suggested by LeConte's classification of the Pterostichi of the U. S. (in Proc. Acad. Nat. Sci. Philad., 1873) [faunal works should not be made the basis of classifications] (by A. Preudhomme de Borre and J. Putzeys), p. cxxx–cxxxii. *d.* Abstract of Kirby's work on the Geographical Distribution of Diurnal Lepidoptera (in Journ. Linn. Soc., Zool., vol. xi, No. 55) [limits and characteristics of regions and faunæ; criticism of the work] (by A. Preudhomme de Borre), p. cxxxviii–clxiii. *e.* List of Members and Corresponding Societies, p. clvii–clxxii. *f.* Catalogue of the Library, p. 1–57.

* 819. J. Putzeys. Monographie des Calathides. p. 19–96. [Febr., 1874.]

Gives in detail the characters of Calathus, distinguishing therefrom the genera Amphigynus, Calathidius and Thermoscelis. Enumerates 2 spp. Calathidius, 87 (23 new) (*C. ovipennis* = 1 new N. A.; Nos. 59 [3 spp.], 67, 69, 70 [3 spp.], 78, 79 = 10 not new N. A.) spp. Calathus, 1 sp. Amphigynus, 1 sp. Thermoscelis. Adds notes on other species and a list of species.

* 820. R. MacLachlan. Notes sur les Myrméléonides décrits par M. le Dr. Rambur. p. 127–141. [Febr., 1874.]

Gives synonymy and notes upon 16 spp. Palpares, 7 (1 N. A.) spp. Acanthaclisis, 43 (1 new) (several N. A.) spp. Myrmeleon, 1 sp. Megistopus, 1 sp. Azesia [= Stilbopteryx].

* 821. S. H. Scudder. Note sur l'œuf et le jeune age de la Chenille d' Œneis Aello. p. 145–148, pl. i. [Febr., 1874.]

Describes the egg and young larva of *Oeneis aello*; defines the nomenclature of the external regions of the body of a larva divided longitudinally.

* 822. R. MacLachlan. Supplément aux Notes additionelles sur les Phryganides décrites par le Dr. Rambur. p. 149–153. [Febr., 1874.]

Gives synonymy and notes upon 36 species, supplementary to the critical revision of Rambur's Phryganidae in Annal. Soc. Entom. Belg., xiii, p. 5–12.

* 823. The **Annal. Soc. Entom. Belg.**, T. xvii (1874), contain the following (in the Compt. Rend.), and Nos. 824 and 825.

a. Note of rectification [synonymical notes on species of Adelocephala, Ceroderes = Syssisphinx, Sphingicampa; *Syssisphinx simulatilis* is found in Mexico] (by A. R. Grote), p. vi. *b.* Discussions upon nomenclature, pp. vii–xviii, xl–xliv, clvii–clix. *c.* Analytic abstract of various recent works upon parthenogenesis and embryogeny of insects (by A. Breyer), p. xxvi–xxx. *d.* How should entomological collections be displayed in museums?, pp. cxlvi–cxlviii, clix–clxvii.

* 824. J. Putzeys. Notice sur les Cicindèles et Carabiques recueillis dans l'Ile d'Antigoa par M. Purves. p. 117–120. [July, 1874.]

List of 10 species, with notes; describes *Selenophorus propinquus, Tachys picturatus* = 2 n. spp.

* 825. G. Van Lansberge. Observations sur la Classification des Lamellicornes Coprophages. p. 177–193. [Jan., 1875.]

Discusses the value of the characters in Ateuchidae, and divides the family into three tribes: Ateuchidae verae (2 sections and 10 genera), Canthonidae (2 sect., 21 gen.), Sisyphidae (4 gen.); the new genera are characterized in the Col. Hefte, xii [see Bibl. Rec., No. 117].

* 826. The **Annal. Soc. Entom. Belg.**, T. xviii (1875), contain the following (in the Compt. Rend.), and Nos. 827 and 828.

a. How should entomological collections be displayed in museums? ; on the use of colored glass to protect collections from injury by light, pp. v–x, xxiii. *b.* Discussions about *Doryphora 10-lineata* [danger of its introduction into Europe; its habits; its systematic relations; interchange of insects in general between Europe and the United States (with lists)], pp. xii–xxii, xxvii, xxix–xxxvii, liv–lv, lxi–lxvi, cxxxv. *c.* Plan of formation of the biological entomological collections of the Museum of Comparative Zoology at Cambridge, Mass. (by H. A. Hagen), p. xlii–xliv. *d.* The genital apparatus of *Euryades Duponchelii* ♀ [compared with the egg-pocket of Parnassius]; *Papilio Alaska* = ? *P. Machaon* var. *asiaticus* (by H. A. Hagen), p. lv–lvi.

* 827. W. Roelofs. Note sur les Curculionides recueillis par M. Purves a l'Ile d'Antigua. Compt. Rend., p. xxv–xxvi. [Aug., 1875.]

Describes *Diaprepes Purvesi* n. sp.; notes on a few other species.

* 828. Dr. J. A. Boisduval. Aperçu Monographique du Genre Io l'un des démembrements de la grande famille des Saturnides. p. 205–248. [Febr., 1876.]

Defends the name of the genus, taken from the name of one species; characterizes the genus; describes 71 (42 [36 S. A.] [6 N. A.] new) species. The new N. A. spp. are: Nos. 8 *I. Banus*, 28 *I. Cecrops*, 29 *I. Montezuma* Lucas, from Mexico, 19 *I. Godartii*, 31 *I. Mendosa*, from Mexico?, 27 *I. Fabricii* (with fig. of larva) [= *Bombyx Io* Fabr.] from U. S.

* 829. The **Annal. Soc. Entom. Belg.**, T. xix (1876), contain the following (in the Compt. Rend.), and Nos. 830 to 833.

a. On the distinctive characters of Locustina and Gryllina [reasons for considering that the Gryllacrididae and Stenopelmatidae, hitherto regarded as Locustina, should rather be transferred to the Gryllina] (by C. Stål), p. ix–xii. *b.* Experiments upon the effect of colored glasses in preventing the fading of specimens of insects exposed to the light [see Rec., No. 826*a*] (by J. B. Capronnier), pp. xiii–xiv, li–lii. *c.* Systematic and synoptic table of the eight subgenera [Ceratura, Anomalagrion, Ischnura, Amphiagrion, Oxyagrion, Acanthagrion, Xiphiagrion, Enallagma] of the first part of the genus Agrion; summary of the characters upon which the subgenera are based (by E. de Selys-Longchamps), p. xxxv–xxxvii; similar table of the twelve subgenera [Nehalennia, Agrion, Pyrrhosoma, Erythromma, Pseudagrion, Xanthagrion, Ceriagrion, Argiagrion, Anisagrion, Telagrion, Leptagrion, Erythragrion] of the second part (by the same), p. xlviii–l. *d.* List of Members, p. cix–cxvii.

* 830. FELIX PLATEAU. Note sur une Sécrétion propre aux Coléoptères Dytiscides. p. 1–10. [Sept., 1876.]

Some Dytiscids emit a milky liquid from between the head and dorsal region of the prothorax, and an entirely different yellowish liquid from between the mesothorax and metathorax. These liquids are examined physically and chemically; the milky liquid compared with the blood and as to its action upon other animals. "The milky liquid is the product of unicellular cutaneous glandules; is a special liquid and not the blood of the insect; probably does not serve to determine the approach of the sexes; does not act at all as a poison upon other insects; cannot be a means of defence; does not serve to form a fatty coating upon the surface of the body."

* 831. BARON MAXIMILIEN DE CHAUDOIR. Monographie des Brachynides. p. 11–104. [Sept., 1876.]

[The author leaves out of this work the Brachynus of the U. S. (for which see Rev. et Mag. Zool., 1868) and of some other countries.] Notes and synonymy of many species; descriptions of new species and genera. Nos. 57–64, 68, 82, 83, 85, 88 of Brachynus = 14 Mexican spp., of which *B. elongatulus*, *B. azureipennis*, *B. rhytiderus*, *B. consanguineus*, *B. melanarthrus*, *B. Sallei* seem to be new. Alphabetic table of genera and species. [See T. xviii, Compt.-rend., p. ii-iv.]

* 832. JULES LICHTENSTEIN. Notes pour servir a l'Histoire des Insectes du Groupe des Phylloxériens, Homoptères formant la transition des Aphidiens aux Coccidiens. p. 164–177. [Febr., 1877.]

Systematic position of the Homoptera Anthogenesia [Phylloxeridae], combining the characters of Aphidae and Coccidae, and divided into the genera Acanthochermes, Phylloxera and Rhizaphis. The development of *Rhizaphis vastatrix* is compared to that of a vegetal as follows: "In the spring, there is an egg under the bark of the vines; that is the seed. This egg hatches and from it issues a little aphid who is to become the mother foundress of the colony. This is the stem of the family. This mother lays numerous eggs; these are the branches. This lay takes place parthenogenetically. These numerous eggs, which I call bud-eggs, in distinction from the fecundated egg, give birth to myriads of aphids which are indifferently aerial or subterranean; these are the leaf-buds or the root-buds. . . . Summer arrives and then, quite like a plant which is about to flower, we see develop amid the colonies of the Phylloxera some insects larger than others, having stumps of wings; these are the nymphs, these are the flower-buds and fruit-buds. These nymphs issue from the earth; their skin splits, and a winged insect appears; this is the flower. This winged insect is neither male nor female, but, quite like a flower, carries within itself little envelops of different sizes, which it will lay on the leaves or bark of the vegetals that are to nourish its progeny. In the large envelops

Annal. Soc. Entom. Belg., T. xix (1876).

is an apterous female, in the small are apterous males. Would you not call it a perfect analogy with the pistil and stamens which the flower contains? We have here, I think, the only example in entomology of a winged form being only transitory, serving only as a vehicle for the perfect sexual form, a real flying cocoon, if I may express myself so. The little apterous aphids which issue from these envelops have no rostrum, but are furnished with generative organs and couple as soon as born. The male dies soon after; the female lays a *sole egg* in the cracks of the bark or on the folds of the leaves. This is the only and the real egg, quite different from the bud-egg parthenogenetically laid, still more different from the egg of the winged insect which I consider a real pupa or chrysalis, for that is, I think, the only name meet for the envelop whence issues a perfect insect which couples immediately." "It is peculiar to" *Rhizaphis* "*vastatrix* that the production of winged individuals does not exhaust the subterranean colony; it is vivacious and, like bees and ants, is parthenogenetically reproduced for four years at least and probably even as long as the nourishment lasts." Notes on the habits of several species.

* 833. Eugene Duges, M. D. Description des Métamorphoses de Minturnia dimidiata Lac., Coléoptère du Groupe des Mégalostomides. p. 178–183, pl. i. [Febr., 1877.]

Describes the larva-cases, larva (fig.) pupæ (fig.) and manner of transformation of *Minturnia dimidiata*, found on the branches of *Schinus mollis* at Guanajuato, Mexico.

* 834. The **Proc. Acad. Nat. Sci. Philad.** for 1875 [see Rec., Nos. 258–263], from p. 153, contain the following, and Nos. 835 to 839.

a. Junction of the American Entomological Society with the A. N. S. Ph. as a Section thereof, pp. 504, 505. *b.* Entomological contributions to the Museum, p. 511.

* 835. A. R. Grote. On Orthosia ferrugineoides. p. 328. [Aug., 1875.]

Synonymy of the species [see Rec., No. 263]; *O. ralla* is another species. "A name proposed for a variety cannot obtain against a name proposed for a species."

* 836. Joseph Willcox. On the Flight of Grasshoppers. p. 361. [Oct., 1875.]

Locusts were observed repeatedly in Colorado to descend to the ground before each shower of rain, taking flight again after the shower.

* 837. Joseph Leidy, M.D. On Mermis acuminata. p. 400. [Nov., 1875.]

[*M. acuminata* is an internal parasite of the larva of *Carpocapsa pomonella* (see Rec., No. 314)].

* 838. A. R. Grote. On North American Noctuæ. p. 418–427. [Dec., 1875 and Jan., 1876.]

Describes *Apatela Harveyana, A.* (*Eulonche*) *lanceolaria, Heliophila lapidaria, Hadena vultuosa, Mamestra vindemialis, M. Dimmocki, Lygranthoecia limbalis, Aedophron Snowi, Agrotis introferens, A. campestris, A. gularis,* Fala, *F. ptycophora, Heliothis luteitinctus, Tarache augustipennis* [? *ang-*], *Catocala Alabamae* = 1 n. g., 14 n. spp.; re-describes *Cirrhophanus triangulifer* (fig.), *Agrotis cinereomacula, Parastichtis minuscula*; remarks on *Helotropha atra*; *Heliophila multilinea* Walk. = *H. commoides, Demas versicolor* Morr. is a Hadena, *Agrotis unimacula* Morr. (nom. praeocc.) = *A. haruspica, Mamestra rufula* Morr. (nom. praeocc.) = *M. lubens*; list of 5 spp. of Catocala to be added to previous lists [see Rec., Nos. 203, 217].

* 839. H. K. Morrison. Notes on the Noctuidæ, with Descriptions of certain New Species. No. II. p. 428–436. [Jan., 1876.]

[See Rec., No. 263.] Describes *Panthea leucomelana, Agrotis Fernaldi, A. tristicula, A. hortulana, Mamestra quadrannulata,* Metahadena, *M. atrifasciata, Tapinostola variana, Taeniocampa vegeta, Orthosia immaculata, O. americana* [= Guenée's American specimen of "*Orthosia lota?*"], *Thalpochares carmelita, Syneda ingeniculata, Homoptera galbanata* = 1 n. g., 13 n. spp.; *Leucania henrici* Grote, *L. evanidum* Grote, and perhaps *Ablepharon fumosum* Morr. = *Arsilonche albovenosa*; *Orthosia minuscula* Morr. is a Hadena; *Taeniosea gentilis* Grote and *T. perbellis* Grote are Dyschorista.

* 840. The **Proc. Acad. Nat. Sci. Philad.** for 1876, contain the following, and Nos. 841 to 846.

a. Formation of the Entomological Section of the Academy of Natural Sciences of Philadelphia [list of members] [see Rec., No. 834 *a*], p. 66, [organization] p. 373. *b.* Entomological contributions to the Museum, p. 384.

* 841. H. Strecker. Description of a New Species of Ægiale and Notes on some other Species of North American Lepidoptera. p. 148–153. [Sept., Nov., 1876.]

Describes *Aegiale Cofaqui, Cossus nanus, Arctia cervinoides, Cymatophora magnifica, Cosmia perophoroides, Phrygionis argentistriata* = 6 n. spp.; describes *Papilio Indra* ♀; *Parasa incisa* Harv. = *Euclea paenulata.*

* 842. J. L. LeConte. Destructive Coleoptera. p. 195. [Nov., 1876.]

Occurrence of *Anthrenus scrophulariae*, destroying carpets, in and near Albany, N. Y. [At the meeting of the Cambridge Entomological Club, Nov. 10, 1876, Dr. H. A. Hagen said that he had often had complaints made to him about the destruction of carpets and woollens by insects, and had received specimens of the pests, which he recognized immediately as some species of Anthrenus, and on raising the imago he had

Proc. Acad. Nat. Sci. Philad., 1876.

determined that it was *A. scrophulariae*, but Mr. G. R. Crotch had asserted that it was *A. varius*, and so no further notice was taken of it. He had traced the origin of the pests mostly to one store in Boston, where they were found in second-hand carpets, and he said that when carpets were purchased they ought to be disinfected before use.]

* 843. REV. H. C. McCOOK. Habits of Formica rufa. p. 199–200. [Nov., 1876.]

Manner in which ants, replete with honey-dew, yielded this honey-dew as food to other ants; amity between ants from separate nests; ants which had been wet were not recognized as friends.

* 844. H. C. McCOOK. On Webs of New Species of Spiders. p. 200–201. [Nov., 1876 and Jan., 1877.]

Describes the web of *Epeira triaranea* n. sp., showing characteristics of the webs of Orbitelariae, Retitelariae and Tubitelariae combined, and of *Tegenaria philoteichos*, showing characteristics of the webs of Orbitelariae and Tubitelariae combined; remarks upon webs made by other spiders, which show a combination of the characteristics of several orders.

* 845. J. L. LECONTE. Report on Insects introduced by means of the International Exhibition. p. 267–271. [Jan., 1877.] — Also separate. 8vo. pg. 6. [Dec., 1876.]

No results evil to the agricultural interests of the United States are to be expected. Differences in the condition of the exhibits from different countries. List of 13 (9 identified) Coleoptera, 2 (identified, or 3) Tineidae, 4 (not identified) Hymenoptera, collected in the Centennial Buildings in Foreign Exhibits. List of 9 (8 identified) Coleoptera and 1 (? identified) Tineid, found in Mouldy Specimens of Straw Goods from Italy.

* 846. JAMES RIDINGS. Report of the Conservator of Entomological Section. p. 392–394. [Febr., 1877.]

Business. The American Entomological Society constitutes, in its relation to the A. N. S. Ph., the Entomological Section of the latter; though the A. E. S. and the Section work under different titles, they are essentially one and the same. The A. E. S. holds two semi-annual meetings for the transaction of its own business; all its other stated meetings are those of the Section. Meetings are held on the evening of the second Friday of every month.

The **Memoires de la Societe Royale des Sciences de Liege**, sér. 2, T. iv (1874), contain No. 847; T. v (1873) contains No. 848.

* 847. ERNEST CANDEZE. Révision de la Monographie des Elatérides. Premier Fascicule. 8vo. pg. viii, 218. [Aug., 1875.]

Difficulty of making a natural classification; geographical distribution and the modification of typical forms in accordance therewith; notice of Ed. Janson's collection, upon which this work is based; nomenclature resp. priority and orthography; variations within specific limits. Proposes the generic name Acrocryptus in place of Cryptotarsus [Philippi, 1873] preoccupied; describes "158" (*Adelocera coeca* and *A. adspersa* from Guatemala, *Dilobitarsus inopinus*, *Chalcolepidius Jansoni* and *Semiotus chontalenus* from Nicaragua, *D. Eloini* from Central America, *Ch. Jekeli* from ? Central America, *Lacon calamitosus*, *L. Truquii*, *Ch. Boucardi* from Mexico, and *Ch. aurulentus* from Southern California = 11 N. A.) n. spp. and enumerates respectively 36, 14, 34 and 0 N. A. spp. of Agrypnites, Alaites, Chalcolepidiites and Oxynopterites.

* 848. AUG. CHEVROLAT. Mémoire sur les Cléonides. 8vo. pg. viii, 118. [Aug., 1874.]

Acknowledgments; synonyms. Cleonidae distinguished from Lixidae; some characters and probable food-plants of Cleonidae. Describes 41 (Exochus, Plagiographus, Stephanophorus, Temnorhinus, Cossinoderus, Pycnodactylus, Cylindropterus, Trachydemus, Centrocleonus, Tetragonothorax, Gonocleonus, Neocleonus, Apleurus, Pseudocleonus, Priorhinus, Cnemodontus, Xanthochelus = 17 new) genera and 114 (3 N. A.) spp., of which 77 (*Apleurus fossus* and *A. Boucardi* from Mexico and *A. quadrilineatus* from Texas = 3 N. A.) spp. are said to be new. Enumerates, in an appended catalogue, 306 ["305"] (4 N. A.) spp., distributed in 41 (1 N. A.) genera, and 50 (5 N. A.) spp. of genera unknown. Recapitulates the genera geographically.

* 849. **J. A. Lintner.** The New Carpet Bug Pest. The [Albany, N. Y.] Argus, vol. l, No. 18,760, Oct. 21, 1876.

Anthrenus scrophulariae now first detected in the U. S.; its ravages.

The **Bull. U. S. Geol. and Geogr. Surv. Terr.**, [see Rec., Nos. 564–573], vol ii, from p. 279, contains nothing entomological; vol. iii contains Nos. 850 to 860.

* 850. A. R. GROTE. Notes on a Collection of Noctuid Moths made in Colorado in 1875 by Dr. A. S. Packard, Jr. p. 115–120. [April, 1877.]

Geographical distribution and synonymy of the 11 N. A. species of Oncocnemis; describes *O. oblita* n. sp. from Nevada. Enumerates about 15 species from Colorado; describes *Hadena diversilineata*, *Heliophila pergracilis* = 2 n. spp.

* 851. V. T. CHAMBERS. The Tineina of Colorado. p. 121–142. [April, 1877.]

"A compendium of all that has been published upon the subject to this time" [see Rec., Nos. 341, 343, 441, 449]. Describes *Anesychia discostrigella*, *Nothris ? bimaculella*, *Gelechia serratipalpella*, *G. pedmontella*, *G. gly-*

cyrhizaeella, G. amorphaeella, G. monumentella, G. trilineella, G ? ocellella, G ? anarsiella, G. ochreostrigella, G. bicostomaculella, G. triocellella, G. collinusella, Argyresthia montella, A. quercicolella, A. altissimella, A. pedmontella, Coleophora basistrigella, C. artemisicolella, Batrachedra clemensella ["= *B. praeangusta* Haw."], *Laverna ? coloradella, Lithocolletis amorphaeella, L. amphicarpeaeella, Eurynome albella, Bucculatrix albella* = 26 n. spp.; enumerates 73 determined species besides several undetermined larvæ, with notes on food-plants, comparative descriptions of related species and statistics and remarks upon the geographical distribution of the species.

* 852. V. T. Chambers. Notes on a Collection of Tineid Moths made in Colorado in 1875 by A. S. Packard, Jr., M.D. p. 143–145. [April, 1877.]

Describes *Gelechia packardella*, Blepharocera, *B. haydenella* = 1 n. g., 2 n. spp.; enumerates 13 recognized species, with notes on geographical distribution.

* 853. V. T. Chambers. On the Distribution of Tineina in Colorado. p. 147–150. [April, 1877.]

Notes on the altitude at which various species occur, the dependence of Tineina upon special food-plants, and the comparison in dimensions and color between Eastern and Western specimens of the same species.

* 854. A. S. Packard, Jr. On a new Cave Fauna in Utah. p. 157–169, fig. 5–10. [April, 1877.]

Description of Clinton's Cave at Great Salt Lake, and of the insects and mollusks found in it; describes *Nemastoma troglodytes* (fig. 5), *Polydesmus cavicola* (fig. 6), found in the cave, and *Scotolemon robustum* (fig. 8), found in Colorado not in a cave = 3 n. spp.; notes upon the habits and affinities of these and the [1] other species [*Tomocerus plumbea* var. *alba*] found, upon the geographical distribution of the genera, and upon "the evolution theory."

Note on a Beetle and Larva found in a cave at Manitou, Colorado; occurrence of *Diclidia laetula* and of three larvæ [here described] (fig. 9) perhaps of the same species, in the cave, and of *Blepharoptera defessa* (fig. 10) [here described by Osten Sacken] n. sp., near the entrance; the Blepharoptera occurs also in various caves in Kentucky.

Nos. 29 and 30 were issued Nov. 10, 1876.
No. 31 was issued Nov. 22, 1876.
No. 32 { p. 217–220, was issued March 6, 1877. / p. 221–244, was issued July 16, 1877. / p. 245–248, was issued July 25, 1877. }
Nos. 33–34 were issued June 8, 1877.
Nos. 35–38 were issued July 9, 1877.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., Sept.-Oct., 1877. [Nos. 41-42.

Descriptions of some Larvae of Lepidoptera, respecting Sphingidae especially.

In this article is given a list, as full as the time and means now at my disposal allow, of the descriptions hitherto published of the larvæ of North American Sphingidae, together with a few descriptions, now published for the first time, of larvæ of Sphingidae and of other moths. It is due to Mr. W. V. Andrews, the author of some of the new descriptions, to say that he put some of his descriptions into the hands of the editors more than a year ago, and their publication has been delayed through no fault of his.

The descriptions which are contained in the monograph of the Sphingidae published by Brackenridge Clemens in the Journal of the Academy of Natural Sciences of Philadelphia, iv (1859), are reprinted in the Synopsis of the described Lepidoptera of North America, i (1862), compiled by J. G. Morris for the Smithsonian Institution. As the latter publication is the more accessible, it is referred to here to the exclusion of the references to the original monograph.

The following named works have been consulted (with others) in the preparation of this list, and are referred to by the abbreviations prefixed.

Abb.—The natural history of the rarer lepidopterous insects of Georgia (1797).

Can. Ent.—Canadian Entomologist, vol. i–ix (1868–1877).

Hy. Edw.—Henry Edwards' Pacific Coast Lepidoptera, Nos. i–xxiii (1873–1877).

Harr. Ins. Inj. Veg.—T. W. Harris' Treatise on some of the insects injurious to vegetation (ed. of 1862).

Harr. Ent. Corr.—T. W. Harris' Entomological Correspondence (1869).

Harr. Sphinx.—T. W. Harris' . . . Catalogue of the North American . . . Sphinx . . . , in the American Journal of Science and Arts, vol. xxxvi (1839).

Lintn. Ent. Contr.—J. A. Lintner's Entomological Contributions, Nos. i–iii (1873–

1876) and another (1877), in the 23d, 24th, 26th, 27th Annual Reports on the New York State Museum (1869–1873). [The pagination of No. ii is that of the Reports.]

Morr.—Brackenridge Clemens in J. G. Morris' Synopsis of the . . . Lepidoptera of North America, part i (1862).

Pr. E. S. Ph.—Proceedings of the Entomological Society of Philadelphia, vol i–vi (1861–1867).

Riley.—C. V. Riley's Annual Reports on the . . . Insects of . . . Missouri, i–ix (1869–1877).

Streck.—Herman Strecker's Lepidoptera, Rhopaloceres and Heteroceres . . . , Nos. i–xiii (1872–1876).

Trans. A. E. S.—Transactions of the American Entomological Society, vol. i–vi, p. 128 [containing nothing upon this subject].

Sphingidae. Description of the "annulets" and position of stigmata, by Lintner, in Ent. Contr., ii (1873), 109.

Sphinx sp. incogn. Brief and imperfect description of young larva, by Lintner, in Pr. E. S. Ph., iii (1864), 670.

Mr. Lintner writes that the larva here described is not that of a Sphinx, but of *Notodonta dictaea*, for which see his Ent. Contr., No. iv, to be published soon.

Sesia diffinis. Figure of *Sphinx fuciformis*, in Abb., pl. 43. Description of Abbot's figure, in Harr. Sphinx, 308–309. Brief description in Morr., 149. Good description, by T. L. Mead, in Can. Ent., ii (1870), 157–158. Excellent description of mature larva, by Lintner, in Ent. Contr., ii (1873), 109–110.

Sesia buffaloensis. Full description of larva in five stages, by Lintner, in Ent. Contr., ii (1873), 112–113.

Sesia tenuis (*Hemaris tenuis* Grote).

Length 35 mm. Green, with eight black stigmatal points. The anterior edge of first thoracic segment a little raised, studded with a double series of deep yellow tuberculate points. Venter deep reddish purple, shading to blackish laterally over the feet. Anal horn black, pointed, yellow on the sides at base, studded with blunt tubercles. Head above green; first thoracic segment tuberculate; the surface of the rest of the body is transversely wrinkled. Feeds on Snowberry [Symphoricarpus].
(*A. R. Grote*, Febr., 1878.)

Sesia thysbe. Brief description, by E. Doubleday, in Harr. Ent. Corr., 129, from an unpublished figure of *Sphinx pelasgus*, by Abbot. Full description, by Lintner, in Pr. E. S. Ph., iii (1864), 646.

Proserpinus gaurae. Figure of *Sphinx gaurae*, in Abb., pl. 31. Descr. of Abbot's figure in Morr., 154.

Thyreus nessus. Brief descr., by W. V. Andrews, in Can. Ent., ix (1877), 20. The same descr., sent to PSYCHE in November 1876, is stated to have been based upon three examples.

Thyreus abbotii. "Figure, by Abbot, in Swainson's Zoological Illustrations, part i (1821), pl. 60." Descr. of Abbot's figure, in Harr. Sphinx, 307. Full descr., discriminating the two sexes, in Morr., 156; others, by Riley, ii (1870), 78–79, and figure of full-grown larva, fig. 54; others, by Lintner, in Ent. Contr., ii (1873), 114–116. Brief descr., especially of young, in Harr. Ent. Corr., 284, and figure of full-grown larva, pl. iii, fig. 1. Evidence, by C. P. Whitney, in Can. Ent., viii (1876), 76, supported by A. R. Grote, in l. c., 100, that the supposed sexual distinctions are not reliable.

Enyo lugubris. Figure of *Sphinx lugubris*, in Abb., pl. 30. Descr. of Abbot's figure, in Harr. Sphinx, 307; also in Morr., 162.

Deidamia inscripta. Exceedingly brief descr., from memory, by J. Akhurst, in Streck., xiii (1876), 112.

Deilephila chamaenerii. Very brief descr., in Harr. Sphinx, 305; same copied, in Morr., 165; another, by G. J. Bowles, in Can. Ent., iii (1871), 145. Full descr., by Lintner, in Pr. E. S. Ph., iii (1864), 661; fuller, as "a supposed new species," by T. G. Gentry, in Can. Ent., vi (1874), 41–42; another, by Wm. Saunders, in Can. Ent., ix (1877), 64, 67.

Deilephila lineata. Figure of *Sphinx lineata*, in Abb., pl. 39. Good descr., in Harr. Sphinx, 304; essentially the same, in Morr., 164–165; another, by Lintner, in Pr. E. S. Ph., iii (1864), 662; others, including varieties, by Riley, ii (1871), 141–142, and figures of two varieties, fig. 61, 62. Riley's descriptions, falsely marked as a quotation, reproduced, by Saunders, in Can. Ent., ix (1877), 64, with Riley's figures, fig. 4, 5. Full description of *D. daucus* = *lineata*, and of a variety by Hy. Edw., xvi (1876), 2–3.

Philampelus vitis. Figure of *Sphinx vitis*, in Abb., pl. 40. Descr. of Abbot's figure, in Harr. Sphinx, 299; also in Morr., 179.

Philampelus satellitia. Very brief descr., in Harr. Sphinx, 300; still briefer, in Harr. Ins. Inj. Veg., 325; fuller, in Morr., 177. Brief descr., by Lintner, in Pr. E. S. Ph., iii (1864), 659–660. Best descr., by Riley, ii (1870), 76–78, and figures of young larva and of full-grown larva at rest and extended, fig. 52.

Mature larva olivaceous, deepest in tint on the inferior and lateral surfaces of the segments bearing prolegs; upper surface of the abdominal segments, and especially of the middle segments, of a pale rosaceous color, merging into green next a narrow, indistinct, pale lateral band; a dark dorsal stripe on the abdominal segments. A little in front of the middle of the spiracles of the third to the seventh abdominal segments is an irregularly ovoid pearly white spot, which extends from the anterior border of the segment to a little past the middle, trends backward and downward, and is bordered narrowly with black; the other spiracles are slaty blue, tipped above and below with white. Third thoracic and first to second abdominal segments with a few irregularly disposed, distinct black dots a little in advance of the middle of the segments. On the summit of the eighth abdominal segment is a nearly circular coral-red spot, with a large black pupil, bluntly pointed anteriorly, squarely docked and bordered with white posteriorly, surrounded by a narrow black border, and this by a slightly ragged, narrow white edging. Head and prolegs uniform brownish green. Length when at rest 66 mm.; breadth 12 mm. Feeds on *Ampelopsis quinquefolia*. Collected in Connecticut. (Described in 1862.)

(*S. H. Scudder.*)

Philampelus achemon. Figure of *Sphinx crantor*, in Abb., pl. 41. Very brief descr., in Harr. Sphinx, 300; still briefer, in Harr. Ins. Inj. Veg., 325, and figure of larva extended, fig. 150. Brief descr. of young and fuller descr. of mature larva, in Morr., 178. Good descr. of mature larva, by Lintner, in Pr. E. S. Ph., iii (1864), 660–661. Not very good figure of larva at rest, in Harr. Ent. Corr., pl. iii. fig. 11. Excellent descr., by Riley, ii (1870), 74–75, and figure of larva at rest, fig. 49. Full descr. of young and later stages, by Lintner, in Ent. Contr., ii (1873), 117–118.

Choerocampa tersa. Figure of *Sphinx tersa*, in Abb., pl. 38. Descr. of Abbot's figure, in Harr. Sphinx, 303–304; also, in Morr., 172.

Darapsa versicolor. Mere indication, in Streck., xiii (1876), 114. Exceedingly brief descr., by G. W. Peck, in Can. Ent., viii (1876), 239–240.

Darapsa choerilus. Figure of green and of pink larva of

Sphinx azaleae, in Abb., pl. 27. Descr. of Abbot's figures, in Harr. Sphinx, 302; also in Morr., 168. Brief descr., by Harris, in Ent. Corr., 283–284.

Darapsa myron, alias *Choerocampa pampinatrix*. Figure of *Sphinx pampinatrix*, in Abb., pl. 28. Good descr., criticizing Abbot's figure, in Harr. Sphinx, 302. Brief descr., in Harr. Ins. Inj. Veg., 326, and small figure of parasited larva, fig. 152. Poor colored figure of larva at extreme period of readiness for pupation [i. e., as usual, pink], in Harr. Ent. Corr., pl. i, fig. 10. Good descr., in Morr., 169. Excellent descr. of young and mature larva, by Lintner, in Pr. E. S. Ph., iii (1864), 663; similar descr., apparently based on Lintner's, by Riley, ii (1870), 71–72, and excellent figure of full-grown larva, fig. 44. Brief descr., by Saunders, in Can. Ent., iii (1871), 66, copying Riley's figure, fig. 25.

Smerinthus astylus. Very brief descr., in Streck., viii (1873), 56. Good descr. of caudal horn, by G. W. Peck, in Can. Ent., viii (1876), 239.

Smerinthus myops. Figure of *Sphinx myops*, in Abb., pl. 26. Descr. of Abbot's figure, in Harr. Sphinx, 291; another, in Morr., 208. Very brief descr., in Streck., vii (1873), 56. Note on variations, by G. W. Peck, in Can. Ent., viii (1876), 239.

Smerinthus excaecatus. Figure of *Sphinx excaecata*, in Abb., pl. 26. Very brief descr., in Harr. Sphinx, 290; same, except the words "larva granulated," in Morr., 209, together with very brief descr. of young larva and of Abbot's figure. Full descr., as an undetermined Smerinthus, by Lintner, in Pr. E. S. Ph., iii (1864), 666. Very brief descr. by Strecker, vii (1873), 55.

[If the crimson markings in Abbot's figure are replaced by yellow, the above descriptions agree in all except the color of the caudal horn. The larva described as *S. excaecatus*, by Lintner, in l. c., 665, is that of *S. geminatus*. For both these statements see Lintner, Ent. Contr., ii (1873), 127.]

Smerinthus ophthalmicus. Descr. of young and excellent descr. of mature larva, by Hy. Edwards, xvi (1876), 3.

Smerinthus geminatus. Full descr., erroneously as *S. excae-*

catus [which see], by Lintner, in Pr. E. S. Ph., iii (1864), 665. Excellent descr. of larva in five stages, by Lintner, in Ent. Contr., ii (1873), 119–121. Partial transcription of Lintner's later descr., by Strecker, vii (1873), 57.

Smerinthus sp. Good descr., by E. B. Reed, of an undetermined Smerinthus, in Can. Ent., i (1868), 40–41, which, as Saunders says, l. c., " corresponds very nearly to that of the larva of *Smerinthus excaecatus*, by Mr. Lintner" [i. e., *S. geminatus*].

This description is too good to lose, especially as it is associated with the mention of a remarkable habit, that of emitting a singing noise when disturbed, and contains some characters not attributed to any other Smerinthus larva referred to in this article, viz.: the paler green color of the back of the head, the semi-transparency of the anterior segments, the central elongated black patch on the anal plate and the paler under surface, with a darker central line. Its special point of agreement with *S. geminatus* consists in the presence of " a reddish spot at the apex " of the head, geminatus having the two superior granulations on the head of an orange color; but both geminatus and excaecatus have a subdorsal thoracic line, while none such is attributed to Reed's larva or to *Cressonia juglandis* in the descriptions. Comparing the description of Reed's larva with those of *S. excaecatus*, *S. geminatus* and *C. juglandis*, and representing these four species respectively by the letters R, E, G and J, we find that all four are green, and thickly granulated, with a lateral stripe on each side of the green and granulated head [head pale reddish brown, in J, according to Clemens], and seven oblique stripes on each side of the green body, the granulations being larger by the side of the stripes. The head of R, G and J is large and triangular, that of G rising above the first segment and being flattened, that of J with the longest diameter twice that of the first segment and with quite pointed apex, while that of E does not rise above the first segment and is semi-conical; it is of a deep shining green color, with a reddish spot at the apex, and is paler green and granulated behind the stripes, in R; green, having the granulations within the lateral stripes larger than those without, in E; pale or apple-green, granulated in pale green anteriorly and in white laterally and having within the lateral stripes a row of larger rounded granulations increasing in size to the apex, where the two superior ones are papilliform and of an orange color, in G; and light green [pale reddish-brown, Clem.] in J: its lateral stripes are yellow in R, bright yellow and straight in G, pale yellow [Clem.] in J, but are, in E, " whitish or light green " [crimson, Clem.], " bordered by darker green posteriorly, commencing anterior to the ocelli, curving slightly, and uniting at the apex;" the body is apple-green in R, E and J, the anterior segments being semi-transparent in R, the body very pale dorsally in E, pale green, whitish dorsally, in G, and pale in J; the under surface is slightly paler than the upper, with a darker central line, in R, while the green color is deeper below the stigmata in E and G; the seventh lateral oblique abdominal stripe is broader than the others and ends at the base of the caudal horn, and the oblique stripes are pale or faint, in R and E, these stripes being faint greenish yellow, the central stripes with a reddish tinge, in R, pale yellow, the seventh brighter, in E and G, and lighter green than the body, approaching white [crimson, edged beneath with pale yellow, Clem.], in J; in G, each of these stripes occupies about three-eighths of one segment, the whole of the next and six-eighths of the third, being straight on the central segment and curved posteriorly on the following one, "not angled at the incisure, — having within them a granulation on each annulation (eight to the segment)," while, in E, these stripes, in the first six segments, begin "at the margin of each somewhat below the lower portion of the stigma, traversing two segments in lines slightly concave anteriorly, forming an angle at the incisure — sometimes continued on a third segment, nearly reaching the vascular line," the seventh stripe beginning "on the posterior portion of the ninth segment on the sub-stigmatal flexure, and continued in nearly a straight line to the horn," the granulations of the seventh stripe being elongated into papillæ, and, in J, these stripes are made the more conspicuous from the increased size of the granulations toward the broadest part of the stripe, "each annulation adding to it a single granulation, extending over two segments and nearly reaching to the vascular line;" E has a "subdorsal thoracic line, pale yellow, extending over the second and third segments nearly horizontally, and on the fourth, curving upward and terminating near the vascular line," while G has the subdorsal thoracic line yellow, granulated with pearl-white, papillæ larger than those in the stripes, beginning "on the anterior of the first segment, diverging from the dorsum as it proceeds, and uniting at the sixth [or seventh] annulation of the fourth segment with the first lateral" stripe; the granulations of the body are small and greenish yellow in R, pointed and white in G, white [pale yellow, Abb.] in J, and small, white-tipped, and more conspicuous on the anterior segments in E; the caudal horn is at an angle of 20°, recurved backwards, purplish red and thickly granulated in R; nearly straight, 6 mm. long, violet [rose-colored, yellow laterally, and often yellow tipped, Lintn., 1864], and acutely granulated in G; straight, 2.5 mm. long, green, and broad at its base in E; and slender, 5 mm. long [brownish, with blackish spinules, Clem.], quite rough with numerous acute granulations, which are more prominent than those of the body, in J: the anal plate bears a central elongated black patch with larger granulations on each side, in R; is of a darker green, concolorous with the ventral region and is granulated, in G; and is light green, studded with conspicuous white granulations, in E: the stigmata are small, round, and dull red, in R; and red, except the first, which is orange, in G: the feet are pale green, spotted with red, and the prolegs greenish, semi-transparent, in R; are dark reddish brown in J, and are roseate and brown, the prolegs green, in G: the legs, at tips, are rose-color, in E; the length of R is 38 mm., that of G, 31–50 mm., and that of E, 63 mm., with a breadth of 10 mm.; the mandibles of R are black; the maxillæ of E, within black; the labrum of E, rose-color.

The food-plant of R (Fagus) is more closely related to those of J (Ostrya, Carya, Juglans) than to the food-plants of either E (Acer) or G (? Prunus, ? Pyrus, Fraxinus, ? Ulmus, Salix). Harris, in Ent. Corr., 281, mentions the squeaking habit of the larva of *C. juglandis.*

Smerinthus modestus. Very brief descr. of the larva in six stages, by R. Bunker, in Can. Ent., ix (1877), 210–211.

Length about 40 mm.[1]; stout. Color, after first moult [this seems to correspond to the second moult, as described by Bunker], very dark green, with yellowish granulations, which form, on third and fourth segments, a sort of crest. A yellowish subdorsal line along each side of the dorsum. The seven sloping side lines slightly yellow; the seventh or anal line, running from the fourth proleg to the anal horn, thickly granulated. Anal horn yellow. Feet yellow, tipped with pink. As the larva matures, all the yellows become white, the body becomes pale green, and the anal horn nearly disappears. Breathing holes edged with red. Head triangular, with heavy granulations. Feeds on Poplar (Populus) in July and August.
(*W. V. Andrews*, September, 1877.)

Cressonia juglandis. Figure of *Sphinx juglandis*, in Abb., pl. 29. Descr. of Abbot's figure, and very brief other descr. of *Smerinthus juglandis*, in Harr. Sphinx, 292; brief descr. of same, in Morr., 213; additional characters, by Clemens, quoted by Grote and Robinson, in Pr. E. S. Ph., v (1865), 187. Good descr., by Lintner, in Pr. E. S. Ph., iii (1864), 668. Brief descr., by Harris, in Ent. Corr., 281; another, briefer, by Strecker, vii (1873), 54.

Ceratomia quadricornis. Good descr., in Harr. Sphinx, 293; another, brief, in Harr. Ins. Inj. Veg., 323–324, and a good figure, fig. 149; another, in Morr., 205. Very brief descr. of young larva, by Harris, in Ent. Corr., 282; another, as *C. amyntor*, by C. S. Minot, in Can. Ent., ii (1869), 28. Excellent series of descriptions of the several stages, deserving, like many of the subsequent descriptions of larvæ by the same author, to rank as a classic model, by Lintner, in Pr. E. S. Ph.,

[1] Mr. Andrews writes as follows, under date of Jan. 18, 1878: "For myself I earnestly protest against any metrical terms being used in any thing you may be pleased to publish from my pen, and if you choose to use the jargon in my papers, I should like you to note my protest."

i (1862), 286–290. Brief mentions of the brown coloration of some larvæ, by W. V. Andrews, in Can. Ent., viii (1876), 40, and by R. Bunker, in l. c., 120.

Daremma undulosa.

Length about 75 mm.; rather slender, smooth. Color of the back and about half-way down the sides a beautiful bright green; under parts dull green. The seven sloping side lines yellowish white. Breathing holes pink or lilac. Head bordered with pinkish white. Legs lilac. Anal horn tinged with lilac. Feeds on Lilac (Syringa) and Privet (Ligustrum) in June and July. (*W. V. Andrews*, December, 1876.)

Diludia jasminearum. Brief descr. of *Sphinx jasminearum*, by Strecker, xiii (1876), 116.

Diludia catalpae. Brief descr. of an undetermined species of Sphinx, by E. Doubleday, in Harr. Ent. Corr., 127–128, from an unpublished figure by Abbot. Mr. A. R. Grote says, in a letter dated Febr. 1, 1878: "The larva on Catalpa, p. 127, is figured and described by Boisduval, Sphing., pl. ii, figs. 1 (imago), 2 (larva), as *Sphinx catalpae* Bd., from Abbot's drawings. The species has not yet been seen in our cabinets." Boisduval's figure is mentioned by Strecker, xiii (1876), 120.

Pseudosphinx tetrio. "Beautifully figured," by F. Poey, in his Centurie de Lépidoptères de l'île de Cuba, Dec. ii (1832); descr., by H. Burmeister, in his Systematische Uebersicht der Sphingidae Brasiliens [ex Abhandl. Naturf. Gesellsch. Halle, iii (1856), Sitzungsb., 58–75], 8; brief descr. of caudal horn, by Poey, quoted by Grote and Robinson, in Pr. E. S. Ph., v (1865), 65, — from which source the above citations are taken. Brief descr. of Poey's figure, in Morr., 185.

Macrosila rustica. Figure of *Sphinx chionanthi*, in Abb., pl. 34. Brief descr. of Abbot's figure, in Morr., 187.

Macrosila [*Sphinx*] *carolina.* Figure of *S. carolina*, in Abb., pl. 33. Exceedingly brief descr., in Harr. Sphinx, 294. Figure, in Harr. Ins. Inj. Veg., 322, fig. 146. Brief descr., in Morr., 189–190; others, in Harr. Ent. Corr., 282–283.

When first from the egg the head is smooth, and covered with rather short sparse hairs, which also clothe the last two segments of the body, otherwise smooth; the caudal horn is very finely serrate. At its next stage the larva has lost its smooth appearance, the head and body being covered with rough points, while the caudal horn has become thorny; there are but few hairs upon the body, and these are mostly confined to the terminal segment and the head, where they are much shorter than in the first stage. When 25 mm. long, the hairs have entirely disappeared, excepting one or two on the terminal segment, which are directed backward; as in the earlier stages the larva is green, but hitherto the markings are confined to a dusky streak along the back, largest on the front of each segment, and a fainter streak along the middle of the sides: now the markings of the full grown larva first appear; until this period also, the spiracles have been testaceous with pale green borders: now they are black, with a faint purplish areola. When 45 mm. long, the head loses its rough points, and its surface becomes obscurely shagreened; the spiracles again become testaceous, or of a pale straw-color, surrounded by a ring of jet black, and this again by purplish, which also is indistinctly edged with black. These peculiarities continue until the final stage, excepting that the edges of the stigmatal openings become dark, and the purplish annular ring, as well as the outer indistinct black bordering, become proportionally broader.

The full grown larva is green (of varying shades), with a moderately narrow oblique white stripe, bordered above with dark brown, crossing the 1–8 abdominal segments at an angle of 45° from below upwards, starting at the front edge of each segment directly in front of the spiracles. The 8th abdominal segment has also a second streak parallel to the first, being a continuation of that on the preceding segment, and extending a little way up the side of the caudal horn. Fainter streaks of the same color also cross the same segments, each commencing at the same point and running backward with a slight downward tendency to the posterior edge of the segment, so as to form a broken substigmatal band. On the eighth abdominal segment the streaks do not reach the posterior edge. The last segment is edged with white. There are also faint dusky oblique streaks on the 2–8 abdominal segments (often obsolete) in continuation of the oblique white streaks of the preceding segments, and nearly uniting at their posterior end with those of the opposite side. Minute circular white dots, bearing a microscopic hair and edged with purplish brown, are scattered over the upper surface of the body, especially on the anterior segments. The caudal horn is slightly curved backward, and is generally held at an angle of 45°; it is of a bluish color, whitish on the sides, and studded with black thorns, or sometimes the whole horn is black; it varies in length in proportion to the body at different stages, as will be seen by the following measurements.

Length	of body	5	mm.;	breadth	of same,	.85	mm.;	length	of horn,	2.5	mm.
"	"	12.5	"	"	"	1	"	"	"	3	"
"	"	16	"	"	"	2	"	"	"	4.25	"
"	"	25	"	"	"	3	"	"	"	5	"
"	"	45	"	"	"	9	"	"	"	8.5	"
"	"	75	"	"	"	17	"	"	"	8.5	"

When the caterpillars have grown to half their size, if disturbed, they make a snapping sound with their mandibles resembling the click of sparks from an electrical machine. Feeds on *Nicotiana tabacum*. Collected in Connecticut. (Described in 1859.) (*S. H. Scudder*.)

Macrosila [*Sphinx*] *quinquemaculata*. Exceedingly brief descr., in Harr. Ins. Inj. Veg., 320, and a figure, fig. 142. Brief descr., in Morr., 190–191. Good descr. of several varieties, by Lintner, in Pr. E. S. Ph., iii (1864), 648–649. Descr., by E. Doubleday, in Harr. Ent. Corr., 126, from an unpublished (?) figure by Abbot. Copy of Harris's figure, by Riley, i (1869), 94, fig. 38 A. Good descr. of two varieties, by T. G. Gentry, in Can. Ent., vi (1874), 88–89.

The mature larva closely resembles that of *M. carolina*, differing from it in the following peculiarities. The oblique stripes are edged in front by a black band made up of somewhat distant delicate lines transverse to the direction of the band, which continue upon the succeeding segments as a border to the dusky extension of the oblique white stripes; the oblique white stripes have a slight bluish tinge above, which partially covers the adjacent black lines; the broken stigmatal band of *M. carolina* is replaced by scattered transverse lines; and, in addition, a narrow stripe, made up of broken and bent black lines, runs horizontally along the edge of the fold just above the prolegs; the last segment is scarcely edged with white, and there are no white dots upon the body. The back of the head is edged with black, the spiracles are of a lighter color, and the horn is smaller, and of a reddish color tipped with black. Feeds on *Solanum tuberosum*. (Described in 1859.) (*S. H. Scudder*.)

Macrosila [*Sphinx*] *cingulata*. Figure of *Sphinx convolvuli*, in Abb., pl. 32. Descr. of Abbot's figure, in Harr. Sphinx, 294; another, in Morr., 189. Good descr. of *S. convolvuli*, by Harris, in Ent. Corr., 282. Excellent descr. of six varieties, criticizing Abbot's figure, by Lintner, in Pr. E. S. Ph., iii (1864), 650–651.

Sphinx drupiferarum. Figure, in Abb., pl. 36. Descr. of Abbot's figure, in Harr. Sphinx, 294. Brief descr., in Morr., 197; another, by Lintner, in Pr. E. S. Ph., iii (1864), 658. Good descr. of young and of mature larva, by Wm. Saunders, published by E. B. Reed, in Can. Ent., iii (1871), 5–6, and a figure of mature larva, fig. 1.

Sphinx kalmiae. Figure, in Abb., pl. 37. Descr. of Abbot's figure, in Harr. Sphinx, 295. Good descr., in Morr., 196.

Excellent descr., by Lintner, in Pr. E. S. Ph., iii (1864), 657–658.

Sphinx cinerea. Good descr., by Lintner, in Pr. E. S. Ph., iii (1864), 655; another, by Harris, in Ent. Corr., 282, and a poor, small figure, pl. ii, fig. 6. The following description belongs very probably to this species.

Head green; lateral bands, running from near its summit to the base of the antennæ, dirty white, edged with pink; triangle and antennæ of the same color, excepting the tips of the latter, which are faint brownish red; mandibles black; other mouth-parts faint brownish red. Body dark green, darkest beneath, with a hoary aspect above on the abdominal segments. The seven oblique sphingial bands are dirty white edged above with dark green, and each extends from the anterior edge of the segment, a little below the spiracle, over that whole segment and two-thirds of the succeeding, on which it curves backward; the last band extends to the base of the caudal horn. Terminal segment with a scarcely discernible yellowish green edge. Caudal horn pale greenish blue above, pale green below, with two obsolescent stripes of yellowish white; it is reddish at the end, with a black tip, and is covered, especially beneath, with white dots and black specks. Spiracles black, surrounded by a white areola. Jointed legs hairy, faint brownish red, with black spots on the inside and black claws; prolegs fringed with hairs, and all but the anal pair faint brownish red at the tip. Length 77 mm.; breadth 12 mm.

In younger stages the bands are sometimes pure white, the dorsum white with a greenish tinge, the edging of the last segment purple, a blush of the same extending to the horn, which is purple; the legs are yellowish green marked with red, and the head sometimes brownish white, the bands white. Feeds on Lilac (*Syringa vulgaris*). Collected on Cape Cod, Mass. (Described in 1859.) (*S. H. Scudder.*)

Sphinx gordius. Exceedingly brief descr., by Harris, in Sphinx, 295; same copied, except saying "rusted" instead of "rust-red," by Morr., 198.

Sphinx eremitus. Brief description of young and full description of mature larva of an unknown species, by Lintner, in Pr. E. S. Ph., iii (1864), 652–653. Mr. Lintner writes that this is the larva of *Sphinx eremitus* Hübn. = *sordida* Harr.

Sphinx lugens. Excellent descr., by F. H. Snow, in Observer of Nature, iii (1875), No. 1; very brief extract from Snow's descr., by Strecker, xiii (1876), 115.

Dolba hylaeus. Figure of *Sphinx prini*, in Abb., pl. 35. Exceedingly brief descr., probably of Abbot's figure, by Harris, in Sphinx, 296; another, of Abbot's figure, in Morr., 204.

The following description belongs very probably to this species.

Penultimate stage. General color green. Head scabrous, and, like the body, thickly covered with raised yellow dots; a narrow yellow stripe on each side, the two nearly meeting on the summit and extending to the base of the antennæ: just behind its lower extremity a black dot; mouth-parts black. The seven oblique spingial bands extend each from the anterior edge of the segment, a little below the spiracle, over that whole segment and two-thirds of the succeeding, upon which they are less oblique; these bands vary from yellow, much paler and fainter on the posterior segment, to red, deepening to crimson anteriorly and changing posteriorly to a slightly rosy white, and upon the succeeding segment to greenish yellow; the last band, however, extends with double width upon the eighth abdominal segment, and, with a color as deep as upon the anterior segment, one-third way up the caudal horn: these bands are all bordered above by a band of equal breadth, of a crimson color, which dies out just before reaching the posterior border of the segments, excepting on the eighth segment, where it continues, as a delicate edging of the lower band, to the extremity of the horn, which is tipped with dark brown, while the basal third of the horn above, between these edgings, is green; the rest of the horn not covered by these markings is black. Edges of the last segment pale yellow; spiracles testaceous with white areola. Length 28 mm., breadth 5 mm.

Mature larva. Head scabrous; color and bands as in previous stage, excepting that the latter are parti-colored, being yellowish green in front and black behind; antennæ and labrum yellowish; other mouth-parts black. The sphingial bands occasionally do not pass to the succeeding segment, but usually they do, and they may be either yellow or white (in the latter case with a yellow tinge posteriorly), edged as before with crimson, and this crimson often followed above by a narrow margin of black, sometimes broken, and extending on the eighth abdominal segment as an edging of the yellow stripe (which here is always yellow), and on this segment never wholly wanting. The horn is black on the sides, with a slight lateral yellow stripe; green above and beneath. The whole body profusely sprinkled with circular white dots having a black areola, but the areola often wanting on the upper surface and sides of the abdominal and first thoracic segments, or the spots may be altogether wanting on the upper surface of the same segments. Spiracles testaceous, changing afterwards to a bright reddish color; prolegs light brown. Length 57 mm. Feeds on Sweet Fern (*Comptonia asplenifolia*). Collected on Cape Cod and at Princeton, Mass., and in Connecticut. (Described in 1869.) (*S. H. Scudder.*)

Anceryx ello. Figure, by M. S. Merian, in "Insectes de Surinam, page and plate 61," cited and exceedingly briefly described by Harris, in Sphinx, 297; Harris' descr. reproduced in Morr., 201.

Hyloicus plebeius.

Head light pea green, somewhat scabrous, with a black band on each side, passing from near the top of the head to a point behind the antennæ. Antennæ and labium white; the other mouth-parts black. Body light pea green; the seven oblique sphingial bands are formed of a narrow white stripe, edged posteriorly with lemon-yellow and anteriorly with black, in front of which the green of the body is darker than elsewhere; the black does not quite reach the edges of the segments, the white dies out a little sooner than the black, while the yellow reaches both edges, and in the last stripe extends over to the base of the caudal horn; the spiracles, which are faint brownish red, are half immersed in the yellow stripes. The caudal horn curves only on its apical half, and is light blue, covered with black tubercles irregularly, and so thickly that the terminal third is entirely black. Last segment and proleg dotted with black warts, and the edges furnished with a few very short hairs. First joint of jointed legs white, with a black spot on the outer surface; the others black, and all furnished with a few white hairs. Prolegs green, the tip furnished exteriorly with a large black spot; the hooks black. Length 75 mm., breadth 11 mm. Feeds on *Syringa vulgaris.* Collected on Cape Cod, Mass. (Described in 1859.) (*S. H. Scudder.*)

Hyloicus saniptri. Good descr. of a larva perhaps of this species, by Strecker, xiii (1876), 118.

Hyloicus cupressi. Brief descr. of an undetermined species of Sphinx, by E. Doubleday, in Harr. Ent. Corr., 128, from an unpublished figure by Abbot. Mr. A. R. Grote says, in substance, in a letter dated Febr. 1, 1878; "I think that the larva on p. 128 may be *Sphinx cupressi* Boisduval, Sphing., pl. ii, figs. 3–5, known from Abbot's figures alone, which are reproduced by Boisduval." Boisduval's figure is mentioned by Strecker, xiii (1876), 120.

Ellema coniferarum. Figure of *Sphinx coniferarum*, in Abb., pl. 42. Descr. of Abbot's figure, in Harr. Sphinx, 297; another, in Morr., 199, exceedingly brief descr. of same, in Harr. Ins. Inj. Veg., 328; another, by Strecker, xiii (1876), 116. [Harris' descr. of the imago of *S. coniferarum* belongs, not to this species, but to *E. harrisii*; the descr. of the larva, however, being copied, belongs to *E. coniferarum.*]

Ellema harrisii. Exceedingly brief descr., from memory, by G. Newman, in Morr., 216; not much better descr., by Strecker, xiii (1876), 117. Full descr., by Lintner, in Pr. E. S. Ph., iii (1864), 669. Figure, by Lintner, in Ent. Contr., i (1873), pl. viii, fig. 8.

Full-grown larva about 50 to 65 mm. in length, the thickness of an ordinary goose-quill at the abdominal segments, tapering from the fourth segment to the head. The ornamentation consists of alternate green and white longitudinal stripes, the dorsal stripe green, spotted with red, the red spots, when the larva is in repose, sometimes forming a stripe. The head is angular; front red, with a white or pinkish white border; the collar green. Legs green, prolegs red. Last segment bordered with red. In repose the head appears to be set on the body at an angle of 50° or 60°, so that a line drawn along the back to the tip of the head would be longer than one drawn over the insertion of the legs. This larva bears a striking resemblance, in shape, color, and manner of feeding, to the larva of the European *Achatea spreta* Fab., as given in Curtis' Genera of Insects, pl. 117, and it is noteworthy that the food-plant, pine, is the same for both species. *A. spreta* tapers less, and has no red markings, but in other respects is very similar, and one would like to know whether its attitude, when not feeding, is like that of *E. Harrisii*, namely, stretched at full length on the twig of its food plant. I took the larva in September, in New Jersey. (*W. V. Andrews*, October, 1876.)

Ellema pineum. Descr., by Lintner, in Ent. Contr., i (1873), 38.

[NOTE. References to Boisduval's work on the Sphingidae (1874), which was not obtained in time for this issue, will be given in the continuation of this article.]

Arctia arge. Brief descr., by Harris, in Ins. Inj. Veg., 346. Fuller descr., by Harris, in Ent. Corr., 286–287; another, by S. H. Peabody, in Can. Ent., vi (1874), 98.

This moth is by no means rare, but I find few people acquainted with its larva. Full grown it presents the following appearance: Length 38 to 45 mm.; cylindrical, that is, of about the same size from end to end. Ground color dark brown, with a dorsal and two subdorsal longitudinal lilac or brownish-pink stripes, the shade varying sometimes; dorsal stripe the broadest. Two rows of short oblique lines in the region of the stigmata. Legs black; prolegs reddish-brown. Body sparsely haired; the hairs brown, proceeding from eight tubercles on each segment; hairs about the stigmata reddish-brown. The very small larvæ, when first hatched, look like a bundle of very long brown hairs. After the second moult the lines appear distinctly, under a low power. Food-plants, Rumex and Plantago; the former preferred. The eggs are white when deposited, and then pinkish; they hatched out in about ten days. (*W. V. Andrews*, Nov., 1876.)

B. Pickman Mann.

(*To be continued.*)

Additions to the List of Newton Noctuidae.

The following names are to be added to those given in the list on p. 34–39 of the present volume of PSYCHE; the abbreviations are the same as in that list.

Diphtera fallax. R. l. Jl.
Apatela Radcliffei. R.; raised. Jn. Lrv. Prunus, Sp.
Agrotis badicollis. R. l. Au.
" *fennica*. Several s. Sp.
" *albipennis*. Two s. l. Sp.
" *incivis*. R.; three s. Sp.
" *trabalis*. Cocoon found under bark of *Pinus strobus* in April. Imago appeared in June.
Hadena impulsa. R. l. Jl.
" *apamiformis*. R. l. Jl. Au.
" *vultuosa*. C. l. Au.
" *leucoscelis*. R. s. Au.
Dryobota stigmata. R. s. Sp.
Laphygma frugiperda. C. s. Sp.
Prodenia flavimedia. R. s. Sp.
" *lineatella*. R. l. Jl. [*P. ornithogalli* is to be stricken from the previous list.]
Gortyna limpida. R. l. Sp.
Arzama densa. R. l. Au.
Nonagria sp. One l. Au.
Doryodes acutaria. R. l. Au.
Platysenta atriciliata. R. l. Jn. Jl.
Parastichtis minuscula. R. l. s. Au. Sp.
Glaea viatica. S. Oct. 19.
" *inulta*. Several s. Sp.
" *deleta*. (See below.)
Scopelosoma Graefiana. Several s. Sp. Oct. Nov.
Lithophane semiusta. R. s. Sp. 28, Oct. 18.
" *Georgii*. One s. Sp.
" *laticinerea*. C. s. Sp. Oct.
" *tepida*. R. s. Sp.
" *querquera*. R. s. Sp.
" *Baileyi*. (Grote, Can. Entom., ix, 86). Several s. Sp. Oct. Nov.
" *viridipallens* (Grote, Can. Entom., ix, 215). R. s. Sp. Oct.
Plusia formosa. One l. Jl.
" *verruca*. One s. Au.
Galgula hepara. One s. Nov.
Catocala neogama. R. s. q. Au.
" *piatrix*. R. q. s. Au. Sp.
Homoptera Woodii (Grote, Can. Entom., ix, 88–89). R. l. Jl.
Spargoloma 6-punctata. R. l. Jl.

The new species mentioned in the above list is described as follows, by Mr. Grote: —

Glaea deleta n. sp. ♂. Belongs, with *G. tremula*, to the section which I have called Epiglaea, in which the thorax has a sharp scale-ridge. Resembles *G. viatica* at first sight, but belongs with *G. pastillicans* to a different section of the genus. Expanse, 46 mm. Of the same color as *G. viatica*, but smaller, and with the transverse posterior line punctate, and the subterminal also broken into spots. Stigmata pale ringed, well sized, concolorous; reniform stained at base. The markings are faint. Hind wings fuscous above; with discal spot and line beneath. Antennæ white at base. Abdomen with ochery anal hairs. (*A. R. Grote.*)

Rare, at sugar, in September. Several (poor) specimens were taken at sugar in October.

Noctuae have been abundant here this fall. Besides the additional species of Lithophane mentioned above, I have taken all those given in my former list. The larvæ of *Lithophane disposita* and *L. Bethunei* were found last June at the roots of apple and willow trees.

R. Thaxter.

Nos. 39–40 were issued Jan. 12, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., Nov.-Dec., 1877. [Nos. 43-44.

Notes upon the American Species of Lithocolletis.

Lithocolletis (Zeller) comprises a multitude of species of small, gaily colored moths, all of which, in the larval state, are "leaf-miners" — that is, they burrow between the upper and lower cuticles of leaves, feeding upon the parenchyma.

We have in this country two distinct larval forms in this genus; so distinct that if the moths differed as do the larvæ, we would be compelled to regard them as differing generically. No differences have been detected, however, between the mature insects of the two groups, and one would not, on meeting with a species of which the larva was unknown, be able to determine to which larval group it belonged, unless indeed the ground color of the moth was white, when it might safely be predicted that the larva would be found to belong to the cylindrical group. The larvæ of this group present nothing in their form or outline whereby they may at first glance be distinguished from any other small cylindrical larvæ having only fourteen feet. Indeed they resemble much more nearly a small larva of the genus Gracilaria than they do the depressed or flattened larvæ of the other group of Lithocolletis.

The late Dr. B. Clemens, the pioneer in the study of American Tineina, who first called attention to the fact that the larvæ of this genus differ as above stated, thus describes the larva of what he calls the second, but which had perhaps better be known as the flattened or depressed group. "The head is thin and flattened, with the mandibles forming an appendage in front; the body is flattened, deeply incised, and mammilated on the sides." To this brief description I will add that, in nearly all the species, the dorsal surface of each segment is maculated, the forms of the maculæ differing with the species, but also differing so much at different stages of growth in the same species that it is very hazardous to undertake to determine a species by the markings of the larva. No decided connecting link between the two groups has been discovered, but the larvæ of some of the species of the flat group seem to undergo developmental changes, whereby they approach in form those of the cylindrical group, without, however, ever assuming the cylindrical form. The only species in which I have ever observed this approach to the characters of the cylindrical larvæ are *L. cincinnatiella* Cham. and *L. coryliella* Cham. I will not undertake to say positively that none of the other species of the flat group pass through similar developmental changes. It is possible that they all do so, and I can only say that, if they do, I have failed to detect it. Even in *L. guttifinitella* Clem., which is so nearly allied to *L. coryliella* Cham. that some entomologists might consider them varieties of only one species, I have never met with the intermediate larval stage, which I have sometimes found in *L. coryliella.* If these species, which have not been found to assume the intermediate form, do really assume it, they do so only after the last moult before passing into the pupal state, and it is very strange that it should never have been observed in them. It is, however, a point somewhat difficult to determine, because the removal of a larva from its mine ensures its speedy death, and one cannot say certainly that it would not have undergone some further development if it had remained in the mine. I can only say that I have removed them from the mine both before and after they had retired into the little circular nidus or depression into which they retire to pupate, but have never found any species in the intermediate stage, except the two above named, *L. cincinnatiella* and *L. coryliella.* Nevertheless it is still possible that, in such cases, their retirement into the nidus was only for some temporary purpose, and that if they had been permitted to remain in the mine they would still have undergone some further change, and might have passed into the intermediate stage. One thing, however, is certain: the larvæ of the cylindrical group are always cylindrical, while those of the flat group never assume the cylindrical form; and if they assume what I have called the intermediate form, it is still very distinct from that of the cylindrical larva, and is assumed only in the later stages of larval life. Indeed *L. cincinnatiella* is the only species which, so far as I have been able to learn, assumes a subdepressed or thickened form; for *L. coryliella* always retains the flattened, mammilated form, and only approaches *L. cincinnatiella* in the structure of the head and mouth parts. (See Figs. 1–4). I have always found the larvæ of *L. cincinnatiella*

Fig. 1.

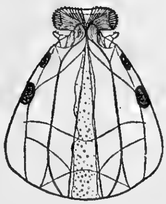


Fig. 2.

Fig. 3.

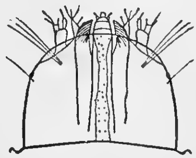


Fig. 4.

Explanation of the Figures.

Fig. 1. Larva of the flat group — ordinary form.
Fig. 2. Head of the same larva.
Fig. 3. Larva of "secondary" form of flat group, *L. cincinnatiella.*
Fig. 4. Head of same.

in the winter and early spring, that is, the latest fall brood having the intermediate form, and have had many specimens from such larvæ. Usually I have found the larvæ of the summer broods in the ordinary flat form; but occasionally, in the summer, the same mine contains larvæ of both forms, for the larvæ of this species are gregarious. The only specimens of the larvæ of *L. coryliella* that I have found in the intermediate stage were found in the fall, and belonged to the last brood of the year. This subject needs further investigation, and I propose to look more closely into it next summer.

I have not seen the larvæ of any exotic species. Mr. Stainton, in his very valuable edition of Dr. Clemens' papers on the Tineina, states, "I doubt much whether we have in Europe anything resembling this second (flat) group." But, if I am not mistaken, Prof. Frey has somewhere stated that it is found in Europe. It is very strange if it is not found there; and, if it is, it is equally strange that the very marked and palpable differences between the two forms have not long ago attracted attention and comment. In the cylindrical form the fourteen legs are distinct and well developed; in the flat form they are very small and indistinct. In The Natural History of the Tineina, vol. ii, the larvæ of several species are figured, some with distinct, well developed legs, others *apparently* apodal; but the latter have the cylindrical form, and have the heads as in this group, both as to form and position, while none have the dorsal maculæ which characterize more or less distinctly all the known larvæ of the flat group, except that of *L. ornatella*. One of the more striking differences between the two groups is found in the form and position of the head. The cylindrical larva does not differ in these particulars from the ordinary type of lepidopterous larvæ; that is, the head is full and rounded in front, and deflexed so that the mouth is a little below the axis of the body segments. In the flat group the head is thin and flattened, and not deflexed, the mouth being exactly in the axis of the body. The flat larvæ have two pairs of eyes, for eyes they are, though on removing the black pigment I find no cornea. Notwithstanding this rudimentary structure the larvæ see well, and retreat on the approach of danger.

Dr. Clemens states that "the cocoons of the second (flat) group are shown on the separated epidermis as a circle, or an almost hemispherical protuberance on the underside" of the leaf, and this, Mr. Stainton remarks, "is a very striking peculiarity." This is the *nidus* above referred to by me, but it is by no means common to all the species of the group. There are various modes of pupation in both groups. *L. helianthemella*, in Europe, and *L. ornatella*, in this country, leave the mine to pupate; all the other known species pupate in the mine. Some spin silken cocoons; others interweave grains of frass or excrement with the silk. Some make very dense, compact cocoons, while those of others are very flimsy; and some species make no proper cocoon, but the pupæ are simply attached to the threads of a very light, loose web; others make the nidus as described by Dr. Clemens. These nidi resemble very closely those made by some species of the genus Tischeria (*T. heliopsisella*, *T. ambrosiaeella* and *T. tinctoriella*). The beetle *Metonius laevigatus* makes a very similar nidus in leaves of Desmodium. The mines of larvæ of the flat group also differ both in form and color. Some, as those of *L. hamadryadella*, *L. cincinnatiella*, *L. coryliella*, are simply roundish, flat blotches; others, as those of *L. bethuneella*, are smaller, and have a distinct fold of the upper cuticle across the mine; others, as *L. tubiferella* and *L. guttifinitella*, when only a single larva is found in a mine, have more nearly the shape of the track made by a drop of water in running over a leaf; others have still other forms. The color of the mine depends upon the species making it, and not upon the leaf in which it is made. Thus *L. hamadryadella* and *L. cincinnatiella* mine leaves of oaks of the white oak group, and their mines are not dissimilar in form and size; but the mine of *L. hamadryadella* is always whitish, while that of *L. cincinnatiella* is dark yellowish. But, as far as I have observed, the larvæ of this group, with few exceptions, made at first an indistinct, long, crooked, narrow or linear mine, which ends in a blotch-like mine. This blotch frequently spreads over and obliterates the linear portion of the mine.

With the exception of *L. ornatella*, which mines both surfaces of the leaves, all the larvæ of the flat group mine the upper surface, and all of them make what may be called blotch mines, as distinguished from the tentiform mines made, without exception, by the larvæ of the cylindrical group. The mines of every species of the cylindrical group are on the under surface, except those of *L. tiliaeella* Cham., which are always on the upper surface; but very rarely a species which habitually mines the under surface will, for some cause or other, be found to have made its mine on the upper surface; yet this latter is an exceedingly rare occurrence. I give the results of my own observations only. The mines of the cylindrical larvæ, though always roomy or tentiform, and never blotch-like, differ in size and form, in the amount of corrugation of the cuticle, and in their position on the leaf. Many of the species are more careful than men are about the location of their dwellings. The little white mine of *L. fuscocostella* Cham. is never found elsewhere than at the extreme edge of the leaf of an oak, the edge being turned closely down over it. There is always something peculiar to the mine of each species of the genus, and the species may be as readily distinguished by its mine as by the characters of the imago.

The modes of pupation in the cylindrical group are as various as in the flat group, and indeed some species pupate in an ovoid cocoon of silk and frass, a mode which has not been as yet observed among the flat larvæ. The mines may be divided into tentiform and blotch mines (but the mine of *L. celtisella*, and a few others, seem to partake of both these characters), and into mines of the upper and of the under surface (but *L. ornatella* of the flat groups and blotch mine, eats into both surfaces, and *L. tiliaeella* of the cylindrical tentiform mine, and occasionally a specimen of some other species, which usually mines the under surface, mines the upper). The larvæ may be divided into the flat and cylindrical groups, but *L. cincinnatiella* and *L. coryliella*, and perhaps others, show a tendency to connect the two.

At first sight the imagos of this genus seem distinctly divisible into those of which the ground color is white, and those in which it is of some shade of yellow, varying from pale golden to deep saffron, or to reddish orange. Every one of the white section has a cylindrical larva and tentiform mine in the under surface of the leaf, except that, as before stated, *L. tiliaeella*, and rarely a specimen of some other species, mines the upper surface. Here then would seem to be a chance to divide the genus, of which the species are too numerous for convenience. But alas! many of the yellow group also have cylindrical larvæ in tentiform mines on the under side of the leaf, such, e. g., as *L. ambrosiaeella*, *L. argentinotella*, and *L. quercitorum*. In the Nat. Hist. Tineina, Mr. Stainton has arranged them, merely for convenience, I believe, in sections, according to the presence or absence of a basal and certain marginal streaks, an apical spot, dusting, etc.; but the basal streak is sometimes present or absent in different specimens of the same species, the marginal streaks and the fascia may be regarded as the same thing, — either as fascia in process of formation by union of opposite streaks, or as fascia breaking up into streaks — and the apical dusting and spot are very variable in many species, and are only different phases of the same phenomenon.

Altogether Lithocolletis is a very well marked and homogeneous genus of beautiful and gaily colored little moths, and, as a genus, is perhaps unsurpassed in beauty, though Cemiostoma and individual species of other genera, as *Lithariapteryx abroniaeella* Cham., or *Strobisia viridipennella* Clem. (the rival queens of the Tineina, in my judgment, and even the rivals of any Papilio, Ornithoptera, Charaxes, or Urania), may surpass any individual species of Lithocolletis. *L. ornatella* will, however, "hold up its head with the best." *V. T. Chambers.*

On the Structure of the Head of Atropos.

In the last number but one of PSYCHE (vol. ii, 49–51) Mr. Scudder has called attention to the erroneous description, by previous authors, of the mouth parts of Atropos, the common book-louse. Recent dissections of these parts, made not only on Atropos, where their minuteness renders study very difficult, but also on Psocus, leads me to believe that Mr. Scudder, equally with his predecessors, has failed to recognize their true structure. As I hope to give the results of my studies in detail elsewhere,[1] I will confine myself at present to the anatomy of Atropos.

It is somewhat singular that the structure of the maxilla in the Psocidae has never received more attention, as it seems to have no parallel among other insects. In Atropos and other members of this family, the maxilla consists of two small basal joints bearing outwardly a normal four-jointed palpus, and inwardly a broad, thin blade, narrower towards the tip, which curves over so as to form a sort of cover or "galea" to the sides of the mouth. As the thickened rim of one blade strikes on that of the opposite one (at least in Psocus), this organ may be used to aid the work of the mandibles in biting.

[1] Proc. Bost. Soc. Nat. Hist., XIX, 291.

This blade is supposed to be homologous with the outer lobe of the typical maxilla, which forms the galea in the Orthoptera. Behind and crossing this part lies the long forked rod, or "fish-bone" of Burmeister, supposed to represent the inner lobe or blade of the maxillæ, and which I shall call the "fork." Mr. Scudder was led, by the appearance of a specimen of Atropos, to consider that this fork consists of two elbow-jointed pieces, capable of being thrust suddenly forward to pierce any object. In an insect, however, which feeds on decaying vegetable or animal matter, such an organ would seem rather out of place, and in fact does not exist. The fork may be described as a long flattened rod or bone, slightly curved inwards, projecting between the blade of the maxilla and the labrum; its free or distal end forked with short tines, the outer tine being the longer.

In a position of rest the base of the fork reaches far back into the head. Near or beyond the middle, the fork is sharply contracted and then gradually tapers to the base. At the point of contraction the bone enters, and unites with, the lining membrane of the mouth. The base of the fork is embedded in a cone-shaped mass of extensor muscles; of which one large one runs into the upper part of the cardo, and was mistaken, I presume, by Mr. Scudder, for the inner arm of his supposed elbowed fork. The fork lies, moreover, between the rest of the maxilla and the flexor muscles of cardo and blade, so that they must aid in keeping it in place. It will be seen, therefore, that the bone is not articulated either to the maxilla or to the head, but is held in place by the muscles at its base and the membrane which it pierces and is attached to, near the middle. This membrane is probably more or less elastic, and allows the fork to be slightly projected and retracted, while the muscles move it about in various directions. Its probable use would thus seem to be that of a sort of pick to detach particles of food and bring them within reach of the mandibles, which are covered by the upper lip, and would be perhaps with difficulty themselves applied to detach portions from a mass of food. The question of homologizing the fork with the inner lobe of the maxilla, I think must be still left open.

The other mouth-parts may be briefly described as follows: the enormous, vaulted clypeus bears a short, broad labrum, the rim of which is bent over inwards, and bears two hooks pointing obliquely inwards, and separated by a distance equal to about one third of the breadth of the labrum. In a state of rest, the two lobes of the labrum fit in between these hooks, while the labial palpi fit in just outside of them on either side, thus closing the mouth completely.

The mandibles are very strong, triangular, the cutting edge sharp, concave, toothed, above expanding into a broad molar surface with fine transverse ribs. The labium is small, its outer border with rounded off angles and extending into two trowel-shaped lobes. The labial palpi are one-jointed, and club-shaped, reaching nearly half of their length beyond the lobes of the labium.

Lying beneath the labium can be seen two yellowish organs with a leaf-shaped outline, connected by two ducts which unite into one, the latter leading into a horse-shoe shaped chitinous bone, situated just below the opening of the œsophagus; these organs I take for salivary glands.

The eyes of Atropos consist of a group of seven simple ocelli, six of them round and arranged in two longitudinal rows, three above and three below, breaking joints with each other, the upper row being slightly in advance; behind and above the upper row is the seventh ocellus, which is long oval in shape.

The antennæ consist of two stout basal joints, the second the longer; and a flagellum of thirteen long, slender, cylindrical joints, which show, under a high magnifying power, a delicate transverse striation. *Edward Burgess.*

A PLAGUE OF HORSE-FLIES. Mr. S. H. SCUDDER said that between Alkali Station and Green River, in Colorado, is a very alkaline meadow which was so infested with Tabanus and Stomoxys that during a rapid walk of one and a half kilometres past this meadow, swinging his net before him, he caught 239 Tabanus of one species, 28 Stomoxys and a few other flies. The flies began to attack him when he had approached within about five kilometres of the meadow. Not a single Orthopteron was found in the meadow, although search was made. (*Oct.* 12, 1877.)

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 64.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. PICKMAN MANN.

Nos. 855 to 860 are from **Bull. U. S. Geol. and Geogr. Surv. Terr.**, vol. iii.

* 855. C. R. OSTEN SACKEN. Western Diptera: Descriptions of New Genera and Species of Diptera from the Region west of the Mississippi and especially from California. p. 189–354. [May, 1877.]

Definition of the localities in which collections have been made. Describes *Aëdes fuscus* (from Mass.) [Culicidae], *Chasmatonotus bimaculatus* (from N. Y.) [Chironomidae], 6 galls of Cecidomyidae, *Gnoriste megarrhina* [Mycetophilidae], *Blepharocera yosemite* [Blepharoceridae], *Limnobia sciophila*, *Elliptera clausa*, *Erioptera dulcis*, *E. bipartita*, *Limnophila damula*, Phyllolabis, *Ph. claviger*, *Ph. encausta*, *Trichocera trichoptera*, *Eriocera californica*, *E. brachycera* (from White Mts.), *Pedicia obtusa*, *Ptychoptera lenis*, *Protoplasta vipio*, *Tipula beatula*, *T. spernax*, *Pachyrrhina altissima* [Tipulidae], *Rachicerus honestus* [Xylophagidae], *Oxycera crotchi*, *Clitellaria rustica* [Stratiomyidae], *Pangonia hera*, *Tabanus procyon*, *T. sonomensis*, *T. phaenops*, *T. insuetus*, *T. aegrotus*, *Chrysops noctifer*, *Ch. fulvaster*, *Ch. proclivis*, *Ch. surdus* [Tabanidae], *Hirmoneura clausa* (from Texas) [Nemestrinidae], *Exoprosopa sima*, *E. dorcadion*, *E. titubans*, *E. dodrans*, *E. doris*, *E. eremita*, Dipalta, *D. serpentina*, *Anthrax alpha*, *Argyramoeba fur*, Triodites, *T. mus*, *Bombylius metopium*, *B. aurifer*, *B. cachinnans*, *B. lancifer*, Anastoechus, *A. barbatus*, *Systoechus oreas*, Pantarbes, *P. capito*, Comastes, *C. robustus*, *Lordotus ? planus*, *Ploas fenestrata*, *P. rufula*, *P. amabilis*, *Phthiria scolopax*, *Ph. humilis*, *Toxophora virgata*, Epibates, *E. funestus*, *E. luctifer*, *E. muricatus*, *E. marginatus*, *E. magnus*, *E. harrisi* (from Eastern ? U. S.) [Bombylidae], *Thereva vialis* [Thereridae], *Scenopinus bulbosus* (from Mo.) [Scenopinidae], *Eulonchus sapphirinus*, *E. marginatus*, *Pterodontia misella*, *Ocnaea helluo* (from Tex.), *Opsebius diligens*, *O. paucus*, *Oncodes incultus* (from White Mts.) [Cyrtidae], Rhaphiomidas, *Rh. episcopus*, *Apiocera haruspex* [Midaidae], *Laphria (Dasyllis) astur*, *L. vultur*, *L. rapax*, *Lampria felis*, *Ceraturgus lobicornis*, *Dioctria pusio*, *Ablautatus mimus*, *Ospriocerus minos*, *Clavator sabulonum*, *Pycnopogon cirrhatus*, *Cyrtopogon cymbalista*, *C. plausor*, *C. aurifex*, *C. princeps*, *C. cretaceus*, *C. profusus*, *C. evidens*, *C. rejectus*, *C. nugator*, *C. positivus*, *C. sudator*, *C. rattus*, *C. cerussatus*, *C. nebulo*, *Daulopogon arenicola* [Asilidae], *Hygroceleuthus crenatus*, *H. afflictus*, *Dolichopus corax*, *D. pollex*, *Tachytrechus sanus*, Polymedon, *P. flabellifer*, *Liancalus querulus*, *Scellus vigil*, *S. monstrosus* [Dolichopodidae], *Melanostoma tigrina*, *Syrphus intrudens*, *S. opinator*, *S. protritus*, Eupeodes, *E. volucris*, *Sphaerophoria micrura*, *Allograpta fracta*, *Baccha lemur*, *B. angusta*, *Volucella avida*, *V. satur*, *Temnocera setigera*, *Eristalis stipator*, *Pocota alopex*, *P. cyanella*, *Chrysochlamys dives* (from Ky.), *Ch. nigripes* (from Mass.), *Ch. croesus*, *Sphecomyia brevicornis* [Syrphidae], *Dejeania vexatrix* [Tachinidae], *Pyrgota debilis* (from Ky.) [Ortalidae], *Trypeta* (*Oedicarena*) *persuasa*, *T.* (*Acidia*) *fausta* (from White Mts.), *T.* (*Oedaspis*) *penelope* (from N. Y.), *T.* (*Eutreta*) *diana* (from Mo.), *T.* (*Zonosema*) *basiolum* (from Mass.) [Trypetidae] = 10 n. gen., 136 n. spp.; describes in part also numerous unnamed species; re-describes *Silvius gigantulus*, Therioplectes, Atylotus, *Tabanus rhombicus*, *Chrysopila humilis*, *Argyramoeba pluto*, *Toxophora amphitea*, *T. fulva*, *Epibates niger*, *Leptomidas pantherinus*, *Laphria* (*Dasyllis*) *columbica*, *Cyrtopogon callipedilus*, *C. montanus*, *C. leucozonus*, *C. longimanus*, *Dolichopus canaliculatus*, *Arctophila flagrans*, *Eristalis hirtus*, *Chrysochlamys buccata*; introduces the generic names Protoplasta to replace Protoplasa (O. S., 1859), for no authorized reason [presumably for classical purity], Chloromyia (Duncan, 1837) to replace Chrysomyia (Macq., 1834) pre-occupied, Paracosmus to replace Allocotus (Loew, Centur. x) pre-occupied, Pseudatrichia to replace Atrichia (Loew, 1866 [Schranck, 1803]) pre-occupied; gives a list of all the known species of Blepharoceridae, of N. A. Rachicerus, of N. A. (north of Mex.) Anthrax, of U. S. Argyramoeba, of U. S. Bombylius, of N. A. Geron, of N. A. Epibates, besides lists of lesser groups, and analytical tables of the N. A. (north of Mex.) genera of Bombylidae, of the U. S. spp. of Exoprosopa, of the Cal. spp. of Cyrtopogon, and of lesser groups. Especial attention is paid to the classification of the Tipulidae brevipalpi, Tabanidae, Bombylidae, Asilidae, Dasypogonina, Syrphidae, to the geographical distribution of the more important families, and to the habits of Cecidomyia, Argyramoeba and Systropus. The work concludes with some general remarks on the Diptera of the Western Region, and of California in particular, describing the limits and physical and faunal characteristics of the region and its affinities with and analogies to other faunal regions.

* 856. P. R. Uhler. Report upon the Insects collected by P. R. Uhler during the Explorations of 1875, including Monographs of the Families Cydnidæ and Saldæ, and the Hemiptera collected by A. S. Packard, Jr., M.D. p. 355–475, with two plates (27, 28) [May, 1877], p. 765–801 [Aug., 1877].

Letter of transmittal [general enumeration of the more noticeable insects collected, with remarks on their occurrence and behavior]. Enumerates 16 fam., 97 gen., 155 spp. Heteroptera; 6 fam., 28 gen., 42 spp. Hom.; 52 gen., 65 spp. Lep.; 21 fam., 69 gen., 95 spp. Col.; 10 fam., about 38 gen., over 55 spp. Dip.; 12 fam., 42 gen., 61 spp. Hym.; 2 fam., 7 gen.,

Bull. U. S. Geol. and Geogr. Surv. Terr., vol. iii. 8 spp. Neur.; 4 fam., 12 gen., 21 spp. Pseudoneur.; 4 fam., 24 gen., 31 spp. Orth. Describes the families Cydnidae and Saldae; describes also the following genera and species: Cyrtomenus, *C. mutabilis*, *C. obtusus* n. sp., Amnestus, *A. spinifrons*, *A. pusillus*, Trichocoris, *T. conformis*, Microporus, *M. obliquus*, *M. testudinatus*, Macroporus, *M. repetitus* n. sp., Homaloporus n. g., *H. congruus* n. sp., Aethus, *A. communis* n. sp., Rhytidoporus n. g., *Rh. indentatus* n. sp., Cryptoporus n. g., *C. compactus* n. sp., Pangaeus, *P. bilineatus*, *P. rugifrons*, *P. discrepans* n. sp., *P. margo*, *P. piceatus*, *P ? fusiformis*, *P ? fortis*, *P ? tenuis*, Melanaethus, *M. robustus* n. sp., *M. picinus* n. sp., *M. spinolae*, *M. elongatus*, *M ? subglaber*, Lobonotus n. g., *L. anthracinus* n. sp., Sehirus, *S. cinctus* [Cydnidae]; Liotropis n. g., *L. humeralis* n. sp. [Asopidae]; *Geocoris decoratus* n. sp. [Geocoridae]; *Phytocoris inops* n. sp., Labopidea n. g., *L. chloriza* n. sp., *Macrocoleus coagulatus* n. sp., Sthenarops n. g., *S. chloris* n. sp., *S. malina* n. sp., *Orthops scutellatus* n. sp. (pl. 27, fig. 7), *Megacoelum fasciatum* n. sp., *Poeciloscytus sericeus* n. sp., Pamerocoris n. g., *P. anthocoroides* n. sp., *Idolocoris agilis* n. sp. (pl. 28, fig. 17), *Orectoderus amoenus* n. sp. [Phytocoridae]; Salda, *S. sign ortii*, *S. ligata*, *S. confluens*, *S. pellita* n. sp., *S. sphacelata* n. sp., *S. hirta*, *S. coriacea*, *S. anthracina* n. sp., *S. crassicornis* n. sp., *S. littoralis*, *S. polita* n. sp., *S. stellata*, *S. lugubris*, *S. deplanata* n. sp., *S. interstitialis*, *S. luctuosa*, *S. coxalis*, *S. pallipes*, *S. reperta* n. sp., *S. elongata* n. sp., *S. orbiculata* n. sp., *S. humilis* [Saldidae]; *Hebrus sobrinus* n. sp. [Veliidae]; *Corixa tumida* n. sp. [Corisidae] = 18 (8 new) gen., 64 (34 new) spp. **Heteroptera**; *Cicada putnami* n. sp. [Cicadidae]; *Stiroma inconspicua* n. sp. [Fulgoridae]; *Gypona cinerea* n. sp., Parapholis n. g., *P. peltata* n. sp. [Tettigonidae]; *Glossocratus viridis* n. sp., *G. lineatus* n. sp., *G. vulneratus* n. sp., *G. fenestratus* n. sp., *Bythoscopus ramentosus* n. sp., Pachyopsis n. g., *P. laetus* n. sp., *P. robustus* n. sp., *Jassus excultus* n. sp., *J. jucundus* n. sp., *J. plutonius* n. sp., *J. belli* n. sp., *J. divisus* n. sp., *Deltocephalus argenteolus* n. sp., *Typhlocyba aureo-viridis* n. sp. [Jassidae] = 2 n. gen., 18 n. spp. **Homoptera**; *Stenobothrus laetus* n. sp. [Acrididae] = 1 n. sp. **Orthoptera**; *Mamestra discalis* n. sp. (Grote), *Botis volupialis* n. sp. (Grote), *Zophodia dentata* n. sp. (Grote), *Ecpantheria reducta* n. sp. (Grote), *Oncocnemis homogena* n. sp. (Grote), *Plusia sackenii* n. sp. (Grote) = 6 n. spp. **Lepidoptera**; figures *Nysius angustatus*, *Ischorcoris errans*, *Cymus claviculus*, *Zosmenus cinereus*, *Trapezonotus agrestis*, *Ischnorhynchus didymus*, *Orthops scutellatus*, *Phygadicus behrensii*, *Plagiognathus obscurus*, *Camptobrochis nebulosus*, *Capsus capillaris*, *Stiphrosoma stygica*, *Rhopalotomus brachycerus*, *Aneurus inconstans*, *Lopidea media*, *Agalliastis associatus*, *Idolocoris agilis*, *Lygus annexus* var., *Dacota hesperia*, *Rhopalotomus ater*, *Poeciloscytus unifasciatus*, *Malacocoris irroratus*, *Fitchia aptera*, *Calocoris rapidus* = 24 spp. **Heteroptera.**

* 857. T. Thorell. Descriptions of the Araneæ collected in Colorado in 1875 by A. S. Packard, Jr., M.D. p. 477–528.

Enumerates 31 spp. of 20 gen. and 9 fam.; describes *Tetragnatha elongata* [Epeiroidae]; *Linyphia orophila* n. sp., *Erigone cacuminum* n. sp., *E. strabo* n. sp., *Steatoda distincta* n. sp. [Theridioidae]; *Pholcus pullulus* [Scytodoidae]; *Gnaphosa conspersa* n. sp., *G. scudderi* n. sp., *Prosthesima melancholica* n. sp. [Drassoidae]; *Xysticus cunctator* n. sp., *Oxyptila conspurcata* n. sp., *Diaea lepida* n. sp., *Philodromus virescens* n. sp., *Ph. inquisitor* n. sp. [Thomisoidae]; *Lycosa sternalis* n. sp., *L. concinna* n. sp., *L. uncata* n. sp., *L. tristis* n. sp., *L. indagatrix* n. sp., *L. impavida* n. sp., *L. iracunda* n. sp., *L. sinistra* n. sp., *Tarentula modesta* n. sp., *T. scalaris* n. sp. [Lycosoidae]; *Phidippus coloradensis* n. sp. [Attoidae] = 25 (23 new) spp. **Araneae**; *Mitopus biceps* n. sp. [Phalangioidae] = 1 n. sp. **Opiliones.** Says (on p. 504): "I fully agree with those who think that when an author has named a certain species as the *type* of a genus proposed by him, the generic name in question ought to be kept for that species; . . . to name one or more species as *examples* of a genus is not the same as to declare them to be *typical* species of it."

* 858. James H. Emerton. Descriptions of Two New Spiders from Colorado. p. 528–529, fig. 18, 19.

Describes *Epeira aculeata* ♀ (fig. 18) and *Drassus coloradensis* ♂ (fig. 19, palpus) = 2 n. spp.

* 859. S. H. Scudder. The First Discovered Traces of Fossil Insects in the American Tertiaries. p. 741–762.

Refers to earlier publications and makes some corrections of them. Describes *Camponotus vetus*, *Liometopum pingue* [Formicidae]; *Ichneumon petrinus* [Ichneumonidae] = 3 n. spp., 3 gen., 2 fam. **Hymenoptera**; *Culex proavitus*, *Corethra exita* [Culicidae]; *Chironomus depletus*, *Ch. patens* [Chironomidae]; *Lasioptera recessa*, Lithomyza, *L. condita* [Cecidomyidae]; *Dicranomyia stigmosa*, *D. primitiva*, *D. rostrata*, Spiladomyia, *S. simplex*, Pronophlebia, *P. rediviva*, Cyttaromyia, *C. fenestrata*, *Tipula decrepita*, *T. tecta* [Tipulidae]; *Mycetophila occultata*, Sackenia, *S. arcuata*, *Gnoriste dentoni* [Mycetophilidae]; *Acrocera hirsuta* [Cyrtidae]; *Eristalis lapideus* [Syrphidae]; *Musca ascarides*, *M. bibosa*, *M. hydropica*, *M. vinculata* [Muscidae]; *Heteromyza detecta* [Helomyzidae] = 24 n. spp., 17 (5 new) gen., 9 fam. **Diptera**; *Aphana atava*, *Delphax senilis* [Fulgoridae]; *Tettigonia obtecta*, *Bythoscopus lapidescens* [Tettigonidae] = 4 n. spp., 4 gen., 2 fam. **Homoptera**; *Pachymerus petrensis* [Lygaeidae] = 1 n. sp. **Heteroptera**; *Phryganea operta* [Phryganidae] = 1 n. sp. **Neuroptera.** "Besides the [numerous] insects mentioned under the families, but not referred to genera, the collection contains forty-six species," of which some account is given. In addition a list is given of the 9 spp. of 9 gen. of 6 fam. of **Coleoptera**, and the 3 spp. of 3 gen. of **Physopoda** previously described from the same localities.

Bull. U. S. Geol. and Geogr. Surv. Terr., vol. iii.

* 860. S. H. Scudder. Description of Two Species of Carabidæ found in the Interglacial Deposits of Scarboro' Heights, near Toronto, Canada. p. 763–764.

Describes *Loricera glacialis* and *Loxandrus gelidus* = 2 n. spp.

*[1] 861. The **Sci. Amer.** [see Rec., No. 142], vol. xxxii, contains the following.

a. Paris Green Poisoning [and its dangers], p. 21. *b*. A Suicidal Scorpion, pp. 21, 68, 99. *c*. To destroy red spiders on plants, p. 92. *d*. Can Ants Talk?, p. 97. *e*. The Voices of Animals [i. e., of insects of several kinds] (by J. Orton), p. 117. *f*. Ants [Termes mining living green-house plants] (by J. Stauffer), p. 149. *g*. Bee Keeping [removing dead bees from the hive], p. 152. *h*. Can Ants Talk? [sound of Mutilla?] (by H. L. A. C.), p. 165. *i*. Fumigating Greenhouses [as done at Harvard College Botanic Gardens] (by D. Zirngiebel), p. 180. *j*. Partnerships of Ants and Plants, p. 192–193. *k*. The Mission of the Fly [*Musca domestica* as an eater of animalcules], p. 209. *l*. How Science is Annihilated [alludes to a criticism, in the *American Garden*, of Lubbock's observations on the relations of insects and flowers], p. 224. *m*. Extermination of the Phylloxera [figures of infected roots and of instrument for applying alkaline sulphurets in destroying the insects; the Phylloxera prize], p. 242. *n*. About Spiders (by E. S. Morse), p. 242. *o*. The Grasshopper [its ovipositor and egg-laying] (by J. G. Shoemaker), p. 244. *p*. The Plague of Flies [modes of keeping vermin out of houses] (by C .Thompson), p. 260. *q*. Parasites in the Tongues of Flies [inquiry about them] (by W. W. W.), p. 260. *r*. *Cimex lectularius* [use and habits], p. 289. *s*. The Use of the Mosquito, p. 326. *t*. The Scorpion Fly [Panorpa?], p. 327, fig. *u*. The Death's Head Moth [*Sphinx atropos*; fig. of larva], p. 327. *v*. Grasshopper Inventions Wanted [mention of devices for destroying Caloptenus and request for more inventions], p. 369. *w*. The diseases of the Silk Worm [from M. Pasteur's work; figures of *pébrine* and *flachérie*], p. 370. *x*. White Ants at St. Helena [their destructiveness], p. 373. *y*. Discovery of the Phylloxera remedy, p. 385. *z*. Insect Aesthetics [ants adorn their dwellings], p. 385. *aa*. Parasites in Wasp Stings, p. 388. *bb*. A Use for Bedbugs [perfumery from Cimex] (by C. K.), p. 404.

*[1] 862. The **Sci. Amer.**, vol. xxxiii, contains the following.

a. How does a Spider Make its Web?, p. 5. *b*. The Animalism of Plants [figures Sarracenia and others], p. 7. *c*. A Grasshopper Parasite, p. 16. *d*. How can the Grasshoppers be Utilized?, p. 19–20. *e*. A new Use for May Bugs [for water colors], p. 21. *f*. The Colorado Potato Bug, p. 32–33. *g*. The New Phylloxera Remedy [Dumas' mode by use of alkaline sulpho-carbonates], p. 48–49. *h*. Grasshoppers in the West, p. 52. *i*. The Birds and the Insect Pests, p. 56. *j*. Cocoon of *Attacus cecropia*

[1] Record made by Mr. George Dimmock.

[from Harris], p. 60. *k*. The Strength of Insects [review of and comments upon Plateau's experiments, p. 64. *l*. Utilizing the Grasshoppers [as food for animals], p. 68. *m*. Grass Planted by Grasshoppers, p. 81. *n*. The Currant and Raspberry Moths [description and figures of pupa of *Abraxas grossularia* and of *Lampronia capitella*, two English moths], p. 115. *o*. The Colorado Potato Beetle [various plants eaten by it], p. 116. *p*. The Chemical Fire-Fly [object and production of light of fire-fly], p. 121. *q*. Flies in a coffin sealed 15 years, p. 123. *r*. The Grasshopper Plague [luxuriant growth of grass after grasshopper invasion] (G. P. Zaleski), p. 132. *s*. The Cobweb Apple Moth [figures *Hyponomeuta*, an English species, and its web] (from *The Garden*), p. 135. *t*. Are Potato Bugs Poisonous? [notes on the paper cited in Rec., No. 587], p. 153. *u*. A Proposed Insect Commission [recommendation of Amer. Assoc. Advanc. Sci.], p. 153. *v*. Locusts as Food [note on the paper cited in Rec., No. 584], p. 153. *w*. Excommunicated Insects [theology against insect plagues], p. 166. *x*. Internal Parasites of the House Fly [from *Nature*], p. 241. *y*. Education of the Flea, p. 370. *z*. What flies do [they do not eat animalcules], p. 388.

*[1] 863. The **Sci. Amer.**, vol. xxxiv, contains the following. *a*. A Neglected Industry. — Bee Culture, p. 81. *b*. A New Insecticide [camphor in methylated spirits for killing insects on house plants], p. 134. *c*. The Extermination of the Phylloxera by Alkaline Sulpho-carbonates, p. 135, fig. *d*. The Secret of Educating Fleas, p. 136. *e*. Insects added to American Museum, New York, p. 136. *f*. A New Utilization of the Grasshoppers [by crushing and using them for sardine bait], p. 143. *g*. Wasps [on *Vespa maculata* and *Sphex ichneumonea*; extract from an article by Prof. A. J. Cook in *Annual Register of Rural Affairs*, for 1876], p. 146. *h*. Electricity as an Aid to Hatching Silk-Worms, p. 271. *i*. Improved Insect-destroying Compound, p. 297. *j*. Two Bee Questions Answered, p. 311. *k*. The Grasshopper Scourge of 1876, p. 321. *l*. Do Bees Make Honey? (by H. L. Eades), p. 388. *m*. The Grasshopper Pest (by J. F. Dunwoody), p. 388. *n*. Moths, p. 404. *o*. Exterminating Bedbugs, p. 405. *p*. The Mygales — Door Building Spiders, p. 407, fig.

*[1] 864. The **Sci. Amer.**, vol. xxxv, contains the following. *a*. The Farmer's Foes [Colorado potato beetles and grasshoppers, and means against them], p. 3. *b*. The Scorpions of Egypt [describes contest between a mouse and a scorpion] (by F. Buckland), p. 7, fig. *c*. The Locust Pest [effect of water and cold on the eggs of *Caloptenus spretus*] (by C. V. Riley), p. 9. *d*. Various Species of Ant Lions, p. 39, fig. *e*. Electroplating of Leaves, Insects, etc., pp. 47, 341. *f*. Facts about Potato Beetles (from S. R. M., in *Scientific Farmer*), p. 63. *g*. A Few more Words About Locusts, p. 84. *h*. Some Well Known British Moths [brief description of a few Sphingidae referred to an accompanying figure on which are represented British species of Argynnis only; the figure is labelled "British Moths"], p. 87. *i*. Potato Bug Sailors [on sea weed], p. 91. *j*. Killing Entomological Specimens [with ether], p. 91. *k*. New

[1] Record made by Mr. George Dimmock.

Sci. Amer., vol. xxxv.

Insect Powder Gun, p. 99, fig. *l.* Bees and their Institutions [from *Home and School*; gives thirteen figures of bees, hives, cells, etc., and of larva and imago of Death's Head Moth] (by S. B. Herrick), p. 103–105. *m.* Are Potato Bugs Poisonous?, p. 116. *n.* "Potato Pest Poison" [condemning some of the patent poisons for *Doryphora decemlineata*] (by C. V. Riley), p. 116. *o.* Resources of Animals [treats especially of spiders], p. 131. *p.* Some Notes on Potato Beetles [criticism of article cited in Rec., No. 864*f*] (by C. V. Riley), p. 164. *q.* Singular Property of Tomato Leaves [fresh tomato leaves used to keep insects from peach trees], p. 183. *r.* Rat-Tailed Larvae [of Eristalis] (by R. M.), p. 228. *s.* Saw Flies [Nematus and Cynips], p. 231. *t.* To Dispose of Curculios, p. 289. *u.* The Hemiptera or Bugs [fig. of *Pentatoma grisea*], p. 295. *v.* The Carpet-Eating Bug [*Anthrenus scrophulariae*], p. 307. *w.* A New Phylloxera Remedy, p. 328. *x.* The Army Worm: Its Natural History Complete [figures and describes all the stages of *Leucania unipuncta*] (by C. V. Riley), p. 372. *y.* Locust Flights East of the Mississippi [figures *Caloptenus spretus* and *Acridium americanum*] (by C. V. Riley), p. 392.

*[1] 865. The **Sci. Amer.**, vol. xxxvi, contains the following.

a. Bots [on *Gastrophilus equi* and *Hypoderma bovis*] (by C. V. Riley), p. 9–10. *b.* A Toad-Eating Fly [*Lucilia bufonivora*], p. 24. *c.* What it costs to Feed Insects, p. 160. *d.* A New Phylloxera Remedy — Decortication, p. 182, fig. *e.* Ant Intelligence, p. 198–199. *f.* A Woman's Success with Bees (by L. E. Cotton), p. 244. *g.* April Management of Bees [from the *Bee Keeper's Magazine*] (by Mrs. E. S. Tupper), p. 247. *h.* Plants and Insects [abstract of a lecture by Sir J. Lubbock], p. 248. *i.* Important observations on the Rocky Mountain Locust, or "Grasshopper" Pest of the West [figures all the stages of *Caloptenus spretus*] (by C. V. Riley), p. 260–261. *j.* Bee-Keeping in the Himalayas [from the London *Agriculture Gazette*], p. 275. *k.* Experiments with Locust Eggs, and Conclusions drawn therefrom (by C. V. Riley), p. 276–277. *l.* A New Remedy for the Potato Bug [potassic sulpho-carbonate for *Doryphora decemlineata*] (by Wm. L. Billin), p. 308. *m.* The Seventeen Year Locusts, p. 322. *n.* The Destruction of the Young Locusts [extract from Bull. U. S. Ent. Comm.; see Rec., No. 797], p. 344. *o.* Locust Prospects (by C. V. Riley), p. 369. *p.* The Cockroach Utilized [*Blatta orientalis* used in Russia as medicine], p. 391. *q.* The Hellgrammite [figures *Corydalis cornutus* in all stages] (by C. V. Riley), p. 392–393.

* 866. **C. Stål.** Om Colorado-Skalbaggen (Chrysomela decemlineata) en för Potatisodlingen högst skadlig Nordamericansk Insect, och om hans befarade öfverförande till Europa. Stockholm, Norstedt, 1875. 8 vo. pg. 21, fig.

Short description (with figures) and account of *Chrysomela 10-lineata*, its migrations, natural history, ravages, and the improbability of its reaching Europe, or at least of its being able to maintain itself there.

[1] Record made by Mr. George Dimmock.

Nos. 41–42 were issued March 8, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB
EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., Jan.–Feb., 1878. [Nos. 45–46.

Recent Progress of Entomology in North America.

FIRST ANNUAL ADDRESS OF THE PRESIDENT.

In selecting a subject for the first address from this chair, I have had in mind the principal objects of our Club. We have favored the biological side of our science — taking biology in its broadest sense — as the most important, the most interesting, and yet on the whole the least known. Anatomical studies also enter into our plan, but mere descriptive entomology, so far at least as it relates to perfect forms, and all vexed questions of nomenclature, have been almost wholly ignored, both at our meetings and in our journal. For, however important these latter subjects may be — to which, indeed, our members have elsewhere given a fair share of attention — we have desired, in the formation of our Club, and the establishment of our journal, to uphold the superior value of questions which have a more direct philosophical bearing. If, from time to time, we pause, and consider the work already accomplished, we shall be stimulated to better and more earnest endeavor for the future; we shall see the direction in which we need to advance, and can draw comparisons which are not without value. I propose then a general review of recent progress in this country, in the direction of our favorite studies. By proper grouping we may obtain a better idea of what has been accomplished. A separate reference to each paper by name will hardly be necessary, since the review is confined to the publications of a single year (1877), and the admirable record of our diligent Secretary will soon place the complete series in our hands.

Histories of insects furnish the fundamental data upon which will be based much of the future progress of entomological science. In this direction Mr. W. H. Edwards has this year contributed some of the most important facts. In the continuation of his admirable work on North American butterflies, the transformations and imaginal variations of *Papilio turnus* are represented on three plates executed with the rarest fidelity. Eleven drawings of the perfect insect appear, nine of the caterpillar in all its stages, and one each of the egg and chrysalis. Without enlarging on the beauty of these plates, we can safely say that in no country have butterflies been so generously illustrated. Mr. Edwards finds three broods of this butterfly in West Virginia, and, as in *Papilio ajax*, the spring brood is not made up solely from the produce of the last brood of the preceding year, but also, in part, from wintered chrysalids of both the earlier broods. The distribution of the butterfly, its habits, as well as those of the caterpillar, the food and the natural enemies of the latter, and the peculiar partial dimorphism of the butterfly, are fully discussed; the latter will be referred to again.

In the "Canadian Entomologist," Mr. Edwards has given us also the life history of *Phyciodes tharos*, with descriptions of the insect in all its stages. Although one of our commonest butterflies, whose early stages had been sought with care, we have, until recently, known nothing of its history. The eggs are laid in masses, on Asters; the caterpillars feed in clusters, and are at no period protected by a web; the winter is passed in the larval stage, and there are, annually, several broods of the butterfly; in the Catskills two, in West Virginia four. In the Catskills, the autumn brood is the form described as *P. tharos* proper, while the spring brood, the form *P. marcia*, is made up from both the broods of the previous year, a portion of the caterpillars from the former brood passing into premature hibernation. In West Virginia there are four broods: the first, from wintered caterpillars, is *P. marcia*, the second and third *P. tharos*, and the fourth both *P. tharos* and *P. marcia;* a large proportion of the larvæ hibernating. The first brood, however, is wholly made up of the remnant of the fourth brood of the previous year, no lethargy or premature hibernation of caterpillars being noticed in this southern station; it might therefore be proper to speak of only three broods, the produce of a portion of the last of which is prematurely developed, and then gives birth to a mixed progeny, cold effecting the change to *P. marcia* at both the beginning and end of the season. A curious fact was elicited by Mr. Edwards' experiments, viz.: that caterpillars maturing in one season moult only four times, while those hibernating moult three times before winter, and twice afterwards.

Mr. Edwards gives us also the history of an allied form, *Phyciodes harrisii.* I also traced the complete history of this insect ten years ago, and my unpublished observations agree almost entirely with those of Mr. Edwards. The eggs are laid in masses, on Diplopappus, and the larvæ feed in company. Mr. Edwards reared them in confinement, and "no web at any stage was spun for protection or other purpose"; in nature, however, a close web, resembling that of *Euphydryas phaëton*, is made, but is deserted on the approach of winter, when the caterpillars hibernate, doubtless under sticks and stones in the vicinity of their feeding spots. Mr. Edwards describes every stage of the insect previous to the imago.

He has also given us some scattered facts and experiments upon several species of Brenthis and Argynnis, supplementary to those he has previously published.

A fourth species of butterfly whose history we owe to the same investigator is *Satyrus nephele.* Descriptions of all the early stages are given; the eggs are laid on the stems and blades of grass, but, in confinement at least, many are dropped loosely on the ground. The eggs hatch late, and the young larvæ hibernate without feeding, as is generally the case in this subfamily. The larvæ mature slowly, only one brood being produced annually, and that late in the season.

Mr. C. V. Riley has given us two or three fine histories of unusual interest. The first is a complete life-history of another of the genera of Meloidae, only that of Meloe and Sitaris having been known hitherto — genera remarkable for their habits and extraordinary metamorphoses. More recently, Lichtenstein has shown a similar hypermetamorphosis in Cantharis. All these three genera undergo parallel changes; they first appear as active larvæ on flowers frequented by bees, and attach themselves to the body of the bees, thus gaining access to the hives, where they assume a maggot-like shape, and feed on honey. While digging for eggs of *Caloptenus spretus*, Mr. Riley found many pseudo-pupæ of blister beetles, and it occurred to him that there might be some connection between the two; which seemed the more probable since these, and other beetles of the same family, abound in the dry western regions where Acridians are so prolific. Following up this clue, he discovered the early larva or "triungulin" of two species of Epicauta and one or two species of Macrobasis in the eggs of the common destructive locust, and also in those of *Caloptenus differentialis*. He has, as yet, completely followed the history of only *Epicauta vittata*, the eggs of which are laid in masses in the ground. On hatching, the larvæ scatter in search of eggs, burrow into the pods, and feed upon the contents; one larva requiring an entire pod; if two enter the same pod, only the fittest survives. The young larva, before entering the eggs, has the triungulin form common, so far as is known, to all Meloidae, but after sucking a single egg it undergoes a moult, and assumes a form resembling the ordinary coleopterous grub — the second larva; this form, however, differs so much in its earlier and later life, a moult intervening, that Mr. Riley has aptly termed the earlier the carabidoid, and the later the scarabaeidoid stage. These differences have not been observed in other Meloidae. After another moult, the antepenultimate or pseudo-pupa stage is reached; this Mr. Riley prefers to call the coarctate larva, as it merely becomes rigid and dormant, in which state generally it hibernates. In the spring another moult takes place, and the larva returns to the scarabaeidoid form; but then, partaking of no food, burrows in the ground, changes to a pupa, and, in less than a week, to a full-fledged beetle. In Meloe and Sitaris the later transformations take place in the skin of the coarctate larva.

Following up his studies upon the Meloidae, Mr. Riley has discovered a remarkable insect of this group, hitherto unknown, to which he has given the name of Hornia, and which differs from other Meloidae by some remarkable characteristics, being a degraded form. It lives in the burrows of *Anthophora sponsa*, a mason-bee building in clay-banks, and probably spends most of its time in the bee-gallery. The triungulin has not been discovered, but the other forms of the larva exhibit the ordinary characters of the family.

Another discovery by Mr. Riley is that of the curious egg-mass of *Corydalus cornutus*, an insect extremely interesting from its relationship to carboniferous types found both in this country and in Europe. The larva and pupa have long been known, but the place of deposition and the nature of its eggs have remained unknown; or rather, eggs of another insect, which Mr. Riley believes to be a Belostoma, have been accredited to it, on the authority of the late Mr. Walsh. Haldeman's figures of the eggs have been very generally overlooked. As it now appears, the eggs are laid in oval masses, upon leaves of trees overhanging the water, or upon rocks; the mass is composed of two or three thousand eggs covered with a common white or cream-colored albuminous secretion. The young leave the egg-mass at night and in company.

Of precisely similar interest is the allied genus Pteronarcys, living specimens of which Dr. Hagen has studied to good purpose. He observed that the male taps upon the surface on which it is seated, with its abdomen, as Barnston had observed in the case of another Perlarian. He witnessed also the remarkable union of the sexes. Oviposition he did not see, but the eggs, probably dropped in the night, were laid in little heaps in the grass or in the water. He studied the curious gills with which Newport has made us acquainted, but which in life are more bag-shaped, with the fringe less widely spread than preserved specimens would lead us to suppose. No motion was seen in these gills after the most careful observation; and the whole appearance of the gills, on internal examination, was that of an organ unfitted for breathing, although the tracheæ were very abundant in their immediate vicinity; on the other hand the abdominal spiracles, at least as far as the seventh segment, were perfectly formed for respiration. Moreover the creatures not only did not seek the water, but on falling into it, or being placed in it, they scrambled out with all speed. These observations rectify, in many important particulars, the statements of Newport, based of course on an examination of alcoholic specimens. Dr. Hagen noticed, moreover, a remarkable degree of individual variation in these insects, especially in the form of the head and prothorax and in the female organs of generation.

During the summer of 1876, Rev. Henry C. McCook studied the habits and architecture of the wood-ant (*Formica rufa*), whose mounds are abundant in the mountains of Pennsylvania; and has just given a very interesting account of his observations. He camped for a week in the immediate vicinity of a large colony of nearly seventeen hundred hills, covering an area of twenty hectars. Although Huber, Forel, and others have already given long accounts of the habits and architectural skill of this ant, the independent testimony of an observer on this side of the Atlantic has a peculiar value, and appears at first sight to indicate some diversity in the habits of this species on the two continents. I am not aware whether any differences between the ants themselves have been observed; but as differences, at least varietal, do occur in American and European examples of *Formica sanguinea* and *Lasius flavus*, two other common ants found in both countries, the distinction of habits found by Mr. McCook in *Formica rufa* has an important bearing.

The mounds made by these ants are cones of greater or less regularity, generally three or four metres in circumference at the base, and seven and a half to nine decimetres high; one double hill — the blending of two hills — was found measuring more than seventeen and a half metres in circumference, and considerably more than a metre in height. Not only do the hills appear to be grouped in large colonies, but each colony is made up of family clusters, probably the work of a single republic. The hills are mostly composed of earth brought from beneath, but the surface is strewn, to a greater or less extent, with bits of decayed wood, pine needles and fragments of straw, though apparently not to the extent that is described in the nests of the European ant. This surface material is brought in by surface foraging. The nest is honeycombed through and through with galleries, most of which lie in horizontal strata, but show no such enlargement into chambers at special points as occurs in European hills. The nests when injured are repaired immediately, not by adding grain to grain, to make a solid mass, afterwards to be mined by galleries, but by constructing these galleries at once with little pellets formed of a few cemented grains of earth, fastened to the parts already in place; in this way arches are sprung at needed points, and galleries are formed by filling in the spaces between the arches. Wherever great damage has occurred, the work goes on simultaneously from many centres by the springing of arches from piers erected at symmetrical intervals. In the same way stories are added to the structure.

The work often goes on with surprising rapidity, so that mounds half the average size of the mature hills may be built in a single year; but when once they have reached the normal size, a period of thirty years may show little change, the multiplication of the colony being provided for by the construction of new mounds. Mr. McCook estimates that usually nearly thirty cubic decimetres of material are raised by new communities in a single year. As all this has to be brought from beneath the ground, through galleries in direct connection with the interior of the mound, the extent of these underground passages must be very great. By stamping on the ground, one such gallery was traced, just beneath the surface of the soil, for a distance of eighteen metres, and it is probable that there are as many subterranean galleries as there are superficial paths. A curious fact was noticed in the orientation of the mounds; that while they were nearly conical, the longest face of the cone lay toward the west and its steepest slope toward the east; this peculiarity was only noticed in the mountains and was not invariably true, but obtained as a general rule, whatever the slope of the ground.

Huber states that these ants close the approaches to their nests at night and open them again by day. Forel says that they seem to close them only when they appear to have no further use for them; and Mr. McCook always found them open. Huber states further that the ants are inactive during the night; Forel, that they may seek their food by night as well as by day, but do not then occupy themselves in building, and remarks that their activity in general depends upon temperature, and they are often quiet at night simply because it is too cool for them to work. McCook's observations point to the same conclusion, but he found the ants both feeding and building at night, their activity in building clearly depending upon the moisture of the ground; when the nights were cold he found the ants torpid on the trees, beside their aphid flocks, just as the cold had surprised them. Here they would resume their activities with returning warmth. Observations in mid-winter show that the colonies then remain still active in the galleries directly beneath their mounds; at the same time the interstices of the mounds may be occupied by the hardier white-ants and by cockroaches. No colonies of Aphides nor any source of food were found within reach; but in this connection it may be mentioned that Dr. Leidy has this year found in a single formicary of *Lasius flavus* two large herds of Aphides and one of Coccidae, sufficient, no doubt, to feed the colony for an entire winter.

The paths diverging from the ant-hills invariably lead to plants or trees occupied by colonies of Aphides. These are visited by immense numbers of ants, who gorge themselves with honey-dew and return to feed the occupants of the nest. Mr. McCook was astonished, however, to see how few of these "repletes," as he calls them, actually returned to the nest; and thus was led to the discovery that many of them were stopped on their return, by hungry workers, "pensioners" he calls them, emerging from the openings of the subterranean galleries, and were compelled to disgorge, so that the queens, males and young ants at home must have fared ill.

Mr. McCook has made the interesting discovery of another source of honey-dew for ants. At former meetings I have called your attention to the description given twelve years ago, by Guenée, of peculiar organs on some of the hinder segments of Lycænid larvæ, which may emit a drop of fluid. This is the new pasture which Mr. McCook has independently discovered by seeing the ants stroke the larvæ with their antennæ, in the familiar manner in which they solicit honey-dew from Aphides. Although search was made for beetles, only a single specimen of *Tmesiphorus costalis* was found in the nests.

Mr. McCook was unable to obtain any show of fight between these ants, excepting that individuals which had fallen into water (which is supposed to destroy their odor) were always attacked violently by their *confrères*. Every expedient was tried: colonies from distant hills were thrown upon a nest while it was covered with a swarming and nervous mass of ants, without the least effect; not the slightest sign of hostility could be induced; the imported ants always melted away into the general community as if at home. These are the principal observations offered by Mr. McCook, which we hope he may continue in the same spirit. Our ants offer a fruitful field of observation to those who have the leisure to observe them.

The only remaining insect, whose history has this year been given in full, with the exception of injurious species, which I reserve until the end, is our common *Platysamia cecropia*, of which Mr. T. G. Gentry has given a detailed description in all its stages.

In a paper on the classification of butterflies I have given generalized histories, as it were, of the different family groups, of which four are recognized; and I have attempted to exhibit the comparative inferiority of structure of the swallow-tails, bringing forward several considerations hitherto unnoticed, some of which may be briefly stated: the four-branched median nervure, supposed to be peculiar to the swallow-tails, exists also in the skippers; the osmateria are paralleled by similar organs in all other butterfly larvæ, and these being exceptionally developed, as tentacles or caruncles, in several special groups of insects, have no structural significance; the swallow-tails are most nearly allied to the Pierids, but the latter group possesses none of the characters on account of which high rank has been claimed for the swallow-tails; on the other hand the swallow-tails are directly allied to the skippers, the lowest family of butterflies, by the form of the egg, the dorsal shield of the first thoracic segment in the larva, the character of the silken attachments of the chrysalis, and by various points in the structure of the imago, such as the antennæ, the papillæ of the tongue, the folding of the inner border of the hind wing, the perfect development of the forelegs and the presence of a fore-tibial epiphysis. The chrysalids of the brush-footed butterflies are also shown to have passed through the "succincti" stage by the persistence of a form of abdomen then of use, but, in the "suspensi" stage, no longer serving any purpose. Several features in other groups of butterflies, such as the loss of the cremaster in the Lycænids, the procession of pupal characters in passing from the lower to the higher groups, and similar details concerning the atrophy of the forelegs and the structure of the tongue, are brought forward for the first time or in a new connection.

Passing now to partial histories and miscellaneous notes upon habits, we have descriptions of the larvæ and mines of various Tineidae by Mr. V. T. Chambers; of the larvæ of some Noctuid and Geometrid moths, five in number, by Mr. L. W. Goodell; of two species of Deilephila by Mr. Wm. Saunders; of the egg, larva and pupa of *Smerinthus modestus* by Mr. R. Bunker; the larva and pupa of *Euchaetes collaris* by Mr. G. H. Van Wagenen; the larva and pupa of *Meganostoma eurydice* and *Heterocampa salicis*, the former feeding on Amorpha, by Mr. H. Edwards; the larva and larval habits of *Megathymus yuccae* by Mr. C. V. Riley; the larva of *Exyra rolandiana* by Mr. R. Thaxter, and of *Thyreus nessus* by Mr. W. V. Andrews. We have notes on the oviposition and cocoon-making of Herpyllus and Epeira by Mr. J. H. Emerton, a notice of finding six chelifers beneath the elytra of a single Alaus by Dr. J. Leidy, and notes by Dr. Anderson on the habits of the trap-door spider of South Carolina, and my own on those of the tube-constructing ground spider of Nantucket — a species of Lycosa. Dr. H. A. Hagen, by the aid of notes from Baron Osten Sacken and Mr. H. S. Treherne, gives us an account of the habits of Termitina in Colorado, Nevada and Manitoba. In the former places they were found up to a height of two thousand one hundred metres. Mr. C. R. Dodge describes the habits of *Rhomalea microptera* in captivity, with notes on the eggs and young. Messrs. H. A. Brous and S. W.

Williston give their experience in hunting Amblychila, showing that it has subterranean and crepuscular habits, and noticing briefly the eggs and larva. Mr. W. H. Dall gives us an entertaining account of the movements of "educated" fleas, which he shows to be simply due to their struggles to escape when tied together, a ludicrous parody on education. Mr. C. V. Riley defends his theory of the pollination of Yucca by Pronuba, from the criticisms it has called forth, and Mr. H. Edwards gives some interesting notes on the larvæ of Psychidae which construct curious nests of various vegetable fragments, within which they live and undergo their transformations. He mentions three new forms of these nests from California. Mr. Wm. Edwards describes a flight of butterflies, probably of *Danaida plexippus*, near Natick, Mass.

Concerning the food of insects and insects as food, we have notes on the plants which nourish *Hemileuca maia*, by Messrs. R. Bunker and O. S. Westcott, and *Saturnia io*, by Mr. L. W. Goodell, besides the scattered notices which usually accompany general lists. Mr. C. R. Dodge gives a curious account of the perforation of a minie ball, which had lodged in a tree, by the larva of a borer, and Dr. H. A. Hagen supplements the account by a long list of lead-boring insects. Dr. A. S. Packard, Jr., notices the preference that white butterflies show for white flowers, and Mr. T. G. Gentry, in his Birds of Eastern Pennsylvania, gives a long list of insects which serve each bird as food, showing on his part remarkable industry, and demanding, on our side, a certain amount of credence.

With regard to the seasons of insects, Mr. F. B. Caulfield publishes some facts to show that *Meloe angusticollis* is a spring, and *M. americanus*, an autumn species, which Mr. W. Brodie's observations do not confirm, if he has rightly determined his species. Mr. F. B. Caulfield believes that *Vanessa J-album* does not appear later than other Praefecti ; and I have attempted to illustrate the harmony of tints in nature by showing how closely, in New England, the colors of the prevailing butterflies, at any one season, correspond to the hues of the landscape.

Experiments have been made upon the vitality and longevity of insects by several persons. Mr. H. C. McCook, in his observations upon ants, found *Camponotus pennsylvanicus* capable of enduring exposure to extreme cold without permanent injury. A formicary was broken open in midwinter and left three weeks in the open air, in the mountains; when carried to a warm house, the ants resumed their activity. He also proves their power to endure extreme heat by relating an instance in which ants were not destroyed nor driven away from their nest by frequently making a fire upon the stone beneath which they dwelt; his own experiments in burying ants for twelve hours in mud and water to the depth of twelve centimetres demonstrate their immunity from dangers of flood. Messrs. S. S. Rathvon and N. Coleman each relate instances, similar to many already known, of supposed longevity in the larvæ of longicorn beetles. Dr. A. S. Packard, Jr. records a number of experiments on the vitality of decapitated or otherwise mutilated insects, mostly Hymenoptera and Coleoptera; several of them, especially an Agrotis, a Hylobius and a Leptinotarsa living several days after beheading. Mr. G. Dimmock has given a series of well-recorded experiments upon the effects of certain gases on Arthropods, particularly on Coleoptera. It appears that carbonic dioxide, whether alone or mixed with air, is poisonous to them; hydrogen is not poisonous, and oxygen generally seems to be a stimulant. Nitric oxide acts as a quick poison, from which they do not recover.

In some notes on the circulation of insects, I have attempted to show that the fluids of the body are forced, by the movements of the dorsal vessels, into the peritracheal cavities, whence, after becoming aerated, they pass into the tissues of the body to perform their functions; are thence received into the general cavity, and, mingling with the fluids newly expressed from the alimentary canal, join the general currents which flow toward different parts of the dorsal vessel, to enter again the initial points of the circulation.

We have one or two papers on the functional use of various organs. Mr. L. Trouvelot has made experiments on the use of the antennæ. Several insects were deprived of antennæ;

their eyes were then covered with a thick coating of india-ink, and in this condition they were set free or placed near sweets, or with their mates. From these experiments he concludes that the sense localized in the antennæ cannot be regarded as simply that of touch, of hearing or of taste, nor can it be regarded as uniting the complex functions of these senses; he would rather regard it as a sense of direction or orientation.

The observations of Mr. Trouvelot led Dr. Packard to make somewhat similar experiments, especially upon Hymenoptera and Lepidoptera; but they were not sufficiently extended for him to draw any general conclusions, and were in some instances so contradictory as to need repetition; but it would appear that the nervous centres are permanently affected by deantennization.

Dr. J. G. Morris has observed, what Charpentier recorded many years ago, the action by which an earwig opens its tegmina by means of its forceps before flight.

Concerning unusual and unexpected variations of form, we have an exquisite colored plate of *Papilio calverleyi*, and figures of hermaphroditic specimens of *Papilio asterias* and *P. turnus* by Mr. W. H. Edwards. Mr. Edwards also announces that he has raised *Limenitis arthemis* from eggs of *L. proserpina*. Mr. H. Edwards describes an apparent dimorphism, possibly phytophagic, in the larva of *Halesidota agassizii*. Mr. C. G. Siewers describes some curious variations said to occur in *Arctia isabella*, and Mr. W. V. Andrews describes the variations of *Dryocampa rubicunda*. Mr. C. E. Worthington reports finding two pupæ of *Platysamia cecropia* in one cocoon, and Mr. W. H. Edwards gives us a continuation of his experiments upon the effect of cold in changing the form of certain butterflies. His experiments were made upon *Phyciodes tharos*, *Papilio ajax* and *Lycaena pseudargiolus*. These species were selected because they have a spring form differing from the forms appearing later in the season. Chrysalids were placed in an ice-box, to simulate the conditions of the winter season; but the experiments lost a part of their value, because he was obliged, at times, to leave them in the care of others. The result, however, proved the possibility of producing in all three species the spring form, or something resembling it; and specimens of this form were not rarely accompanied by specimens such as are called suffused when they occur naturally. Mr. Edwards suggests that the chrysalids producing such specimens in nature may have been subjected to such extreme cold, over a long period, as would be produced by a snow or ice envelope, — a suggestion which is rendered more probable from the fact that these examples of suffusion are most common in cold or mountainous countries, and, so far as I am aware, are unknown in the tropics.

In this connection we may again refer to Mr. Edwards' exquisite illustrations, where he discusses the melanism of the female of *Papilio turnus*. He notices that the dark form of the female is restricted to districts where a summer generation is possible, and is thus inclined to think the cause of its original appearance "in some way climatal," and brings forward some evidence against Dr. A. Weismann's theory that the dark female has superior attractions for the male. Mr. Edwards does not find the dark form more prevalent in one brood than in another, and has obtained dark females from a yellow mother and *vice versâ*; not however with the same frequency, having found only one instance of the former, which, as the male is always yellow, he does not think surprising; but that more yellow females are not produced from dark mothers — he has reared two out of twenty-three — indicates, he believes, an amazing energy in the dark form, and implies a time when the yellow female will wholly succumb to the other, throughout the region now inhabited by both. He would further explain the probable greater abundance of dark forms in the west than in the south, by the larger proportion of insectivorous birds in the prairie region, and the association of this butterfly with a larger number of yellow-colored swallow-tails in the south.

This insect, possessing two forms of female, one differing from the male and the other resembling it, is only one example of a large class, which I have recently discussed, attempting to show, in the first instance, that sexual dimorphism, or antigeny, is of two kinds, colorational and structural; the first prevailing in females, the latter in males. Colorational antigeny is divisible into partial and complete, the former being confined to the phenomena of albinism and melanism. Melanic antigeny is more common in this country at the south, and albinism at the north; while, in apparent contradiction to this, albinic females of a partially antigenic species, as *Eurymus philodice*, never appear in the spring brood, but increase in numbers throughout the hot season. So far as we know (*Cyaniris pseudargiolus* is an instance[1]), the opposite is the case with melanic females. Structural antigeny is found in the antennæ, legs and wings, affecting especially the contour of the wings, or the direction of their veins, and showing itself in peculiar patches of scales or rows of special hairs (of which the discal dash of our smaller skippers is a good example) or in folds of the wings, as seen in other skippers. But one of the most extraordinary cases, extraordinary both in its nature and in its concealment, is found in the presence of peculiar scales, called plumules or androconia, which occur in nearly every group of butterflies, although often entirely hidden by the ordinary scales. In endeavoring to account for them, the theory of sexual selection, put forth by Darwin, appears to fail just where we most need its aid.

Baron Osten Sacken has given us an important paper on the distribution of Diptera in this country, based, in great measure, upon the large collections made by him in the western territories. He contends for the essential unity of the entire western region of this continent, from the eastern limit of the dry plains to the Pacific Ocean, a region characterized by its extreme dryness in summer. Adducing his examples from all orders, he compares the organic forms of this region with those of the Mediterranean and central Asiatic regions of the old world, a district possessing very similar meteorological conditions; he recalls especially the prevalence in both of Heteromera among the Coleoptera and of Bombylidae among the Diptera, and remarks that the resemblance between the faunas of these two vast regions is an analogy, not a relationship.

[1] Since the delivery of this address, Mr. Edwards, to whom we owe our knowledge of the melanic form of this insect, and who has heretofore stated that the melanism was peculiar to the female, finds that all melanic individuals are males.

The general distinction between the western and eastern half of this continent, and the resemblance of the insect fauna of the former to that of Europe, is shown by the citation of a large number of important genera which do not occur in eastern America, but are found in both the other regions.

In an analytical comparison of the butterfly faunas of eastern North America and of Europe, I have shown the greater richness of the European fauna, and have pointed out some curious disparities in the proportions of the numbers of members belonging to different groups. Europe proves to be peculiar for its wealth in brush-footed butterflies, America in skippers; and this difference is largely due to the fact that there are more than four times as many Satyrids in Europe as in America, and five times as many small skippers in America as in Europe. Other minor groups, which are much better represented in Europe than in eastern America, are the blues (38 to 13), orange-tips (7 to 2) and Parnassii (6 to 0); while the groups disproportionately abundant in eastern America are the hair-streaks (20 to 10), the yellows (20 to 10) and the swallow-tails (9 to 3). A minuter analysis shows similar or even greater disparities, so that we find only one-fourth of the North American genera represented in Europe. The derivation of our present fauna is believed to be largely from the south.

Mr. V. T. Chambers has published some remarks on the distribution and geographical peculiarities of the Tineina of Colorado. He shows that the range of the species is generally dependent upon that of the food-plant, and that they scarcely occur above timber line. He also finds them rather plainer or more obscurely colored in Colorado than in the Mississippi Valley, Colorado having in fact an unusually large proportion of uncolored species.

Dr. A. S. Packard, Jr. has made us acquainted with a new cave-fauna at the southern extremity of Great Salt Lake, nearly as characteristic as that found in the caverns of Kentucky, Indiana and Virginia. In a straight gallery less than one hundred metres long, in which the darkness was not total, he found a bleached Poduran, of a species which is widely distributed in this country and in Europe, but which occurs in this condition only in caverns; a myriopod of the genus Polydesmus, also white; and an arachnid, belonging to the group of harvestmen, and to a genus, Nemastoma, not before known to the new world. Besides these there occurred a small white mollusk of a form hitherto unknown. He also explored a cave near Manitou, in Colorado, and found there a beetle, *Diclidia laetula*, which occurs near the mouth and also in the open air under stones; and a fly, *Blepharoptera defessa*, which had been taken before in Kentucky caves.

This brings me to the final division of my subject, the biological results of the investigations of injurious insects. A proper analysis of all that has been done in this field is manifestly a work of great difficulty, for over three hundred octavo pages have appeared during the past year in official documents or scientific journals on the destructive locust alone, without counting Mr. Riley's book of two hundred and thirty-one pages, which is a reprint of a part of the material above estimated, together with some taken from his previous reports. I cannot attempt to treat this portion of my subject in detail, but will content myself with a simple statement of what insects have been discussed, and close with a brief account of what has been done upon the natural history and ravages of *Caloptenus spretus*.

With the exception of Mr. A. R. Grote's account of a species of Nephopteryx which injures pine trees by boring into the bark and wood and thus causing an exudation of the pitch, all papers which pretend to offer anything new upon injurious insects, other than the locust, were written by the members of the U. S. Entomological Commission. Of these three naturalists, however, Mr. Cyrus Thomas, in his Illinois report, has contributed no new observations that I can discover, excepting upon the army worm, *Leucania unipuncta*; this he regards as normally a cut-worm, believing that he has found it living in early life upon the heads and blades of grain, and at its final stage "working beneath the grass and remaining hid from view." The evidence upon which he bases this extraordinary statement is, however, as his own words show, purely a matter of inference, and has no scientific basis.

Mr. Riley has given us, in his final report on the insects of Missouri, the complete life-history and full notes on the ravages and general habits of *Nematus ventricosus;* a nearly complete account of *Lophyrus lecontei;* has supplied the desiderata in the history of *L. abbotii;* and has added, from his earlier publications and those of Walsh, histories of *Pristiphora grossulariae* and *Emphytus maculatus* — all Tenthredinidae. He has also given a full account of *Eufitchia ribearia*, has added the most important parts of the history of the army-worm, and has furnished the history of an allied form, *Leucania albilinea.* Notes on the Colorado potato-beetle are also given, but these are taken from his work on potato-pests published the previous year. Perhaps the most interesting parts of the report are the account of the second species of Leucania (*L. albilinea*), which confines its attacks principally to heads of wheat, and the discovery of the mode and place of oviposition of both the species of Leucania.

Dr. Packard's account of injurious insects in the west, while largely relating to the destructive locust, includes histories of over one hundred other insects. These histories have been collated, in large measure, from his earlier publications and those of others. In addition to what was already known, he gives full notes upon the red-legged locust (*Caloptenus femur-rubrum*), *Donacia proxima*, the northern army-worm (*Heliophila unipuncta*), the cabbage web-moth (*Plutella xylostella*), *Gastropacha californica*, *Phryganidea californica*, the two latter contributed by Mr. H. Edwards, and *Pieris rapae;* as well as brief notes on *Oedipoda pellucida*, *Acridium americanum*, *Blissus leucopterus*, *Bruchus fabae*, *Eurytoma hordei*, *Cecidomyia destructor*, *Aletia argillacea*, *Clisiocampa americana*, *Aegeria cucurbitae* and *Nematus ventricosus;* figures of the early stages of most of these are given, with maps showing the distribution of the Cecidomyia, Blissus, Heliophila, Aletia and Eurytoma, as well as of *Cecidomyia tritici* and *Heliothis armigera;* he also gives some new accounts of the journeyings of the notorious Colorado potato-beetle and original figures of the early stages of a Harpalus, of *Pleotomus pallens*, of *Dryocoetes affaber* and of *Tomicus pini.*

Articles upon the destructive locust have appeared during the last year from Messrs. Riley, Packard and Thomas, of the Entomological Commission appointed to examine into this evil; all these articles, however, have been contributed independently of that appointment. Other papers have been published by Messrs. G. M. Dawson, Allen Whitman, J. B. Phillips, Geo. Gaumer and H. H. Godfrey. Mr. Thomas' paper is only a reproduction of what he published several years ago. Mr. Dawson's paper is a clear, well-digested account of the migrations of this insect and the extent of the region infested by it in Manitoba and in the adjoining parts of British America, in 1875. Mr. Whitman's is a good account of the invasion of Minnesota in 1876, with valuable notes on the habits of the insect; it appears that the state suffered more that year, and had a larger part of its territory invaded, than was the case during the three previous years, when the insects were wholly confined to the southwestern part of the state. Mr. Phillips, not an entomologist, but the Commissioner of Statistics in Minnesota, fills most of his report with a rather useless account of the Asiatic destroyer, but adds some tables of estimates of the damage done in his state. Mr. Gaumer's and Mr. Godfrey's reports relate the experiences of these assistants of Mr. Riley in observing the locust in southeastern and northeastern Kansas.

By far the most important of all the papers upon the locust are those of Messrs. Riley and Packard. The former, in his ninth Missouri report, adds to our previous knowledge of the history of Caloptenus an account of the method by which the young escape from the egg, reports additional parasites, and gives the result of some valuable experiments upon the vitality of the eggs. He subjected the eggs to alternate freezing and thawing, to different degrees of moisture, to the open air, and to burial at various depths. By his experiments it appears that neither moisture nor sudden alternations of freezing and thawing have much injurious effect upon the eggs, that simple frost is actually beneficial, but that exposure to the free air is decidedly injurious; so that thorough harrowing will prove an effectual means of destruction. Mr. Riley also gives a very full history of the locust in 1876.

Dr. Packard gives a similar history for 1876, and gives general histories of the ravages of the locust in Colorado and Utah, collecting evidence from a great number of sources. He also cites proof of the appearance of these insects in California, and discusses the probable extent of their natural breeding grounds. In connection with the theory of their enfeeblement in moist regions, he gives some curious experiments, made by Prof. Samuel Aughey, on the comparative strength of the hind legs of individuals from Nebraska and Utah, clearly to the advantage of the natives of the latter state. He also discusses the relation of their migrations to meteorological phenomena, and publishes some interesting tables furnished for the purpose by the Weather Bureau. He adds some interesting notes on the habits of the locust, and describes the insects from life, at every stage, making out that it has three larval and two pupal stages, by considering the penultimate stage, before the acquisition of full-grown wings, a pupal rather than a larval condition.

This review gives an account of the observations, during 1877, of forty-one different writers, including seven who have discussed injurious insects only. This seems to me a sorry number for the whole of North America; but, on the whole, I believe we may fairly congratulate ourselves that the biological side of entomology has made a considerable advance; at least we will hope that another year will show an increase of earnest work, with promise of greater progress.

Samuel H. Scudder.

[On account of a prevailing unfamiliarity, especially amongst the European subscribers to PSYCHE, with the English names used for butterflies in the foregoing article, the editors deem it advisable to say that the blue butterflies are the *Adolescentes* of Scudder or a part of the *Lycaeninae* of Edwards; the brush-footed butterflies are the *Nymphales* of Scudder or the *Nymphalidae* of Edwards; the hair-streaks are the *Armati* of Scudder or the *Theclinae* of Edwards; the orange-tips are the *Frugalia* of Scudder or genus *Anthocharis* of Edwards; the skippers are the *Urbicolae* of Scudder or the *Hesperidae* of Edwards; the swallow-tails are the *Equites* of Scudder or the *Papilioninae* of Edwards; the yellows are the *Fugacia* of Scudder or a part of the *Pierinae* of Edwards.]

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 96.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

*[1] 867. The **Sci. Amer.** [see Rec., nos. 861–865], v. 37, contains the following.

a. The seventeen year locusts (by H. J. Loomis), p. 9. *b.* Enemy of the potato beetle [figures *Arma spinosa*, which devours *Doryphora decemlineata*] (by F. A. Whitney), p. 36–37. *c.* The lantern fly [figures *Fulgora laternaria*], p. 55. *d.* The seventeen year locust (by R. K. Slosson), p. 68. *e.* The mole cricket [imago figured], p. 71–72. *f.* Bees and hives (by Mrs. L. E. Cotton), p. 148. *g.* The locusts in Kansas (by C. V. Riley), p. 164. *h.* A satisfactory grasshopper machine [invention of C. V. Riley], p. 169. *i.* How to prevent grasshopper raids, p. 183. *j.* The Colorado potato-beetle in Europe. — German thoroughness (by C. V. Riley), p. 198. *k.* About some insects [figures imago of *Alaus oculatus*, *Cicindela dorsalis*, *Calosoma scrutator*, and development of *Cicada pruinosa* from the pupa] (by C. Few Seiss), p. 215. *l.* Curious proclivities of insects [abstract of a lecture by J. Lubbock on the destruction of the beautiful and the hideous plants], p. 244. *m.* Russian remedy for hydrophobia [larva of *Cetonia aurata*], p. 257. *n.* The potato bug in Germany, p. 273. *o.* Are ants civilized?, p. 313. *p.* The ancestry of insects [extract from Packard's "Our common insects"], p. 329. *q.* Vitality of ants (from Proc. Acad. Nat. Sci. Philad., by H. C. McCook), p. 338. *r.* The proboscis and lancets of the stable fly [figure of the proboscis of ? Stomoxys] (by J. Michels), p. 344. *s.* The curious life history of our blister beetles [figures all stages of Meloe and Sitaris; but the figures of Sitaris are marked Meloe and *vice versa;* corrected on p. 404] (by C. V. Riley), p. 346. *t.* How scorpions sting, p. 357. *u.* The Carolina Mantis [figures *Mantis carolina*] (by C. Few Seiss), p. 359. *v.* Testing wool by entomological knowledge [from the insects it contains], p. 362. *w.* The curious life history of our blister beetles, no. 2 [figures *Caloptenus differentialis*, *Epicauta vittata*, all stages of Epicauta, and *Macrobasis unicolor*] (by C. V. Riley), p. 373.

The **Bulletins de l'Academie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique,** sér. 2, t. 36 (a. 1873), contain nos. 868 and 869.

* 868. Edm. de Selys Longchamps. Appendice aux troisièmes Additions et liste des Gomphines, décrites dans le Synopsis et ses trois Additions. p. 492–531. [Jan., 1874.]

Gives a table of the classification, comprising 2 divisions, 3 subdivisions, 5 legions, 12 genera, 46 subgenera, and a list of the 200 species of Gom-

[1] Record made by Mr. George Dimmock.

phina, with indication of the ordinal numeros under which the species are described in the Synopsis or its three Additions. Intercalates "11 new subgenera," of which Allopetalia alone is indicated as new. Gives a partial synopsis of the 20 subgenera of Gomphus. Describes 21 (13 [*Ophiogomphus bison* from Cal., *Gomphoides suasa* and *G. pacifica* from Mex., *G. ambigua* from Guatemala = 4 N. A.] new) spp.; re-describes *Dromogomphus armatus* ♂.

* 869. Edm. de Selys Longchamps. Appendice aux troisièmes Additions au Synopsis des Caloptérygines. p. 610–619. [Mar., 1874.]

Describes 14 (7 [no N. A.] new) spp.; re-describes *Hetaerina titia* ♂ from the probable type specimen, and *H. capitalis* ; describes *H. occisa* var. *sublimbata* n. var. Corrects the general list of species given previously.

The **Bull. Acad. Roy. Belg.,** sér. 2, t. 37 (a. 1874), contain no. 870; t. 38 (a. 1875), t. 39 (a. 1875), t. 40 (a. 1875), contain nothing on N. A. entomology.

* 870. Edm. de Selys Longchamps. Additions au Synopsis des Cordulines. p. 16–34. [Mar., 1874.]

Treats of 23 species, of which 5 are North American; *Epitheca nasalis*, *Macromia magnifica* = 2 n. N. A. spp. ; *Macromia cingulata*, hitherto considered North American, is from the region of Bengal.

The **Annals and Mag. Nat. Hist.** [see Rec., nos. 609–619], ser. 4, v. 18, contain nos. 871 to 874.

* 871. Fel. Plateau. Note on the phenomena of digestion in the cockroach (Periplaneta americana). p. 355–356. [Oct., 1876.]

Abstract of the results of a study of these phenomena, confirming the conclusions arrived at in his Recherches sur les phénomènes de la digestion chez les insectes in the Mémoires de l'Académie Royale de Belgique, v. 41 (a. 1874) (a summary of which was given in the Annals and Mag. Nat. Hist., v. 16 [a. 1875], p. 152) and maintaining that the digestive juices of insects are never acid, in opposition to the views expressed by Jousset de Bellesme in his Recherches expérimentales sur la digestion des insectes et en particulier de la blatte (Paris, 1875. 8°) (an abstract of which was reproduced under the title: On the function of the glands of the digestive apparatus of insects in the Annals and Mag. Nat. Hist., v. 17 [a. 1876], p. 333) and in subsequent discussions. A claim of priority over Jousset's work was made by Plateau in the Comptes rendus, v. 82 (a. 1876), p. 340. [From the Bull. de l'Acad. Roy. de Belgique, v. 41, p. 1206.]

* 872. Fel. Plateau. Researches on the phenomena of digestion and on the structure of the digestive apparatus in the Belgian myriopods. p. 437–438. [Nov., 1876.]

Abstract, by the author, of a paper published by him in the Mém. de l'Acad. des Sciences de Belgique, v. 42 (a. 1876).

* 873. Ja. Wood-Mason. On the femoral brushes of the Mantidæ and their function. p. 438–439 [Nov., 1876], p. 507 [Dec., 1876].

Brushes of stiff hairs were found near the distal end of each of the fore femora in numerous species of 29 genera and probably occur throughout the whole group; they are used to keep the eyes and ocelli in a functional condition, and are present in the young when these quit the egg. [Prof. Wood-Mason says, l. c., v. 19, p. 269, that these brushes were previously mentioned by Stål, although no suggestion was made as to their possible use.]

* 874. Ed. Brandt. Anatomical and morphological researches on the nervous system of hymenopterous insects. p. 504–506. [Dec., 1876.]

O. Bütschli and A. Kowalewski have proved that the embryos have seventeen ganglia — one supraœsophageal, three subœsophageal, three thoracic, ten abdominal; the three subœsophageal unite to form one in the larva; the last three abdominal form the last one in the larva; the larvæ of Hymenoptera therefore have thirteen ganglia, while the larvæ of Lepidoptera have twelve. The adult Hymenoptera have the two cephalic, two or three thoracic and from three to seven abdominal ganglia. The article states the number and composition of the ganglia in the respective genera and sexes. [From the Comptes rendus, Sept. 18, 1876, p. 613.]

The **Annals and Mag. Nat. Hist.**, ser. 4, v. 19, contain nos. 875 to 879.

* 875. W. C. Hewitson. Descriptions of twenty-five new species of Hesperidæ. p. 76–85. [Jan., 1877.]

Describes 25 (*H. luda*, *H. fidicula*, *H. egla*, *H. midia* from Costa Rica = 4 N. A.) new species of Hesperia; four species are from parts unknown.

* ——— Joly. On the reproductive apparatus of the Ephemeridæ. p. 193–195. Feb., 1877.]

Describes the structure of the testes and penises of Baëtis and of the ovaries of Palingenia.

* ——— Megnin. On the power possessed by certain mites, with or without mouths, of living without food through entire phases of their existence or even during their whole lives. p. 270–271. [Mar., 1877.]

The Ixodes found attached to animals are always fecundated females, to which the male adheres by a copulatory lip; they are oviparous and prolific; the larvæ live on the food which is enveloped in their bodies while they are yet in the egg, and the males never take food. The mouthless

Annals and Mag. Nat. Hist., v. 19.

Acarina, like Hypopus, Homopus, Trichodactylus and Astoma, are nymphs, and take no food in the nymphal stage, but the imagos are very voracious. [From the Comptes rendus, Nov. 20, 1876, p. 993.]

* 878. Fel. Plateau. Note on the phenomena of digestion and on the structure of the digestive apparatus in the Phalangida. p. 272–274. [Mar., 1877.]

The Araneida are sucking animals ; the Phalangida eat their prey: the arrangements of the digestive tube of the two are compared. The organ hitherto called the liver in decapod Crustacea and in Araneida is present in Phalangida, and is the organ of secretion of the digestive liquid intended for the emulsion of the fats and for the solution of the albuminoids.

* 879. Ja. Wood-Mason. On the final stage in the development of the organs of flight in the homomorphic Insecta. p. 380–382. [May, 1877.]

The wings, other than the small flattened duplicatures of the integument which form the " sheath " are not developed in Orthoptera until after the penultimate moult; then they grow rapidly, becoming closely packed in transverse and longitudinal plaits.

The **Annals and Mag. Nat. Hist.**, ser. 4, v. 20, contain nos. 880 to 884.

* 880. O. P. Cambridge. On some new and little-known spiders from the Arctic Regions. p. 273–285, pl. 8. [Oct., 1877.]

Enumerates 13 species ; describes 7 n. spp., of which 3 (*Dictyna borealis* (fig.), *Erigone whymperi* (fig.), *Linyphia turbatrix*) are from North Greenland.

* 881. W. C. Hewitson. Descriptions of twenty-three new species of Hesperidæ from his own collection. p. 319–328. [Oct., 1877.]

Describes 23 (*Cyclopides eryonas* from Costa Rica and *C. dardaris* from Mexico = 2 N. A.) n. spp.; six species are from parts unknown.

* 882. ——— Jousset de Bellesme. Phenomena accompanying the metamorphosis of *Libellula depressa*. p. 447. [Nov., 1877.]

When the imago quits the pupa-skin the function of respiration is not yet set up; the imago distends its digestive tube by swallowing air, forcing the blood into the head, eyes and wings and by it giving their form to these parts and depositing the pigments which color them. [From the Comptes rendus, Aug. 20, 1877, p. 448.]

Nos. 43–44 were issued April 12, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB
EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., March–April, 1878. [Nos. 47–48.

Notes on some Noctuid Larvæ found about Newton, Mass.

Apatela radcliffei Harvey. Color black. Three bright yellow lateral bands, the inferior about twice as broad as the two superior ones: also a narrow dorsal band of the same color. Eleventh and twelfth segments deep black above and separated by a yellow line; eleventh a good deal hunched. The whole larva is sparsely covered with very small warts from which project a few short, fine, dirty-white hairs mingled with a few much longer ones. Legs black. Head black below and dull crimson above, with a few projecting hairs. Length 37 mm. Found on wild cherry (*Prunus serotina*). One, taken before the last moult, was light apple-green with a lozenge-shaped red patch above, and could not be distinguished from the larva of *Apatela clarescens*. When at rest this larva elevates the fore part of its body, bending back its head, so that it would easily be mistaken for a young larva of Datana, which it almost seems to mimic. It spins a slight cocoon composed of silk interwoven with bits bitten out of the substance on which it spins. Before spinning, the yellow lines turn milky white. The pupa is slender and has a curious olive tint. The moth appears early in June.

Apatela spinigera Guen. Color blackish brown. On each segment are eight warts from which project thick clusters of bristly hairs, three on each side which are single, and two above which are double and larger than the rest. On the first and on the last two segments the hairs are dirty blackish, but on the third the four upper tufts are deep crimson at the base and become black at their extremities; a few crimson hairs in the corresponding tufts of the second segment. On the remaining segments, excepting the last two, the four upper tufts are of a clearer shade of white. The remaining tufts are dirty blackish. On the eleventh segment the double warts become each two separate ones, placed longitudinally. Legs black. Head black, with a V-shaped lighter mark. A few lighter blotches above, at the bases of the double warts. Length 40 mm. One, found October 5, spun October 9 a loose cocoon of white silk and changed in two days. The moth appears early in May and in August. It is a rare species in this locality. Larva eats Rubus and Betula.

Calocampa nupera Lint. Large and stout. Brilliant apple-green, lighter between the segments. A double lateral narrow stripe, black above and greenish white beneath. This stripe passes through the breathing orifices, which are orange colored and catch the eye at once. An inconspicuous whitish dot just above the breathing orifices, and above this three white dots (the middle one just above the other two) from which project several minute hairs. Head and legs green. Feet red. Length 60 mm. In its early stages it is light green, closely resembling the young larva of *C. curvimacula*, and having the appearance and habits of a Geometrid, its full number of legs being developed during its successive moults. I reared a small brood of these larvæ this spring from the egg, but had no leisure to observe their successive changes. When mature they presented many striking variations, some being almost black, with the three white spots above the breathing holes strongly contrasting; others were of a rich shining brown, some pale brownish green; but the majority were of the form described above. The larva enters the ground towards the end of June, and changes to a pupa about the middle of August. The moth appears in September and October.

Calocampa curvimacula Morr. Color dirty greenish brown, appearing in certain lights as if frosted; immaculate beneath; mottled with darker shades of brown above. A narrow dorsal dirty white line edged with brown. Faint oblique blotches on the sides, composed of mottling a little darker than the ground color of the larva. Head shining brown with darker mottling.

The whole larva is sparsely covered with short fine hairs. Length 45 mm. A very ordinary looking larva, and forming a striking contrast to the brilliant larvæ of *C. nupera* and the two European species. When at rest it bends its head to one side, after the manner of the larvæ of Lithophane, thus differing from *C. nupera*, which rests straight along the stalk of its food plant. I obtained the eggs from which I reared this larva by confining a female in a box with leaves of Iris, on which it laid a large bunch. The larvæ however did not thrive on this plant, and only one or two came to maturity.

Calpe canadensis Beth. Color greenish white. A row of irregular black spots above; another row of black spots on each side, three on each segment and one between. The middle spot on each segment is larger than the other two, and partially encloses a bright yellow patch above it. Beneath dull green, contrasting with the yellowish white color of the sides. Head greenish yellow with six black spots, two larger above and four smaller about the jaws. Eleventh segment slightly humped and with three conspicuous black spots. Length 35 mm. Spun a frail cocoon among some moss, and emerged about a fortnight after, June 22. Feeds on *Thalictrum cornuti.* The young larva spins a case for itself, when about to change its skin. The mature larva is very showy and conspicuous.

Roland Thaxter.

Oviposition in Spiders.

In Psyche, v. 2, p. 33–34, I described the method by which the eggs are laid and enclosed by several spiders that make cocoons attached by one side. In July last I had the good fortune to see the method of oviposition of Drassus, which carries the cocoon in its claws or leaves it loose in the nest. A female, who had been kept several days in a bottle, began her cocoon early one morning, and when I first saw

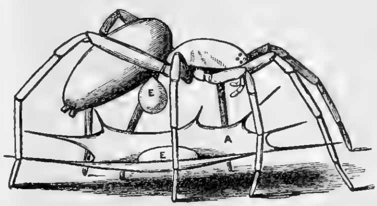


Fig. 5.

her at about six, a.m., she had made a flat web about a centimetre in diameter, held by threads extending in various directions to the sides of the bottle (A in the figure). The spider stood over this web and dropped the eggs (E) in a soft mass on it. She then spun threads from one side of the web to the other, over the eggs, until they were completely covered, and finished the cocoon by biting away the threads that held it to the bottle.

This agrees exactly with Menge's description of the cocoon-making of *Lycosa piratica*. In all his later accounts of this process, in various species of spiders, he says that, after the eggs are laid, the spider drops over them a small quantity of liquid which the eggs absorb, thereby becoming larger. This did not take place in any of the cases which I have seen. The eggs were always laid in a soft and wet condition, the whole mass resembling a drop of jelly, and they were always covered immediately by the spider. *J. H. Emerton.*

Proceedings of the Club.

§ 27. Locusts in Mid-Ocean. Mr. Samuel H. Scudder exhibited a bottle full of Acridians put into his hands for identification by Dr. H. A. Hagen. They had been sent to the Museum of Comparative Zoology, at Cambridge, by Rev. N. H. Chamberlain, accompanied by the following memorandum :

These locusts came on board the ship Harrisburg, of Boston, on the passage from Bordeaux bound to New Orleans, on the 2d day of November, 1865, in Lat. 25° 28′ North, Long. 41° 33′ West, making the nearest point of land 1200 miles off. They came on board in a heavy rain squall; the clouds and ship's sails were full of them for two days.

E. G. WISWELL, Master.

The locusts prove to be *Acridium* (*Schistocerca*) *peregrinum*, long known for its powers of flight and destruction in the Old World. The Compte-rendu of the Belgian Entomological Society, No. 44, Nov. 3, 1877, p. 3–5, contains a note upon their appearance in Corfu, in Spain, and even in England. The Corfu swarm was composed of the variety with yellow colored hind wings, and therefore came from northern Africa, where that form is found ; while the Spanish and English swarms were of the rose colored variety, and must have originated in Senegal. But the most interesting point of all is the fact, first pointed out by Stål, that all the other species of that group of the genus to which this species belongs are American, whence it is highly probable that *A. peregrinum* also is indigenous to America, from whence it has been recorded. Its occurrence in mid-ocean in such numbers is a clear indication that it originally flew from one continent to the other in sufficient numbers to establish itself in a new home. (*Dec. 14, 1877.*)

§ 28. Chemical Experiments on the Respiration of Insects. Mr. G. Dimmock called attention to an article, by Robert Pott, in Landwirthshaftliche Versuchsstationen, xviii, 1875, p. 81, entitled Ueber die Mengen der durch Respiration und Perspiration ausgeschiedenen Kohlensäure bei verschiedenen Thierspecies in gleichen Zeiträumen und unter verschiedenen physiologischen Bedingungen, in which are recorded the results of experiments to determine the amount of carbonic dioxide given off by forty-two different animals, under similar conditions. The results of the experiments on the insects were as follows: For every one hundred grams weight of living insects, there was exhaled during six hours, the annexed weight of carbonic dioxide (CO_2).

Mistkäfer, *Geotrupes vernalis*,	0.678	grams.
Laufkäfer, Carabus,	0.981	"
Engerling, [larva of May-beetle[1]],	0.592	"
Fuchsschmetterling [*Vanessa urticae*],	0.888	"
Kohlweisslingraupe, *Pieris brassicae* [larva],	0.706	"
Ligusterschwärmerraupe [*Sphinx ligustri*, larva],	1.321	"
Ligusterschwärmerpuppe [*Sphinx ligustri*, pupa],	0.780	"
Weidenbohrerraupe, *Cossus ligniperda* [larva],	0.519	"
Bärraupe, [*Bombyx caryae*]	0.861	"
Grashüpfer [grasshopper],	0.475	"
" (andere Species) [grasshopper, another species],	0.442	"
" (andere Species) [grasshopper, another species],	0.593	"
Gryllus campestris (6 Tage alt) [6 days old],	1.356	"
" " (and. Individuen) [other individuals],	1.382	"
Blattwanze [Tenthredo?],	1.276	"

[1] The parts in brackets were added by Mr. D. The rest of the table is quoted. It is to be regretted that writers on chemical zoology do not always give the scientific names of the species experimented on.

From Mr. Pott's experiments, of which a more extended abstract can be found in the Jahresbericht für Agriculturchemie for 1875 and 1876, Bd. ii, p. 119–121, it appears that the evolution of carbonic dioxide, for like weights and times, is greatest in aves, less in mammalia, still less in insecta and batrachia, and least in vermes and mollusca.

In a house-mouse experimented upon, the same author found the amount of carbonic dioxide exhaled varied when the animal was kept in different colored lights, being greater in colored light than in white light, and the greatest in green or yellow light. A series of extended experiments upon the respiration of insects would be a valuable addition to entomological knowledge. *(Jan. 11, 1878.)*

STRIDULATION OF COLEOPTERA. Is it worth while to note in PSYCHE the two following cases of stridulation? I would be glad if other persons having the opportunity would observe the noises made by Coleoptera, and the movements by which they are produced.

Passalus cornutus makes a very loud stridulation by rubbing the acute edge of the ventral segments against the inner edge of the elytra. Lucanus, on the contrary, is entirely mute.

Prionus brevicornis stridulates by rubbing the rough surface of the inner side of the hind thighs, near the distal end, against the outer edge of the epipleuræ, *i. e.*, against the lateral margin of the elytra. The movement of the legs is alternate and the sound is made while the leg moves downward.

J. L. LeConte.

ELYTRA OF DYTISCUS AND ACILIUS. On page 436 of Packard's "Guide to the Study of Insects," is a singular error, namely:—

"The males of these two genera [Dytiscus and Acilius] often have the elytra deeply furrowed while those of the females are smooth."

The reverse of this is the general fact. The elytra of the males are smooth and those of the females are furrowed. This arrangement is for the purpose of enabling the males to get a good foothold. One does now and then get hold of a smooth female, and it would be interesting to know if such females are fertile. *W. V. Andrews.*

MODE OF ADVENT OF ANTHRENUS SCROPHULURIAE. I have noticed the new "carpet beetle," *Anthrenus scrophulariae*, in considerable numbers for the past two years mingled with *A. varius*, among the dried skeletons of Peabody Museum. As a large number of these skeletons have been brought from England, I do not doubt but that the beetles were in this case originally from thence, especially as they thus cling to their previous habit of feeding upon dried meat. *S. W. Williston*, New Haven, Conn.

CORRECTION. In no. 45, of PSYCHE, v. 2, p. 101, lines 13 and 14, *for* Haldeman's *read* Leidy's.

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 120.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 883 and 884 are from **Annals and Mag. Nat. Hist.,** ser. 4, v. 20.

* 883. Jos: Leidy. Remarks on the yellow ant. p. 539–540. [Dec., 1877.]

["From Proc. Acad. Nat. Sci. Philad., 1877, p. 145."]

* 884. J. Chatin. On the coloration of the optical elements in Locusta viridissima. p. 542. [Dec., 1877.]

"The bacilli of Locusta present, in their intimate constitution, great similarity to the same parts studied in the Crustacea; their proper coloration is the same in these different types." Description of the structure of the bacilli, which are of a rose-color.

* 885. **The Canadian Naturalist and Quarterly Journal of Science,** v. 7, contains the following, and no. 886.

a. Color of cocoons of *Bombyx mori* affected by the nature of the food-plants of the larvæ, p. 182–183.

* 886. S: H. Scudder. Two new fossil cockroaches from the Carboniferous of Cape Breton. p. 271–272, fig. 1–2. [July, 1874.]

Describes *Blattina bretonensis* and *B. heeri* = 2 n. spp.; enumerates the (3) previously described carboniferous American fossil cockroaches.

* 887. The **Can. Nat.,** v. 8, as far as p. 378, contains the following, and nos. 888 to 894.

a. Entomological doings of the Natural History Society of Montreal, during 1874–1877 (by J. F. Whiteaves) [increase and arrangement of the collections] p. 19–20, p. 180–181, p. 305, p. 307, [donations received] p. 24.
b. List of insects taken or observed June 10, 1876, at Belœil mountain (by F. B. Caulfield) [21 Col., 20 Lep., 2 Orth., 1 Neur.], p. 288–289.

* 888. F. B. Caulfield. List of diurnal Lepidoptera of the island of Montreal. p. 25–27. [Nov., 1875.]

[From Can. Entom.; see Rec., no. 476.] Enumerates 47 species, with notes on abundance and seasons.

* 889. G. E. Bulger. A summer stroll in England. p. 28–30. [Nov., 1875.]

Useless mention of a few plants, birds and insects seen at Upnor, in Kent, in May and June, 1874.

Can. Nat., v. 8.

* 890. S: H. SCUDDER. New and interesting insects from the Carboniferous of Cape Breton. p. 88–90, fig. 1–2. [Apr., 1876.] Also separate. 2 p. t 17 × 9, fig. 1–2.

[Same as the article cited in Rec., no. 582.]

* 891. G: M. DAWSON. Notes on the locust invasion of 1874 in Manitoba and the north-west territories. p. 119–134. [Nov., 1876.]

Habits, history and ravages of *Caloptenus spretus*. Summary of information collected from the region lying north of Lat. 49° N., towards the history of the invasion of the summer of 1874. A belt of coniferous forest seems to arrest the invasions.

* 892. G: M. DAWSON. Notes on the appearance and migrations of the locust in Manitoba and the north-west territories—Summer of 1875. p. 207–226. [Apr., 1877.]

Information similar to that about the invasion of 1874. Two classes of locusts occurred: the natives and the invaders mostly from the south; hatching began as early as May 7, and was noticed in September, where the ground was overflowed all summer; migrations of natives were mostly towards the southeast and south.

* 893. J. F. WHITEAVES. Obituary notice of Elkanah Billings, F. G. S. p. 251–261. [July, 1877.]

Mr. Billings was born May 5, 1820, and died June 14, 1876.

* 894. C: V. RILEY. The Rocky Mountain locust. p. 363–374. [Dec., 1877.]

[From Amer. Nat., v. 11, p. 663–673.] Distinctive characters and evolutionary history of *Caloptenus spretus*; its habits and means against it.

* 895. **Field and Forest**, v. 1 (1875–1876), contains the following, and nos. 896 to 909.

a. Unusually great killing of horses and mules in the southcentral U. S., by the "buffalo gnat," in the spring of 1875, p. 2. *b. Pieris rapae* found 27 April, *Doryphora 10-lineata* 12 May, *Anthrenus varius* on flowers of Spiraea early in May (by C: R. Dodge), p. 8. *c.* A late cold winter not destructive of eggs of *Caloptenus spretus*, p. 8. *d. Doryphora 10-lineata* eaten by chickens, p. 16. *e.* Figure of larva of Ephemera, pl. 1, fig. 15, opposite p. 24. *f.* Occurrence of *Doryphora 10-lineata* in Vermont, Canada and Rhode Island, p. 28. *g.* A pump useful in warfare against insects, p. 31. *h.* Florida litany [verses upon insect pests], p. 32. *i.* Locusts gnawing the edge from a scythe in eating the juices of grass hardened into a gum upon it, p. 32. *j.* How a scorpion kills flies (by C: R. Dodge), p. 42. *k.* Description of the cases used by the Department of Agriculture for the preservation of its collection of insects (by C: R. Dodge), p. 43.

l. Phylloxera vastatrix on vines destroyed entirely in thirteen days by the application of potassium sulpho-carbonate, p. 56. *m.* Calendar of meetings of the Cambridge Entomological Club, for 1876, p. 64.

* 896. Cyrus Thomas. Description of a new grasshopper from Arizona. p. 4–5. [June, 1875.]

Describes *Eremobia magna*, n. sp.

* 897. C: R. Dodge. A new enemy to the cucumber. p. 9–10, fig. [July, 1875.]

Pupa and imago of *Phakellura hyalinitalis*, whose larva is destructive to Cucumeris in Florida, figured and described.

* 898. C: R. Dodge. Strength and perseverance of ants. p. 25–26. [Aug., 1875.]

Observations upon ants dragging heavy articles of food homewards.

* 899. E. F. Jackson. Grasshoppers again troublesome in Minnesota. p. 31. [Aug., 1875.]

Ten km. south of Graham Lakes the southern limit of ravages in Minnesota; eggs destroyed by "a white worm", imagos by "a white maggot;" more damage done in four hours, on the last day, than in eight days previous together.

* 900. E. C. Huntington. Grasshoppers again troublesome in Minnesota. p. 31. [Aug., 1875.]

Locusts appeared 10 July; ground full of eggs 26 July.

* 901. *Science Gossip.* The house-fly. p. 47–48. [Jan., 1876.]

Musca domestica said to cleanse the air by devouring the animalcules in it. [See Rec., no. 861 *k*, no. 862 *z*.]

* 902. J. J. Chickering. Notice of White Mountain birds and insects. p. 48. [Jan., 1876.]

List of five "&c." species of "butterflies" (one of which is a moth) captured and one seen.

* 903. Fs: Gregory Sanborn. Sentiment among insects. p. 55–56. [Feb., 1876.]

Canthon laevis is usually found in pairs, the female rolling the ball in which eggs are to be laid, the male trying to keep on top of the ball; if the male is quietly removed he is soon missed, and the female, after a vain search for him, deserts the ball.

* 904. *Science Gossip.* "Missing links" among the Lepidoptera. p. 63–64. [Apr., 1876.]

Kunckel found that all the species of Ophideres have rigid terebrant probosces; the structure and use of these is here described (from the *Comptes rendus*); *O. fullonica* and probably the other species destroy oranges by piercing them for their juices.

Field and Forest, v. 1.

* 905. Jac: Stauffer. Dung beetles. p. 71–72. [Apr., 1876.]

A female *Canthon laevis*, whose ball had fallen into a hole from which she alone could not remove it, left the ball and fetched an assistant, with whose help the ball was extricated.

* 906. C: R. Dodge. Entomological gleanings in southern fields. p. 73–76. [June, 1876.]

Larvæ of *Goniloba olynthus* found feeding on leaves of *Canna indica*, at Charleston, S. C., 10 or 12 June, pupated 19 and 20 June, imaginated 26–28 June; method of concealment of larva, and of pupation; larva and pupa described. Method of emergence of *Mantis carolina* from the egg. Description of the nest of a "trap-door spider" from S. C., and of one from the West Indies; the spider in the former nest feeds at night and resists attempts to inspect it by day.

* 907. Fs: G. Sanborn. A few words on cocoons and cocoon-builders. p. 76–78. [June, 1876.]

Definition of a cocoon in a strict and in a broad sense; description of the silk-forming organs, of various silks and of various silken abodes formed by larvæ.

* 908. W. L. Carpenter. Notes on the alpine insect fauna of the Rocky Mountains. p. 80–83. [June, 1876.]

Correspondence of alpine and arctic faunas; speculations on the reason of colorational variation and variations in size; relative luxuriance of insects of the several orders in warm and cool climates.

* 909. C: R. Dodge. Comparative scarcity of insects in the mountains of Colorado. p. 89–91. [July, 1876.]

Upon an excursion through stated localities in Colorado, insects were common on the table lands but scarce in the mountains; speculations. [See Rec., no. 941.]

* 910. **Field and Forest**, v. 2 (1876–1877), contains the following, and Nos. 911 to 945.

a. Galeruca calmariensis eating leaves of Ulmus, p. 12. *b.* Centennial captures [*Pieris rapae*, *Papilio troilus*, *Cimex lectularius* taken in Philadelphia], p. 33. *c.* Notice of meeting of the Entom. Club A. A. A. S. to be held at Buffalo, 22 Aug. 1876, p. 36. *d. Hyoscyamus niger* eaten by *Doryphora 10-lineata* (by J. W. Chickering, Jr.), p. 44. *e.* Colonies of aphids on *Cirsium lanceolatum* visited by several species of insects here insufficiently named (by E. Foreman), p. 52. *f. Sinea multispinosa* reported to puncture and exhaust blossoms and twigs of apple-trees, in Texas and Pennsylvania, p. 67. *g. Euschistus punctipes* preys upon *Doryphora 10-lineata*, p. 69. *h.* Need of legislative provision for the destruction of locusts (by C: R. Dodge), p. 69–70. *i.* Notice of Glover's Manuscript notes . . . Heteroptera [see Rec., no. 967], p. 70–71; of Riley's 8th annual report on insects of Missouri [see Rec., no. 968], p. 71–72; of the Annual report of the Entom. Soc. Ontar. for 1875 [see Rec., no. 633], p. 72; of the Proc. Dav. Acad. Nat. Sci., v. 1 [see Rec., nos. 592–605], p. 90. *j.* New remedies for the Phylloxera [Gachez says that *Phylloxera vastatrix* abandons roots of Vitis for roots of Zea; Pignede found a remedy for the Phylloxera in burying slacked lime (CaO_2H_2) around the vines and in white-washing the decorticated vine], p. 89. *k.* Maggots in strawberries [the carpal receptacle of Fragaria infested by the maggot of a Drosophila], p. 102. *l. Cychrus viduus* taken in Lancaster Co., Pa. (by S. S. Rathvon), p. 144. *m.* House-flies may be repelled by growing *Mimulus moschatus* in windows of rooms affected (from *Science Gossip*), p. 193. *n.* Intelligence of ants [notice too short for much value of a paper by Sir John Lubbock], p. 218.

* 911. Ja: W. Milner. Invertebrates which prey upon fishes, reptiles and amphibia. p. 4–6. [July, 1876.]

A Dytiscus caught a young *Rana halecina* and in about ten minutes devoured its viscera; in one night the same beetle killed a young *Chrysemys picta* and eat its viscera; it ate fish which were put within its reach, but did not attack them of its own accord. A *Belostoma grandis* caught fish which came within its reach while it floated on the water, and sucked out their juices. A Ranatra attacked insects and *Gammarus fasciatus* but not vertebrates. A *Cambarus obesus* ate its smaller congeners and Cyprinids.

* 912. M. S. Evans (in *Nature*). Plant fertilization. p. 15–16. [July, 1876.]

Way in which an ant cross-fertilizes a plant of the sub-order Coffeae ? at Natal, South Africa.

* 913. C: R. Dodge. Collection of economic entomology in the government exhibit at the Centennial. p. 21–24. [Aug., 1876.]

Description of the plan of arrangement of the collection, containing nearly one thousand specimens and filling twenty-four cases. [See Rec., no. 895 *k.*] [A collection embracing the plan described forms the characteristic feature of the entomological exhibit in the Museum of Comparative Zoology, at Cambridge, Mass. *B. P. M.*]

* 914. E. W. (in *Science Gossip*). On collecting Hymenoptera, &c. p. 35. [Aug., 1876.]

Method of preparing and using a double laurel-leaf collecting-bottle.

* 915. C: R. Dodge. Jumping seeds. p. 53–57, fig. [Oct., 1876.]

Galls of *Cynips saltitans* (galls and larvæ here described and figured) occur abundantly in summer on the under side of the leaves of oaks of the

Qu. alba group, in several states of the U. S.; in autumn they fall to the ground; they leap to distances of twenty times their diameter, making a noise like the patter of rain. Larvæ of *Carpocapsa saltitans* (larva, pupa and imago here described) occur, in Peru, Mexico and California, in capsules of an Euphorbia? (here described), and by their motions (here described) cause these to leap four times their length. Other similar occurrences are mentioned, with bibliographical references.

* 916. E. C. Merrick. Grasshoppers in the North-west. p. 64–65. [Oct., 1876.]

List of counties in Minn., Ia., Mo., Ks., Nebr., invaded by *Caloptenus spretus*, in Aug., 1876; excessive estimate that 700,000,000 eggs were laid to the hectar.

* 917. C: R. Dodge. The Colorado beetle. p. 66. [Oct., 1876.]

Doubts a quoted statement that *Doryphora 10-lineata* occurs at Block I., R. I.

* 918. S. S. Rathvon. Elm leaf beetle. (Galeruca xanthomalaena.) p. 96–98. [Dec., 1876.]

Describes larva, pupa and imago of *G. xanthomelaena*, which occurred abundantly at Lancaster, Pa.; method of pupation.

* 919. O. (in *Gardeners' Chronicle*). A fly's toilette. p. 101–102. [Dec., 1876.]

Describes the process by which a fly cleans itself.

* 920. S. S. Rathvon. Doryphora decemlineata. p. 114–116. [Jan., 1877.]

Abundance of *Doryphora 10–lineata* washed up on the sea-shore and occurring upon cars and in cargoes, so that they may be carried to Europe.

* 921. Dr. Anderson. Notes on the trap-door spider. p. 120–121. [Jan., 1877.]

A wide strand of web, holding open the lid of a spider's "den", extended across a road, for some distance on each side of it, and up a tree; parties of insects [were they the young spiders? *B. P. M.*] were marching to and from the nest on the web.

* 922. *Nature.* Caterpillars. p. 123–124. [Jan., 1877.]

Larvæ of *Pieris brassicae*, which normally pupate succinctorily, were forced to pupate suspensorily: three pupæ succeeded and five failed to attach their anal hooks to the web which had held the larva.

* 923. H. W. Livett (in *Science Gossip*). The locust in England. p. 124–125, fig. 3. [Jan., 1877.]

Pachytylus migratorius found in England; figures of it.

* 924. C: R. DODGE. The grasshopper bill in Congress. p. 125–126. [Jan., 1877.]

Text of and comments upon a bill introduced into the House of Representatives by Mr. Hatcher of Missouri, 18 Dec., 1876.

* 925. W: SAUNDERS. Phylloxera vastatrix. p. 138–140. [Feb., 1877.]

The ravages of the Phylloxera are only rendered possible by the previous weakening of the grape-vines by mildew (Oidium); the Zea remedy [see Rec., no. 910 *j*] is discredited.

* 926. C: R. DODGE. Acridium americanum. p. 145, fig. 4. [Feb., 1877.]

A swarm of these locusts visited Vevay, Ind., in November; figure of the locust.

* 927. C: R. DODGE. Appearance of snow fleas. p. 145–146. [Feb., 1877.]

Myriads of *Podura nivicola?* appeared in winter, upon snow.

* 928. S. S. RATHVON. Insect longevity. p. 156–158. [Mar., 1877.]

A specimen of *Hylotrupes bullatus* worked in the pine wood of a piece of furniture at least fifteen years.

* 929. C: R. DODGE. The "lubber" grasshopper. p. 160–161. [Mar., 1877.]

Description of eggs, young and imagos of *Rhomalea microptera*; notes on the habits of the species.

* 930. MR. MEEK (in *Science Gossip*). The venomous spider of New Zealand. p. 161–162. [Mar., 1877.]

Effects of the bite of the "kapito." [See Rec., no. 560 *g*.]

* 931. G. J. ROMAINES (in *Nature*). Sense of hearing in birds and insects. p. 162–162. [Mar., 1877.]

"An auditory sense is certainly present" in moths.

* 932. J. R. S. C. Friendly spiders. p. 164. [Mar., 1877.]

A spider helped a neighbor catch a fly.

* 933. S. S. RATHVON. Trox scaber. p. 164. [Mar., 1877.]

Fifteen hundred specimens of *Trox scaber* taken at one time within an area of thirty-one square decimetres, at Lancaster, Pa., Oct., 1876.

* 934. W: H. SEAMAN. On plant galls. p. 165–171. [Apr., 1877.]

Field and Forest, v. 2.

[Abstract of an article by M. W. Beyerinck, in the *Botanische Zeitung* for Jan., 1877.] A valuable taxonomic synopsis of galls, with bibliography.

* 935. C: R. Dodge. Hungry Anthreni. p. 184. [Apr., 1877.]

Paper labels partly eaten in a box in which butterflies had been eaten by Anthrenus; was it from hunger or from choice ?

* 936. Ja: S. Johnson. A new killing bottle. p. 194–195, fig. 5. [May, 1877.]

Description and figure of an oval bottle, less liable to breakage than a cylindrical bottle.

* 937. *Nature*. The Phylloxera and insecticides. p. 199–201. [May, 1877.]

[Abstract of an official report to the French Academy of Sciences.] Requisites to an efficient remedy for the Phylloxera; seven groups of substances experimentally used; only sulphur compounds give satisfactory results, and of these the sulpho-carbonates give the best results; proper method of application of the remedy.

* 938. Ja: S. Johnson. Hints on hunting Catocala. p. 201–202. [May, 1877.]

Several species of Catocala hide very closely under loose bark and can only be dislodged by hard beating of the tree-trunk.

* 939. Ja: H. Bell (in *Canadian Entomologist*). Good words. p. 202. [May, 1877.]

A portion of the periodical should be devoted to notices facilitating the discovery, capture and preservation of the rarer species of insects.

* 940. C. E. Worthington (in *Canadian Entomologist*). Two pupæ in one cocoon. p. 203. [May, 1877.]

Two pupæ of *Attacus cecropia* in a cocoon of one chamber.

* 941. C: R. Dodge. Insects in Colorado. p. 205–206. [June, 1877.]

Re-iterates the assertions cited in Rec., no. 909.

* 942. J. R. S. (in *Science Gossip*). Strength of the stag-beetle. p. 206. [June, 1877.]

Lucanus cervus lifted nearly one and a half kilograms.

* 943. G: Welles (in *Nebraska Farmer*). Concussion theory. p. 216. [June, 1877.]

Locust-eggs are crushed when water-wheels fall on them.

* 944. C: R. Dodge. Singular "insect injury." p. 217, fig. 5. [June, 1877.]

A minie ball gnawed through by the larva of an Orthosoma? [Hagen says, l. c., v. 3, p. 55, probably gnawed by the imago.]

* 945. Fritz Mueller (in *Nature*). Commensalism among caterpillars [corr.]. p. 217–218. [June, 1877.]

A small caterpillar lives amongst the branching thorns on the back of another caterpillar, and feeds upon the same leaves with it.

* 946. **Field and Forest**, v. 3 (1877-78), as far as p. 134, contains the following, and nos. 947 to 966.

a. Phytoptus galls. [Certain protuberances formerly supposed to be fungi on leaves of Fagus and on other leaves may be galls of a Phytoptus; a translation of an article by G. Briosi on the Phytoptus of Vitis is published in the *Monthly Microscopic Journal* for May, 1877], p. 16. *b.* Ravages of white ants [books eaten by Termes in Liberia], p. 17. *c.* The big bed-bug [effects of the bite of *Conorhinus sanguisuga*] (by Dr. J. S. Walker), p. 18. *d.* Enemy to the potato beetle [eggs of *Doryphora 10-lineata* eaten by *Lema 3-lineata*], p. 18. *e.* Natural and artificial checks have reduced greatly the prospect of injuries by locusts in Nebraska, p. 19. *f.* Notice of the Annu. Rep. Entom. Soc. Ontar. for 1876 [see Rec., no. 972], p. 20; of the same for 1877 [see Rec., no. 973], p. 134; of Glover's Entomological Index to Agricultural Reports [see Rec. no. 968], p. 94; of Thomas' 6th Report on insects of Illinois [see Rec., no. 974], p. 134; of King's Bee-keeper's text book [see Rec., no. 975], p. 134; of Provancher's Additions et corrections à la Faune coléoptèrologique de Québec [see Rec., no. 976], p. 134. *g.* The Destructive Insects Bill in Great Britain [sketch of an act of Parliament for the destruction of *Doryphora 10-lineata*], p. 52. *h.* Calendar of meetings of the Cambridge Entomological Club, for 1877–1878, p. 55. *i.* The business of breeding maggots in Paris by exposing carrion to the flies was suppressed by the police (from *Nature*), p. 55. *j.* Two living specimens of *Doryphora 10-lineata* found at Liverpool (from *Nature*), p. 55–56. *k.* Forficula raises its elytra with its forceps in preparing for flight (by J: G. Morris) (from *Canadian Entomologist*), p. 85. *l.* A migratory flight of *Danais archippus* and other butterflies occurred in Denton Co., Texas, from 15 Oct. to 5 Nov., p. 91. *m.* Moths injuring pianos by destroying the woolen dampers, p. 91–92. *n.* Description and figures of recent inventions for insect destruction [for destroying Aletia, Leucania and Doryphora] (by Dan: Breed), p. 92, p. 93, fig. 23–27. *o.* Squib concerning *Amblychila cylindriformis* (from *New England Farmer*), p. 94. *p.* A vessel 160 kilometres east of the capes of Virginia boarded by hundreds of specimens of *Doryphora 10-lineata*, p. 94. *q.* The "tarantula"

Field and Forest, v. 3.

[habits of a Mygale; its battle with a toad], p. 129-130. *r.* Death trap to bees [bees die wedged in the corolla-tube of Tritoma, in England,] p. 132. *s.* Decortication as a remedy for the Phylloxera, p. 132. *t.* Winter butterflies [*Melitaea phaeton* flying 25 Dec. in Texas; fruit of *Quercus obtusiloba* destroyed by Balaninus], p. 132. *u.* Method of arrangement of the collection illustrating economic entomology sent by the U. S. Department of Agriculture to the Paris Exhibition, p. 133. *v.* Notice of the forthcoming report of the U. S. Entomological Commission, p. 133.

* 947. C: R. Dodge. Collecting nets for insects. p. 4–8, fig. 1–6. (July, 1877.]

Descriptions and figures of various nets.

* 948. Ja: S. Johnson. Response to " Good words." p. 31–32. [Sept., 1877.]

Description of a collecting net which can be carried in a pocket; of a gig for moths; of the way to kill large-bodied moths.

* 949. *Nature.* The subject of insect warefare in Great Britain. p. 32–35. [Sept., 1877.]

Minutes of a conference of British agriculturists; paper by Mr. Andr: Murray; besides occasional great injuries insects cause a continual drain of agricultural products; coöperative measures against insects, especially in the rotation of crops, are necessary; the general government must secure the needed coöperation.

* 950. M. E. Banning. Notes on the fungi of Maryland. p. 42–47. [Oct., 1877.]

Growth of fungi upon insects.

* 951. W. L. Carpenter. Lepidoptera of Big Horn Mountains. p. 48. [Oct., 1877.]

List of 37 spp. of butterflies collected in Big Horn Mts., Dakota; description (by W: H. Edwards) of *Thecla sheridonii* n. sp.

* 952. N. Coleman. Insect longevity. p. 53–54. [Oct., 1877.]

The larva of a capricorn beetle living in a lath fourteen years.

* 953. Rev. A. Lakes. Predatory flies. p. 54–55. [Oct., 1877.]

A Pompilid wasp carrying and burying a caterpillar.

* 954. H. A. Hagen. Lead boring insects. p. 55. [Oct., 1877.]

Notice of article cited in Rec., no. 944. Citation of previous writings upon the subject.

Nos. 45–46 were issued June 14, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., May–August, 1878. [Nos. 49–52.

On Larvæ of Tineina, especially of Lithocolletis.

In PSYCHE, v. 2, p. 81–87, I have alluded to the discovery by Dr. Clemens of two larval forms of Lithocolletis in this country, and have stated that in some species of what Dr. Clemens calls the second or flat group I had observed a modification which I called the intermediate form, under the impression that it afforded a connecting link between the second group and that which Dr. Clemens considered the first or cylindrical group; coupled however with the suggestion that this supposed intermediate form might prove to be only a later stage of growth of the flat form. This suggestion proves to be the truth; the intermediate form is the last larval state of the flat form, and is also a connecting link between the first and second larval groups. As hereinafter stated, however, the larva at this stage undergoes a change of form without moulting, and fig. 3, p. 83, represents it at one point only of this larval stage.

This is, however, not the only connecting link between the two groups, for *L. ornatella* of itself forms another group, and at the same time affords another connection between Dr. Clemens' first and second groups, as well as connecting both with Dr. Clemens' genus Leucanthiza. But notwithstanding that the larvæ of all three groups are thus connected, the groups are distinct and well marked, so that, in a large collection, ninety-nine out of every hundred would, without hesitation, be referred to its appropriate group. But while this is true it is also true that the larvæ of all the groups resemble each other closely on their emergence from the egg, and are almost indistinguishable in the latter part of the last larval state, and the pupæ are entirely so. Starting from a common point, or nearly so, they diverge from each other to converge and meet again in the latter part of the last larval stage. (In illustration of these life-histories it will be necessary to refer again to the figures on page 83. In fig. 2 I have not made the dentation of the mandibles distinct enough.)

Concealed as these larvæ all are within their mines, inside of leaves, and dying as they inevitably do when removed from the mines, it is somewhat difficult to trace accurately all the larval changes; but by watching them closely, by collecting large numbers of larvæ in all stages of growth, and comparing them, and by pursuing the same process with the cast skins in the mines, and counting them, I believe that I have succeeded in tracing the larval histories of many species; and while the larval history of each group is materially different from that of the others, that of the species of either group does not differ in any important respect from that of others of the same group. There are, however, many points common to all the groups, and I give these first, accompanied by some general remarks upon their characters and affinities, and followed by a statement of the points peculiar to each group; giving thus a brief life-history of the genus, and of each of the three groups, rather than life-histories of separate species; together with notices of such relations of the genus to others as seem to be indicated by the larval characters.

I have never seen the unhatched egg of Lithocolletis; but upon the spot at which the mine begins, and while the mine is yet scarcely visible to the unaided eye, may be seen, under the lens, a glittering point. This is the shell, or rather chorion. It is perfectly flat, and one might almost say that it is imbedded in the substance of the leaf; its outline is oval, and it does not vary much in size in the different species, being usually about 0.34 mm. long and half as wide. The mine begins under the egg, the larva passing obliquely into the leaf because the structure of the head and trophi is such that it cannot enter the leaf vertically, as do the larvæ of some other genera. As shown in figs. 1 and 2, the head of the larvæ of the flat group projects straight forward and can neither be elevated nor depressed; the jaws project in the same way beyond the head, and can neither be elevated above nor depressed below the axis of the body; this is equally true of the larvæ of the other groups in their earlier stages. Such a larva placed upon the surface of a leaf could never enter it, but must perish; but, when the egg is so imbedded in the surface of the leaf, and so firmly attached to it, the larva, in passing obliquely out of it, necessarily enters the leaf. This affords a sufficient reason why a larva once removed from its mine always dies, so long as the structure of the head and mouth-parts retains this character (figs. 1 and 2); though no good reason, apart from the creature's instinct, can be given why it might not, after the change occurs, which takes place in all at some period, and after the trophi become like those of ordinary larvæ of Lepidoptera, as shown in fig. 4, re-enter the leaf, and form a new mine, as do the larvæ of many other genera (*e. g.*, some species of Gracilaria, Ornix and Laverna), or feed externally, like the greater number of lepidopterous larvæ. But, as a matter of fact, it never does so. Dr. Clemens has stated that the larva of *L. crataegella*, when feeding in leaves of the wild cherry (*Prunus serotina*), sometimes leaves one mine and makes another. If this is true, its habit is unique in the genus; but, though I am very familiar with this species, I have not been able to confirm Dr. Clemens' statement, and I have found reason to think that he was in error. *Ornix prunivorella* Cham. was unknown to Dr. Clemens. It mines the leaves of *Prunus serotina*, and its mine cannot be distinguished from that of *L. crataegella* Clem., and, like other species of Ornix, it does leave one mine and make another. I think it at least probable that Dr. Clem ens mistook the Ornix mine for that of *L. crataegella.*

To return from this digression. After leaving the egg, the mines of all the species of Lithocolletis that are known to me, as well as those of many other genera of Tineina (*e. g.*, Phyllocnistis), are at first linear and confined to the surface, upper or lower, as may be the habit of the species. Larvæ with the trophi as in fig. 2 (*e. g.*, Phyllocnistis, Lithocolletis, and very young Gracilaria) simply separate the epidermis from the parenchyma, and do not eat the latter. The linear part of the mine of Lithocolletis is very similar to a Phyllocnistis mine; and during the portion of the larval life when this mine is made, and indeed in the flat and ornatella groups throughout the entire larval life, except in its last stage, the mouth parts (fig. 2) are identical with those of Phyllocnistis. So long as this character of the trophi is present in all these groups the body is depressed or flattened, the sides of the segments are mammillated, and the legs are but feebly developed. In all of these respects the larvæ resemble somewhat those of Phyllocnistis. Prof. Zeller, as quoted by Mr. Stainton in Ins. Brit., v. 3, p. 285 (I have not seen Zeller's paper myself), gives as one of the characters of Phyllocnistis "larva apod," and Dr. Clemens, in Tin. N. Amer., p. 83, states that the "larva is without feet or prolegs." As to the earlier stages of its larval life, this is no doubt true, but as to the later stages, its truth depends on what is meant by being "without feet or prolegs." The next three segments after the head, the last and the penultimate segments are certainly without appendages of any kind; but on each side of each of the other segments, not, it is true, at the point usually occupied by the legs, but projecting obliquely from the edge of each segment, I find, in *P. ampelopsiella* Cham., a very distinct two-jointed appendage, without either claw or circlet of tentacles, which certainly aids the larva in its slow progress through its long and narrow mine. It is not pretended that these appendages are homologous with even the feebly developed legs and prolegs of the young Lithocolletis larvæ, yet I do not see why they are not as properly called legs as those of a Nepticula. The resemblances of the larvæ of Lithocolletis to those of Phyllocnistis lie in the thin and flattened body, the mammillated sides of the segments, the character of the trophi (fig. 2), and the linear character of the mines. The next three segments after the head are somewhat enlarged in the first stage of Lithocolletis, as in many other genera (*e. g.*, Gracilaria), but this is not like the great lateral enlargement of the same segments in Phyllocnistis. The legs (fourteen in number) are present in all the three groups of Lithocolletis, though they are feebly developed in all stages of the flat group, in the first five stages of the cylindrical group, and in all except the last stage of *L.*

ornatella, so that they are unfit for crawling, when the larva is removed from the mine, in all except the last stage of *L. ornatella*, which voluntarily leaves the mine and crawls away to pupate. No good reason can be given why the cylindrical larvæ, after their fifth stage, when the feet are apparently large and strong enough for use, seem unable to crawl when removed from the mine. When out of the mine they apply the spinneret to the surface on which they rest, and spin a thread fit to afford a secure foothold, as do most crawling larvæ, but they are unable to crawl, and yet if, while tumbling helplessly about, the true feet happen to touch a part of a mine from which the upper cuticle has been removed, the larva at once drags itself upon the mined portion, and then crawls actively enough, without attempting to spin a thread for a foothold.

From each side of each segment project three hairs, just above which are two other shorter ones. These hairs are found in all the groups, and persist throughout the larval life.

I have mentioned above the Phyllocnistis-like character of the trophi and of the mine in the earliest stages of Lithocolletis. Indeed, while this character of the trophi is retained, this character of the mine results as a necessary consequence. The larva can only feed straight on or turn to one side or the other, merely separating the cuticle from the parenchyma, and cannot deflect the head so as to eat out the latter, as a mining larva with the head deflexed and the trophi as in fig. 4 would do. The form of trophi in fig. 2 is found in the earlier stages of some other genera besides Phyllocnistis and Lithocolletis, and in such cases the mine is *usually* linear and is *always* a mere separation of the cuticle from the parenchyma. It need not be linear. Indeed, in *Phyllocnistis ampelopsiella*, though the mine is, strictly speaking, linear, yet it winds about from the midrib to the margin and back, between the veins of the leaf, until the entire cuticle in the mined portion is separated, and the mine becomes a blotch. In Lithocolletis and many other genera, the mine always becomes blotch-like. Frequently, as in *L. ornatella*, the blotch obliterates the linear part of the mine, but in other cases, as in *L. celtisella*, the linear part is long, and the blotch is at one end of it, like the mines of some Nepticulas.

The period during which this form of trophi (fig. 2) lasts varies in different genera and in different species of the same genus. Thus, in Phyllocnistis, it lasts until the last larval stage, when the form in fig. 4 is assumed, and the larva immediately spins its cocoon. This is also the case in the flat and ornatella groups of Lithocolletis; but in the cylindrical group the change takes place at the fifth stage, as it does also in *Gracilaria* (*Parectopa*) *robiniella* Clem., and probably in other species of the Euspilapteryx group of Gracilaria, while in such species as *G. rhoisella* and *G. blandella*, which I call true Gracilaria, it takes place at the second stage.

But while larvæ having trophi as in fig. 2 must make linear or flat mines, the converse does not hold good. Many larvæ, like those of Nepticula, Bedellia, Aspidisca and Antispila, make linear mines, at least in their earliest stage, but the trophi of these are of the ordinary type of lepidopterous larvæ (fig. 4), and the head is deflexed, the mouth not being fixed in the axis of the body. But in such cases the mine is not a mere separation of the cuticle from the parenchyma; the latter itself is eaten out. *Gracilaria robiniella* and *G. salicifoliella*, after the moult at which they assume the trophi as at fig. 4, also continue making flat blotch mines, but the parenchyma is eaten out. In these two species of Gracilaria and in others having similar habits, the body never becomes cylindrical, but is always somewhat depressed, and the head is very flat and thin, even after assuming the form of trophi, as in fig. 4. This form of trophi is assumed sooner or later by all lepidopterous larvæ; in some, as above shown, not until a late stage of larval life, in others earlier. In the great majority of species it is assumed before the larva leaves the egg; if this is taken to indicate a high rank, then Nepticula, instead of taking the lowest place among Tineina, as in Ins. Brit., v. 3, should out-rank Lithocolletis and even Gracilaria; and Tischeria also would out-rank Gracilaria because the larvæ of Tischeria assume the form given at fig. 4, either before leaving the egg or at the first moult thereafter.

In describing mines, they are frequently mentioned as being either tentiform or flat. But from what is written above it will be seen that this is not the true distinction. It is rather between those in which the parenchyma is eaten out, and those in which it is simply separated from the cuticle; whether it is the one or the other is a necessary consequence of the structure of the head and trophi. At whatever period of larval life the moult takes place, at which the form in fig. 4 is assumed, the character of the mine is changed at once; and thereupon the larva, as in the cylindrical group of Lithocolletis and in Gracilaria, proceeds to eat out the parenchyma, or leaves the mine; or, as in the flat and ornatella groups of Lithocolletis, and in Phyllocnistis, at once ceases to feed and spins its cocoon, to do which *L. ornatella* leaves the mine. In the cylindrical group and in Gracilaria, the larva, after that change, finds itself unable, from the position of the head and the structure of the trophi, to continue to separate the cuticle from the parenchyma, and must feed upon the latter; and the body having assumed a more cylindrical form, the cuticle presses uncomfortably on it; this leads the larva if it continues to mine, as in Lithocolletis, to meet its changed condition by making its mine into a tentiform one, or, as in most Gracilaria, to leave the mine and feed externally. Some of the latter also, as *G. erigeronella*, make the mine tentiform; others, with more flattened bodies, as *G. robiniella*, make sufficient room by eating out the parenchyma. Previous to this change there is no indication of any instinct to spin a web, probably because there is no organ to elaborate the silk, or to spin it. It is at this change that the silk glands and the spinneret first appear, just in time to meet the wants of the larva, which could neither give its mine the tentiform character, nor subsist externally, without the ability to spin. The tentiform character of the mine is caused, in part at least, by the shrinkage of the silken web; and to secure its hold on the leaf, as an external feeder, the larva must spin a few threads upon the surface. Large larvæ no doubt aid in curling the leaf to make the mine, or to feed externally, by drawing the silken threads; but in small larvæ this is accomplished mainly by the contraction of the silk itself.

In the Nat. Hist. Tin., v. 2, Mr. Stainton enumerates seventy-six species of Lithocolletis as known in 1857, and many others have been discovered in Europe since that date. In my Index in the Bull. Geol. Geog. Surv., v. 3, seventy American species are enumerated. The total number now known is probably near two hundred. There is no published account of the occurence of the flat larva in Europe, and it is not probable that it would have remained unnoted had it been found there. In this country the flat group is represented by only fourteen species, and *L. ornatella* is the only species of its group as yet made known. All the other species belong to the cylindrical group. Though the species of the flat group are comparatively so much less numerous, the individuals are as numerous as those of the cylindrical group. So far as the mines are concerned, this might be explained by the fact that the mines of the flat group are always on the upper surface and are large, conspicuous blotches, while those of the cylindrical group are smaller, and with the exception of *L. tiliaeella* Cham. and *L. robiniella* Clem. in this country, are always on the under side ; but this will not explain the greater abundance of the moths of the flat group. This is owing, as I believe, simply to the fact that they are more prolific. The larvæ of this group are gregarious, while it is a comparatively rare thing to find more than one larva in a mine of the cylindrical group.

The larval life of a Lithocolletis lasts, in Kentucky, in midsummer, about three weeks. Many species, however, pass the winter in the larval state, though their development may be hurried by keeping them in a warm room ; then the moths make their appearance irregularly, according to temperature, all through the winter. It is probable that the larval life can not be shortened to a less time than three weeks. Since the larvæ cannot be removed from one mine to another, and it is difficult to keep the leaves green and fresh for so long a time, the only way to determine the length of the larval life is by observing a multitude of mines in various stages. From such observations, repeatedly made, I find the length of larval life to be about three weeks. In this period the larvæ moult eight times, at the eighth moult passing into the pupa state. This seems to be a large number for so short a life-time, but I am convinced that it is correct. I have already alluded to the difficulty of determining this matter accurately as to larvæ which are concealed in their mines, but I have observed hundreds of the larvæ in various stages of growth, and I find always seven distinct sizes in each species, and I find an eighth form different structurally from all the others, but no larger, or rather no longer than the seventh; and although I have not seen the unhatched egg, I have removed larvæ from mines which had not extended to the length of the egg from it, so that I am certain of having seen the first stage.

At each moult except the seventh, the length of the larva in its first stage is added to that of the moulting larva. Thus *L. coryliella* Cham. and *L. guttifinitella* Clem. are each in their first stage 0.56 mm. long. In the second stage they are 1.13 mm., and in their seventh stage 3.95 mm., and in several complete series of specimens now before me 0.56 mm. have been added at each moult. *L. ornatella* Cham. is at first 0.52 mm. long, and in its seventh stage it is 3.63 mm. long. In *L. robiniella* and in *L. crataegella* a somewhat different rule prevails. *L. robiniella* is at first 0.63 mm. long, at its second stage it is 1.26 mm., and so on to the fifth stage, when it is 3.15 mm. long. At its fifth moult there is no increase in size, but its form is changed from moniliform depressed, to a nearly cylindrical larva, the trophi have changed from the form given in fig. 2 to that given in fig. 4, and the legs are much better developed. In other words, in the cylindrical group a change takes place at the fifth moult, which is equivalent to that which takes place at the seventh moult in the flat and ornatella groups, and which takes place in Phyllocnistis at its last moult before becoming a pupa, which is probably also its seventh. At their sixth moult, however, *L. robiniella* and similar species add their original length again, and continue to do so at each subsequent moult, including the seventh, at which they pass into the last larval or the prepupal state, thus differing from the larvæ of the flat and ornatella groups, which at this moult do not increase in size, but simply change their forms and structures. In these latter groups the first seven stages are stages of nutrition and growth, not apparently of development; but the seventh moult and eighth stage are stages of development, and not of growth. In the cylindrical group all the stages are stages of growth and nutrition, except at the fifth moult. The changes which take place at the seventh moult in the flat and ornatella groups, and which continue to progress gradually through the eighth stage in the flat group, are necessary to bring these larvæ up to the level of the cylindrical group in its sixth and subsequent stages; except that the legs of the flat group are never so well developed as they are in the cylindrical group after the fifth, and in *L. ornatella* after the seventh moult. With this exception, the larvæ of all the three groups have reached the same level at the end of the eighth stage.

I am not positive as to the length of any one stage of larval life except the last (eighth), and of that only in the flat and ornatella groups. In these it lasts between two and three days in the summer, but the fall broods pass the winter in this stage. The moult by which the larva passes into the pupa state is different from the previous larval moults. The cast skins of the very young larvæ are usually lost in the frass in the mine; this sometimes happens with the older skins, and I have opened mines of larvæ in their penultimate stages, when only a single skin could be found. Usually, however, three or four may be found. In moulting, the head is first loosened completely, and retracted out of its skin, the suture between the head and next segment opens on the under side, and the opening extends back along the sides of the next two segments, upon the upper surface of which the head is thrown back; the larva in its new skin wriggles out at the opening, and very frequently the head is entirely torn off. The skin thus cast is thick and hard, and that cast at the seventh moult frequently remains almost entire. But the skin cast at the eighth moult is thin and delicate, and is usually torn into shreds, which are pushed off to one side in the cocoon, forming a little heap. As this moult takes place in the cocoon, it of course can only be observed by opening the latter, which usually injures the pupa or stops the moulting process. In a specimen of *L. ornatella* thus opened, I found some shreds of the skin pushed back to the apex of the abdomen, others adhering to parts of the body, and the skin entirely or partly removed from some of the feet, and uninjured on others. It had the appearance of a pupa which was freeing itself from its larval skin by wriggling about against the sides of its cocoon.

In the latter part of its last stage the cylindrical larva becomes white, having previously passed from the white of its earliest stages to pale greenish. The larvæ of the flat group, yellowish or whitish in their earlier stages, usually become more or less tinged with a smoky or fuscous hue, sometimes almost blue-black, but at their seventh moult they again become white. The larva of *L. ornatella*, at first whitish, gradually becomes tinged with green, which deepens in its last and penultimate stages to a peculiar bluish green not found in any other larva of the genus. This hue persists in the earlier part of the pupa state.

The pupa has the head pointed in front, with a serrated edge running back on each side, which is no doubt useful in cutting through the cocoon, while it pushes itself out by the contortions of its body, aided by the microscopic bristles which arm the upper surface of the abdominal segments. The pupa does not entirely free itself from the larval skin for nearly two days after the cocoon is made, and the pupa state lasts about eight days after that, at midsummer, and the moth emerges through a rupture of the pupa skin across the back of the head and down the sides of the wing-cases.

In this latitude these insects may be found in all their stages from May to the fall of the leaves. I have plucked from the same plant of *Rhus toxicodendron*, at the same time, leaves containing larvæ of *L. guttifinitella* in all their stages, as well as pupæ, and pupa-skins from which the imago had emerged. It is therefore manifestly impossible to say how many broods may succeed each other in a season. That depends on the temperature and length of the season. In Kentucky I have found *Gracilaria robiniella* mining locust leaves from the first of July to the fall of the leaves in October; while I have found it doing the same thing in New Orleans in December, when the leaves were falling. Larvæ which are in their last stage, having finished feeding, may winter in that stage, and this is the condition in which they are usually found in the winter, the temperature preventing them from passing into the pupa state till the return of warm weather. Larvæ which have not finished feeding when the leaves fall must of course perish, but no good reason can be given why pupæ might not winter. Nevertheless, I have never met with a Lithocolletis pupa in the winter or spring.

Neither can I conceive any good reason why moths disclosed late in the fall might not winter, and indeed the moths of *L. robiniella* and *L. salicifoliella* do; but I have never met with any others hibernating, and indeed I have not seen *L. salicifoliella* later than November. There are, however, some facts about the hibernation of the species which need further explanation. Thus, I have known *L. tubiferella* Clem. and *L. aesculisella* Cham. to pass into their last larval state in the middle of August, and to remain in that condition until late in the fall, when my last observations were made upon them, and in such cases there was abundant warmth and time for another brood before the fall of the leaves.

It now remains only to notice the points in which the three larval groups differ from each other. The larvæ of the flat (second) group are the flattest lepidopterous larvæ known to me. Fig. 7 represents the larva of *L. coryliella* in its first

Fig. 6.

Fig. 7.

Fig. 8.

EXPLANATION OF THE FIGURES.

Fig. 6. Larva of *L. robiniella*, first stage, 0.63 mm. long.

Fig. 7. Larva of *L. coryliella*, Cham., first stage, 0.56 mm. long.

Fig. 8. *a.* Outline of *L. coryliella* in transverse section at the fifth stage. *b.* Outline of *L. ornatella* in transverse section at the fifth stage. *c.* Outline of *L. ornatella* in transverse section at the eighth stage immediately after the seventh moult. *d.* Outline of *L. robiniella* in its fourth stage.

stage, 0.56 mm. long; fig. 1, an older larva of the same group; fig. 3, the same towards the latter part of its last stage; fig. 8*a*, the outline of one of these larvæ in transverse section at about the fifth stage, when the vertical thickness is scarcely one-fifth of its width. The "maculæ" of Dr. Clemens are usually only transverse rings, as shown on each segment in fig. 1; they appear at the second stage and persist throughout the larval life, except in the eighth stage, when they are found to have disappeared entirely. In the seventh moult the larva undergoes great changes. The legs are no better developed after that change than before it, though towards the latter part of the eighth stage each of the true legs is found to be placed upon a distinct mammillary projection of the segment; but immediately after the seventh moult the larva is found to have increased in thickness, till its vertical thickness is more than one-third its width; this thickness continues to increase, and the width to decrease, till, before shedding its last larval skin and disclosing the pupa, it has become distinctly cylindrical. During this time and in the same gradual way the head has become convex above, and deflexed, until the trophi are no longer in the axis of the body, but have assumed the position usual in ordinary caterpillars. During this stage it eats nothing, and its body seems to be a mass of oil-globules, which, however, have been increasing in number during the last two stages. It lies quiescent in the part of the mine to which it had retired before moulting, and seems disinclined even to wriggle when touched. *Pari passu* with these external changes internal changes as important have taken place. The spinneret has made its appearance at the seventh moult, and the long convoluted silk-glands may be seen lying along on each side of the intestine. These organs are seen to much the best advantage in a larva of the cylindrical group under slight pressure. The oil-globules arrange themselves along the median line of the body, sending two branches out on each side, in each segment, and gradually the form of the pupa becomes visible under the thin larval integument.

The mode of spinning the cocoon is as follows. The larva having, as above stated, retired to a part of its mine, and cast its skin, lies quiet for two or three hours. Up to this time the mine is flat. Turning upon its back, and applying its spinneret to the separated upper cuticle, it weaves short bands of silk in a line. These, by their contraction, produce a narrow longitudinal fold in the cuticle, thus drawing it tightly and raising it above the lower surface, which is made to curve slightly; the mine has thus become tentiform. Turning again upon its ventral surface, and slowly revolving around, it spins beneath it a circular sheet of white silk, which, by its contraction, draws from the circumference towards the centre, and causes a circular bulge or projection on the under side of the leaf, the diameter of which is a little greater than the length of the larva. Turning again upon its back, it spins, in like manner, a white and thin, though tough, transparent sheet above it, which, by its contraction, causes the nidus to project still more on the under side of the leaf, and the cocoon is complete.

In the larvæ of this group the upper surface of the integument is shagreened, and, as the feet are of little use in crawling, this roughness is no doubt useful in aiding progress, by contact with the separated cuticle; in some of the species the hind margin of the penultimate segment beneath is serrated, which affords similar aid. The larvæ of this group never really crawl, they only wriggle.

In *L. ornatella* the surface is not roughened, nor the penultimate segment serrated, and the legs are no better developed than in the flat larvæ, to which, in all of its stages but the last, it is closely allied. It differs from those larvæ, however, in having the segments more distinctly mammillated at their sides, and its outline in transverse section is more nearly elliptical, as shown by fig. 8*b*. The larva is white, and the maculæ are only distinct in the second, third and fourth stages. At the fifth stage it is tinged with green, which becomes deeper in each succeeding stage. Until the seventh moult the mouth parts are as in fig. 2. At that moult, however, the trophi, like those of the larvæ of the flat group, become as in fig. 4, and the legs become larger and more perfect than before, or than ever in the cylindrical group. The form also is so altered that, immediately after the moult, it is almost semicircular in transverse section (fig. 8*c*). Like the larvæ of the flat group, *L. ornatella* does not eat in its eighth stage, but, unlike them, it is far from inactive. It is the only larva of the genus (except *L. helianthemella*, one of the cylindrical group in Europe) which is capable of crawling when removed from the mine, and in a few hours after its seventh moult it voluntarily cuts a semicircular opening in the cuticle, by which it leaves the mine, and crawls away to spin its cocoon and pupate. Its cocoon is not flat, but is so tightly drawn transversely that it looks like a little knot. On opening it, however, it is found to be essentially like that of one of the flat group. As the larva leaves the mine to pupate, the mine never becomes tentiform, but remains flat. It mines indifferently either surface of the leaves of locust (Robinia). In the leaves of an allied genus, Amphicarpaea, mines and larvæ are found, which are indistinguishable from those of *L. ornatella*; the larvæ have the same life-history, and the cocoons and pupæ are indistinguishable. Judged by the mines, larvæ and pupæ, it is the same species in the leaves of both plants. But the moth from Amphicarpaea belongs to a different genus. It is *Leucanthiza amphicarpeaeella* Clem. The ornamentation differs from that of all the known species of Lithocolletis, though perhaps it is nearer to that of *L. ornatella* than to that of any other in some respects. The antennæ, which in Lithocolletis are carried back under the wings in repose, are carried extended at the side in *L. amphicarpeaeella*; the neuration of both pair of wings differs decidedly from that of Lithocolletis, and is identical with that of *Phyllocnistis vitigenella* Clem., except that in the hind wings of *L. amphicarpeaeella* the median vein is furcate on the hind margin, instead of being simple as in Phyllocnistis. In its other characters, however, it is near Lithocolletis.

The mines of larvæ of the cylindrical group are at first linear, ending in a blotch, and they retain this character until after the fifth moult of the larva. Up to that moult the trophi are those of the flat group (fig. 2), and the larvæ, though not flattened like those of the flat group, are depressed and submoniliform, while the feet, though better developed than in the flat group, are small and feeble. The mine is of course only a separation of the cuticle from the parenchyma, and as it is small, and on the under side of the leaf (except in the case of *L. robiniella* and *L. tiliaeella*, as before stated), it is likely to escape notice. By far the greater number of mines and larvæ of this group, which one sees, have passed the fifth moult, when the larva has become more cylindrical, though still a little depressed, and the mines have been made tentiform. Hence the mines of this group are usually described as tentiform, and the larvæ as cylindrical. Before becoming tentiform, that is, before the fifth moult of the larvæ, their mines are always greenish, which aids in preventing their discovery, and distinguishes them from mines of the flat and ornatella groups, which are always brown, yellow, or whitish, and therefore more conspicuous.

The larvæ, even in their earliest stages, differ from those of the flat and ornatella groups more than those groups do from each other. (Fig. 6, larva of *L. robiniella* in its first stage.) Still, even after its fifth stage, and until the latter part of its eighth stage, a larva of this group is more properly described as submoniliform than as cylindrical. In its younger stages it is more elongate, and is vertically thicker than a larva of the flat or ornatella groups. Fig. 8*d* gives the outline of *L. robiniella* in transverse section in its fourth stage. Its vertical thickness is nearly equal to half of its width. The maculæ are usually obsolete in these larvæ, but they sometimes may be seen. Thus, *L. robiniella* mines indifferently either surface of locust leaves. I have never found, out of the hundreds that I have examined, a specimen from the under side of the leaf that had distinct maculæ, and but a small proportion of those of the upper side show them. But sometimes they are found, at about the third and fourth larval stages, as distinct as they ever are in the flat larvæ, showing distinctly through the epidermis. At first I thought that these maculate larvæ must belong to a distinct species, but I have repeatedly bred them by themselves, without having been able to detect any difference between them and moths bred from larvæ without maculæ. At the fifth moult the same changes take place in these larvæ that take place in the flat and ornatella group only at the seventh. The larvæ become more cylindrical, the legs are better developed, the trophi are as in fig. 4, and the head is deflexed. A different sort of mine is therefore needed.

The mines are made in different ways by different species. *L. crataegella*, lying on its back, spins its web across the inner surface of the separated upper cuticle, whereby it is drawn, not as in the flat group, into a single longitudinal fold, but into a multitude of wrinkles like those in the mine of *Ornix prunivorella*, and the mine is deeper than that of a flat larva. *L. robiniella* spins a somewhat dense web across the floor of its mine, causing it to curve greatly, while the upper cuticle remains smooth. Its mine also is deep, and all the mines of this group are deeper and more decidedly tentiform than those of the flat group, as is necessary because of the more cylindrical form and larger legs of the larvæ, and especially because the flat larva only needs its tent to spin its cocoon in, while the larvæ of this group continue to feed and grow in the mines. *L. caryaealbella*, however, which pupates in an oval cocoon of silk mixed with frass, makes a single fold, like that of a flat larva, but larger, so that the tent has a higher ceiling.

The most singular mode of pupation that I have observed is found in the two closely allied species *L. ambrosiaeella* Cham. and *L. helianthivorella* Cham. These pupate in a fusiform silken cocoon suspended by a silken rope like a hammock in the mine, which is like that of *L. crataegella.* The larvæ spin the rope through the middle of the mine, and then, lying on it, carry their threads to and fro, over and around themselves, until they are completely enclosed. (The moths of these two species have one of the branches of the median veins of the fore wings furcate on the dorsal margin of the wing, thus differing from the usual neuration of the genus.) Some other species simply spin a few silken threads, on which they lie, or at most make but a very slight web. This is the habit of *L. desmodiella* Clem., which is the smallest species of the genus, and which has one fewer marginal veins in the fore wings than is usual in the genus.

As before stated, in the latter part of the last larval state, and in the pupal state, the groups are indistinguishable, except by the green color of *L. ornatella*, which gradually disappears, and then the pupæ are indistinguishable. The moths cannot be divided into groups having any connection with the larval characters.

It will be seen that on more attentive study of the larvæ of a greater number of species I have found it necessary to modify some of the statements in my former paper (PSYCHE, v. 2, p. 82–87). *All* the larvæ of the flat group pass through the form given in fig. 3, and that form is only one condition of the larval stage through which the larvæ pass, in the gradual change to the pupa state, which takes place in that stage.

V. T. Chambers.

A SINGULAR PLACE FOR RAT-TAILED LARVÆ. I found several of these curious larvæ in a branch of an old apple tree that had just been cut down. They were below a large nest of black ants, who had honey-combed the branch for quite a distance. They were twenty-five millimetres long when crawling, not so much when at rest, wrinkled and ridged rather remarkably, the tail a little longer than the body and tipped with a row of bristles curved backwards. Packard does not describe any such, and I am unable to determine the species. Can you help me?

Berlin, Conn., Mar. 20, 1878. *N. Coleman.*

INTERESTING CAPTURES.—A perfect specimen of *Deidamia inscripta* was taken in Newton at light early in June, 1878, the first example I have seen from this vicinity. *Plusia triloba* and *Oncocnemis chandleri* were taken at the Isles of Shoals on flowers in July. *R. Thaxter.*

PLANTAIN BEETLES.—Prof. F. H. Storer, of the Bussey Institution, Jamaica Plain, Mass., writes me that in the latter part of May, 1876, it was next to impossible to discover a single leaf of plantain (Plantago) that was not completely riddled by beetles (*Dibolia aerea* Melsh.). Several thousand plants from all sorts of situations had passed through his hands, and the only perfect ones he could find were from particularly cold, sunless places on the north side of buildings. *Samuel H. Scudder.*

ORTHOPTERA OF FLORIDA. The following species of Orthoptera were collected in Appalachicola: *Labidura riparia*, *Anisobia maritima*, *Labia burgessi*, *Polyzosteria ingens*, *Stagmomantis carolina*, *Anisomorpha buprestoides*, *Chimarocephala viridifasciata*, *Caloptenus femur-rubrum ?*, *Arphia* (near *xanthoptera*), *Acridium appendiculatum*, *Psinidia eucerata*, *Hippiscus phoenicopterus*, *Amblytropidia subhyalina*, *Leptysina marginicollis*, *Arnilia chlorizans*, *Trimerotropis picta*, *Stenobothrus* sp., *Tettigidea lateralis*, *Conocephalus triops ?*, *Gryllus luctuosus*. *S. H. Scudder.*

Proceedings of the Club.

§ 29. INSECTS WHICH LIVE IN RESIN. Baron OSTEN SACKEN exhibited specimens of *Cecidomyia* (*Diplosis*) *resinicola*, the larvæ of which inhabit drops of resin on scrub pine (*Pinus inops*) and are provided with long breathing tubes which project beyond the surface of the resin. (*March 13, 1874.*)

§ 30. PECULIARITIES OF RIPARIAN INSECTS. Baron OSTEN SACKEN quoted an observation by Dalman, that insects which live near water have prominent eyes, and cited, in illustration of this, the species of Elaphrus, Notiophilus, Stenus, Sphyracephala and many Hemiptera. (*May 8, 1874.*)

§ 31. Insect Deformities. Mr. H. K. Morrison showed a specimen of *Erynnis icelus*, which had a nick in the front margin of each fore-wing, perfectly symmetrical on the two wings. It seems as if the pupa must have received some wound just at the point where the two fore-margins meet, which corresponds to the position of the notches on these wings.

(*Oct. 9, 1874.*)

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 136.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 955 to 966 are from **Field and Forest**, v. 3.

* 955. Ja: S. Johnson. A season's collecting in Catocala. p. 64–66. [Dec., 1877.]

About 446 specimens of 29 species of Catocala collected [at Frankford, Pa.] between 9 July and 10 Oct., 1877, as follows:

	Liriodendron.	*Acer.*	*Robinia.*	*Nyssa.*	*Fraxinus.*	*Juglans.*	*Carya.*	*Quercus.*	*Castanea.*	*Fagus.*	*Salix.*	*Brush, Stumps, &c.*
42 ilia J. 9–A. 30										42		
3 grynea J. 9–J. 24								3				
8 ultronia J. 12–A. 13								1		7		
20 serena J. 17–S. 4							20					
47 obscura J. 17–A. 31							47					
4 epione J. 17–J. 25								3	1			
2 minuta J. 21	2											
13 parta J. 21–O. 10		3			3						7	
1 tristis J. 21	1											
25 neogama J. 23–S. 25		2						2		20	1	
42 paleogama J. 24–S. 19										42		
22 retecta J. 25–S. 4							3	18	1			
4 subnata J. 25–A. 14	1								1	2		
19 habilis J. 25–S. 4	2						4	12	1			
9 insolabilis J. 25–A. 31								9				
37 flebilis J. 26–S. 19							7	21	9			
1 ponderosa J. 26										1		
7 cara A. 6–S. 13									1		3	3
6 cerogama A. 8–A. 27		1		1				4				
47 desperata A. 9–S. 19	6						8	24	9			
5 judith A. 9–A. 13							5					
7 piatrix A. 10–A. 30						7						
6 innubens A. 10–A. 31			1					1				4
43 amatrix A. 14–O. 6			4								39	
2 antinympha A. 15–A. 16												2
1 concumbens A. 16										1		
2 phalanga A. 18–A. 20										2		
6 robinsoni A. 29–A. 31							5	1				
3 unijuga S. 4–S. 21								1			2	
446	12	6	5	1	3	7	99	102	23	117	52	9

The search began 20 June, but no specimens were found until 9 July. In pleasing contrast to the ways of sham scientists who collect only good specimens or uncommon species, Mr. Johnson collected all the specimens he could get.

Field and Forest, v. 3.

* 956. Ja: S. Johnson. Setting blocks for Lepidoptera. p. 83–85, fig. 20–22. [Dec., 1877.]

Description of blocks for setting the wings of Lepidoptera, and how to use them; other descriptions, by C: R. Dodge, with figures, appended.

* 957. W: H. Edwards. Descriptions of new species of Diurnal Lepidoptera found in North America. p. 86–89. [Dec., 1877.]

Describes *Argynnis macaria* from Cal., and *Charis australis*, *Lycaena striata* and *Thecla clytie* from Texas = 4 n. spp.

* 958. S. B. (in *Nature*). Selective discrimination of insects. p. 90–91. [Dec., 1877.]

Insects are guided by odor rather than by color.

* 959. C. E. Bessey. Flights of spiders. p. 91. [Dec., 1877.]

Lycosa and other spiders wafted through the air upon their threads.

* 960. J. W. Chickering. Insect ravages among the willows. p. 92. [Dec., 1877.]

Leaves of alpine species of Salix on Mt. Washington eaten by insects.

* 961. W: H. Edwards. Descriptions of new species of Diurnal Lepidoptera found in North America. p. 101–105. [Feb., 1878.]

Describes *Melitaea bollii* from Texas, *Argynnis columbia* (H: Edwards) from British Columbia, and *Apatura antonia* from Texas and Arizona = 3 n. spp.

* 962. S. S. Rathvon. The "wheel-bug," (Reduvius novendrius). p. 108–109. [Feb., 1878.]

Predatory and cannibalistic propensities of *Reduvius novenarius*.

* 963. W: H. Edwards. Descriptions of new species of North American Lepidotera. p. 115–119. [Mar., 1878.]

Describes *Pamphila rhena*, *P. rhesus*, *P. morrisoni*, *P. phylace*, *Amblyscirtes aenus*, *Pholisorapirus* from Southern Colorado; *Amblyscirtes nilus* from Texas=7 n. spp.; the female of *Pamphila snowi* resembles the male, except in the absence of the stigma.

* 964. S. S. Rathvon. Mandibular power of insects. p. 130–131. [Mar., 1878.]

Two imagos of *Urocerus cyaneus* cut a passage 10 cm. long through firm casimere cloth.

* 965. C: R. Dodge. Scale insects of the peach. p. 131. [Mar., 1878.]

Twigs of *Amygdalus persica* covered with scales of *Lecanium persicae*; seasons of the insect.

* 966. C: R. Dodge. A Colorado Yellow Jacket. p. 131. [Mar., 1878.]

Terrifying effect of an onslaught of *Vespa* sp., narrated in twenty-two verses.

* 967. **Townend Glover.** Manuscript notes from my journal, or Illustrations of insects, native and foreign. Order Hemiptera, suborder Heteroptera, or plant-bugs. Washington, written & etched by Townend Glover; transferred to & printed from stone by J. C. Entwisle, 1876. [2]+2+10+133 p. (p. 1–57bis, p. 58–132), 10 pl. (pl. 1–9 colored), printed only on one side of the sheet. 30·5 × 24. t 24×17. [Not published. Only 53 copies printed, for gratuitous distribution.] [Oct., 1876.]

Title; copyright. *a.* Introduction, p. 1–2. *b.* About 325 figures of about 257 imagos, 19 young and numerous anatomical details of about 240 species, pl. 1–10, each pl. with a p. of explanatory text. *c.* Arrangement of families &c. of the Heteroptera, or plant-bugs [Burmeister's arrangement (1835), p. 1–6, p. 16; Westwood's (1840), p. 7–9, p. 16; Amyot and Serville's (1843), p. 9–12, p. 16; Douglas and Scott's (1861–1865), p. 12–15, p. 17], p. 1–17. *d.* Alphabetical list of the families, & genera of Heteroptera mentioned in this work with synonyms, habits, food, habitat, &c. [includes, with others, all the species mentioned in Say's works, with the names of the genera to which they have more recently been removed], p. 18–73. *e.* Alphabetical list of predaceous or parasitic Heteroptera, the larvae, pupae, or perfect insects of which destroy other insects, p. 74–75. *f.* Alphabetical list of vegetable, and animal substances, frequented, injured, or destroyed, by Heteroptera, p. 76–85. *g.* Alphabetical list of insects, of other orders, either destroying Heteroptera, or destroyed by them, p. 86–87. *h.* Alphabetical list of the names of the authors and of authorities, or societies, &c., referred to in this work, p. 88–91. *i.* Abbreviations &c used in this work [with a diagram of three French inches divided into lines], p. 92. *j.* Remedies reported to be serviceable in destroying insects of the suborder Heteroptera or plant bugs, p. 93–96. *k.* Alphabetical list of [some principal] sections, families, and genera of the Hemiptera, Heteroptera, with derivation of names &c., &c. [compiled from the works of various authors, omitting many synonyms, and referring the genera to the families of Amyot and Serville's classification], p. 97–112. *l.* Alphabetical list of species, of the Hemiptera, Heteroptera [with translation of the names and referring the synonyms to their proper genera], p. 112–118. *m.* Genera as arranged in the entomological cabinet of the Museum of the Department of Agriculture, Washington, D. C., 1876 [with reference to the pages on which the genera are mentioned in Amyot and Serville's Histoire naturelle des Hémiptères, Paris, 1843], p. 119–123. *n.* Extracts from the list of Hemiptera, of the region west of the Mississipi, including those collected by the Hayden explorations of 1873, by P. R. Uhler, Baltimore, Md., Washington, D. C., Jan. 1876 [giving Uhler's arrangement of the "families &c.," and referring to the pages on which the genera are mentioned in that work (see Rec., no. 568)], p. 124-127. *o.* Notes of the habits of Heteropterous insects, with the latest changes in the nomenclature, position and classification of the various families, subfamilies, genera and species [taken from Uhler's List (see Rec., no. 568), and referring to the pages of that list], p. 128–131. *p.* Errata and addenda, p. 132. *q.* List of [45] societies, and individuals, to whom a copy of this work has been sent (1876), p. 132.

* 968. **Townend Glover.** Manuscript notes from my journal, or Entomological index, to names, &c., in Agricultural reports, with list of vegetable and animal substances injured or destroyed by insects, &c. Washington, written by Townend Glover; transferred to and printed from stone by J. C. Entwisle, 1877. Title-cover + title-p. + p. 1–79bis + p. 81–103, printed only on one side of the sheet. 30 × 23. t 22·5 × 16. [Not published. Only printed for gratuitous distribution.] [Dec., 1877.]

a. Entomological index to the Agricultural reports [with abstract of many of the passages referred to], p. 1–77. *b.* Insects to a greater or less degree beneficial, by destroying noxious insects [stating what insects they destroy], p. 78–79*bis*. *c.* Other agencies useful in the destruction of insects [animals, fungi and other plants, poisons and diseases; insects which bore in lead], p. 79*bis*. *d.* [List of vegetal and animal substances injured or destroyed by insects; list of articles, in the Reports, on cotton and on cotton insects], p. 81–101. *e.* Addenda and errata, p. 102–103. *f.* Blank for notes, p. 103.

* 969. **Townend Glover.** Manuscript notes from my journal. — Cotton, and the principal insects, &c., frequenting or injuring the plant, in the United States. Washington, D. C. Written and etched by Townend Glover, transferred to and printed from stone by J. C. Entwisle, 1878. T.-p. + 2 p., 22 pl.; each pl. with explanation at bottom, all printed only on one side of the sheet. 31 × 25. t 27 × 16·5. [July, 1878.]

Introductory; list of some principal articles, relating to cotton, printed in the Reports of the U. S. Department of Agriculture, p. 1–2. *b.* Seeds, and young plants, pl. 1. *c.* Root, and disease commonly known as soreshin, pl. 2. *d.* Rust of the leaf, as caused by fungus or by Acarus, pl. 3. *e.* Rust more developed, pl. 4. *f.* Blight, pl. 5. *g.* Aphis, pl. 6. *h.* Plusia, 2 spp.; Boarmia, pl. 7. *i.* Hyperchiria, pl. 8. *j.* *Lozotaenia rosaceana*, *Laphrygma macra*, pl. 9. *k. Aletia argillacea*, pl. 10. *l. Lozotaenia gossypiana, Anthocoris insidiosus, Centrinus perscillus, Calocoris rapidus, C. bimaculatus*, pl. 11. *m.* Young flower bud, young boll, bud in its involucre or "square," pl. 12. *n.* Flower open first day; *Epicauta strigosa, E. vittata, E. ferruginea, Chauliognathus americanus, Ch. marginatus*, pl. 13. *o.* Young "squares" shed in consequence of non-impregnation occasioned by wet weather, pl. 14. *p.* Flower and young boll on second and third day; *Euryomia melancholica, E. sepulchralis, Trigonopeltastes delta, Podisus spinosus, Conotelus obscurus*, pl. 15. *q.* Young bolls; *Leptoglossus phyllopus, Euschistus punctipes, Nezara pensylvanicus, Largus succinctus*, pl. 16. *r.* Flower; *Heliothis armigera*, pl. 17. *s.* Boll; *H. armigera*, pl. 18. *t. Dysdercus suturellus*, pl. 19. *u.* Rotted bolls; *Colastus semitectus, Homalota?* sp., *Carpophilus hemipterus*; *Silvanus quadricollis* attacking maize also; fungoid growth on maize, pl. 20. *v.* Rusted bolls; *Tinea granella* (?), in maize also, pl. 21. *w.* Healthy boll and partially rusted boll, pl. 22.

* 970. **C. V. Riley,** State Entomologist. Eighth annual report on the noxious, beneficial and other insects of the state of Missouri, made to the State Board of Agriculture, pursuant to an appropriation for this purpose from the legislature of the state. Jefferson City, 1876. 7 + 185 + 4 + p. 23·5 × 15·5. t 19 × 11·5. 55 fig. [June, 1876.]

Preface and Table of contents, p. iii–vii.

a. The Colorado potato beetle — *Doryphora 10-lineata* Say [damage during the year; migrations; generic name; natural enemies; remedies, especially Paris green; native home; poisonous qualities], p. 1–12, fig. 1–2. *b.* Canker worms [antithetic descriptions of *Paleacrita vernata* and *Anisopteryx pometaria*, defining the new genus Paleacrita; remedies], p. 12–22, fig. 3–15. *c.* The army worm — *Leucania unipuncta* Haw. [various applications of the vernacular name; past history of this species; sexual differences in the imagos; description of all stages; habitat; oviposition; hibernation; habits and time of appearance of the larva; number of broods; comparison with *Prodenia autumnalis*; food-plants; conditions under which it becomes abundant; natural enemies; remedies], p. 22–56, fig. 16–38; p. 182–185. *d.* The Rocky Mountain locust — *Caloptenus spretus* Thomas [experience with it in 1875 in Mo., Ks., Nebr., Ia., Minn., Col., Dak., Mont., Wyom., Tex., Ind. Terr. and Manitoba; moulting; habits and migrations; native home; comparison with allied species; food-plants; changes in vegetation following the invasions; natural enemies; remedies, legislative and practical; use of locusts as food for man; fears and injuries caused by other locusts], p. 57–156, fig. 39–47. *e.* The grape phylloxera [oviposition of, description of female, of male and of egg of, and means against *Phylloxera vastatrix*], p. 157–168, fig. 48. *f.* The yucca borer — *Megathymus yuccae* (Walker) [indefiniteness of classificatory divisions; biological, bibliographical and descriptive details about the species; its affinities; its enemies], p. 169–182, fig. 49–55. *g.* Index, p. i–iv.

* 971. **C: V. Riley**, State Entomologist. Ninth annual report on the noxious, beneficial and other insects of the state of Missouri, made to the State Board of Agriculture, pursuant to an appropriation for this purpose from the legislature of the state. Jefferson City, 1877. 7 + 129 + 3 + p. 23 × 15. t 20 × 11·5. 32 fig.

Preface and Table of contents, p. iii–vii.

a. Insects which feed on plants of the genus Ribes, and their appropriation to the several species of this genus; treats especially of *Eufitchia ribearia* (p. 3–7, fig. 1–3), of *Nematus ventricosus* (p. 7–22, fig. 4–8) with a figure of *Podisus placidus* which preys upon it, and of *Pristiphora grossulariae* (p. 23–27, fig. 9). *b.* History, habits and description of *Emphytus maculatus*, which feeds upon Fragaria, p. 27–29, fig. 10. *c.* Habits, transformations and description of *Lophyrus abbotii* which feeds on Pinus; description of *Limneria lophyri* n. sp., parasitic in the larva of the Lophyrus, p. 2 9–32, fig. 11. *d.* Habits and description of *Lophyrus lecontei*, which feeds on Pinus, p. 32–34. *e.* Spread and present distribution of *Doryphora 10-lineata*, with a map of distribution; probability of and precautions against the introduction of the beetle into Europe; figure and description of *Uropoda americana*, parasitic on the beetle; value of various "potato pest poisons," p. 34–47, fig. 12–13. *f.* Oviposition, number of annual broods, longevity, hibernation and summary of the natural history of *Leucania unipuncta*, p. 47–50. *g.* Ravages, habits and natural history and description and figures of egg, larva and imago of *Leucania albilinea*; its natural enemies and means against it; description of *Anomalon apicale*, a parasite, p. 50–57, fig. 14–15. *h.* Detailed information of the invasions of *Caloptenus spretus*, during the year 1876, into all the regions subject to it; source and destination of swarms, distribution, rate of spread, direction of flight; oviposition and hatching of eggs; natural enemies and parasites, especially *Trombidium sericeum*, *Anthomyia radicum* var. *calopteni* (descr. and fig.), *Sarcophaga carnaria*, an undetermined ichneumon and two undetermined carabids (one figured and described), *Erax bastardii* (fig.) and *Amblychila cylindriformis* (fig.); experiments to test the effects of alternately freezing and thawing the eggs of *C. spretus*, of soaking and drying them, of exposing them to the air, of burying them, and of pressing the soil down over them; resolutions of the Omaha Conference [see Rec., no. 794]; active and legislative means against the locusts; prospects for the year 1877, p. 57–124, fig. 16–29. *i.* Description and figures of the eggs, egg-masses and larvæ of *Corydalus cornutus*; figures of the pupa and imago; figure of *Belostoma grandis* and of eggs, probably of this species, formerly supposed to be those of the Corydalus, p. 125–129, fig. 30–33. *j.* Habits of *Megathymus yuccae*, p. 129. Index, p. i–iii. Errata.

*[1] 972. **Annual Report of the Entomological Society of the Province of Ontario**, for the year 1876. Printed by order of the Legislative Assembly. Toronto: 1877. 8vo. pg. 2, 58, fig. 1–15, 18, and 1 pl., contains the following, and nos. 973 to 978.

Title. *a.* Annual business reports and reports of the annual meetings of the Society and of the London and Montreal Branches, p. 1–6. *b.* Annual address of the President of the E. S. O. (by Wm. Saunders) (from Can. Entom., 1876, v. 8, p. 210–217) [collection exhibited by the Society at the Centennial Exhibition in Philadelphia, and notes on the other collections of insects shown there; rules of nomenclature discussed at the meeting of the A. A. A. S., at Buffalo], p. 6–10. *c.* Report of the Committee on Centennial Exhibition (by W. Saunders, Chairman) [with appended notice from *The Daily Graphic*—N. Y., Sept. 26, 1876—of the collection exhibited by the Society], p. 10–12. *d.* Meetings of the Entom. Club of the A. A. A. S. (rom Can. Entom., 1876, v. 8, p. 176–185) [incl. address of Dr. J. L. Le-Conte, Pres. of the Club], p. 12–17. *e.* Insects introduced by the Centennial Exhibition [see Rec. No. 845], p. 20–23. *f.* Index, p. 57–58.

*[1] 973. H. Hagen. On genera. p. 17–20.

Discusses the relations of Artemia and Branchipus, and those of Daphnia, Cyclops and Canthocamptus; advocates enlarging the characters of species and those of genera; list of characters not to be considered generic; generic characters.

*[1] 974. W: Saunders. On blistering beetles. p. 24–29, fig. 1, pl.

Treats of *Epicauta vittata*, *E. cinerea*, *E. atrata*, *Meloe angusticollis*, *Cysteodemus armatus*, *Mylabris cichorii*, *Macrobasis albida*, *M. atrivittata*, *M. segmentata*, *Cantharis vesicatoria*, *C. vulnerata*, *C. nuttalli*, *Pyrota mylabrina*, *Tergrodera erosa*, figuring all except *Epicauta atrata;* life-history of Meloe, mostly an abstract from Trans. Linn. Soc., v. 20; notes on Meloe about Toronto. [Essentially the same as Can. Entom., 1876, v. 8, p. 221–228, pl., and Can. Entom, 1877, v. 9, p. 11–12.]

*[1] 975. C: J. S. Bethune. The destructive locust of the west. p. 29–34, fig. 2.

Brief introductory remarks and a reprint of "The migrations of the destructive locust of the west," by A. S. Packard, Jr., in Amer. Naturalist, 1877, v. 11, p. 20–29. Figures *Caloptenus femur-rubrum.*

*[1] 976. W: Saunders. On some of our common insects. p. 35–38, fig. 3–8.

Treats of *Actias luna*, *Deilephila chamaenerii*. *D. lineata*, *Papilio asterias*. [Essentially the same as Can. Entom, 1877, v. 9, p. 32-33, fig. 1; p. 63–67, fig. 2–5; with a brief sketch of *Papilio asterias* added.]

*[1] 977. W: Saunders. Notes of the year. p. 39–40, fig. 9.

Treats of *Heliophila unipuncta*, *Pempelia grossularia*, *Pieris rapae.*

[1] Record made by Mr. George Dimmock.

Annu. Rept. Entom. Soc. Ontar., for 1876.

*[1] 978. Jos: Williams. Beneficial and injurious insects. p. 41–55, fig. 10–15, 18.

Treats of *Apis mellifica*, *Galleria cereana*, *Trupanea apivora*, *Pimpla annulipes*, *Tremex columba*, *Sigalphus curculionis*, *Porizon conotracheli*.

*[1] 979. **Annu. Rept. Entom. Soc. Ontar.,** for the year 1877. Including reports on some of the noxious, beneficial and other insects of the province of Ontario. Prepared for the Honourable the Commissioner of Agriculture, on behalf of the Society. Printed by order of the Legislative Assembly. Toronto: 1877. 8vo. pg. iv, 59, fig. 1–50, and 1 pl., contains the following, and nos. 980 to 989.

Title, Index, p. i–iv. *a.* Annual business reports and reports of the annual meetings of the Society and of the London and Montreal Branches, (partly from Can. Entom., 1877, v. 9, p. 181–183, 187–189, 211–213), p. 1–4, 6–9. *b.* Annual address of the President (W. Saunders) (Can. Entom., 1877, v. 9, p. 183–187) [ravages of *Clisiocampa sylvatica*, migrations of *Pieris rapae* and of *Doryphora decemlineata*, the U. S. Entom. Comm., the Entom. Club of the A. A. A. S., progress and literature of entomology for the year 1877], p. 4–6. *c.* Proceedings of the Entom. Club of the A. A. A. S. (by A. G. Wetherby) (Can. Entom., 1877, v. 9, p. 172–174), p. 11–12. *d.* The U. S. Entom. Comm. (Can. Entom., 1877, v. 9, p. 81–84), p. 14–17. *e.* Recent entomological works (Can. Entom., 1877, v. 9, p. 137–138) [reviews of "Economic entomology" by Andrew Murray, and of the Ninth Annual rept. . . . insects of . . . Missouri, by C: V. Riley], p. 19. *f.* Catalogue of the Lepidoptera of America north of Mexico. By W. H. Edwards. Part I. Diurnals (by W. Saunders) (Can. Entom., 1877, v. 9, p. 97–98, 36–37, 80, 138) [reviews of the above-named work; of LeConte and Horn's Rhynchophora of America north of Mexico; of Glover's Manuscript notes from my journal, etc., Heteroptera, [see Rec. no. 967]; of The Rocky Mountain locust [see Rec. no. 794]; of Packard's Half hours with insects [see Rec., nos. 309 and 994]; of Scudder's Rept. upon the Orthoptera collected by the Wheeler Expedition, and notes on several other papers by the same author; and notice of "*Harpalus caliginosus*," by Franklin C. Hill], p. 19–21.

*[1] 980. W. Brodie. Experiments on the Colorado potato beetle. p. 9–10.

Food-plants and quantity of food required by *Doryphora decemlineata*.

*[1] 981. A: R. Grote. A new lepidopterous insect injurious to vegetation. p. 13–14.

Description of *Nephopteryx* (*Dioryctria*) *zimmermani*, a new species of Pyralidae destructive to pines about Buffalo, N. Y. [Same as Can. Entom., 1877, v. 9, p. 161–163.]

[1] Record made by Mr. George Dimmock.

*[1] 982. C. G. SIEWERS. Notes on larvæ — Fondness for water — Hints to beginners. p. 17–18.

Treats of larvæ of *Arctia isabella*, Ecpantheria and others. [Same as Can. Entom., 1877, v. 9, p. 127–129.]

*[1] 983. PROF. JA: T. BELL. How to destroy cabinet pests. p. 18.

[From Can. Entom., 1877, v. 9, p. 139–140.] Uses cyanide of potassa (KCN) and sulphuric acid (H_2SO_4). [The hydrocyanic acid vapor generated by this mixture is a very dangerous poison, and should never be used except by an experienced chemist. *G. D.*]

*[1] 984. C: J. S. BETHUNE. A few common wood-boring beetles. p. 22–30, fig. 1–3, 1 pl.

Treats of and figures *Monohammus scutellatus*, *Clytus speciosus*, *Orthosoma cylindricum*, *Clytus robiniae*, *Chrysobothris femorata*, *Saperda candida*, *Monohammus confusor*, *Oberea tripunctata*. [From Can. Entom., 1877, v. 9, p. 221–226, 1 pl.]

*[1] 985. W: SAUNDERS. The aphides or plant lice. p. 31–39, fig. 4–20.

Treats of generation of aphides; figures and treats of *Aphis mali*, *Eriosoma pyri*, *Aphis cerasi*; and their insect enemies, *Pipiza radicum* [corr.], *Coccinella novemnotata*, *C. bipunctata*, *Hippodamia maculata*, *H. tredecimpunctata*, *Coccinella munda*, *Hippodamia convergens*, *Mysia quindecimpunctata*, *Chilocorus bivulnerus* and species of Chrysopa and Syrphus.

*[1] 986. B. GOTT. Report on some of our fruit insect enemies. p. 40–47, fig. 21–36.

Treats of *Clisiocampa americana*, *Aegeria ? tipuliformis*, *Nematus ventricosus*, *Pempelia grossularia*, *Phyllophaga quercina*, *Agrotis devastator*, *Doryphora decemlineata*, *Pelidnota punctata*, *Haltica chalybea*, *Phylloxera vastatrix*, Eriosoma, *Carpocapsa pomonella*, *Conotrachelus nenuphar*, *Pieris rapae*, *Arctia isabella*; figures of most of the above species; an insect register for 1877.

*[1] 987. JOS: WILLIAMS. On grape vine galls. p. 48–51, fig. 37–41.

Figures and treats of galls made by Cecidomyidae.

*[1] 988. JOS: WILLIAMS. Dragon flies. p. 52–55, fig. 42–49.

Treats of *Libellula trimaculata*, *L. quadrimaculata*, *Diplax rubicundula*, *D. berenice*, *D. elisa*, *Nanophya bella*, *Agrion saucium*.

*[1] 989. C: J. S. BETHUNE. The Hessian fly. p. 56–59, fig. 50.

Treats of *Cecidomyia destructor*.

[1] Record made by Mr. George Dimmock.

990. **N. H. King** and **H. A. King.** The bee-keeper's text book. 23d ed. New York, King and Slocum, 1877. 139 p., ill.

Published in German and English; "has been thoroughly revised, and embraces the latest discoveries and improvements in bee keeping; and, in short, just the information most useful to the apiarian."—*Field and Forest*, 1878, v. 3, p. 134. [Not seen by the recorder.]

*[1] 991. **L. Provancher.** Petite faune entomologique du Canada précédée d'un traité élémentaire d'entomologie. Volume I — Les coléoptères. Québec, 1877. 12mo. pg. viii, 785, with 52 figures. [June, 1877.]

Title; Preface [a patriotic appeal for the study of the Canadian fauna] p. i–viii. Introduction [definitions], p. 1–3. Anatomy of insects: head, p. 5–31; thorax, p. 31–58; abdomen, p. 58–60; interior organization, p. 60–65. Metamorphoses of insects: general and classification into orders, p. 66–69; egg, p. 69–73; larva, p. 73–78; nymph, p. 79–82; perfect insect, p. 82–87. Functions of the relative life : general, p. 87–88; touch, p. 88; taste, p. 89; smell, p. 89–91; hearing and sight, p. 91. Faculty of emitting sound among certain insects, p. 92–94. Instinct and intelligence of insects, p. 95–106. The part of the insect in the economy of creation, p. 106–112. Classification [definition of species and criticism of Darwin], p. 113–123.

Entomological fauna of Canada: introductory, p. 127–130; Coleoptera [characters and synoptic table of 54 families], p. 130–138; descriptions of 54 families, 418 genera, and 873 species of Coleoptera of Canada in systematic order, and mention of other species attributed to Canada [the (2) new genera and (7) new species described are *Athous bipunctatus* [corr.], Micronychus, *M. sulcatus*, *Erirhinus viridis*, *Attelabus maculatus*, Homogaster, *H. quebecensis* [Elateridae], *Leptura nitidipennis* [Cerambycidae], *Anatis canadensis* [Coccinellidae]. [For synonymy see Rec. No. 992.] Under each family are its characters, a synopsis of its genera; under the genus, its characters, a synopsis of the species if numerous, notes on habitats; under the species, its description and notes on its rarity. The French and scientific names are both given, (the former usually a direct translation of the latter], p. 138–705. Additions to the coleopterous fauna of the province of Quebec [made during the printing of the preceding pages]; describes 1 family, 31 genera, 90 (*Philonthus longipennis* [Staphylinidae] = 1 new) species; adds a few synoptic tables], p. 707–756. Vocabulary, p. 757–765. Contents, Index of genera and species, p. 767–785. Errata, [p. 786].

*[1] 992. **L. Provancher.** Additions et corrections à la faune coléoptérologique de la province de Québec. 1877. Québec: 1877. 8vo. pg. 38. [Jan., 1878.]

Title, Preface, p. 1–4. Additions [1 family, 32 genera, and 89 species] and corrections [including the following: *Philonthus longipennis* Prov.=*Ph.*

[1] Record made by Mr. George Dimmock.

sordidus Grav.; *Micronychus sulcatus* Prov.=*Cyphomimus dorsalis* Horn; *Erirhinus viridis* Prov.=*Phytonomus nigrirostris* Fab.; *Homogaster quebecensis* Prov.=*Piazurus subfasciatus* Lec.], p. 5–36. Index, p. 37–38. [See Rec. No. 991.]

* 993. **Cyrus Thomas,** State Entomologist. Sixth report of the State Entomologist (Walsh, 1. Le Baron, 4. Thomas, 1.) on the noxious and beneficial insects of the state of Illinois. — The first biennial report by Cyrus Thomas. — Springfield, Ill., 1877. 174 + 4 + 2 + p., 31 fig. 22·5 × 14·5. t 18·3 × 10·8.

Part I. Report, p. 1–62. *a.* Plan of work, acknowledgments, general recommendations, p. 3–7. *b.* Horticultural entomology [directions for planting and tending nurseries and orchards, so as to preserve them from insects and diseases; lists of useful, doubtful and noxious birds and useful insects], p. 8–15. *c.* History, description and habits of Anisopteryx; remedies, p. 16–21. *d.* Descriptions and histories of wire-worms [Elateridae]; remedies, p. 21–32. *e.* Habits, descriptions and lists of coleopterous, lepidopterous and hymenopterous borers; synoptical table of wood-boring larvæ; remedies, p. 32–44. *f.* Occurrence of *Caloptenus atlanis* in Illinois; breeding grounds and migrations of *C. spretus* and *C. differentialis*, means against locusts, p. 44–56. *g.* Habits and oviposition of *Leucania unipuncta*, p. 56–59. *h.* Description and geographical dlstribution of *Murgantia histrionica*, p. 59–60. *i.* Description of larva and imago of *Ceramica picta*, p. 60. *j.* Description of larva of *Selandria rubi*, means against this and against *Nematus ventricosus*, p. 61.

Part II. The introduction to, and first part of, a manuel [*sic*] of economic entomology for the state of Illinois. — The part herein present includes only the Coleoptera, or beetles [definition of insects and of their several orders, list of their important families, description of the developmental stages and of the structure of imagos, directions for the identification of injurious species, characters of the several subdivisions of Coleoptera; descriptions, habits and food of about 112 species of Coleoptera, beneficial or injurious, with means against many of them], p. 63–174, fig. 1–31. List of trees, plants and other substances injured by insects described in this report, with names of the species injuring, p. 1–4. Index, p. 1–2. Errata.

* 994. **A. S. Packard, Jr.** Half hours with insects. Boston, Estes and Lauriat, 1877. 8 + 384 p., 2 pl. (1 pl. colored). 20·5 × 14. t 14·5 × 9. 260 fig.

[See Rec., no. 309.]

10. Insects as mimics. p. 257–294, fig. 196–229.

Use of mimicry as a protection and disguise; insects which mimic their surroundings; insects which mimic other insects; prophetic and synthetic types of insects.

11. Insects as architects. p. 295-320, fig. 230–250, pl.

Description of pits, holes, galls and dwellings made or inhabited by insects.

12. The social life of insects. p. 321–352, fig. 251–259.

Organization and work of colonies of termites, ants, wasps and bees.

13. Mental powers of insects. p. 353–384, fig. 260.

Activity, senses, nervous organization, volition, reason, temper, timidity, faculties, memory, power of communication, educability, solicitude and loyalty of insects.

[We are requested by the author to publish the following corrections of errors detected in this work. Page 187, in explanation of fig. 187, *for* Bucculating *read* Bucculatrix; p. 289, line 23, *for* Disippus *read* Archippus, and in line 25, *for* Archippus *read* Disippus; p. 305, line 13, *for* sumac *read* cottonwood; p. 306, in explanation of fig. 236, *for* sumac gall *read* vagabond gall.]

* 995. **Allen Whitman.** Report [of the Geological and Natural History Survey] on the Rocky Mountain locust. For 1876. St. Paul, Pioneer Press Co., 1877. 43 p. 23 × 15. t 18 × 10. map 50 × 43.

Etymology of the word "locust"; frequency of locust invasions; liability of Minnesota to invasions; history of past invasions; naturalization and degeneration of the locusts in Minnesota; source, destination and direction of flight of the locusts; area in which eggs have been deposited (map); time of depositing eggs; parasites and enemies; ravages of the locusts; practical methods of contending with the locusts young and old.

* 996. **Herman Strecker.** Butterflies and moths of North America, with full instructions for collecting, breeding, preparing, classifying, packing for shipment, etc., a complete synonymical catalogue of Macrolepidoptera, with a full bibliography, to which is added a glossary of terms and an alphabetical and descriptive list of localities. — Diurnes. — Reading, Pa., 1878. [4] + 2 + 283 p. t 19·5 × 11·9. 2 pl. t 23·5 × 14·6. 24·5 × 16.

a. Title, copyright, dedication, verses. *b.* Contents, p. 1–2. *c.* Preface [request for correspondents and for specimens of Lepidoptera and Coleoptera], p. 1–6. *d.* Capturing day butterflies (Rhopaloceres) [implements and their use, time of day, localities, clothing, food], p. 7–10. *e.* Capturing night butterflies or moths (Heteroceres) [localities, baits, rules], p. 11–12. *f.* Preparing for the collection [spreading the wings], p. 12–14. *g.* Cabinets, &c., for containing Lepidoptera [size and construction of drawers or boxes], p. 14–15. *h.* Forceps [indispensable], p. 15. *i.* Pins [sizes], p. 16. *j.* Arranging in the cabinet [topography], p. 16–17. *k.* Labeling [description and order of labels], p. 17–19. *l.* Cleaning [from grease], p. 19–20. *m.* Relaxing and expanding, p. 20–21. *n.* Repairing, p. 21. *o.*

Museum pests [detection and destruction], p. 21. *p.* Packing and transportation, p. 22–23. *q.* Packing . . . for transmission to foreign parts [packing, making lists, expresses, custom-houses], p. 24–28. *r.* Rearing . . . from the egg and caterpillar [getting eggs, keeping pupæ, varieties], p. 28–31. *s.* Final remarks [sending money, price of specimens], p. 31–32. *t.* Structure of butterflies and moths, as shown on plate 1, figs. 1–10, p. 33–34. *u.* Terms and abbreviations used in works on Lepidoptera, p. 35–45. *v.* Alphabetical and explanatory list of localities of which the lepidopterous fauna is more or less known, p. 46–66. *w.* Catalogue of the American Macrolepidoptera north of Mexico [comprising Rhopalocera only; full bibliography and synonymy, with localities, food-plants and descriptions of varieties, p. 67–192. *x.* Corrigenda, p. 193–194. *y.* Index to catalogue, p. 195–208. *z.* Bibliography [titles of all the articles upon Lepidoptera published by authors who have treated of the Rhopalocera of various parts of the world, as well as all the titles of articles upon the N. A. lepidopterous fauna; with biographical notes], p. 209–283.

*[1] 997. The **Amer. Nat.** [see Rec., nos. 264–307], v. 9, from p. 573, contains the following, and nos. 998 and 999.

a. Cave-inhabiting spiders, p. 663–664. *b.* Digestion in insects, p. 664–665.

*[1] 998. A. S. PACKARD, JR. Life histories of the crustacea and insects. p. 583–622, fig. 235–284.

Brief enumeration of the characters of crustacea and of insects (tracheata), embryology of many forms, with figures of different stages and of adult forms. Numerous references to the literature of the subject.

*[1] 999. MRS. MARY TREAT. Plants that eat animals. p. 658–662, fig. 306–308.

Capture of larvæ of Chironomus and other insects in the bladders of Utricularia.

*[1] 1000. The **Amer. Nat.**, v. 10, contains the following, and Nos. 1001 to 1021.

a. Notice of Scudder's Fossil butterflies [see Rec., no. 591], p. 53, 106–107; of Edwards' Butterflies of North America, p. 108–109; of Hentz's Spiders of the United States [see Rec., no. 790], p. 170; of Grote's Check list of the . . . Noctuidae of America, Part I [see Rec., no. 345], p. 312; of Tullberg's Monograph of the Poduridae of Sweden, p. 375; of Riley's Eighth report on the noxious insects of Missouri [see Rec., no. 970], p. 485–486; of Packard's Monograph of the . . . Geometrid moths of the United States, p. 568; of Lacordaire and Chapuis' Genera des Coléoptères, p. 568–569; of Cook's Manual of the apiary, p. 621–622; of Mayer's Ontogeny and phylogeny of insects (by A. S. Packard, Jr.), p. 688–691. *b.* Proceedings of societies: Acad. Nat. Sci. Philad. [Horn on a method of distinguishing sexes in Amblychila], p. 632; Acad. Sci. St. Louis [Riley

[1] Record made by Mr. George Dimmock.

Amer. Nat., v. 10.

on locusts, and on *Carpocapsa saltitans*; Broadhead on locusts; Riley on Paris green and its poisonous effects, and on agave wood for lining insect boxes], p. 125–126 [Riley on oviposition of *Leucania unipuncta*], p. 508–509 [Riley on the periodical cicada, on the cocoons of *Sericaria mori* reared on osage orange, on *Leucania albilinea*, and on a specimen of *Doryphora decemlineata* covered with mites], p. 635–636; Bost. Soc. Nat. Hist. [Scudder on the geographical distribution of *Vanessa cardui* and *V. atalanta* (see Rec., nos. 1013 and 1020)], p. 61; Buff. Soc. Nat. Sci. [Grote on Noctuidae from the Pacific Coast, and on *Polenta tepperi* from Texas], p. 128; Cal. Acad. Sci. [H. Edwards on *Darlingtonia californica* and the insects taken by it], p. 127 [Dr. Hale on a milk-white spider which is the exact counterpart of the flower Medrono], p. 574; Cambridge Entom. Club [Hagen on *Termes flavipes*, Scudder on osmateria of butterflies], p. 62 [Schwarz on Rhynchophora], p. 127–128 [Scudder on glands in the thorax of *Anisomorpha buprestoides* (see Psyche, v. 1, p. 137–140), Stebbins on a deformed *Papilio machaon*, Scudder on *Megathymus yuccae*, Fewkes on glands of *Autolyca pallidicornis*, Dimmock on bleaching wings of Lepidoptera], p. 255–256 [Burgess on pupæ of *Eudamus tityrus*, Mann on larvæ of *Anisopteryx pometaria*, Scudder on *Gryllus domesticus*, Hagen on amber, Scudder on the species of Cyaniris, Hagen on an insect allied to Mantispa and living in wasps' nests, Scudder on Forficularians (see Psyche, v. 1, p. 177–178), Austin on captures of Dytiscidae], p. 507–508. *c.* Perforation of orange skins by moths [of the genus Ophideres, from Australia] (from the *Monthly Microscopical Journal*), p. 50. *d.* A remarkable forage for bees [using the epispores of *Uredo luminata* in place of pollen grains] (by J. L. Zabriskie, in the *Bee Keepers' Magazine*), p. 122. *e.* The cotton worm, p. 303. *f.* Insects of the Kerguelen Island, p. 482. *g.* Carnivorous plants [and some of the insects taken by them] (by W. J. Beal), p. 588–591. *h.* Notice of death of Edward Newman, of London, p. 700. *i.* Meeting of the governors of the western states and territories in Omaha, Neb., 25 Oct., 1876, to devise means to rid the country of the grasshopper pests, p. 754–755.

*1 1001. Rev. Samuel Lockwood. The Florida chameleon. p. 4–16.

Some insects eaten, and *Doryphora decemlineata* refused by *Anolis principalis*.

* 1002. J. M. Mulligan. Intelligence in the hawk moth. p. 50.

Hawk moths observed never to go twice to the same flower of *Oenothera lamarckiana*.

Correction. In no. 48 of Psyche, v. 2, p. 131, line 3, for 968, *read* 970; on p. 135, lines 21-26, *for* 973 *read* 979, *for* 975 *read* 990, *for* 976 *read* 992, *for* 974 *read* 993.

Nos. 47–48 were issued Sept. 24, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., Sept.–Dec., 1878. [Nos. 53–56.

Life History of Danais Archippus.

Danais archippus Smith-Abbot, I, pl. 6. *Danaida plexippus* Scudder, Psyche, I, p. 81.

As authors have differed much in their accounts of this species, I propose to relate here simply what I have myself observed.

In this part of West Virginia, *D. archippus* is, I have reason to believe, four-brooded, and the butterflies of the last brood, and these alone, hibernate. The survivors appear very early in the next spring, and are always faded and more or less broken. They may be seen on the blossoms of the wild plum, the last of March, and on lilacs and other flowering shrubs in April. The females deposit their eggs the last of April and early in May on the leaves of different species of Asclepias, beginning as soon as the plants are well out of the ground, and thereafter, without doubt, soon die, after the manner of their kind. I have watched carefully, later in the season, for worn and faded individuals, which could possibly have hibernated, and the latest date at which I have seen such was 2 June, when I took one that bore every appearance of considerable age. The ovaries were found to be empty of eggs. Every female from which I have obtained eggs in confinement, later than May, and all those which I have noticed as they were ovipositing in natural state, have been fresh colored, and evidently not long from chrysalis; so that I have no idea that this species differs in this respect from other butterflies. One brood of *D. archippus* succeeds another the season through, the females of each brood depositing their eggs within two or three weeks after emerging from chrysalis, and soon after dying; and the last brood of the year hibernates, the females not to be impregnated till the next spring.

The number of moults is invariably four, and the most marked changes in appearance of the larvæ occur at the first and third moults. With the third, come in the long curved horns, and at the fourth they double in length. These horns are present in the stages preceding the third moult, but are shorter and straighter at the second moult, and mere stubs at the first. The whole round of changes from the laying of the egg to the appearance of the butterfly is rapid, and surprisingly so in hot weather. The females readily lay eggs in confinement, either upon the growing plant or plants cut and standing in water. I find recorded in my journal that 29 Aug. 1868, I found a larva of *D. archippus* on morning glory (Convolvulus), which I had quite forgotten. I suppose it was feeding on this plant, but I cannot now assert the fact. It remains to be verified.

I had concluded in previous years that this species must be many-brooded, from the larvæ which I had bred at different months, and outside observations, but in 1878 I undertook to breed in successive generations from early spring to the end of the season, and I give the result.

The first brood of larvæ came from eggs laid 2 May. They hatched on the 7th, and began to suspend on the 20th, and the butterflies to appear on the 30th of May. Whole period 28 days. But on 21 May fresh butterflies were seen about the gardens, and these must have come from eggs laid about the middle of April.

The second brood of larvæ proceeded from eggs laid 1 June. I saw the female ovipositing, caught her, and confined her in a bag over the plant, obtaining thus several eggs. She was certainly not a hibernator, being nearly perfect in wing, and I believed could have been one from the butterflies seen flying on 21 May. The eggs hatched 5 June. On the 20th, four larvæ made chrysalis, and their butterflies emerged 25 June. Whole period 25 days.

The third brood of larvæ proceeded from eggs laid 29–30

July, the female being not at all broken and very little worn, evidently not many days from chrysalis. On 1 August these began to hatch. On morning of 12th two larvæ suspended, and at 4 p. m. of the same day were in chrysalis, and the butterflies emerged 20 August. The several stages were; egg, 2 to 3 days; larva 11, chrysalis 8. Whole period 21 to 22 days. As the larva, from 2.5 mm. at hatching, reaches 4.6 mm. at maturity, this was rapid growth.

Another brood of larvæ, however, raised in May 1876, matured about as rapidly as those of August 1878, and the chrysalis much more so. The eggs were laid 14 May, hatched the 17th; the first moult passed the 19th; second moult the 21st; two passed the third moult on the 22d; these two passed the fourth moult on the 25th; one of them made chrysalis the 29th, and its butterfly emerged 1 June. The whole period was but 17 days from the laying of the egg to the emerging of the butterfly; the egg 3, larva 12, chrysalis 2. Here the chrysalis stage was immensely accelerated by the hot weather which then prevailed, the mercury ranging daily between 29° and 32° C.

The fourth brood of larvæ of 1878 proceeded from eggs laid 30 August, and the butterflies from them began to emerge 29 September. Whole period 30 days.

These four broods may fairly be taken to represent the usual sequence of generations in this region, for though the butterflies of the first, as I bred them, appeared 30 May, while the eggs of the second were laid 1 June, yet fresh butterflies were seen flying nine days before 30 May, and besides it is not likely that I saw the first that were on the wing. Individuals may have been out some days earlier. On the other hand, the interval between the butterflies of my second brood and the laying of eggs for the third was 34 days. Between the butterflies of the third and the laying of eggs for the fourth was but 5 days. But butterflies fresh from chrysalis were seen late in October, some weeks after my fourth had emerged. So that between the laying of eggs in early spring and the end of the season, there is ample time for a sequence of at least four generations of butterflies. When the female emerges from chrysalis, the eggs are not shaped: only fatty masses are found in the ovaries. It is just as in *Argynnis cybele*, on its first appearance in August, and in that species the eggs mature and are ready to be laid in about 15 days after the first butterflies are seen. This I have ascertained by many dissections and observations, in course of several years.

The eggs of *D. archippus* are laid singly on the leaves of its food-plant, and by preference on young plants. In the latter part of summer these spring up in abundance about my grounds, after the grass and weeds have received their annual cutting, and I can at any time be sure of finding eggs. In almost all cases they are laid on the upper side of the leaf, and sometimes there are two or three on the same leaf. But these have usually proceeded from different females, or have been laid at different periods, as may be known by the freshness of some and the maturity of others. At the same time larvæ of any stage may perhaps be feeding on the same plant. The young larva eats its egg-shell and presently attacks the fleshy surface of the leaf, eating out a narrow ring, of about 6 mm. diameter. After the first moult it is strong enough to cut the leaf through, and henceforth feeds on the edges.

There has been some diversity of statement as to the number of moults of *D. archippus*, but there are four, as I have already said. In all my experience with larvæ of butterflies, I know of only one species which has but three moults, viz., *Neonympha gemma* Hüb., and I should not assert this if I had not verified it repeatedly. *N. sosybius*, *N. areolalus* and *N. eurytris*, placed in the same genus, all have four moults. Indeed nearly all butterflies have four, but a few of them five. *P. philenor* has five, while all the other Papilios found in the northern states have but four. The hibernating Argynnids have five, as do the Phyciodes, but those which are many-brooded pass but four moults in the summer. Nearly all my rearing of larvæ is done in quarter litre[1] jelly glasses, with tin tops. In these the plant keeps fresh a long time, and I have not found that the larvæ suffer from the close confinement. The tops are lifted two or three times a day at least, and the

[1] *i. e.*, half pint.

glasses are thoroughly cleaned every morning. The advantage of glasses over boxes or any description of breeding-cages is that the larvæ can be inspected daily, and if need be hourly, and, by having a slip of paper attached to each glass, the changes can be recorded as they occur. If there be reason, any observation can be verified again and again. In case of *D. archippus* the facts were so verified in single individuals kept in separate glasses, and this was done with several broods of larvæ. So I can state positively that there are four moults, neither less nor more.

The change to chrysalis I shall describe from observations made last season, and it will be noticed that the account varies from the usual version. My attention was drawn to a paper in the Entomologist's Monthly Magazine for Aug. 1878, by Dr. J. A. Osborne, in which he declared that the process of pupation of the Nymphalidae had been erroneously described by authors, and that the safety of the chrysalis at the crisis of pupation was assured by a membrane which connected the chrysalis with the old caterpillar skin, and which was ruptured after the hooklets of the chrysalis had grappled with the silk; and not, as had been asserted, by the seizing of the old skin between the joints of the chrysalis, and the climbing up to the silk thereby. I watched the pupation of quite a number of larvæ of *Grapta interrogationis* soon after reading Dr. Osborne's paper, and found that a membrane or ligament always bound the last joint of the chrysalis to the old skin till the pupation was accomplished. In *G. interrogationis* this is white, 2.5 mm. long, flat, in shape of a long triangle, the narrow base of which is a little forked, and the forks fastened to the anterior ends of the two anal ridges on the chrysalis, which ridges or their equivalents (as in *D. archippus*, where there are two rows of black knobs) may probably be seen in any of the Nymphalidae, and also in the Papilionidae. That this ligament is the sole support of the chrysalis at the crisis of pupation, may be made evident by cutting off the caterpillar skin with scissors just below the ligament as the struggle to reach the button of silk begins, and so exposing the whole body of the chrysalis. The contortions of the chrysalis will not be in the least abated thereby, and the instant the tail is freed from the sheath of skin, the chrysalis will be seen to rise, the last segment describing an arc of a circle of which the ligament is the radius, and the tail, now bent forward, will be brought around and over the packet of skin and will strike the silk. It has been suggested to me that this membrane or ligament may be the drawn out rectum, or the external cover of the rectum, and further observations may sustain that view. At present I know it only as a ligament binding the chrysalis to the old skin, as it appears to the eye. I have given a full account of the observations made by me on this pupation in a paper written for the Canadian Entomologist, but which has not yet been published, and therefore I repeat only so much here as will serve to make the history of *D. archippus* more complete.

The larva of *D. archippus* spins a button of white silk when preparing for its pupation, and after fastening therein the hooklets of its anal claspers, soon casts off, and hangs suspended, at first in the form of an oval, the head being brought up to the twelfth segment. A few hours later the body relaxes and the position becomes that of a figure 6. Still later it hangs straight down, the four anterior segments bent at a right angle to the body. When this position is reached it is evident that the final change is not far off. Soon a spasm of contraction will be seen, the body being lifted up to the last segment and let fall again. This is repeated more than once after short intervals, and is followed by a slight creeping movement of the body beneath the skin, advancing from the last segment forward. This movement increases in rapidity and intensity, and as the strain on the anterior segments becomes severe, the skin bursts on the dorsal line of the second, third and fourth segments, and the top of the head is also rent. The mesonotum of the chrysalis is first forced through, and the body is slowly divested by the continued creeping movement. The slit is oblique and the ventral side is at first covered by the skin three segments beyond the dorsal, the skin fitting tightly everywhere, except on the last segment, where it is loosening and gathering in a mass about the anal feet. When the dorsum is exposed at the tenth segment the ventral is covered at the eighth, and the effort for the extrication of the tail begins, to be immediately followed by the lifting up of the body, so that the hooklets of the tail can grasp the silk. The body is bent sharply back while the tail is pointed outward and freed, the abdominal segments are stretched to their utmost and then contracted, one telescoping into the next successively, so that the skin is drawn into one joint after another. At the same time the chrysalis is seen to rise, the tail is bent back, and by a curving movement strikes the silk. The chrysalis has been described as climbing by the aid of the skin alone, as it is pinched between the segments. But on lifting the flap of skin entirely clear of the struggling segments, the same struggle continues, the chrysalis rises and the tail strikes the silk surely as before. The looker-on sees plainly a black ligament holding the chrysalis. This is 3.75 mm. long, flat, roundly excised at the broader end, the two prongs thus made being attached to the anterior black knobs on the last segment of the chrysalis, the other end to the extreme part of the caterpillar skin. I watched the pupation of only two caterpillars of *D. archippus*, — one from beginning of the process to the end. But in the other I lifted the flap of skin till the ligament was exposed. In doing this the whole thing unhooked from the silk, and as it lay in my hand, I pulled back the skin and was able to examine the ligament. I also lifted the chrysalis by the skin, and the ligament did not part. It did so afterwards only by a strenuous effort of the chrysalis, and then remained distended.

After the hooklets of the tail have caught the silk, the chrysalis whirls one way and then the other, the last segment twisting and screwing in order to fasten the hooklets more securely.

I had dropped one of the chrysalids of *G. interrogationis* into glycerine, at the crisis of pupation, and this was sent to an experienced microscopist for examination. He verified the existence of the membrane, and suggested that it is the rectum, or the external cover of it, drawn out and adhering to the anal ridges of the crysalis But if it be tubular it does not appear why it attaches at but two points only, namely, to the two knobs in *D. archippus*, and the hooked ends of the ridges in Grapta. The knobs seem adapted to this special purpose, being fashioned something like a shirt stud, the neck being a little narrower than the top. This top is rounded, but on the anterior side a little pointed and prolonged, so that it makes an efficient hook to the ligament, the other attachment of which (to the skin) is higher up as the chrysalis hangs. Further examination, and sections made after the larva has suspended, are necessary in this matter. When the skin is off, the chrysalis hangs limp and greatly distended, in the shape of a long and narrow cone, irregularly truncated at base. Presently the segments begin to contract, those of the abdomen to an extreme degree, and to widen correspondingly; the head-case lengthens and the mesonotum swells out, — till in course of half an hour the characteristic shape of the genus is assumed.

DESCRIPTION OF THE PREPARATORY STAGES OF D. ARCHIPPUS.

Egg. — Conoidal, the height being to the breadth as 70 to 60, and as 75 to 50, in different examples; in some the sides are much more convex than in others; somewhat flattened at top; the base flat; marked by about twenty-two prominent, smooth, vertical ribs, most of which extend from base to edge of summit, but a few terminate a little below summit; between the ribs are about thirty smooth, horizontal striæ, enclosing spaces in shape of parallelograms with rounded corners; the surface within these spaces finely wrinkled in the direction of the longer axis of the egg; on the summit, about the micropyle, are arranged six spaces, long, narrow, enlarged externally, each with a deepened median groove running to the central point; these are separated, and between each pair are one, sometimes two, similar spaces, but shorter and broader, each having a double groove; interior are two concentric rows of spaces like these last, each double grooved; the whole forming a sort of rosette, with all the grooves leading to the micropyle; color greenish-yellow, becoming later grayish. Duration of this stage from two to five days, according to the temperature.

Young Larva. — Length 2.5 mm.; cylindrical, very little largest anteriorly; the head a little broader than next (second) segment; color of body white, tinted yellow at the junction of the segments; on each segment after the second a transverse row of short black hairs, and a few hairs back of this row; on the second an obovate black spot on each side of the dorsal line, with many black hairs; on the third and eleventh each, two subdorsal black prominences; head obovoid, the vertices rounded, smooth, black; before the moult a brown stripe appears on the middle of each segment, and pale stripes on the head. Duration of this stage from two to five days.

After 1st moult. — Length 4 mm.; cylindrical; banded with white, and pale yellow and black, the latter occupying the middle of each segment after the second, with white on each side, yellow being at the extreme edges; on the third a short, tapering, blunt, black process, flattened transversely, on each side of the dorsal line, and similar but shorter processes on the eleventh; head obovoid, at first black, but afterwards light stripes appear; these become distinct, and at last there is a black triangle with yellow centre on the front face; next above is a yellowish band, followed by a black one, then a pale line and after that black to the back of the head. Duration of this stage two to four days.

After 2d moult. — Length 7 mm.; same shape, and banded as before; several segments now show a black line on the dorsal area next after the anterior yellow band, the processes on the third and eleventh segments are straight, rounded, black, 2 and 1 mm. long respectively; head striped black and yellowish as at last stage, the upper stripes broader. Duration of this stage two to four days.

After 3d moult. — Length 12.5 mm.; the black bands deep colored, broader, and prolonged to base of body; on each side of this a white band edged without by a black line on dorsum, and then deep yellow to end of segment; the processes slender, tapering, black, 2.75 and 1.5 mm. respectively, but twenty-four hours later 4 and 1.75 mm.; each pair divergent, the anterior pair projected forward and recurved, the posterior projected backward, and also recurved; head nearly as before. Duration of this stage two to four days.

After 4th moult. — Length 28 mm., and at three to five days later reaching maturity.

Mature Larva.—Length 46 mm.; shape cylindrical, of nearly even thickness from the third to the twelfth segment; banded transversely with black, white and yellow, black on the middle of each segment, white on both sides of the black, and next the white, yellow, these two shades separated on the dorsum by a black line or narrow stripe; on the third and the eleventh segments, on each side the dorsal line, are two slender, tapering, flexible and divergent black processes; the anterior ones 8 mm., the others 4 mm. long; feet black, pro-legs black with a white lunate spot on each; head obovoid, slightly depressed at top, the vertices rounded, smooth, banded with black and yellow; on front face a black triangle enclosing yellow triangle, next above a band of yellow, then black, yellow, and at back of head black.

Chrysalis.—Length 28 mm., greatest breadth 15 mm.; cylindrical, stout; the head-case but little prolonged, rounded; mesonotum slightly prominent, rounded, followed by a shallow depression; abdomen very large, the segments extremely contracted; color light yellow-green, smooth and shining; a line of separated golden dots from posterior base of mesonotum to head-case; two similar dots on ventral side between the wing cases; a line of golden dots thickly set across the abdomen, ending at the wing cases, and bordered anteriorly by a black line; the tail black and slender and, at its base, on ventral side, on the last segment, two rows of rounded, shining, black knobs, three in each row, the outer pair larger than the others and more prominent, and a little pointed anteriorly; in some examples one or two of these knobs are missing, but the outer ones are always present. Duration of this stage from five to fifteen or more days, according to the temperature. In one instance, mentioned above, this period was restricted to two days. *W. H. Edwards.*

SOME SYNONYMS OF BUTTERFLIES. I received, 27 March 1878, the 14th part of Strecker's Lepidoptera, dated 1877 twice on the cover, but issued after 20 March 1878. In this are described as new four of my species and I suppose one of Scudder's. His *Melitaea imitata*, *M. larunda*, *Charis gaudaloupe*, *Pamphila similis* are, respectively, my *M. ulrica*, *M. dymas*, *Ch. australis*, *Amblyscirtes nysa*; his *Satyrus ashtaroth* is doubtless Scudder's *S. dionysius*; his *Libythea larvata* is, in my opinion, *L. carinenta*. As he will claim priority by his system of antedating, I think attention should be called to the matter. W. H. EDWARDS.

Notes on certain Californian Diurnals.

It has probably been remarked by all who have collected on the Pacific coast that the fauna changes most strikingly with a change of level. At times, in the mountainous districts, a walk of five or six kilometres will suffice to transport the collector into a faunal region more distinct from the one just left than any that might be found in a journey of many hundred kilometres along the coast. This circumstance is so noticeable that it leaves the impression that more than ordinary differences of climate must be at work to accomplish such marked results ; a little calculation, however, will show that the climatic alteration due to elevation alone is sufficient to account for all the changes that we see.

A journey due north of five thousand kilometres from central California would bring the explorer to hyperborean regions, while a rise of 4500 metres would cause an equivalent change in external conditions of life ; and I think that it will not be far wrong to assume that the changes for each 300 metres elevation are equivalent to, though of course not identical with, the changes which would be noted in a journey of 325 kilometres along the coast or at a uniform level.

Though there is not such a sharply defined limit to the truly alpine fauna as we find in the Rocky Mountains, where this is coincident with the timber line, usually at about 3350 metres above the sea, yet in the Sierra Nevada we can trace a pretty distinct line below which the sub-alpine species rarely stray in any numbers, and this limit at the Yo Semite valley is at from 1800 to 2100 metres above the sea. It is somewhat remarkable that in this valley the line should be traceable at all, for the cliffs are so high that it would take but little fluttering for a butterfly to descend a thousand metres, in many places, to the floor of the valley. It is impossible to doubt that this often occurs; thus *Parnassius baldur* Edw., which usually inhabits a sub-alpine district, was occasionally found flying over the meadows, at the base of the cliffs, and *Papilio indra*, which seems most at home at an elevation of 2750 to 3000 metres, was several times observed and captured one and a half kilometres beneath its usual level.

Papilio zolicaon is found at all elevations, being smaller in high alpine districts, where it flies in company with *P. indra.* In these situations an umbelliferous plant, resembling a wild carrot, is abundant, and doubtless serves as the food-plant of both species. Their flight is high and wild in such situations: often the males of *P. indra* will rise, buffeting each other, for a hundred metres in the air, descending almost as abruptly, and not infrequently alighting on bare rocks to sun themselves. I took, altogether, nine males of *P. indra*, but was not rewarded by the capture of a female, although I was very anxious to obtain one to "set" for eggs.

Of all the Papilios, *P. eurymedon* was the most abundant, the males often congregating by dozens at muddy places in the road, at moderate elevations, although occasional specimens were met with as high as 2750 metres. *P. rutulus* was rather less common in similar situations. One female of this species, tied in a large bag upon a branch of wild cherry, laid twenty eggs. The young caterpillars decidedly resemble those of *P. turnus*, but seem more difficult to raise than that species. Mine died when past the first moult. Mr. Henry Edwards informs me that he has repeatedly found larvæ of this species, but invariably lost them before they changed to chrysalis. There is more difficulty in obtaining the egg than with *P. turnus*, for this same female had been confined in a smaller bag with the food-plant for some days previously and had utterly refused to lay. About half a dozen other females of *P. rutulus* were placed in the large bag from time to time, but none of these laid any eggs. Eggs of *P. eurymedon* were obtained; they are slightly smaller than those of *P. rutulus*, and of a clearer, less yellowish green. Under a lens the surface of both is seen to be slightly roughened.

Parnassius clodius I did not meet with, but eight females and one male of *P. baldur* were taken around the Yo Semite valley late in June, most of them at an elevation of about 2100 metres, although two, as before mentioned, were taken 900 metres lower down in the valley. The disproportion between males and females is remarkable, for in all other places I have found the males of this species and of *P. smintheus* apparently to outnumber the females by about five to one.

Some of these females of *P. baldur* readily laid eggs upon Sedum. The shape of the eggs is similar to that of the eggs of *P. smintheus*, but the color is a rather light chocolate brown, instead of a chalky white as in that species. The color seems to be due to some liquid which smears the eggs when they are laid. Later in the season I met with more of *P. baldur*, 325 kilometres north, near Lake Tahoe. Here they were flying over the granite rocks at an elevation of 1800 metres, in company with the variety *behrii* of *P. smintheus.*

Most of the rock formation in this vicinity is of conglomerate, which seems rather easily affected by the weather, and does not give a congenial foothold to a species of Sedum which abounds in the crevices of the granitic rocks.

It may be remarked that the coloration of Parnassius is eminently protective in such situations as these ; their flight is slow and they alight frequently, thus becoming an easy prey to the collector. The case of *P. behrii* is very curious. Numbers of this form have been taken by various collectors, and I succeeded in capturing over forty, yet in none of them was there any trace of the crimson color almost invariably found in fresh specimens of *P. smintheus*, but all had yellow or orange-yellow ocelli. It is difficult to conceive of any influence which should induce so complete a change, while failing in any way to affect the color of the corresponding spots in *P. baldur*, this being always crimson in fresh specimens.

I obtained eggs of *P. behrii* ; they are white as in the true *P. smintheus*, and like the others were laid on Sedum.

I have found a little device very convenient, on excursions where only a limited amount of baggage can be carried, for inducing butterflies to lay eggs. I had a number of wire frames made, each consisting of two rings about thirteen centimetres in diameter, connected by wire uprights about twenty centimetres high, the joints being all soldered. These frames will fit in, side by side, so as to require only a moderate amount of room. Then I had a similar number of round tin box-covers made, differing in size sufficiently to nest together. A few cylindrical flat-bottomed bags of gauze, of suitable size to fit over the rings, completed the apparatus. If the food-plant is not too large, it may be transplanted to one of the box-covers, otherwise a suitable branch may be placed in a bottle of water within one of these cages, and the female introduced. In this simple way the eggs of more than a score of Diurnals were obtained during the summer.

Among the Pieridae, a number of interesting facts were gleaned regarding the early stages of species, both of Pieris and Anthocharis.

Twenty-four hours were spent at Mojave station in the midst of the Mojave Desert, a tract of land about 160 kilometres north of Los Angeles, which is said to blossom as the rose during the two or three months of greatest rainfall, but is a barren waste during the remainder of the year.

At the time of my visit it did not seem an inviting field to the lepidopterist; the ground was nearly covered with the dried remains of some low herb which bristled with stinging prickles; a sparse growth of sage-brush alternated with a few other shrubby composite and cruciferous plants along the dry and parched water courses; the only trees were the strange "Yucca-Palms," with their numerous stiff heads of bristling green bayonets, lifted up five to ten metres upon a branching trunk, which seemed entirely composed of coarse interlacing fibres. Even in this wilderness a few now leafless wild tulips lifted their glowing scarlet heads above the sandy surface of the soil, and butterflies were not entirely lacking. The ubiquitous *Pyrameis cardui*, a species which seems to defy every climatic extreme of heat and cold, was abundant, some being fresh from chrysalis. A few of the delicate *Anthocharis sara* were to be seen flying about; and worn specimens of the rarity *Pieris beckerii*. Careful search upon the cruciferous plants revealed caterpillars of this butterfly in various stages, as well as those of *P. protodice*, and one or two which I think must belong to *P. occidentalis*. Some three weeks previously, when the train stopped at Mojave station, I alighted for a moment, and found a caterpillar of *Anthocharis ausonides*. This is almost exactly like that of *P. protodice*, therein differing very widely from the caterpillar of the otherwise very closely allied *A. hyantis*, while the chrysalids of the two Anthocharis are alike, and totally different from those of Pieris.

The *P. beckerii* larvæ, when mature, were about 32 mm. long, in color greenish white, thickly marbled or sprinkled with gray, and with a very distinct orange-yellow belt between the segments. The head is also tinged with yellow. In addition to the dark gray sprinkling, each segment has sixteen or eighteen jet black tubercles, which taper into bristles about 1.5 mm. long.

The chrysalis is of much the same general shape as that of *P. protodice*, but less angulated; the point is terminated by a blunt tubercular point; the cephalic portion of the chrysalis is rounded, with uneven surface, and, like the dorsal surface of the thorax, is dark grayish brown. The ridge above the wing-cases, which is quite conspicuous in *P. protodice*, is absent in this species. The remainder of the chrysalis is gray, nearly white upon the wing-covers and on the ridges of the two abdominal segments; these segments form a sort of hump, which has no dorsal ridge like that on the thoracic hump, and hence is lower. A pale spiracular streak extends from the margin of the wing-covers to the tail, and there are four black dots in a line across the back at the dorsal boundary between thorax and abdomen. The chrysalis state lasts about 18 days.

During the month of June, one or more eggs or larvæ of *Anthocharis hyantis* Edw. might be found on almost every cruciferous plant growing upon the talus at the base of the walls of the Yo Semite valley, and up to a height of perhaps 450 metres above the floor of the valley. The full-grown larva is 32 mm. long; head and body apple-green, very minutely dotted with black, with a pure white stigmatal line or stripe. There are no bristled tubercles on the mature larva, though such are present in the earlier stages. Just before the change to chrysalis, the caterpillar turns dull purple; the chrysalis retains this color for a day or two, and then gradually assumes a waxy grayish-white color. In shape and general appearance it is like the chrysalis of *A. ausonides* (figured in Edwards' Butterflies of N. A., v. 2).

At different times during June, I found in the Yo Semite valley a few caterpillars which I feel certain are those of *A. lanceolata*. When mature they were 32 mm. long; head rounded, pale green, thickly dotted with black; body rather elongated, tapering somewhat posteriorly from the sixth segment; back apple-green, shading off laterally into pale blue, which is bounded by a distinct bright yellow line just above the spiracles; next to the yellow line is a slightly broader line of pure white; venter and legs apple-green, assuming a slight bluish tint in the middle. Each segment above is covered with fine black points arranged in transverse rows; on each segment are six minute black tubercles, from which fine black bristles arise; these stand in the position of the points of equilateral triangles with their bases forwards. The chrysalis is somewhat larger than that of *A. hyantis*, and the long palpi-case is bent around backwards into a sickle-shape, giving the pupa a remarkable appearance. In many particulars of shape the pupa is not unlike that of *Terias nicippe*, and I believe that this species is the nearest to Terias of all our Anthocharis.

I will give a brief description of the larva which I suppose to be that of *P. occidentalis*; it is certainly a Pieris, and can hardly be any other species than this.

Head black with white dots; collar distinct, whitish; body striped transversely with yellow, black and white, the yellow predominating. In the middle of each segment (except the second and third, where it is obsolete), is a narrow black cross-line, sometimes faintly lined with whitish in the middle; this black line terminates just above and behind the spiracles, and is surrounded by white, thus giving dorsally two white cross-stripes. In front of the anterior white stripe of each segment is an irregular blotched stripe of black, consisting of a median rounded dot, a constriction on either side, and an irregularly triangular spot, with blunt apex forwards, reaching the segmental fold. The rest of the back and sides of the caterpillar is bright yellow, except a sub-spiracular band of irregular black blotches just above the prolegs. The chrysalis is black with a few lighter points.

This caterpillar is found with those of *A. hyantis*, but is much more subject to the attacks of ichneumon-flies, so that I obtained but two chrysalids and no perfect insects, although I must have taken altogether more than a dozen of the young larvæ. *Theodore L. Mead.*

Breeding Habits of Callosamia promethea.

During the spring of 1876, I carefully observed many specimens of *C. promethea*, confined in boxes, with the hope of gaining some clue to the singular attracting power possessed by the females. The results were of the most unsatisfactory nature. Males confined in the same box with females seemed to be entirely unconscious of their presence, crawling over their wings, and fluttering around the box in evident bewilderment. At the same time, twenty or thirty males were collected just outside the window, attracted from great distances by the same females. Neither confinement nor fright prevented copulation, for when a male accidentally alighted on the body of a female, copulation took place, and a pair would copulate if held together in the fingers.

Only one observation of importance was made. The newly hatched female, during the first two or three afternoons, protrudes from the end of her abdomen the organ which subsequently answers the purpose of an ovipositor. At this time its delicate walls are distended by a transparent fluid, and it has the appearance of an irregularly conical sack about five or six mm. long. At intervals it is withdrawn and again protruded. The slightest jar or touch causes its withdrawal for several minutes. It is only protruded during those hours of the day when the males are active.

In the April numero of the American Naturalist for 1877, Mr. L. Trouvelot gives the details of experiments which prove that the males of *C. promethea*, deprived of their antennæ, are incapable of fertilizing the female, although apparently not in the least crippled by the amputation. This fact, with the one previously mentioned, served as a guide for further observations.

If a female, with ovipositor distended, be placed in a room with an open window through which there is no draught of air, although there is a slight breeze out of doors, the males will collect in great numbers, flying about the window, or even into it and about the room, but being unable to find the female, though passing close to her. The conditions are the same as when the insects are confined in boxes. Now if she is suspended in the current of air outside the window, it will be found that the males have no difficulty in locating her. The instant that one passes to the leeward, he turns in his flight and begins working against the wind directly toward her. I have also observed that if a female alights upon the ground and then flies away, males will congregate for a short time around the spot where she had been. They show the greatest agitation, fluttering around, and grasping at different objects with their claspers.

From these facts it would appear that the female attracts the male by a volatile exhalation, and that this, acting on the nerves of the male, produces sexual desire, and prompts him to fly against the wind.

That this volatile exhalation is principally from the ovipositor is evident from the fact that this organ is only distended at those times when the males are active and the females willing. It is not distended to facilitate copulation, for the instant that the female feels the slightest touch from the approaching male it is withdrawn, the horny ring surrounding its base is protruded, the abdomen contracts and becomes rigid, particularly on the ventral surface, thus drawing the genitals downward and forward; then she is ready for copulation. That the exhalation is not wholly from the ovipositor would appear from the fact that sterile females, three or four days old, in whom this organ is dried and shrunken, and only protruded for the purpose of laying eggs, still have the attractive power. They resist every approach of the males, beating them off with their wings, and struggling to escape, but, if held fast in the fingers, the males will succeed in copulating. These females are unable to fly any great distance, in fact are quite abortive, and in the natural order of things would not exist.

The experiments of Mr. Trouvelot have proved that the antennæ of the male are necessary for the recognition of the female. Observation will show in what manner. When he is not in a state of repose, his antennæ are in constant vibration, moving back and forth in the direction of their broadest faces. This motion is very noticeable as he hovers just to the leeward of the female that he is approaching. This vibration of the antennæ, causing a constant movement of air between their finest pectinations, would facilitate the action of no known sense except the sense of smell.

If then the male is sexually excited and guided to his mate by a sense of smell located in the antennæ, the final act of copulation must be effected by some other sense, as these organs are never directly applied to the genitals of the female. This is the case. The male lights upon the female's body, and gropes around with his claspers, until he discovers the projecting horny ring fitted for his grasp. A sexually excited male will endeavor to copulate with a dead female, another male, or even a piece of cotton twisted into the shape of the body. In this last experiment every precaution was taken to prevent the faintest smell of the female about the cotton.

If the previous conclusions are correct, it would logically follow that an insect so intensely sexually excited as a male *C. promethea* would retain the excitement for a short time after the sensation causing the excitement had ceased. The nerve centres would remain in the condition produced by the action of the volatile substance on the nerves of the antennæ after the smell itself had stopped. In fact, he should strive to effect copulation even after the antennæ are removed. As a conclusion to this season's investigations, I put this deduction to an experimental test. An attractive female was held by the wings in the open air. A male soon approached. As he alighted on her body he was caught, the antennæ were removed, and he was instantly replaced in his former position. Immediately he began groping around with his claspers, and soon copulated. After a few seconds, no longer feeling the stimulus through his antennæ, he lost his desire, loosed his hold, and, after again feeling around with his claspers, flew away, apparently as well as ever. To make snre that the fault was not with the female, I allowed the next male who approached to copulate, and he was perfectly successful.

From these observations it seems fair to conclude that the virgin female exhales a volatile substance, which, acting on the antennæ of the male, produces sexual desire, and prompts him to fly against the wind; that this exhalation is principally from the ovipositor, and that the final act of copulation is effected by the sense of touch. *C. E. Webster.*

Eristalis tenax Linn. in America.

Baron Osten Sacken, in his Catalogue of Syrphidae (Bull. Buff. Soc. Nat. Sci.), records the capture of a specimen of this fine fly, so common in Europe, in his room at Cambridge, Nov. 1875. Dr. Hagen has lately called my attention to the species, having taken several specimens the present autumn in Cambridge. During the past few weeks I have taken many specimens of both sexes in Boston and Beverly, and Mr. S. Henshaw has done the same in this vicinity. I have also in my collection two females and a male from Beverly, taken in October 1875, and among the Diptera collected in Georgia by Mr. H. K. Morrison is a somewhat soiled female, which seems to belong to the same species. We must therefore regard *E. tenax* as fairly settled in America.

The species may be recognized from its large size, 15–16 mm. in length, wing 13 mm. long. Face grayish yellow, the cheeks and a broad median stripe black; forehead and occiput black with a grayish spot and hairs between. Antennæ dark brown. Eyes with two darker stripes, connected above and below. Thorax clothed with dull tawny hair, a faint trace of pattern showing through. Scutellum brownish yellow, transparent. Abdomen black, sparsely clothed with fine yellowish white hair. Second segment with two triangular, more or less distinct, ferruginous spots. Third segment in the male with a faint trace of similar marking. The segments are margined with a row of short yellow hairs. Wings clear, somewhat embrowned on the forward margin, and sometimes slightly clouded on the disk. Legs black, knees and anterior metatarsi yellow; hind tibiæ much curved and strongly ciliated.

Edward Burgess.

[It is remarkable how rapidly *E. tenax* has spread over this part of the country. The specimen taken by Baron Osten Sacken, mentioned above, is preserved in the collection of the Museum of Comparative Zoology, and bears date of 5 Nov. 1875. There are also in the same collection two specimens of this species taken by Baron Osten Sacken, labelled Newport, R. I., 22 Oct., and 20 Nov. 1876. I have in my collection, besides many taken this season, a male taken 3 Nov. 1876, at Cambridge, Mass., and other collectors have also taken specimens. *G. D.*]

Parasite on Magdalis. A new species of the Hymenopterous genus *Calyptus* (Braconidae) parasitic on *Magdalis olyra* belonging to the Coleopterous family Curculionidae:

Calyptus magdalis Cresson.—♂ ♀. Shining black; base of antennæ, palpi, tegulæ, and legs, yellowish-testaceous; face and sides of thorax thinly pubescent; metathorax rugose; wings hyaline, faintly dusky at tips, stigma and nervures black, the latter yellowish at base; tips of tarsi and sometimes the posterior tibiæ behind, fuscous; abdomen polished, depressed, first segment longitudinally aciculated; ovipositor of the female as long as the abdomen. Length 3.5–5 mm.

Hab.—Massachusetts. (Mr. Samuel Henshaw.) *E. T. Cresson.*

Hymenopterous Insect from Stems of the Black Raspberry. A new species of the Hymenopterous genus *Diomorus* (Chalcididae), hatched from the nest of *Crabro stirpicola* Pack., in the stems of the black raspberry:

Diomorus zabriskii Cresson.—♀. Bright metallic green, varied with shades of blue; antennæ black, base of scape testaceous; thorax confluently punctured; wings hyaline, faintly dusky at tips; legs green or blue, tibiæ fuscous or black, base whitish, as is also base of tarsi, posterior femora with a short tooth beneath near tip; abdomen smooth, polished, green changing to brilliant blue or purple in certain lights; ovipositor rather longer than abdomen. Length 5 mm.

Hab.—New Baltimore, Greene Co., New York. (Rev. J. L. Zabriskie.).

E. T. Cresson.

A Cardinal Grasshopper. Last autumn Dr. Joseph Leidy of Philadelphia, sent me a specimen of *Phylloptera rotundifolia* Scudd., taken 29 Aug., on Sharp Mt., Schuylkill Co., Penn., which was of a vermillion hue. At first I supposed the color was due to the use of the cyanide bottle in killing the insect, but it seems that Dr. Leidy was attracted by the color and kept the Phylloptera alive in a jar for nineteen days, during which it ate morning glory (Convolvulus) leaves, drank drops of water and laid eggs loosely in the jar. The insect differs in no respect from ordinary specimens of this species excepting in color, the entire body even to the ovipositor (which is usually brown in the normally green specimens) being of a uniform hue, which after drying has become somewhat embrowned.

Samuel H. Scudder.

Prionus prolific. In July 1877, I examined the abdomen of a female *Prionus laticollis*, and found therein 332 eggs; in August 1878, I found in another female 597 well-formed eggs, besides some soft bodies which may have been undeveloped eggs. *B. Pickman Mann.*

Proceedings of the Club.

§ 32. List of Butterflies collected in Florida by Dr. Palmer. Mr. S. H. Scudder exhibited a collection of butterflies from Key West and other parts of Florida, received from Dr. Edw. Palmer. He had found many Cuban forms among these, as he had anticipated. The following is a list of the species contained in the collection :

Callidryas agolithe, given as *C. argante* in Edwards' Synopsis.

Callidryas sennae Poey, sometimes confounded with *C. marcellina.*

Erycides sp., a very interesting new species from Indian River, in fine condition.

Pieris cleomes in two forms, at least as regards the female, one dark and the other pale. *P. cleomes* seems to be distinct from *P. monuste.*

Eumenia atala, very common in Cuba and very common at the Keys.

Melitaea frisea Poey, from Lake Okeechobee, never taken in the U. S. before.

Thecla favonius Abb.

Thecla eurytulus, which is figured in Hübner's Exotic Butterflies as coming from the U. S., but is not included in Edwards' Synopsis.

Lycaena Pseudoptilites, which is not in Edwards' Synopsis. Kirby calls it a synonym of *L. hanno* and also a synonym of *L. filenus*, but these are certainly three distinct species.

Lycaena Pseudofea Morrison, from the Keys and from St. Johns. It was previously called *L. isophthalma* by Herrich-Schæffer.

A Hesperian, which Mr. Scudder does not know.

Acolastus savignyi.

Anartia jatrophae.

Mr. H. K. Morrison said that the dark variety of *Pieris monuste* L. is frequently found in the Southern States, and that often both wings are entirely suffused with black.

Nov. 13, 1874.

§ 33. Insects imported from Europe. Dr. H. A. Hagen read some notes on insects which purport to have been imported into this country from Europe. At the previous meeting he had said that three-fourths of the species of insects which were introduced into America were not indigenous to Europe, but if they had come to this country from Europe they had equally come to Europe previously from the east. Their line of migration was indicated in some cases by the names they bore. All these migrating insects had spread from the east toward the west. Dr. Hagen now took up the subject of clothes-moths and their allies. In recent years, lists of insects imported into America had been made by B. D. Walsh, by C. V. Riley, and by J. A. Lintner. In these lists *Tinea vestianella*, *T. tapetzella*, *T. pellionella* and *T. flavifrontella* are said to have been imported from Europe. Dr. Hagen says that Linnaeus' description of *T. vestianella* is not sufficient for the recognition of the species. The only specimens of *T. tapetzella* known to have been collected in this country are the type of V. T. Chambers' description and two specimens in the Harris collection. Dr. Hagen has not seen *T. pellionella* in this country, and it is doubtful whether the common species known in this country as *T. flavifrontella* is identical with the European species that bear that name. *Nov. 8, 1878.*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 168.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 1003 to 1021 are from the **Amer. Nat.**, v. 10.

*[1] 1003. H. A. Hagen. The history of the origin and development of museums. p. 80–89, 135–148.

Notices the earliest known collections and of the mode of preservation of the natural history specimens; gives a brief history of the use of paper and other articles essential to the preservation of collections; curious collec-

[1] Record made by Mr. George Dimmock.

tions of the past; impulse given to the establishment of museums by the formation of academies and by the discovery of the microscope; the invention of the binomial nomenclature; objects, mode of arrangement, and development of modern museums.

*[1] 1004. S: H. SCUDDER. The chirp of the mole-cricket. p. 97–98.

[Same as PSYCHE, v. 1, p. 105–106.]

*[1] 1005. A: R. GROTE. A colony of butterflies. p. 129–132.

How *Oeneis semidea* was left on the White Mountains by the receding glaciers, at the decline of the ice-period; species similar to if not like it are found upon the mountains of Colorado and in Labrador, from the same causes.

*[1] 1006. ——— ———. Lubbock's observations on bees and ants. p. 148–161.

Quotation from F. Müller to show that bees "knew how to advise the queen that something was as yet to be done, but knew not how to show her *where* it had to be done"; bees do not show attachment or affection for one another; their devotion to their queen is of the most limited character; they can distinguish scents; experiments to determine whether the same bees always act as sentinels; bees possibly recognize others of the same hive by their scent, but not much importance need be attached to their recognition of one another as an indication of intelligence; experiments to ascertain whether the bees which collect honey also work in the hive, to determine how well they can find their way about, to ascertain if they return to the same part of the hive; bees as robbers of hives not their own: ability of ants to recognize companions; their power of communication.

*[1] 1007. A: R. GROTE and ADOLPH KAYSER. Are potato bugs poisonous? p. 205–207.

[Same as article cited in Rec., no. 587.]

*[1] 1008. ——— ———. Jumping seeds and galls. p. 216–218.

Concerning the larvæ of *Carpocapsa saltitans* from the *Yerba de flecha* the cause of the so-called "Mexican jumping seeds," the larvæ of *Nanodes tamarisci* which cause motion in the seeds of Tamariscus, and the larvæ of *Cynips saltatorius* which cause a kind of oak-gall to jump.

*[1] 1009. W. F. BUNDY. Flowers of the golden currant perforated by humble-bees. p. 238.

Flowers of *Ribes aureum* and *Robinia pseudacacia* perforated by humble bees.

*[1] 1010. A. S. PACKARD, JR. The cave beetles of Kentucky. p. 282–287, fig. 17, and pl. 2.

[1] Record made by Mr. George Dimmock.

Localities where the different species of Anophthalmus and Adelops are found; variations in size of the individuals of the same species; beetles from outside which had accidentally found their way into the caves; larvæ of the species; figures *Batrisus spretus*, *Anophthalmus tellkampfii* larva and pupa, *Adelops hirtus* and larva, *Quedius fulgidus* and two undetermined larvæ.

*[1] 1011. J. S. Kingsley. Are potato beetles poisonous? p. 303.

Regards the experiments made by Messrs. Grote and Kayser [see Rec., nos. 587 and 1007] not conclusive.

*[1] 1012. Gilbert S. Judd. Occurrence of maggots in a boy. p. 374–375.

Anthomyia scalaris larvæ in the intestines of a boy.

*[1] 1013. S: H. Scudder. A cosmopolitan butterfly. I. Its birthplace. p. 392–396.

Vanessa cardui originally came from North America; its distribution. [See Rec., no. 1020.]

*[1] 1014. H. A. Hagen. The probable danger from white ants. p. 401–410.

Habitations and mode of life of Termes; history of the devastations of the European *T. lucifugus* and the North American *T. flavipes*; means recommended to prevent danger from them.

*[1] 1015. A. S. Packard, Jr. The house fly. p. 476–480, fig. 28.

[Reproduction of the leading points of the article cited in Rec., no. 6.]

*[1] 1016. S: H. Scudder. The mode in which cockroaches and earwigs fold their wings. p. 521–529, fig. 29–41.

Illustrations and descriptions of the mode in which quite a number of species close and open their wings.

*[1] 1017. ——— ———. Mimicry in butterflies explained by natural selection. p. 534–536.

[An abstract of Fritz Müller's article in the Jenaische Zeitschrift für Naturwissenschaft, xi, Feb., 1876.] Discussion of mimicry with especial reference to the species of Leptalis.

*[1] 1018. A. S. Packard, Jr. A century's progress in American zoölogy. p. 591–598.

Enumerates some of the contributors to progress in entomology.

*[1] 1019. G. T. Bettany, in *Nature*. The missing link between the vertebrates and invertebrates. p. 598–602.

[Abstract of Dohrn's Der Ursprung der Wirbelthiere und das Princip des

[1] Record made by Mr. George Dimmock.

Functionwechsels: Genealogische Skizzen.] Correspondences between vertebrate and insect embryos.

*[1] 1020. S: H. Scudder. A cosmopolitan butterfly. II. Its history. p. 602–611.

Life history of *Vanessa cardui*, as far as known, in different parts of the world; its broods, food-plants and parasites. [See Rec., no. 1013.]

*[1] 1021. T. M. Peters. A spider fisherman. p. 688.

A spider kills a minnow by dropping upon it from a tree over a spring and biting its neck until it is dead.

*[1] 1022. The **Amer. Nat.**, v. 11, contains the following, and nos. 1023 to 1036.

a. Notices of Dr. F. Katter's Entomologischer Kalender für Deutschland, Oesterreich und die Schweiz, p. 55; of Weismann's Final causes of transmutation [including a description of the nature of the markings of Sphingid larvæ], p. 109–110; of Glover's Manuscript notes . . . Heteroptera, or Plant bugs [see Rec., no. 967], p. 110; of the entomological portions of Bulletin, no. 2, v. 3, of Hayden's U. S. Geol. Surv. Terr. [see Rec., nos. 855–858], p. 367; of Scudder's Fossil insects from British Columbia, p. 374–375; of Packard's Half hours with insects, correcting typographical errors [see Rec., no. 994, where the same errors are corrected], p. 443–444; of Murray's Economic entomology, p. 482–483; of Psyche, p. 508; of Gerstaecker's Arthropoda (in Bronn's Klassen und Ordnungen des Thierreichs), p. 702. *b*. Proceedings of societies: Amer. Assoc. Advanc. Sci. [Grote on Our knowledge of the cotton worm, and on A new lepidopterous insect injurious to vegetation (see Rec., no. 981), Bassett on Agamous reproduction among the Cynipidæ], p. 638; Acad. Nat. Sci. Philad. [LeConte on the spreading of introduced insects, McCook on *Formica rufa*, Leidy and McCook on destruction of plants by ants, LeConte on *Anthrenus scrophulariae*, and on the effect of corrosive sublimate ($Hg\ Cl_2$) scattered upon ant-hills], p. 61–63; Bost. Soc. Nat. Hist. [Scudder on perfect and imperfect metamorphoses of insects, and on polymorphism of our blue butterflies], p. 447 [Scudder on fossil insects from Colorado], p. 703; Camb. Entom. Club [Dimmock on Anisopteryx, Scudder on a Myrmecophila from Georgia, and upon fossil ants from Colorado], p. 190–191. *c*. Obituary notice of Dr. William LeBaron, p. 56. *d*. The zoology of the Wheeler survey, p. 108–109. *e*. A few words about scavengers [among which are mentioned flies, mosquitoes in their larval state, Silpha (for which is figured a Necrophorus) and Iulus] (by Prof. Sanborn Tenney), p. 129–135. *f*. The phenomena of digestion in the cockroach [from Plateau's researches], p. 243. *g*. Appropriation by Congress for U. S. Entom. Comm., and the appointment of its members, p. 254. *h*. *Thelyphonus giganteus* poisonous, p. 367. *i*. Locust ravages in northern China, p. 634.

[1] Record made by Mr. George Dimmock.

j. The jigger flea [*Pulex penetrans*] (from the Danish Journal for the Popular Diffusion of Natural Science), p. 755–756, and 12 fig.

*[1] 1023. ALFRED W. BENNETT. Is protective mimicry due to natural selection? p. 3–7.

Opposes the arguments advanced by Fritz Müller "that the curious phenomena of protective mimicry in lepidoptera can be fully explained by the theory of natural selection." The mimetic species are often far separated geographically. "Difficulty of understanding how the first steps in the approach of one insect towards another could possibly be useful in deceiving an enemy."

*[1] 1024. W: H. DALL. Educated fleas. p. 7–11.

Describes an exhibition of so-called "educated fleas," and the way in which they perform. Their performances "may be traced directly to the desire and earnest efforts of the insects to escape."

*[1] 1025. A. S. PACKARD, JR. The migrations of the destructive locust of the west. p. 22–29.

Table of dates of migrations of Caloptenus; "the immediate cause of the migrations of the locust from its original breeding places is the unusual abundance of the species during certain years." "The secondary cause of the migration is the desire for food, and possibly the reproductive instinct." Possibility of predicting insect years by meteorological data. Losses sustained in the United States from the attacks of insects; need of a salaried commission of entomologists. [See Rec., no. 975.]

*[1] 1026. A. S. PACKARD, JR. Explorations of the Polaris Expedition to the North Pole. p. 51–53.

Notes the species of insects captured by Dr. Bessels and describes 2 new species, *Microgaster hallii* [Braconidae] and *Isotoma besselsii* [Poduridae].

*[1] 1027. L: TROUVELOT. The use of the antennæ in insects. p. 193–196.

Concludes from experiments described in the article that "the sense localized in the antennæ cannot be regarded only as that of touch, hearing, or taste, nor can it be regarded as uniting their complex functions. . . . It is a kind of feeling or smelling at a great distance, by some process now totally unknown."

*[1] 1028. A. S. PACKARD, JR. Partiality of white butterflies for white flowers. p. 243.

Pieris rapae abundant on a white Aster, and *Colias philodice* on a yellow Solidago, in the same field.

*[1] 1029. S: H. SCUDDER. A flight of butterflies. p. 244–245.

A sketch, describing a flight of butterflies seen near Boston, by Wm. Edwards, followed by notes on similar migrations, by Mr. Scudder.

[1] Record made by Mr. George Dimmock.

Amer. Nat., v. 11.

*[1] 1030. C: SEDGWICK MINOT. The study of zoölogy in Germany. II. The methods used in histology and embryology. p. 392-406, fig. 71–76.

Figures the teeth of the crop of *Gryllus cinereus*, a section of the trachea of *Hydrophilus piceus*, and an isolated muscular fibre of a common water beetle.

*[1] 1031. A. S. PACKARD, JR. Experiments on the sense organs of insects. p. 418–423.

After describing a series of experiments made by removing the antennæ from various species of insects, the author says, "I do not see that my experiments enable us to prove anything as to the nature of the function of the antennæ, except to indicate that the insect's brain is as it were projected into them, and that their nerves probably possess nucleated cells, homologous with those of the ganglia from which the sense-nerves originate."

*[1] 1032. [C: R. OSTEN SACKEN.] Ganin's Metamorphoses of insects. p. 423–430.

Reviews at length Materials for a knowledge of the postembryonal development of insects by Prof. M. Ganin, [in Russian], in the Transactions of the fifth meeting of Russian naturalists in Warsaw.

*[1] 1033. ANDREW MURRAY. The museum mite. p. 479–482.

Describes *Tyroglyphus entomophagus*, and how to rid collections of it. [Extracted from Economic entomology: Aptera. By Andrew Murray. London, 1877.]

*[1] 1034. ALFRED RUSSEL WALLACE. The colors of animals and plants. I. The colors of animals. p. 641–662, 713–728.

Reviews theories of animal coloration, giving numerous examples from insects, especially from Lepidoptera; classifies colors thus:

ANIMALS.	1.	Protective colors.	
	2.	Warning colors.	a. Of creatures specially protected. b. Of defenseless creatures, mimicking *a*.
	3.	Sexual colors.	
	4.	Typical colors.	
PLANTS.	5.	Attractive colors.	

This classification is followed by an extended discussion of its different kinds of colors, often illustrated by insects. [From Macmillan's Magazine, 1877, v. 36, p. 464–471; reprinted in Littell's Living Age, 1877 [s. 5], v. 20, p. 67–86; and in Popular Science Monthly Supplement, no. 7.

*[1] 1035. C: V. RILEY. The Rocky Mountain locust. p. 663–673.

[Abstract of an address delivered at the Chicago session of the Amer. Agricultural Congress, in September 1877.] General description of Calo-

[1] Record made by Mr. George Dimmock.

ptenus and its mode of operation; what can be done to prevent its ravages; migrations and rules that govern them.

*[1] 1036. Fk: H. Snow. Hunting Amblychila. p. 731–735.

Habits and abundance of *Amblychila cylindriformis*.

*[1] 1037. The **Amer. Nat.**, v. 12, contains the following, and nos. 1038–1057.

a. Notice of Brehm's Thierleben, Bd. 9, Die Insekten . . . von Dr. E. L. Taschenberg, p. 116–118, [fig.]; of Kirby's Synonymic catalogue of Diurnal Lepidoptera, p. 118–119; of Monteiro's Angola and the river Congo, p. 238–242, [fig. of insects]; of Thomas' Sixth rept. . . . insects of the state of Illinois, p. 243 [see Rec., no. 993]; of Glover's Manuscript notes . . . Index to names, etc. . . . [see Rec. no. 968], p. 262; of Girard's Les abeilles, organes et fonctions éducation et produits miel et cire, p. 313–314; of Emerton's Structure and habits of spiders, p. 544–545; of Cook's Manual of the apiary, p. 550; of Thorell's Studi sui ragni Malesi e Papuani, p. 550; of First annual rept. of the U. S. Entom. Comm., p. 575; of Lintner's Entom. contributions, no. iv, p. 576; of Flögel's On the structure of the brain in different orders of insects [in *Zeitschrift für Wissensch. Zool.*], p. 616–617; of Graber's Die Insekten, p. 689–690. *b.* Proceedings of societies: Acad. Nat. Sci. Philad. [Potts on insects in pitchers of Nepenthes], p. 268–269; Appalachian Mountain Club [Scudder on insects of high altitudes in N. A.], p. 577; Bost. Soc. Nat. Hist. [Scudder on Prodryas, a new fossil butterfly and on the early life of some tertiary insects, and particularly on the eggs of a fossil Corydalus], p. 337. *c.* Notice of death of T. Vernon Wollaston, and of Andrew Murray, p. 197; of Jared P. Kirtland, p. 198. *d.* Skunks eating *Amblychila cylindriformis* (by S. W. Williston), p. 206. *e.* Eleodes and Asida in burrows of prairie dogs (by S. W. Williston), p. 208. *f.* Mono Lake Indians eating roasted wasp-nests and their way of discovering the nests (by Edw. Palmer), p. 311–312. *g.* Entomological instruction at the Summer School of Biology of the Peabody Acad. Sci., p. 337. *h.* *Thelyphonus giganteus* offensively odorous, p. 396. *i.* Phylloxera in Switzerland, p. 411. *j.* C. V. Riley appointed Entomologist to the Dept. of Agric., p. 413. *k.* Mode of moulting the lining of crop and stomach in insects [mostly from Wilde's observations on Orthoptera], p. 476–477. *l.* Silk-production of European countries per annum [from *Nature*], p. 496. *m.* Insects needed to fertilize Utricularia and Pyxidanthera (by W. J. Beal), p. 552–554, 6 fig. *n.* Call for meeting of Entom. Club of the A. A. A. S. (by B. P. Mann), p. 577. *o.* Entom. observers appointed by the Dept. of Agric., p. 705. *p.* Geophilus, a myriopod, from nostrils of a child, p. 705. *q.* *Cetonia inda* injuring corn, p. 753.

*[1] 1038. C: V. Riley. On the transformations of the red mites. p. 139–146, fig. 1–6.

[1] Record made by Mr. George Dimmock.

Amer. Nat., v. 12.

Describes and figures *Trombidium locustarum*, *T. giganteum*, *T. muscarum*, and *Hydrachna belostomae* = 4 n. spp. Figures and describes the parasitic habits and most of the stages of the above species. [Extracted from advance copy of the First annual report of the U. S. Entomological Commission.]

*[1] 1039. C: V. Riley. On the transformations and habits of the blister-beetles. p. 213–219, 282–290, pl. 1, fig. 1–5.

Life history of Meloe, Sitaris, Hornia, and Epicauta; larval habits of Macrobasis, Henous and other Meloid genera. Larvæ of *Epicauta cinerea*, *E. pensylvanica* and *Macrobasis unicolor* feed upon eggs of Caloptenus. Figures the different stages of the above-mentioned Meloidae. [From the Trans. Acad. Sci. of St. Louis.]

*[1] 1040. C: S. Minot. A lesson on comparative histology. p. 339–347, pl. 2, fig. 1–3.

Illustrations mostly drawn from Caloptenus and Oedipoda. [Figures are the same as in the First annual report of the U. S. Entomological Commission.]

*[1] 1041. Mrs. V. O. King. Phosphorescent insects. Their metamorphoses. p. 354–358.

Traces, in Lampyris, the "supposed evolution from an apterous to that of an aerial being, and back to earth again as a creeper with heavy disproportioned body, feeble feet and mandibles, small eyes, and brilliant terminal segments."

*[1] 1042. A. S. Packard, Jr. The mode of extrication of silkworm moths from their cocoons. p. 379–383, fig.

Figures and describes a cocoon-cutter, or "*sector coconis*," found upon the base of each fore wing in *Actias luna*, *Telea polyphemus*, *Callosamia promethea*, *Platysamia cecropia*, *P. gloverii*, *Samia cynthia*, *Attacus amazonia*, *Saturnia pavonia-minor*, *Endromis versicolora* and *Bombyx mori*, by means of which these species may cut their way out of their cocoons.

*[1] 1043. T. Thorell. Notice of the spiders of the "Polaris" Expedition. p. 393–396.

Notes upon the 4 species found, *Erigone psychrophila*, *Erigone penessa* [n. sp. here described], *Lycosa glacialis*, and *Trochosa* inc. spec.

*[1] 1044. Rev. H: C. McCook. Mound-making ants of the Alleghenies. p. 431–445, fig. 1–8.

Habits of *Formica exsectoides*; their mounds, gallery-building, underground galleries, adding stories, entrances, size of ant compared with its edifice, sentinels, paths on trees, winter habits, beetles found in nests (*Tmesiphorus costalis*, *Atemeles cava* and *Cedius ziegleri*), lepidopterous larvæ (of Lycaena) in nests of ants and the use which the ants make of

[1] Record made by Mr. George Dimmock.

them. [Substantially extracts from the Trans. Amer. Entom. Soc., 1877, v. 6, p. 253–296; in which paper the species of ant is given as *Formica rufa*.]

*[1] 1045. HON. J. D. COX. The smallest insect known (Pteratomus putnamii). p. 445-448, fig.

Figures *Pt. putnamii.*

*[1] 1046. D. C. MCLAREN. The mode of extrication of the American silk-worm moth. p. 454–456.

Observations on *Telea polyphemus* in the act of emergence from the chrysalis, and confirming the observations recorded in Rec. no. 1042.

*[1] 1047. A. S. PACKARD, JR. Some characteristics of the central zoö-geographical province of the United States. p. 512–517.

Review of the zoological provinces into which different authors have divided the United States. Insects of the central province lying north of the fortieth parallel, including Colorado, Wyoming, northern Utah, western Idaho, central and northern Montana.

*[1] 1048. E: D. COPE. The report of the Committee of the American Association of 1876 on biological nomenclature. p. 517–525.

Notes upon the circular in regard to nomenclature issued by the Amer. Assoc. Advanc. Sci., with a summary of the answers received to the questions in the circular.

*[1] 1049. JA: A. LINTNER. The new carpet beetle—Anthrenus scrophulariæ. p. 536–544, fig. 1.

Introduction of *A. scrophulariae* into America; figures and descriptions of larva, pupa and imago; habits and extent of its depredations; remedies; enumeration of some other injurious insects said to have been introduced from Europe.

*[1] 1050. J: A. RYDER. Discovery of two remarkable genera of minute myriapods in Fairmount Park, Philadelphia. p. 557–558.

Notes *Polyxenus fasciculatus* and *Pauropus huxleyi* from Philadelphia. An appended editorial note says *Pauropus lubbockii* and *Polyxenus fasciculatus* have been found at Salem, Mass.

*[1] 1051. J: P. MARSHALL. Mode of construction of the cocoons of Microgaster. p. 558–560, 2 fig.

Figures the different stages of cocoon-building of a Microgaster parasitic on Philampelus.

*[1] 1052. H: TURNER. Notes on a New Jersey carpenter bee. p. 627–628.

Nest of *Xylocopa virginica* described.

[1] Record made by Mr. George Dimmock.

Amer. Nat., v. 12.

*[1] 1053. EMILY A. SMITH. The maple-tree bark-louse. p. 655–661, fig. 1–6.

Describes and figures *Lecanium acericorticis*, ♂ and ♀; notes upon its habits and parasites. Describes *Coccophagus lecanii*, n. sp., parasitic on *L. acericorticis*.

*[1] 1054. MRS. V. O. KING. The fire-flies and their phosphorescent phenomena. p. 662–665.

General remarks upon the light of Lampyridae, differences in the different genera, supposed chemical causes of the light, uses of the light.

*[1] 1055. W: A. BUCKHOUT. The cocoons of Microgaster. p. 752.

Several points in the spinning of the cocoon different from the modes described in the article recorded in Rec., no. 1051.

*[1] 1056. EMILY A. SMITH. Modes of spreading and means of extinguishing the maple-tree bark-louse. p. 808-809.

Transportation of *Lecanium acericorticis* upon trees and on the legs of flies and wasps; recommendation of fire-extinguisher charged as usual except with the addition of a little carbolic acid.

*[1] 1057. S. A. FORBES. Breeding habits of Corixa. p. 820.

Eggs of *Corixa alternata* found abundantly on the carapace of *Cambarus immunis*, *C. acutus* and on the shells of fresh water mollusks. This peculiar place of oviposition is supposed to prevent the eggs from drying up when a pool dries, for the animals upon which the eggs are placed migrate to a new pool.

* 1058. The **Can. Entom.**, [see Rec., nos. 397–534], v. 8, contains the following, and nos. 1059 to 1135.

a. [Notice of the collection of] Canadian insects at the Centennial [Exposition in Philadelphia; 86 cases sent from the Entom. Soc. Ontario; see Rec., no. 712.] p. 112. *b*. [Announcement of the meeting of the] Entomological Club of the A. A. A. S. [to be held at Buffalo, N. Y.], p. 138. *c*. Notice of Packard's Monograph of the Geometrid moths, p. 139; of Riley's 8th Annual report [see Rec., no. 970], p. 140; of Hagen's On some insect deformities, p. 140. *d*. [Notice of E. P. Austin's] Agency for the exchange and sale of Coleoptera, p. 228. *e*. Miscellaneous [inquiry about the distribution of *Papilio turnus*, black female; insects to exchange or sell], p. 239. *f*. Index, p. 241–244.

[1] Record made by Mr. George Dimmock.

Nos. 49–52 were issued Nov. 8, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB
EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., January, 1879. [No. 57.

The Nervous System of Phylloxera.

While engaged in studies on the anatomy of the Coccidae[1] there were not at my command specimens of the grape-vine pest —*Phylloxera vastatrix* Planch., so that, very naturally, my first concern, on returning from Europe in the summer of 1876, was to submit the grape-vine louse to a hasty scrutiny, principally with the view of ascertaining whether it agreed with other plant-lice in the possession of salivary glands. That question was soon settled in the affirmative, but, inasmuch as the glands did not present peculiarities strikingly different from those already described at length for Aspidiotus, there seemed no reasonable grounds for publishing the results of my short studies. Although some other points in the anatomy of Phylloxera seemed to me of interest, I hesitated to make any announcement of them, thinking that the great amount of attention recently bestowed upon these insects had probably, at that time, already led to a very thorough acquaintance with their anatomy. Being at the time without access to the literature on Phylloxera, it therefore seemed best to defer any statement till such time as I might have the opportunity to learn what had already been written by others.

Investigations of another sort have enticed me from the further study of the plant-lice. But for an inquiry from Mr. J. Duncan Putnam, of Davenport, Iowa, it is likely I should not have ventured to offer anything on this subject to the readers of PSYCHE. Late in January 1878, Mr. Putnam wrote to me:

[1] Mark: Beiträge zur Anatomie und Histologie der Pflanzenläuse, insbesondere der Cocciden; in Archiv für mikroskopische Anatomie, Bd. 13, S. 31–86, Taf. 4–6.

"Riley in his 8th Report, page 159, has described similar tracheae in the Phylloxera as *nerve* chords. Is he right?" On turning to Prof. Riley's Reports[1] I was not a little surprised at the description of the nervous system. It seems to me that it is not only not quite accurate for that insect, but also that it hardly corresponds to the nervous system of any animal.

Although I have not studied the *sexual* individuals — which are the ones described by Prof. Riley,— I have not the least doubt that the objects very carefully drawn by him as nerves are nothing other than the tracheae, as suspected by Mr. Putnam. The nervous system will certainly be found to present other peculiarities than those figured by Prof. Riley, and probably will differ only slightly from the same system as observed in the sexless individuals.

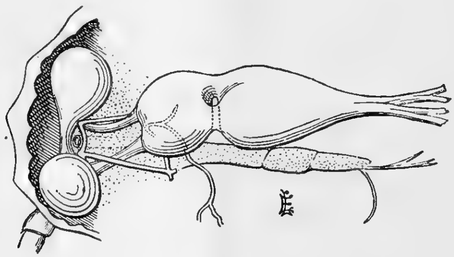


Fig. 9 — *Phylloxera vastatrix* Planch.— *radicicola*, winged.

An oblique view of the upper left surface of the central portion of the nervous system, as seen after cutting away the dorsal wall of the body, and the oesophagus where it ascends from the level of the brain-commissure. Magnified about 100 diameters.

The following observations were all made on sexless root-infesting individuals in the month of August 1876. The central portion of the nervous system, in both winged and wingless forms, came under observation. The accompanying figure represents the ganglia in a pupa of a winged form in which the tip of the wing-pads reached backward to near the middle of the abdomen.

[1] Seventh annual report on the noxious, beneficial and other insects of the state of Missouri, . . . 1875, p. 99, fig. 19, and foot note.

Eighth annual report on the noxious, beneficial and other insects of the state of Missouri, . . . 1876, p. 158, fig. 48 *b* and *e* ; p. 159.

Trans. St. Louis Acad. Sci., v. 3, p. 283, fig. 22; p. 284.

That which first strikes one's attention, in dissecting out the nervous system, is the absence of so marked a consolidation of the ventral chain of ganglia as characterizes most of that group of insects. Instead of the single oval ganglionic mass, which in the near relatives of Phylloxera represents the concentrated ventral chain of ganglia found in most arthropods, the Phylloxera presents *two* distinct ganglionic masses below the front end of the digestive canal; or, to be more exact, two pairs of ganglionic enlargements. The component lateral halves of each of the two masses are so consolidated as to leave only slight external indication of the fusion. This fusion of the lateral halves is, however, like the antero-posterior consolidation, not so pronounced as in many of the plant-lice. These two nervous masses are joined to each other by a pair of stout, short, longitudinal commissures. The anterior, in turn, is joined to the superoesophageal pair of nerve-centres by a pair of much longer and more slender commissures.

The posterior ganglionic pair is larger than either of the two remaining pairs. It is continuous behind with a single median nerve trunk, which promptly bifurcates. As seen from above it presents a somewhat elongated heart-shaped, symmetrical outline, its greatest breadth being considerably in front of its centre. In a lateral view it is also seen to present the greatest thickness a little in advance of its centre. Its outline from the latter point of view is, however, not quite symmetrical, the dorsal surface being considerably more flattened than the ventral. In their backward continuation, moreover, the dorsal and ventral outlines are quite unlike, inasmuch as the former passes with almost unnoticeable curvature into the dorsal outline of the main nerve-trunk, while the ventral outline suffers a conspicuous and rather prompt bending to bring its course into a line parallel with the dorsal outline of the main nerve.[1] At its anterior end, also, differences in the course of the dorsal and ventral outlines are noticeable. While the outline of the dorsal, in passing by means of the stout commissure into that of the first suboesophageal ganglion, presents only a very gentle

[1] Owing to the obliqueness of the view furnished by the figure this difference is not there made prominent.

curve, the ventral outline is very sharply curved, or may even form a cusp, thus reducing the ventral surface of the commissure to a minimum.

Both dorsal and ventral surfaces of this ganglion present longitudinal, shallow depressions, more conspicuous at the anterior than at the posterior end, and less pronounced above than below. Further traces of the real nature of this double ganglion are sometimes observed in the behavior of the main nerve-trunk which arises from its posterior end, inasmuch as this trunk may be reduced to zero by an early division into its lateral halves. Thus the notch at the anterior end becomes continuous with the dorsal and ventral furrows, and, through them, with the posterior notch which separates these two nerve stems. In this manner the consolidation of the lateral halves of the ganglion often appears far from complete. The lateral outlines of this ganglion pass, by a gentle curve, into those of the main nerve. The latter sooner or later bifurcates, the two branches diverge and undergo further sub-division, in their course backward, to be distributed to the organs of the posterior part of the abdomen. In addition to this main trunk there arise from the lateral margins of the posterior ganglion other nerves, which are not always symmetrically placed. As many as four such nerves, at least, may arise from each side of this ganglion. The commissures between this and the first suboesophageal ganglion are short, rounded cords, which are slightly flattened side-wise, and lie somewhat nearer the dorsal than the ventral surfaces of the ganglia which they connect. Their narrowest measurements indicate a thickness of about one-half or one-third that of the ganglion just described, and a breadth of one-fourth that of the same ganglion. As seen from above, the opening embraced by the commissures and the ganglia which they join is an oval with its antero-posterior diameter equal to the breadth of one of the commissures, and its transverse diameter about half as long.

The first suboesophageal pair presents a flattened, rounded mass, in width one-third less than the posterior ganglion, and of a length equal to its own breadth, and a thickness not varying much from three-fourths of the same. The longitudinal axes of the two suboesophageal ganglia do not form a continuous line, but are so directed as to form a very obtuse angle opening downward, as may be seen in the figure. This deflection in the nervous axis helps to increase the differences already noticed in the dorsal and ventral outlines connecting the ganglia. This ganglion also presents both anterior and posterior indentations, as well as slight longitudinal depressions in its dorsal and ventral surfaces, indicative of its origin from lateral halves. It is under the anterior end of this ganglion that the two ducts of the salivary glands unite and eventually open into the beginning of the oesophagus. (See figure.)

The circumoesophageal commissures are comparatively long and slender. Their direction from the lower anterior aspect of the first suboesophageal ganglion is — unlike that of most arthropods — obliquely *downward* and forward. In their course they pass beneath a chitinous frame-work,[1] and ultimately diverge to reach the infero-posterior surface of the two halves of the brain ganglion.

The ganglionic pair which constitutes the superoesophageal or brain-mass presents considerable variations, from a rather intimate union of the two halves[2] to such a condition as is represented in the accompanying figure, where the lateral halves are joined by a brain-commissure of considerable length and of not much greater thickness than that of the circumoesophageal commissures. Although my observations were not sufficiently extensive to exclude the possibility of an erroneous inference, I still think that these two forms of the brain-mass belong respectively to the wingless and winged individuals. So much, at least, is certain, that the figure here presented was made from one of the winged insects, and that all my drawings of the wingless forms show a much closer approximation of the two halves.

It can be in no way a source of surprise that the brain-mass, in the wingless form, is, moreover, considerably smaller than in the winged form, when one reflects on the greater develop-

[1] The anterior portion, or cross-piece, of this frame work is what I have called *arcus superior*, and the lateral portions *costae superiores*, in the paper above referred to.

[2] Much as in *Aspidiotus nerii*. Vide *op. cit.*, Taf. VI, fig. 31, *gp*.

ment of the organs of special sense in the latter form. The distribution of the nerves to the special sense-organs, however, has not been followed out, save that, in some of my sketches of the wingless forms, I find a pair of nerves given off from the anterior end of the hemispheres, which I have no doubt supplies the eyes, and that another pair arises from the ventral aspect of the same hemispheres, and probably makes its way to the antennae. In the winged forms, the hemispheres lie in such close approximation to these organs that the nerves will certainly be found to be very short.

As may be seen from the accompanying figure, the oesophagus ascends in the space bounded by the *arcus superior* behind, and by the brain commissure in front. *E. L. Mark.*

Cambridge, Dec. 24, 1878.

Note. — After the preceding article was in type my attention was directed to an article by Targioni-Tozzetti [1] through a review of the same by P. Mayer in Hofmann u. Schwalbe's Jahresberichte ueber die Fortschritte der Anatomie und Physiologie. Bd. 6, Abth. 2 : Entwickelungsgeschichte ; Anatomie der wirbellosen Thiere. p. 185. 1878.

Inasmuch as the article alluded to contains a short statement with regard to the nervous system in a nearly related species of the same genus, I will take advantage of the opportunity here afforded to give its substance.

The author says (p. 237) : "The nervous system is composed, as far as regards the suboesophageal part, of two ganglia ; it is not possible to separate from the surrounding parts the superoesophageal ganglion so as to define it with accuracy. Of the two ganglia beneath the oesophagus, the anterior is the smaller, it is heart-shaped and joined by means of two thick and short divaricating commissures to the posterior ganglion, which is larger and pyriform. The latter gives rise to lateral nerves, and ends with a long, thick cord, which, having furnished some branches in its course, is divided into other branches and there terminates."

[1] Sommario di nuove osservazioni sulla Fillossera del Leccio e della Querce.—(*Phylloxera florentina, Ph. signoreti*) Targ. Bull. Soc. Ent. Italiana, v. 9, p. 236–239. 1877.

It will be seen that, so far as the description goes, it corresponds very closely with that which is given for *Phylloxera vastatrix.* The extreme difficulty of successful dissections with these minute insects is sufficient explanation of the failure of the accomplished Italian to make out satisfactorily the superoesophageal ganglion.

I will also avail myself of this opportunity to confirm for *Ph. vastatrix* the observation of Targioni-Tozzetti, made on an oak-infesting species, that the Malpighian vessels are absent; and finally to add that Targioni-Tozzetti has demonstrated the presence of a pair of salivary glands in the Phylloxera which he has studied. *E. L. M.*

Jan. 9, 1879.

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 200.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 1059 to 1135 are from **Can. Entom.**, v. 8.

* 1059. C: J. S. Bethune. Annual address of the President of the Entomological Society of Ontario, 1875. p. 1–4. [Mar., 1876.]

Progress of work; preparation for the Centennial Exhibition; meetings of the Entom. Club A. A. A. S.; remarks upon *Doryphora decemlineata, Pieris rapae* and its parasite *Pteromalus puparum, Caloptenus spretus, Leucania unipuncta, Clisiocampa americana, C. sylvatica, Bruchus pisi.*

* 1060. L. F. Harvey. New Texan moths. p. 5–7. [Mar., 1876.]

Describes *Parasa incisa*, Euerythra, *E. phasma*, Litodonta, *L. hydromeli, Aletia hostia, Caradrina conviva, Mamestra brachiolum* = 2 n. gen., 6 n. spp. *Catocala belfragiana* Harv. = *C. jocaste* Streck.

* 1061. G: J. Bowles. Notes on Biston ursaria Walker. p. 7–9. [Mar., 1876.]

Describes the imagos, eggs, new-born larva and mature larva; abundance, habits; larva feeds on Populus and Prunus.

* 1062. G: M. Dodge. New species of Acridini from Nebraska. p. 9–12. [Mar., 1876.]

Describes *Pezotettix junius, P. autumnalis, P. alba, Caloptenus lurida, C. regalis* = 5 n. spp., natives of Glencoe, Dodge Co., Nebraska.

Can. Entom., v. 8.

* 1063. O. S. Westcott. Sugaring for moths. p. 12–17. [Mar., 1876.]

Methods of killing, and precautions to be observed in capturing moths; list of dates between 17 Aug. and 6 Oct., at which, respectively, 91 species of Heterocera were captured.

* 1064. A: R. Grote. On Choephora and allied genera. p. 17–18. [Mar., 1876.]

Distinguishes the genera Choephora, Pseudorthosia and Pseudoglaea; describes Pseudoglaea and *Ps. taedata* = 1 n. g., 1 n. sp.

* 1065. V. T. Chambers. Micro-lepidoptera. p. 18–19. [Mar., 1876.]

Describes *Gracilaria negundella* n. sp., the larvae of which roll leaves of Negundo from the tip downward, in Colorado; corrects numerous typographical errors which occur in the Cincinnati Quarterly Journal of Science, 1875, v. 2, p. 289–305, and others which occur in the Can. Entom., 1875, v. 5, p. 124–125.

* 1066. H. H. Lyman. Notes on Arctia americana. p. 20. [Mar., 1876.]

Times at which the moults occur. [See Rec., no. 501.]

* 1067. H. H. Lyman. Correspondence. p. 20. [Mar., 1876.]

Adds two names to Caulfield's List [see Rec., no. 476], and corrects an error in that list.

* 1068. W: Couper. Weevil cocoons. p. 20. [Mar., 1876.]

Cionus scrophulariae obtained from cocoons made by the larvae on *Scrophularia aquatica.*

* 1069. W. L. Mead. Vanessa milberti. p. 20. [Mar., 1876.]

Emergence of the butterfly from its winter retirement. [Is this article by T. L. Mead?]

* 1070. S: H. Scudder. The North American blue butterflies of the genus Nomiades. p. 21–24. [Apr., 1876.]

Rejects the generic name Glaucopsyche for Hübner's name Nomiades; gives a revision of the [N. A.] species; *N. xerxes*, *N. antiacis* (syn. *Lycaena mertila* Edw.), *N. couperi* (syn. *L. pembina* Edw., Syn.; nec Edw., Proc. Acad. Nat. Sci. Philad.) (syn. *L. lygdamus* Doubl., List Brit. Mus.; nec Doubl., Entom.), *N. lygdamus* (Doubl., Entom.), *N. oro* n. sp., *N. behrii* (syn. *L. polyphemus* Boisd.).

Nos. 53–56 were issued Dec. 31, 1878.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., February, 1879. [No. 58.

On the Repugnatorial Glands in Eleodes.

The repugnatorial glands of *Eleodes gigantea* and *E. dentipes* are situated on both sides of the intestinal tract, imbedded in the fat-bodies. They are two reddish-brown, semi-bilobed pieces, cylindrical at the upper, longer lobe and more flattened at the lower, shorter part, the latter being on the inner side, as the figure shows. Their extent is from the base of the last up to the middle of the second integumental segment, and they have an average length of 6.5 mm. Both *E. gigantea* and *E. dentipes*, male and female, possess these glands, and on teasing the living specimens in the breeding cage, they stand on their anterior and middle legs, holding the abdomen high up, and spirting the contents of the glands left and right. I have handled several hundred live specimens, and, in every case, the spirting had a sidewise direction. The liquid stains the human skin, and the stains are not easy to remove. In some cases, when the secretion is spirted on a glass slide, it solidifies within a few seconds, forming an orange-colored magma of minute crystals; in other cases it only partially crystallizes, and in others it remains entirely liquid. It is, in all cases, of an acid reaction, and of an intensely penetrant odor, causing the eye to lachrymate. It is soluble in water, alcohol and ether. Boiled with concentrated sulphuric acid and alcohol an ethereal aromatic vapor is produced, indicating the presence of one or more organic acids. The smell of the glandular secretion is to my knowledge incomparable with anything else, and very peculiar. Having tested

Fig. 10.

for valerianic acid in the usual way with neutralized soda-solution upon sesquichloride of iron, no red precipitate of valerianate of iron was formed, nor have I obtained a bluish-white opalescent liquid of butyrate of copper on adding acetate of copper. Uric acid was also found to be absent, on treating with nitric acid and ammonia in the usual way; neither could I detect formic or acetic acid, nor did boiling with caustic soda liberate ammonia. A few drops of the secretion, put on a piece of dry caustic soda, turned at first dark green, became in a few seconds dirty brown, and cleared up to a brownish red after several hours. So far I am not aware of the constituents of the secretion, and, on sending some of it to Prof. Chandler, asking his kind advice, I was told that a payment of sixty to seventy-five dollars, in advance, would be necessary to have an accurate analysis made.

The secretion was gathered gradually, by holding live specimens into a test-tube containing 10 grams of dry caustic soda. About 60 drops have accumulated during a period of three months. *Carl F. Gissler.*

Attacks of Native Insects upon Imported Trees.

It is often stated that foreign trees, and other plants imported into a country, are not attacked by the insects peculiar to the new surroundings. The presumed immunity is even quoted as an advantage in the use of such trees for forest trees. But the immunity is apparently only presumed, at least for plants and trees after their entire acclimatization. When I was a boy I saw extensive plantations of *Pinus strobus* and of *Robinia pseudacacia*, which grew excellently and seemed not to be attacked by native insects. This was between 1824 and 1830. Later, things have changed considerably; nevertheless Ratzeburg contends that at least deciduous trees are attacked less (as he states it to be a common fact) than pine trees. Therefore exotic oaks near by indigenous ones infested by Chrysomela and Tenthredo are attacked less. The *Pinus strobus* according to Noerdlinger, is attacked even more than European pine, being damaged together by *Scolytus polygraphus*, *S. piniperda*, *S. villosus*, and *S. pityographus*, which never occur in European pines.

Perhaps it will be of some interest to know what insects have until now been observed to injure, in Germany, *Pinus strobus* and *Robinia pseudacacia*.

Pinus strobus. *Scolytus bidens* var. *quadridens*, *S. autographus*, *S. lichtensteinii*, *S. pityographus*, *S. polygraphus*, *S. villosus*, *S. piniperda*, *Cryphalus abietis*, *Xyloterus lineatus*, *Pissodes pini*, *P. notatus*, *Leptura rubrotestacea*, *Lyda erythrocephala*, *Chermes corticalis*. Coleoptera 12, Hymenoptera 1, Hemiptera 1.

Robinia pseudacacia. *Bostrichus capucinus*, *Lyctus canaliculatus*, *Cryptocephalus b lteatus*, *Lycaena argiolus*, *Amphidasis hirtaria*, *Lithocolletis acaciella*, *Nematus hortensis*. Coleoptera 3, Lepidoptera 3, Hymenoptera 1.

The insects here damaging *P. strobus* (and *P. rigida*) are Coleoptera 41, Hymenoptera 7, Hemiptera 15, Lepidoptera 3, Termes 1: *R. pseudacacia*, Coleoptera 4, Lepidoptera 7, Hemiptera 2, Diptera 2. Not one of them is identical with the European enemies. *H. A. Hagen.*

Coleoptera of the White Mountains.

In July 1877, Mr. W. Schaus, Jr. and I collected on and around Mt. Washington, N. H. Our stay was necessarily very short and some of the days were rainy. The time was devoted to a thorough search for Coleoptera, in special localities, and resulted in obtaining so many species not yet catalogued as from this region, that it seemed worth while to present a list of them to the readers of Psyche.

The following list includes species not mentioned in Austin's Catalogue of the Coleoptera of Mt. Washington (see Bibl. Rec., no. 175) with a few (marked with an asterisk), which, though found in that list, are interesting as coming from a new point. The height above the sea level is given in metres, either in connection with the list of abbreviations for localities, or against the locality in the list of species.

I am indebted to Dr. J. L. LeConte for his kindness in determining species.

The following abbreviations are used for localities : **C.** Carriage Road, Mt. Washington; **H.** Half-way House, on Carriage Road, Mt. Washington, 1170 m.; **L.** Lake of the Clouds, 1527 m.; **W.** Summit Mt. Washington, 1918 m.; **WS.** Willis' Seat, Mt. Washington, 1430 m.

CICINDELIDAE.

* *Cicindela longilabris.* Mt. Monroe, 1641 m. and SW. slope **W.** 1820 m.

C. purpurea. Mt. Monroe, 1641 m.

C. repanda?. Mt. Franklin, 1495m.

CARABIDAE.

Blethisa julii. Crawford Bridle Path, 1675 m.

Calathus impunctatus. **C.** 1495 m.

Platynus obsoletus. Near **L.**

P. angustatus. **H.**

Pterostichus mutus. Near **H.**

Amara haematopus. **L.**

Anisodactylus baltimoriensis. **C.** 1500 m.

Bradycellus nigrinus. **WS.**

B. neglectus. **WS. L.**

Harpalus herbivagus. **H.**

H. viridiaeneus. **WS.**

DYTISCIDAE.

Hydroporus griseostriatus. **L.**

H. tartaricus (?). Pools 1520–1700 m.

Gaurodytes sp. **L.**

Dytiscus harrisii. **L.**

HYDROPHILIDAE.

Helophorus lineatus. **L.**

Tropisternus glaber. **L.**

Hydrocharis obtusatus. **L.**

Berosus striatus. **L.**

Laccobius agilis. **L.**

Philhydrus perplexus. **L.**

P. consors. **L.**

P. fimbriatus. **L.**

Hydrobius subcupreus. **L.**

STAPHYLINIDAE.

Mycetoporus lepidus. **WS.**

Leistotrophus cingulatus. **W.**

Staphylinus badipes. **WS.**

Lathrobium sp. **WS.**

Cryptobium latebricola. **WS.**

Anthobium sp. **W. L.**

SILPHIDAE.

Necrophorus americanus. **H.**

N. orbicollis. **H.**

Liodes globosa. **L.**

ENDOMYCHIDAE.

Lycoperdina ferruginea. **WS.**

ATOMARIIDAE.

Cryptophagus sp. **C.** 1490–1520 m.

NITIDULIDAE.

* *Byturus unicolor.* **WS.**

COCCINELLIDAE.

Coccinella tricuspis. **WS.**

Brachyacantha ursina. **WS.**

SCARABAEIDAE.

Geotrupes balyi. Near **W.** 1820 m.

Aphonus tridentatus. Near **W.** 1820 m.

BUPRESTIDAE.

* *Buprestis maculiventris.* **W.**

Chrysobothris lesueuri. **W.**

ELATERIDAE.

Adelocera brevicornis. **W.**

Cryptohypnus sanborni. **W. WS.**

C. bicolor. Wet moss, **L.**

Elater sp. **WS.**

Agriotes fucosus. **W.**

Dolopius lateralis, and var. **WS.**
Limonius confusus. **WS.**
* *Campylus denticornis.* **WS.**
Paronomus estriatus. **WS.**
Corymbites caricinus. **WS.**

LAMPYRIDAE.

Calopteron reticulatum. **L.**
Eros coccinatus. Fabyan Bridle Path, 1675 m.; **WS.**
E. modestus. **C.** 1500 m.
Photinus corruscus. Fabyan Bridle Path, 1800 m.
Photuris pensylvanica. **WS.**

TELEPHORIDAE.

Podabrus rugosulus. **WS.**
Telephorus rotundicollis. **WS.**; Fabyan Bridle Path, 1800 m.

CERAMBYCIDAE.

Clytanthus ruricola. **WS.** (Small specimen, 7 mm. long.)
Desmocerus palliatus. **WS.**
Leptura sanguinea. **WS.**

CHRYSOMELIDAE.

Orsodachna atra, var. **WS.**
Pachybrachys sp. **WS.**
Colaspis tristis, var. Moss, **L.**
Chrysomela bigsbyana. **WS.**
* *Phyllodecta vulgatissima.* **WS.**
Plagiodera lapponica var. **WS.**
* *P. tremulae.* Abundant from summit to foot of Mt. Washington.
Luperus meraca. **WS.**
Galeruca cavicollis. **WS.**
G. sagittariae. **WS.**
Trirhabda canadensis. **WS.**
Graptodera bimarginata Say. Fabyan Bridle Path at foot of the Mountain, and **WS.**
* *Crepidodera helxines.* Moss, **L.**

TENEBRIONIDAE.

Tenebrio molitor. **WS.**
T. tenebrioides. **WS.**

LAGRIIDAE.

Arthromacra aenea. **WS.**

ANTHICIDAE.

Corphyra lugubris. **WS.**

MORDELLIDAE.

Anaspis rufa. **L.**

MELOIDAE.

Macrobasis unicolor. Abundant on flowers of *Pyrus americana*, near **WS.**

PYTHIDAE.

Priognathus monilicornis. SW. slope of **W.** 1830 m.

CURCULIONIDAE.

Eurymycter fasciatus. **WS.**
Cercopius chrysorrhaeus. **L.**
Dorytomus brevicollis. **WS.**

SCOLYTIDAE.

Polygraphus rufipennis. **L.**

F. Gardiner, Jr.

HAWAIIAN BUTTERFLIES. A New England teacher in Honolulu has sent me the only two species of butterfly said to be found in the Sandwich Islands. They prove to be *Danais archippus* and *Pyrameis atalanta* — the latter known there as a mountain species. *H. W. Parker.*
Amherst, Mass.

CORRECTION. Page 176, 7th line from the bottom *for* interior *read* exterior.

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 208.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. PICKMAN MANN.

Nos. 1071 to 1135 are from **Can. Entom.**

* 1071. A: R. GROTE. Descriptions and notes on certain moths. p. 25–29. [Apr., 1876.]

Distinction of the genera Ochria and Gortyna; describes *Gortyna necopina*, *Hadena quaesita*, Hypenula, *H. opacalis*, *Oncocnemis saundersiana* = 1 n. g., 4 n. spp.; "*Heliothis fastidiosa* Streck. = *Lygranthoecia meskeana* Grote"; "*Dryobota californica* Behr = *Xylomiges hiemalis* ".

* 1072. V. T. CHAMBERS. Tineina. p. 30–35. [Apr., 1876.]

Describes *Polyhymno fuscostrigella*, *Gracilaria rhoifoliella*, *G. inornatella*, *G. sauzalitoeella*, *G. behrensella*, *G. basqueella*, *G. sassafrasella*, *Lyonetia gracilella* = 8 n. spp.

* 1073. L. F. HARVEY. New Californian and Texan moths. p. 35–38 [April], p. 52–56. [May, 1876.]

Describes *Arsilonche album*, *Jaspidea viridata*, *Agrotis aequalis*, *A. satis*, *A. choris*, *A. sierrae*, *A. recula*, *A. pyrophiloides*, *Hadena dunbari*, *H. chlorostigma*, *Perigea niveirena*, *Gortyna obliqua*, *Caradrina flavimaculata*, *Graphiphora pulchella*, *Calymnia calami*, *Lithophane oregonensis*, *L. carbonaria*, *Thalpochares elegantula* = 18 n. spp.; gives the synonymy of the species of Arsilonche; *Orgyia leucostigma* captured in Buffalo, N. Y., 21 December.

* 1074. F. B. CAULFIELD. Addenda to lists of diurnal Lepidoptera, Sphingidae and Zygaenidae occurring on the island of Montreal, P. Q. p. 38–39. [Apr., 1876.]

Adds 6 species [see Rec., nos. 476 and 533].

* 1075. V. T. CHAMBERS. Correpsondence [*sic*]. p. 39–40. [Apr., 1876.]

Re-describes his method of denuding the wings of Microlepidoptera. [See Can. Entom., v. 4, p. 41–42.]

* 1076. W: V. ANDREWS. Entomological notes. p. 40. [Apr., 1876.]

Capture of half-grown larvae of *Ceratomia quadricornis* of a brown color [see Rec., no. 1095]. Method of destroying *Doryphora 10-lineata.*

* 1077. W: H. EDWARDS. Notes on entomological nomenclature. Part I. p. 41–52. [May, 1876.]

Examination of the claims put forward in Scudder's Historical sketch

. . . [see Rec., no. 716] that the so-called generic names proposed for Lepidoptera by Hübner are to be accepted as valid in modern nomenclature; opposing these claims. Treats especially of Hübner's Tentamen. [See Rec., no. 1085.]

* 1078. A: R. Grote. On genera and the law of priority. p. 56–58. [May, 1876.]

Upholds the advantage of applying distinct generic names to distinguish groups showing slight differences of structure, over making generic names have a wide signification, inasmuch as the former method allows a more ready comparison of representative faunae.

* 1079. Vincent Clementi. Entomological notes from the county of Peterboro, Ont. p. 59-60. [May, 1876].

Times at which various Lepidoptera and Coleoptera were caught; injuries by *Pieris rapae*, *Haltica striolata*, *Doryphora 10-lineata* and *Nematus ventricosus*, and means against them.

* 1080. S: H. Scudder. The relationship of the early spring blues. p. 61–66. [May, 1876].

Puts forward, to incite investigation, the hypothesis that there is but a single species of Cyaniris in North America, which species is dimorphic and polygoneutic; seasons at which the several forms appear.

* 1081. G: Norman. Captures of Noctuidae near Orillia, in the province of Ontario, Canada. p. 67–72. [May, 1876.]

Mentions in list and text 7 species to be added to his list of captures at St. Catharines [see Rec., no 448], and 152 species captured near Orillia, with dates and statement of abundance. [For descriptions of the new species, see Rec., no. 345, 504, 509, 513, 514, 523, 524, 531, 838.] [" Palms" are the flowers of Salix.]

* 1082. W: Saunders. Notes on Catocalas. p. 72–75. [May, 1876.]

Describes larva and imago of *Catacala crataegi* n. sp., and larva of the closely allied *C. polygama*, besides three varieties of the latter larva.

* 1083. C: P. Whitney. Notes on Lepidoptera. p. 75–77. [May, 1876.]

The sexes of *Thyreus abbotii* are not distinguished by the color of the larvae [see Rec., no 1088]; describes *Lerema loammi* n. sp., from Florida.

* 1084. Fk: B. Caulfield. On Platysamia columbia Smith. p. 77–80 [May], 95–98. [June, 1876.]

Argues that *P. columbia* is a distinct species, and not a hybrid nor a variety [see Rec., no. 216]; notes on the cohabitation of distinct species. [The name of the author is printed Caulfeild several times in v. 8 and 9, but elsewhere it is Caulfield.]

* 1085. W: H. EDWARDS. Notes on entomological nomenclature. Part II. p. 81–94, 113–119. [June, 1876.]

[For part I, see Rec., no. 1077.] Treats especially of Hübner's Verzeichniss bekannter schmetterlinge, to show that the names used in that work have no claim to recognition in nomenclature.

* 1086. A: R. GROTE. New Pyralids. p. 98–99. [June, 1876.]

Describes *Botis sexmaculalis* and *B. penitalis* from Kans., *B. erectalis* from N. Y., and *B. communis* from N. Y. to Ala. = 4 n. sp.

* 1087. A: R. GROTE. On Copidryas gloveri (G. & R.). p. 99–100. [June, 1876.]

Describes the male of the species formerly called *Euschirrhopterus gloveri*, and makes it the type of the new genus Copidryas.

* 1088. A: R. GROTE. Larvae of Thyreus abbotii. p. 100. [June, 1876.]

Confirms the statement [see Rec., no. 1083] that the sexes of the larvae of *Thyreus abbotii* are not distinguished by color.

* 1089. G: M. DODGE. Notes on the variation in color of Oedipoda corallipes and Oedipoda cincta. p. 101–102. [June, 1876.]

Describes several varieties of *O. corallipes* and one variety of *O. cincta*, which latter is named *O. cincta* var. *umbrator* n. var.

* 1090. V. T. CHAMBERS. Tineina. p. 103–106. [June, 1876.]

Describes *Adela* (*Nematais?*) *trifasciella*, *A. fasciella*, *A. flammeusella* = 3 n. sp. from Cal.; describes *Semele argentinotella*, *Tinea imitatorella*, *T. croceoverticella*, *T. thoracestrigella* = 4 n. sp. from Ky.; places *Tinea argentistrigella* in the genus Semele; states that the name *T. eunitariella* in Can. Entom., v. 5, p. 85, should be *T. coemitariella*.

* 1091. A: R. GROTE. On Homoptera and allied forms. p. 107–109. [June, 1876.]

Points out some of the differences between the species of Homoptera; describes *H. unilineata* and *Ypsia umbripennis* from Canada = 2 n. sp.

* 1092. L. F. HARVEY. Notes on Litodonta, with remarks on Oncocnemis. p. 109–110. [June, 1876.]

Describes the variations of *Litodonta hydromeli*, and names *L. fusca*, n. sp.; geographical distribution of the genus Oncocnemis.

No. 57 was issued Jan. 10, 1879.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., March, 1879. [No. 59.

Geographical Distribution of North American Coleoptera.

SECOND ANNUAL ADDRESS OF THE PRESIDENT.

Last year your president gave a sketch of the various contributions to the life-histories of our insects during the preceding year. I shall speak only of the geographical distribution of the Coleoptera; my excuse must be a lack of sufficient time, and a want of familiarity with the other groups. Any conclusions derived from the study of the geographical distribution of Coleoptera will have more value than if derived from other groups, because of the great number of species of Coleoptera, and the fact that this group has been much more extensively collected and studied in our region than any other.

The increasing popularity of the theory of the continuity of organic life from the earliest geological ages to the present time has given a great impetus to the study of questions of distribution, while at the same time every new fact in regard to distribution is important as tending to confirm or throw doubt on the theory.

So long as every species was supposed to be due to a special creative act, questions of distribution were of very little interest. It was as easy to conceive of the creation of the same species in several places, at the same or different times, as to conceive of the creation of several species in the same place. As soon, however, as one is convinced that all the specimens of a species are related to each other by descent from a common ancestor, and that all the species of a genus are also so related, and that when found in widely separated localities they must necessarily have emigrated from their original birth-place, every fact of distribution becomes a link in the chain of evidence of the successive migrations and changes of the species.

An examination of the literature of the subject shows that the past ten or fifteen years have furnished the greater part of the data for tracing the geographical distribution of our Coleoptera; and it is only within five or six years that many extensive local lists have been published, based on careful collecting for a considerable time. I have made out a list of papers containing facts bearing on the distribution of the Coleoptera of boreal America, published during the last eleven years. My list includes nearly every paper on Coleoptera published during this period, because nearly every paper gives the localities of one or more species, and as the number of such papers is very great, it will of course be impossible for me to notice each one separately. They may be grouped as follows:

1°. Independent descriptions of new species.

2°. Monographs or analytical tables of species.

3°. Lists of species collected in particular regions.

Many of the papers published are of a mixed nature, but a few of the more important ones, belonging substantially to the third group, are as follows:

Dr. Horn (Trans. Amer. Entom. Soc., 1868, v. 2, p. 123–128) gives a list of 180 species from southwestern Virginia.

J. Pettit (Can. Entom., 1869, v. 1, p. 106–107, v. 2, p. 7, 17–18; 1870, v. 2, p. 53–54, 65–66, 84–86, 102–103, 117–118, 131–133, 151; 1871, v. 3, p. 105–107; 1872, v. 4, p. 12–14) gives a list of 1143 species, of which 383 are indicated as new to the Canadian fauna. In Can. Entom., 1872, v. 4, p. 98–99, he adds 65 species.

Dr. LeConte (Annals and Mag. Nat. Hist., 1869, s. 4, v. 4, p. 369–385) gives a list of 188 species collected in Vancouver's Island, with remarks on the wide distribution of some of the species; 17 species were not before known to occur so far west and 14 others not so far north.

S. V. Summers (Can. Entom., 1873, v. 5, p. 132–134, 145–147, 168–170, 190–192; 1874, v. 6, p. 52–55) enumerates, to the end of the Colydiidae, 595 species from St. Louis co., Mo.

The same author (Bull. Buffalo Soc. Nat. Sci., 1874, v. 1, p. 78–99) enumerates 904 species from the region of Lake Pontchartrain, La., with remarks.

S. Henshaw (Psyche, 1874, v. 1, p. 17–18, 22–23) enumerates 135 species collected at Cliftondale, Mass., 12 June 1873.

E. P. Austin (Proc. Bost. Soc. Nat. Hist., 1874, v. 16, p. 265–272) gives a list of 232 species from Mt. Washington, N. H.

Dr. Horn (Trans. Amer. Entom. Soc., 1876, v. 5, p. 198–201) enumerates 23 species from Guadalupe Island, with mention of the other known localities of the species.

J. D. Putnam (Proc. Davenport Acad. Nat. Sci., 1876, v. 1, p. 169–207) enumerates 226 species from near Davenport, Iowa; 37 from Monticello, Iowa; 19 from near Frederick, Iowa; 252 from the Rocky Mts. of Colorado; 109 from northwestern Wyoming; 55 from Mt. Nebo alpine region, Utah (2100 to 3000 metres); 39 from a salt mud-flat near Utah Lake; 112 from the sage-brush region near Spring Lake Villa, Utah (1200 to 1800 metres).

Prof. Snow (Trans. Kans. Acad. Sci., 1877, v. 5, p. 15–20) enumerates 304 species from Colorado.

E. A. Popenoe (Trans. Kans. Acad. Sci., 1877, v. 5, p. 21–40) enumerates about 1200 species from Kansas, with remarks.

By far the most important contributions to this subject which have recently been made are the work of two members of our club, who have given the results of several years' labor, in two papers published the past season. "The Coleoptera of Florida" by E. A. Schwarz, (Proc. Amer. Philos. Soc., 1878, v. 17, p. 353–472) contains remarks upon the nature of the region collected in; descriptions, by E. A. Schwarz, of 34 new species, with a table of the species of Cyclonotum; descriptions of 141 new species by Dr. LeConte, of which 42 species are extra-limital, five species are noted for the first time as belonging to the fauna of the United States, 5 new genera are described and tables of the species of many genera are given; a list, by E. A. Schwarz, of 1457 species with localities, notes on comparative frequency, and other notes, and remarks by Dr. LeConte upon the distribution of species, accompanied by lists of the species of restricted range common to Florida and one or more adjacent regions. "The Coleoptera of Michigan," by H. G. Hubbard and E. A. Schwarz, (Proc. Amer. Philos. Soc., 1878, v. 17, p. 593–666, 669) contains descriptions of 63 new species by Dr. LeConte, with remarks on several other species, among which are four new to the American fauna, descriptions of three new genera, and tables of the species of several genera; descriptions, by Dr. Horn, of seven new species, with tables of the species of Mycetophagidae and Orchestes; a list by Hubbard and Schwarz of 1246 species of Coleoptera found in the Lake Superior region, besides mention of the occurrence of many unnamed species in various groups; a list of 1787 species from the lower peninsula of Michigan; finally, a description of the larva of *Micromalthus debilis*, by H. G. Hubbard, with a plate figuring larva, imago and details of structure. Of the new species described 14 do not belong to the fauna of Michigan.

The various government surveys have also contributed considerable material towards a fauna of the great interior region of the continent. This is contained in the publications of the respective surveys as follows:

The Annual reports of the Geol. and Geog. Surv. of the Terr. under charge of Dr. Hayden, contain the following papers: by Dr. Horn (1872, rept. 2, p. 469–470) list of 123 species from Colorado and eastern New Mexico; (1872, rept. 5, p. 382–392) list of 822 species from various regions, with remarks on the variation of certain species of extended geographical range; (1873, rept. 6, p. 717) list of 39 species from Yellowstone Lake, Teton Basin and Snake River; (1877, rept. 9, p. 811–815) list of 146 species from Colorado and Utah; by Lieut. Carpenter (1874, rept. 7, p. 539–542) list of 16 species from the alpine region of Colorado: by Henry Ulke (1874, rept. 7, p. 567–571) list of 163 species from Colorado.

The Bulletin of the same survey contains the following papers: by P. R. Uhler (1877, v. 3, p. 770–779) list of 95 species from the western territories, with remarks; by Dr. LeConte (1878, v. 4, p. 447–480) list of 221 species from the alpine regions of the Rocky Mts., with remarks upon the altitudes at which they occur and upon geographical distribution, list of 30 species peculiar to the Rocky Mountain region, list of 154 species from Atalanta, Idaho (altitude 2340 metres).

The Annual report upon the Geog. Surv. west of the 100th Meridian . . . by Lieut. Wheeler, contains the following papers: by H. Ulke (1875, p. 809–827) list of 389 species collected in several western states and territories, with localities; by Dr. LeConte (1876, p. 296–300) list of 75 species from southern California and 224 species from northern Colorado and northern New Mexico.

It may not be amiss also to note the publication of such lists of Coleoptera for sale as have indications of the localities; these are the earlier and smaller lists published by the Philadelphia Agency in 1874, and G. W. Belfrage's list of 471 Texan species in PSYCHE Advertiser for December 1876.

The preceding lists, from their extent or the interest attached to the localities, seemed to demand special notice, and the foregoing sketch shows that much progress has been made in collecting data for solving the problem of the present distribution of North American Coleoptera. The published lists, however, are far from representing the whole progress in that direction, and I will briefly notice some of the principal collections known to me which are capable of adding materially to our stock of knowledge, and which I trust will be used for that purpose in the near future.

Mr. Henry Ulke has collected for many years in the vicinity of Washington, D. C., and can give a nearly complete catalogue of the Coleoptera of that region.

Mr. Samuel Auxer has made a collection in the vicinity of Lancaster, Pa., which will give a good idea of the fauna of that section.

Good materials for a representation of the fauna of Texas exist in the collections of Messrs. Belfrage, Boll, and others.

The extensive collections made by Mr. G. R. Crotch, in California and British Columbia, would have contributed greatly to our knowledge of the distribution of the species of the Pacific coast, as all the specimens had the localities carefully marked, if only a set had been kept together for investigation.

Mr. A. S. Fuller has accumulated, during the past few years, an immense collection from all parts of the country, which will doubtless furnish much information in this regard.

The collections made by Mr. H. K. Morrison in Georgia and North Carolina in 1876, in Colorado in 1877, and in the Sierras during the past year, would be of great value, if a set of the specimens was kept together and sufficient pains were taken to separate species which are superficially alike.

The numerous collectors in New York and Brooklyn have done much also towards working up their local fauna and have begun to publish lists.

Several industrious collectors in Buffalo, N. Y. have done good work in this direction.

We may hope that the labors of Messrs. Hubbard and Schwarz are by no means completed. I have recently examined a collection of over 700 species taken by Mr. Schwarz, in Colorado, in a few weeks' collecting during the past season, and as this consisted only of the duplicates of the collection, there must be at least 1000 species in all.

Much has been done, though little published, towards working up the fauna of New England. The collections of Mr. G. Dimmock and others, in the Connecticut Valley, will give a good idea of the fauna of that section, which is very different from that of the eastern part of the state. Mr. F. Blanchard has made a collection in the vicinity of Lowell, Mass., which is probably the most complete local collection in New England.

For Boston and vicinity, the collections of the various members of the Club will furnish the basis for a pretty complete list, as soon as some one will undertake to prepare it.

Since the publication of my list of Mt. Washington Coleoptera, materials have been gathered for a more full list of the species of that region.

Mr. S. Henshaw has been, for some time, collecting data for a complete list of New England species.

The materials already collected suggest many interesting questions in regard to the migrations of species, and concerning the former distribution of land and water on this continent. Some of these questions have already been noticed by Dr. LeConte and others, but it is evident that such problems are only beginning to be studied, and that when collections increase, and, particularly, when the great interior of the continent is as carefully explored as have been a few localities on each shore, numerous cases of remarkable distribution of species will be discovered, fully as interesting as any which have been already noticed.

Several interesting questions suggest themselves in regard to the Cicindelidae. *Cicindela puritana*, *C. macra* and *C. cuprascens* are no doubt comparatively recent forms of a formerly single species. *C. puritana*, having apparently become isolated at an early date, is now confined to the Connecticut Valley, and is in several respects intermediate between the other two species, which have a wide distribution in the western and southwestern states. *C. macra* and *C. cuprascens* probably occur together in many localities. *C. macra* is the most abundant and widespread form, and seems to have a tendency to separate into races, a tendency not yet noticed in *C. cuprascens*, and not to be expected in *C. puritana*, on account of its limited range.

In tracing out variations of species, it is of course important to pay attention to all variations which tend to become permanent, in other words to study the formation of races, which is, of course, the first step in the formation of new species. I cannot close this essay without entering a protest against a tendency, which has sprung up recently, of ignoring these variations and of regarding as synonyms the names under which they have been described, when in reality they are varieties, in many cases quite permanent, which are from separate regions and tend very little to run into each other. *E. P. Austin.*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 216.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 1093 to 1135 are from **Can. Entom.**, v. 8.

* 1093. A: R. Grote. New moths. p. 111–112. [June, 1876.]

Describes *Botis submedialis* and *Eurymene rosaria* (G. & R.) from Canada, *Hydrocampa ekthlipsis* from N. Y. and Canada, Sisyrosea, *S. nasoni* from Va. = 1 n. g., 4 n. spp.; the type of Sisyrosea is *Limacodes inornatus* G. & R.

* 1094. W: H. EDWARDS. Notes on preparatory stages of Danais archippus. p. 119–120. [June, 1876.]

Periodicity of the developmental stages; there are four moults, and in W. Va. there are at least two broods annually.

* 1095. R. BUNKER. Correspondence. p. 120. [June, 1876.]

In 1873 most of the larvae of *Ceratomia quadricornis*, at Rochester, N. Y., were brown; green ones were the exception. [See Rec., no. 1076.]

* 1096. G: W. PECK. Correspondence. p. 120. [June, 1876.]

A female *Smerinthus cerisii* was captured in Maine.

* 1097. JA: A. LINTNER. On Catocala pretiosa, n. s. p. 121–122. [Aug., 1876.]

Describes *Catocala pretiosa* n. sp. Records the capture of *C. crataegi* and *C. polygama*.

* 1098. LAWRENCE BRUNER. New species of Nebraska Acrididae. p. 123–125. [Aug., 1876.]

Describes *Oedipoda nebrascensis*, *Pezotettix gracilis*, *P. occidentalis* = 3 n. sp.

* 1099. A: R. GROTE. On a new Canadian Bombycid moth. p. 125–126. [Aug., 1876.]

Describes Ellida n. g., and *E. gelida* n. sp., from Can. and N. Y.

* 1100. G: H: HORN. Synonymy of the Coleoptera of the Fauna Boreali-Americana, Kirby. p. 126–130 [Aug.], 150–151 [Aug.], 166–170 [Oct.], 190–193. [Nov., 1876.]

Kirby mentions 343 species, describing 238 as new species, of which 111 are retained with Kirby's specific names, and 2 are unknown or in doubt.—*S: Henshaw*, Entom. writ. Horn, no. 61.

* 1101. A: R. GROTE. On Jacob Hubner and his works on the butterflies and moths. p. 131–135. [Aug., 1876.]

Argues that minute characters are sufficient for the distinction of genera, that Hübner was an advanced thinker upon classification, and that Ochsenheimer approved of the adoption of Hübner's nomenclature. Treats the discussion as settled by this paper, but does not deal with the more essential arguments of his opponents.

* 1102. V. T. CHAMBERS. Tineina. p. 135–138, 158–160. [Aug., 1876.]

Describes *Laverna? (Anybia?) gleditschiaeella* and *L. oenotheraesemenella* = 2 n. sp.; describes the larva of the former and its habits, and describes another larva unidentified. Describes *L. bifasciella*, *L. unifasciella*, *Nepticula badiocapitella* = 3 n. sp. [See Rec., no. 1113.]

No. 58 was issued Feb. 14, 1879.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., April, 1879. [No. 60.

The Nervous System and Salivary Glands of Phylloxera.

I have read with interest the remarks of Dr. E. L. Mark upon this subject in PSYCHE for January. He is without doubt right in his conclusion that what I have inadvertently called nervous cords are, in reality, the tracheae ; I have been of this opinion for some time. Dr. Mark's article suggests, however, another thought which induces me to write these few lines. M. Maxime Cornu has, under the direction of the French Academy, made extended investigations into the nature of the root swellings caused by *Phylloxera vastatrix*, arriving at the conclusion, to me somewhat surprising, that they are purely the result of the mechanical action of the puncture made by the insect, and of the subsequent absorption of liquids. These results are recorded in an extended and elaborately illustrated memoir.[1] I have always believed Cornu's conclusions essentially erroneous, for the following reasons, which I quote from my 6th Report on the insects of Missouri, 1873, p. 70.

"For a very minute and careful study of the pathological characteristics of these swellings, the reader may refer to Maxime Cornu's excellent papers in the Comptes Rendus, for 1873, and Mémoires (xxii, no. 6) of the Académie des Sciences, Paris. He corroborates, by detailed observations, the conclusions previously arrived at by Planchon and his followers ; but, like too many of his countrymen, very generally ignores observations made out of France, and consequently sometimes repeats as original, facts recorded elsewhere with less of detail. He concludes that the Phylloxera is not nourished by the sap of the plant, but by plasmatic material which the

[1] Maxime Cornu. Etudes sur le Phylloxera vastatrix. Paris, 1878.

latter stores up. He also concludes that the swellings are produced solely by the mechanical action of the tongue, and that they in themselves are the cause of the trouble, by absorbing in their development, the nourishment needed for the vine, and by affecting, in rotting, the parts not touched by Phylloxera: in other words, that the amount of nourishment appropriated by the lice would never seriously affect the vine, were it not for the characteristic and intrinsic swellings. I can not accept the last two conclusions. There is a strong *a priori* probability that the swellings are due to something more than mere mechanical action — to some poisonous excretive fluid, as in many gall-flies (*Cynipidæ*) and saw-flies (*Tenthredinidæ*); or to some irritating and poisonous property of the proboscis, as in the spines and hairs of many larvæ. We may not be able to analyze it, but it is difficult to understand how, without some such poisonous property, the Phylloxera leaf-gall is developed, while so many other plant-lice perform similar mechanical acts to that performed by Phylloxera without causing abnormal growths on the plants they infest. Bearing in mind also, the withering and blasting effects which many plant-lice and bark-lice cause to plants which never swell abnormally from their punctures, it would seem obvious that with the vine roots covered with Phylloxeræ, most of them rapidly developing and multiplying, the direct loss of plant substance must be very material — however great the indirect loss through the swellings may be. There are any number of plant-lice no larger than our Phylloxera, and which there is every reason to believe appropriate no more for the nourishment of their bodies, which nevertheless affect most seriously the plants they inhabit by direct sucking of the plant juices."

Do not the anatomical researches of Targioni-Tozzetti and Mark, in showing the possession, by Phylloxera and other Aphididae, of such conspicuous salivary glands, lend additional weight to my view of the subject, and do they not give strong presumptive evidence that there is introduced into the plant-tissues, with the puncture of the proboscis, a secretion which acts upon the plant in a peculiar manner, according to the species? In other words, have we not a right to assume an analogy between the puncture of the aphididan proboscis and the cynipidan ovipositor? On no other hypothesis can we explain, with any degree of satisfaction, the production of a dozen or more essentially different gall-growths (as by the different species of Phylloxera affecting the hickory) on the same plant by insects differing in no appreciable manner from each other, so far as size and structure of proboscis are concerned.

C. V. Riley.

Washington, D.C., 20 Feb., 1879.

Editors of Psyche: At the bottom of p. 147, v. 2, I have stated that "I have never met with a Lithocolletis pupa in the winter or spring." The reader will please interpolate the words "of the flat group" after the word pupa, as it is intended to apply only to that group. So far as I have observed, the species of the cylindrical group always hibernate as pupae; and I have taken *L. ornatella* from its cocoons in January in both conditions — as larva and pupa. The statement on p. 142 that *Gracilaria robiniella* undergoes the change mentioned at the fifth stage is incorrect. *Lithocolletis robiniella* does so; but *G. robiniella* assumes that character of trophi at the third stage.

The statement that there are eight larval stages is perhaps made too positively. It is the conclusion to which I was led by careful examinations of a great many larvae, and I am fully convinced that the number cannot be less than seven. But owing to the difficulty in determining the matter accurately (suggested at p. 138), there is a possibility of error. Whether the number is eight or less the other statements in the paper are not affected thereby. The change in the character of the trophi and in the larval habits takes place at different stages in the different groups.

V. T. Chambers.

Covington, Ky., 16 Feb., 1879.

Editors of Psyche: On reading my address to the Club, as printed in Psyche, I find so many improvements that I hardly recognize my own work and suggest the title should have been "The opinion of the editors of Psyche as to what the second annual address of the president should be."

Although I have no doubt the printed address is much better than the one actually delivered, still I do not wish to sail under false colors, and trust you will give place to this little note in acknowledgement of the improvements made in it.

I would also like to be permitted to suggest that I did not make any excuse for speaking of the geographical distribution of Coleoptera, but only for not including the other groups as well as Coleoptera. Neither do I consider that Coleoptera possess any special advantages over other groups in the study of questions of distribution as would be inferred from the printed statement, in fact some other groups are no doubt better suited to that purpose than the Coleoptera.

A number of notes which I had prepared for insertion were omitted, as I received no proof before the paper was printed. In the list of collections, which I have indicated as containing material deserving of publication, I have only included such as were known to me, either by personal inspection or from exchanges with the collectors. There are doubtless several other equally valuable collections which should be included in a list. Among others the collection of Mr. Henry Edwards, is probably the most valuable in existence for Pacific coast species.

It may also be advisable to state that I did not mention the collections of Drs. Horn and LeConte, as most of the material contained in them has already been made use of in the various papers published by these gentlemen. *E. P. Austin.*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 224.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor; unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 1103 to 1135 are from **Can. Entom.**, v. 8.

* 1103. S. H. Peabody. Inquiries concerning the genera of Mr. Scudder's "Systematic revision." p. 141–148. [Aug., 1876.]

Analyses in tabular form Scudder's descriptions of the genera of the tribe Adolescentes, to show the impracticability of distinguishing the genera; argues that the differences stated are not of more than specific value.

* 1104. W: H. Edwards. No. of broods of Danais archippus. p. 148. [Aug., 1876.]

There are at least three broods of *D. archippus* in West Virginia in a year.

* 1105. Ja: Behrens. Description of a new Saturnian. p. 149. [Aug., 1876.]

Describes *Saturnia* (*Aglia*) *mendocino* n. sp., from Cal.

* 1106. A: R. Grote. Notes on Geometridae. p. 152–154. [Aug., 1876.]

Synonymy of several genera and species.

* 1107. L. F. Harvey. New Noctuidae. p. 154–156. [Aug., 1876.]

Describes *Mamestra orobia*, *Gortyna appasionata*, *Homoptera stylobata*, *H. mima* = 4 n. spp.

* 1108. A: R. Grote. New Pyralides. (II.) p. 156–158. [Aug., 1876.]

Describes *Emprepes novalis*, Mochlocera, *M. zelleri*, *Zophodia dentata* = 1 n. g., 3 n. spp.; notes on other species.

* 1109. W: H. Edwards. Correspondence. p. 160. [Aug., 1876.]

Prof. P. C. Zeller condemns the efforts of lepidopterists to resuscitate Hübner's names.

* 1110. W: H. Edwards. Farther notes upon Argynnis myrina. p. 161–163. [Oct., 1876.]

[See Rec., no. 515.] Seasons of the broods; description of egg, of larva at each period, and of chrysalis.

* 1111. B: P. Mann. A synonym of Anisopteryx pometaria. p. 164. [Oct., 1876.]

Correction of statements in Packard's Monograph of the Phalaenidae.

* 1112. C: E. Worthington. Notes on certain variations of Samia cecropia. p. 165–166. [Oct., 1876.]

Variations in color, in markings and in size.

* 1113. V. T. Chambers. Tineina. p. 171–173. [Oct., 1876.]

Describes *Asychna ? pulvella*, *Elachista cristatella*, *Coleophora nigralineella*, *Gelechia clemensella*, *G. saundersella* = 5 n. spp.

* 1114. Ja: Behrens. On four new Californian Hepiali. p. 174–175. [Oct., 1876.]

Describes *Hepialus sequoiolus*, *H. mendocinolus*, *H. baroni*, *H. lenzi* = 4 n. spp. from Mendocino, Cal.

* 1115. [W: Saunders.] Meetings of the Entomological Club of the American Association for the Advancement of Science. p. 176–180 [Oct.], 181–185. [Nov., 1876.]

Address of the President, review of the year's progress in entomology (by J: L. LeConte); venation of wings of Anisopteryx, and variation in imagos (by C: V. Riley and A: R. Grote); report of the committee on nomenclature, and discussion of it; an acarid parasite of Doryphora (by C: V. Riley); eggs of ?Corydalis (by C: V. Riley); eggs of Hydrophilus (by C: V. Riley); pupae of Calopteron (by W: Saunders); preservation of larvae for the cabinet; retardation of development; sugaring for Oecanthus and Catocala; election of officers; a pattern insect-box.

* 1116. Mary E. Murtfeldt. Larva of Anaphora agrotipennella. p. 185–186. [Nov., 1876.]

Description of larva, larval habits, and pupa.

* 1117. C: Dury. List of Catocalae observed in the vicinity of Cincinnati, Ohio, 1876. p. 187–188. [Nov., 1876.]

Enumerates 40 species and varieties, with remarks.

* 1118. A: R. Grote. Notes on Noctuae. p. 188–190. [Nov., 1876.]

Describes *Ipimorpha subvexa*, Chytoryza, *Ch. tecta* = 1 n. g., 2 n. Texan spp.; corrections of his check list [see Rec., no. 345].

* 1119. H. A. Hagen. On genera. p. 194–198. [Nov., 1876.]

Distinction and definition of generic and specific characters; modification of characters by circumstances.

* 1120. W: V. ANDREWS. Correspondence. p. 198. [Nov., 1876.]

Larva of *Catocala badia* on *Myrica cerifera.*

* 1121. J: G. MORRIS. Extract from a letter. p. 198–199. [Nov., 1876.]

[Name of author given as J. C. Morris.] Development of *Samia cynthia* pupa retarded three or four years; abundance of *Scaphinotus elevatus.*

* 1122. JA: ANGUS. Important captures. p. 199–200. [Nov., 1876.]

Catocala marmorata (partly re-described), *C. atarah*, *C. amasia*, taken at West Farms, N. Y.; abundance of Catocala this season.

* 1123. JA: BEHRENS. How do specialists prefer to receive material? p. 200. [Nov., 1876.]

Dr. H: de Saussure prefers Hymenoptera not spread, V. T. Chambers is satisfied with Tineidae not pinned; how is it with other persons?

* 1124. MARY E. MURTFELDT. An experiment with a stinging larva. p. 201–202. [Dec., 1876.]

Painful effects of being stung with hairs of *Lagoa opercularis* larva; description of the larva after its last larval moult.

* 1125. W: H. EDWARDS. The preparatory stages of Lycaena comyntas. p. 202–205. [Dec., 1876.]

Eggs obtained and larvae raised on *Desmodium marilandicum* and on *Trifolium pratense*; description of egg, of larva at all stages, and of pupa; habits of larva.

* 1126. A: R. GROTE. Notes on certain species of moths. p. 205–208. [Dec., 1876.]

Describes *Homopyralis discalis*, *Conchylis argentifurcatana*, *C. hipeana*, *Eustrotia caduca*, *Selenis monotropa* = 5 n. spp.; proposes the new generic name Caterva for *Geometra catenaria* Drury; synonymy of *Phyprospus callitrichoides.*

* 1127. H. H. LYMAN. Notes on the occurrence of Argynnis idalia Drury. p. 208–210. [Dec., 1876.]

The majority of females seem to appear several days later than the males.

* 1128. W: SAUNDERS. Annual address of the President of the Entomological Society of Ontario. p. 210–217. [Dec., 1876.]

Account of the various exhibits of insects at the Centennial Exhibition in Philadelphia; minor remarks.

* 1129. V. T. CHAMBERS. Tineina. p. 217–220. [Dec., 1876.]

Describes Lithariapteryx, *L. abroniaeella, Blastobasis gigantella* = 1 n. g., 2 n. spp.; habits of each.

* 1130. C: E. WORTHINGTON. Parasite on Samia cecropia. p. 220. [Dec., 1876.]

Several *Ophion macrurum* obtained from cocoons of *Telea polyphemus*; traces of unknown parasites in cocoons of *Samia cecropia*; pupae of the latter species transforming in the second year after formation.

* 1131. W: SAUNDERS. Notes on cantharides. p. 221–228, with one plate. [Jan., 1877.]

Describes and figures eleven North American and two other species of vesicant Coleoptera, related to *Cantharis vesicatoria*; habits and transformations of the latter; eggs and young larva of *Epicauta vittata*.

* 1132. A: R. GROTE. On species of Catocala. p. 229–232. [Jan., 1877.]

Describes *C. angusi* n. sp., *C. cerogama* var. *bunkeri* n. var., *C. habilis* var. *basilis* n. var.; notes on several species, especially on *C. relicta*.

* 1133. T. L. MEAD. Notes on some of the genera of Mr. Scudder's "Systematic revision." p. 232–238. [Jan., 1877.]

Detailed measurements of the proportions of parts in butterflies, used by Mr. Scudder to define genera, intended to show the unreliability of the definitiions.

* 1134. G: W. PECK. Observations on Sphingidae. p. 239–240. [Jan., 1877.]

Smerinthus astylus, S. myops, Darapsa versicolor, and *D. choerilus* double-brooded; larvae of first three partially described.

* 1135. R. BUNKER. Notes on Vanessa lintnerii, Fitch. p. 240. [Jan., 1877.]

Describes a specimen, from Rochester, N. Y., resembling in many particulars that described by Dr. Fitch as *V. lintnerii.*

* 1136. **Canadian** entomologist (The). Ed. by William Saunders; assisted by Rev. C. J. S. Bethune, M. A., E. B. Reed, and G. J. Bowles. Vol. 9. London [Ont.], [Entomological Society of Ontario], 1877. [4] + 244 p., 23 × 15.

Contains the articles cited in the Bibliographical record of PSYCHE, no. 1137–1266.

* 1137. **Edwards,** W: H. History of Phyciodes tharos, a polymorphic butterfly. (Can. entom., 1877, v. 9, p. 1–10, 51–58.)

Food, seasons, forms, habits and synonyms of *Ph. tharos*, comprising var. *morpheus* and var. *marcia*, perhaps also var. *batesii*; descriptions of egg, of all stages of larva, and of pupa. [Feb., 1877.] [Correction of errata, l. c., p. 30.]

* 1138. **Grote**, A: Radcliffe. Description of a new Botis allied to flavidalis. (Can. entom., 1877, v. 9, p. 10.)

Describes *B. langdonalis*, n. sp., from Ohio. [Feb., 1877.]

* 1139. **Brodie**, W: Notes on Meloe angusticollis. (Can. entom., 1877, v. 9, p. 11–12.)

Food (*Ranunculus acris*), seasons and habits of the imagos. [Feb., 1877.]

* 1140. **Grote**, A: Radcliffe. Notice. (Can. entom., 1877, v. 9, p. 12.)

Specimens and notes wanted for a monograph upon Tortricidae. [Feb., 1877.]

* 1141. **Hagen**, *Dr.* Hermann A: On Samia gloveri and columbia. (Can. entom., 1877, v. 9, p. 13.)

The type-specimens seem not to differ specifically; is *S. gloveri* a salt deformity? [Feb., 1877.]

* 1142. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1877, v. 9, p. 13–15.)

Corrections of errata and synonymy; notes upon 7 species. [Feb., 1877.]

* 1143. **White**, *Dr.* F. Buchanan. Canadian hemiptera wanted. (Can. entom, 1877, v. 9, p. 15–17.)

Directions for collecting hemiptera. [Feb., 1877.]

* 1144. **Edwards**, W: H. Correspondence. (Can. entom., 1877, v. 9, p. 17.)

Priority of appearance of one sex of butterflies to that of the other. [Feb., 1877.]

* 1145. **Brous**, Harry A. On the habits of Amblychila cylindriformis, Say. (Can. entom., 1877, v. 9, p. 18.)

Geographical distribution, habits, food. [Feb., 1877.]

* 1146. **Murray**, W: On capturing Catocalas in the day-time. (Can. entom., 1877, v. 9, p. 18–19.)

Haunts and habits of the moths, method of capture. [Feb., 1877.]

* 1147. **Andrews**, W: Valentine. Larva of Thyreus nessus. (Can. entom., 1877, v. 9, p. 19–20.)

Description of mature larva and of pupa; habits and food. Makes *Parthenos nubilis* Hübn. the type of a new genus Catocalirrhus. [Feb., 1877.]

No. 59 was issued March 14, 1879.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., May–June, 1879. [No. 61–62.

The Anatomy of Amblychila cylindriformis Say.

(*With lithographic plate 1.*)

LITERATURE.

Imago. Schaupp: On the Cicindelidae of the United States (Bull. Brooklyn Entom. Soc., June 1878, v. 1, no. 2, p. 5).

Larva. Horn: Descriptions of the larvae of the North American genera of Cicindelidae, . . . (Trans. Amer. Entom. Soc., 1878, v. 7, p. 28–40, pl. 2.)

See also Brous: Habits of Amblychila cylindriformis (Trans. Kansas Acad. Sci., 1877, v. 5, p. 11–12), and Snow: Amblychila cylindriformis Say (Trans. Kans. Acad. Sci., 1878, v. 6, p. 29–32).

I began the investigations recorded in the present paper in the winter of 1877–8, on the receipt of fifty specimens of *A. cylindriformis* from Mr. George Porter Cooper, of Topeka, Kansas, but dropped the subject in the spring, and only took it up again in January 1879, on the receipt of fresh material from Prof. F. H. Snow, of the State University, Lawrence, Kansas. I had occasion also to dissect numerous specimens of *Omus audouinii*, received from northern California and from Prof. O. B. Johnson, Salem University, Oregon.

In comparing the two genera, I find that they differ in several points. Omus has the facets of the cornea of the eye convex,[1] while in Amblychila the eye is entirely smooth. The accessory

[1] Omus and many other Cicindelidae have not only very convex facets on the cornea but also comparatively large eyes, both these characters giving more distant sight than Amblychila has. The cones are biconvex in Omus, while in Amblychila they are only convex interiorly. The more anterior position of the eye in many Cicindelidae gives better sight than a lateral position would give; in the latter case the antennae are of far more use, as organs of touch, than in the former.

gland of the male sexual organ of Amblychila (Fig. 9 *b*)[1] is more dilated than in Omus and the bending of the testis is in the reverse direction; there is also in Omus a double pair of long accessory tubes discharging their contents into the vas deferens, each pair of these tubes uniting near their insertion. The tip of the penis is acute in Amblychila (Fig. 13 *A*) but is rounded in Omus (Fig. 13 *B*). The last abdominal segment is emarginate in all the genera of our fauna except Amblychila. I do not know whether this emargination corresponds with the form or position of the tip of the penis, or not, but it is certain that most, if not all, the species of the different genera fly around *in copula*, and the emargination may help to make this possible.

In looking over the family of Cicindelidae in a speculatory way, I drew the inference that the line of descent diverged (probably in the mesozoic age) into branches, the lowest[2] and certainly the oldest of which is still represented in the genus Amblychila. In Omus, Tetracha, *Cicindela pilatei*, *C. maga*, *C. cursitans* and *C. celeripes* we have an aberrant lesser branch, the latter genera being closely linked with the rest of the Cicindelidae.

Contemplating the law of adaptation and heredity, I arrived at the conclusion that the prototype of Amblychila formerly lived on the shores of the great intercontinental gulf in cretaceous times, before the arrival of *Cicindela hirticollis* and *C. lepida*,[3] and was in those ages provided with a more specialized structure, which by degrees became retrograded and inherited, when its survivors adapted themselves to the clay-banks of the undulating prairies of Colorado and Kansas. It probably formerly led a life, like its congeners in Mexico and South America, on leaves of trees, along the shores of the great gulf; the consequent breaking up of the latter into innumer-

[1] The figures referred to are on Plate 1.

[2] Deficient in organ of sight, less specialized in organs of reproduction and in larva, reduced in abdominal segments and wanting wings.

[3] LeConte: Address of Retiring President (Proc. Amer. Ass. Adv. Sci., 1875 [v. 24], p. 1–18), p. 4. Horn: Notes on some coleopterous remains from the bone cave at Port Kennedy, Penna. (Trans. Amer. Entom. Soc., 1876, v. 5, p. 241–245) (Misc. papers on Amer. coleoptera, p. 241–245), p. 241.

able salt and brackish lakes being the primary cause of its retrogradation.[1]

Owing to the light membranous body of insects, they were less likely to be destroyed[2] in pre-historic evolutions than were vertebrates and many invertebrates; consequently future researches in the rich deposits of the Rocky Mountain tertiaries may yet reveal the fossil ancestor of Amblychila.

As a secondary adaptation, I mention the pubescence of the middle tibia in the male of Megacephalini and Cicindela (excepting in *C. pilatei* and *C. maga*, where it is glabrous). It is intended for a firmer hold of the female during copulation; in Amblychila the dilation of the anterior tarsi in the male was dropped as useless, probably owing to the smooth cylindrical thorax of the female, and was replaced by an acute hind trochanter[3] for firmer insertion into the funnel-shaped pores between the ridges of the elytra of the female. This structure was useless to the female and therefore the trochanter remained blunt. We find similar inherited adaptations in the serrulate and curved middle tibia of *Calosoma sayi*;[4] the dilation of the anterior tarsi was in this instance preserved. Although *C. sayi* occurs frequently in Kansas and thereabouts, its frequency is probably checked by some enemy; its large size, and perhaps other causes, lessen its number. The interrupted elevations between the longitudinal ridges of its elytra are also, perhaps, fit for the acute trochanter of the male.

Whenever we find characters dropped because they are of no apparent use, we find them existing elsewhere, where they are probably also useless. They are merely — as are, for instance, the arthropodous trochanters — rudimentary organs which become important indications in comparative anatomy for tracing their ancestral connections, at the same time teach-

[1] LeConte: Classification of the coleoptera of North America, p. 1.

[2] LeConte: Address (*l. c.*), p. 8. "Cataclysms and submergences, which would annihilate the higher animals, would only float the temporarily asphyxiated insect, or the tree trunks containing the larvae and pupae to other neighboring lands."

[3] Horn: Sexual characters of North American Cicindelidae ... (Trans. Amer. Entom. Soc., 1875, v. 5, p. 232–240, pl. 1 in part) (Misc. papers on Amer. coleoptera, p. 232–240, pl. 1 in part), pl. 1, fig. 18.

[4] Horn: *ibid.*, pl. 1, fig. 26.

ing, also, how an organ is apparently preserved without purpose for an indefinite time. In order to understand the teleology of certain inherited organizations it is necessary to be perfectly acquainted with the external conditions and the biology of the respective species. Adapted forms and accommodations are explicable only upon such conditions. Since the determining impulses for transitions and changes in organisms lie outside of the latter, or are to be sought there for the greater part, they thus often escape our observation.

Instances could also be mentioned of sexual peculiarities which seem to be in opposition to easy copulation, yet the species are abundant. Such apparently conflicting facts could undoubtedly be explained if we had full knowledge of the peculiar biology of those species. Amateur entomologists ought, therefore, by accurate biological observations, to concentrate their studies especially upon this generally neglected theme.

ANATOMY OF THE IMAGO.

Integument. The dark brown elytra exhibit, on the upper side, elevated longitudinal beads and funnel-shaped punctures. In a deeper layer, next to the hypodermis, are several longitudinally meandering cylindrical canals, running between the pores and the beads. The larger, serially arranged pores just reach the chitinogenous matrix (hypodermis), forming a minute protuberance, while the smaller, more or less irregularly placed pores, pierce the matrix. The circular fibrous area of each of the larger pores forming a third group has an interruption, which is always on the side towards the base of the elytra, and appears to be a concave groove, the exact nature of which I did not succeed in disclosing. (Fig. 7.)

On macerating a piece of the head alternately in caustic potash and acetic acid, three different sizes of pigment-granules can be discerned in the cuticula: first, a fine granulation, second, an irregularly arranged coarser granulation, and third, a nearly round, homogeneous assemblage of larger spots.

A broad zone of spinous excrescences, arranged like tiles, extends along the pleurae of the abdominal integument between and around the stigmata.

Inner skeleton. For the suspension of the pharynx two chitinous furcate processes are fastened to the roof of the anterior portion of the head. Each process has a hook above the pharynx and a membrane at its lower portion, which connects with the other process. (Fig. 12.) Another chitinous process extends longitudinally along the roof of the thorax, and serves for the insertion of muscles. Similar organs have been observed in many other insects, always serving either for the insertion of muscles or for the support of delicate organs.

Alimentary canal. (Fig. 4.) The most anterior muscular portion of the canal, the pharynx, first bends upward, passes through a chitinous diaphragm formed by the above-mentioned processes, and then reaches nearly down to the base of the head. At this point its lower part is contracted by a sort of sphincter pharyngis. The chitinous and membranous continuation, the oesophagus, gradually widens its lumen, and ends with a capacious bladder, the ingluvies, or crop.

The pharynx has two layers, the inner of which consists of quite large glandular cells, occasionally including small tracheal branches. The glandular cells are densely grouped in the transverse and longitudinal folds. The outer layer consists of a sheath of ring-muscles, which are, along the longitudinal glandular cell-folds, covered with a layer of longitudinal muscular fibres. The fibres of the longitudinal muscles are broader than those of the ring-muscles. In order to convey a better idea of the complicated arrangement of the two layers in the pharynx, Fig. 14 is added: *e* and *d* belong to the outer, *a*, *b*, *c* and *f* to the inner layer.

The structure of the membrane of the oesophagus and ingluvies is perfectly homogeneous, the latter taking charge of the maceration of the semi-fluid nourishment and the expulsion of undigested food. The contents of the ingluvies are in all cases a dirty grey emulsion, mixed with a fine, crystalline, sand-like sediment. As Amblychila lives in clay-holes, probably it swallows, along with its food, a quantity of clay, for the purpose of comminuting and crushing its food, with the assistance of the triturating muscles of the proventriculus, as is the case in many other insects.

The widest lumen of the ingluvies is in the neighborhood of the first abdominal segment. A powerful muscular complex forms the proventriculus, and consists of eight flesh-colored fascicles, a little over 2 mm. long, convex outside and concave inside at the base. The broader bases of the fascicles are closely fitted to the proventriculus, and their pointed ends are turned backward. Two of these eight fascicles are connate, exhibiting a deep longitudinal fold at their connection. Each fascicle terminates in a chitinous tooth, and the entire complex is covered with tooth-shaped excrescences, or aciculi, directed backward and outward. The same apparatus exists in Omus and in many other insects.[1] In the larva of Corethra, a dipteron, these spines are directed toward the lumen of the pharyngeal bulb, forming a sort of weir-basket, and the mechanism as well as the function of this apparatus must be different from that of the complex in Amblychila.

Just behind the proventricular apparatus three pairs of Malpighian vessels discharge their contents into the very narrow and compactly muscular chylific ventricle. They are of considerable length, winding themselves through the lobes of the corpus adiposum, but are not in any way extraordinary, having the histological structure of Malpighian vessels in other insects.

Four other short, yellow sheaths, or utricular organs, also discharge into the chylific ventricle. Their envelope shows very fine, transverse lines, which do not, under high magnifying power, prove to be ring-muscles. The contents of these sheaths is an aggregation of closely packed, glandular lobules. I assume them to be functionally the so-called pyloric appendages. They neither precede nor follow the Malpighian vessels but are closely intermingled with the latter, and only with difficulty can be traced to their insertion.

The anterior portion of the chylific ventricle, connected with the Malpighian vessels and pyloric appendages, consists of a thickened external layer of fine fibrous network with large meshes, having from three to six yellowish glandular lobes enclosed in each mesh. (Fig. 8 *a* and *b*.) The anterior part of

[1] Burmeister: Handbook of entomology, translated by Shuckard. 1836.

the chylific ventricle, with its glandular envelope, is probably the true digesting portion, and the posterior part serves for the absorption of chylified fluid.

The course of the chylific ventricle is straight. Its length, in contracted alcoholic specimens, is about 25 mm.; its diameter, 1.5 mm. Owing to its tough muscular substance, it is supposed to be capable of extension and contraction, and to have peristaltic motions, in the living animal.

The chylific ventricle terminates with a sort of sphincter, reaching into the third and last part of the alimentary system, the rectal bladder (Fig. 4 *g*).

The rectal bladder is of the same form as the ingluvies and, like the latter, is a capacious organ with thin, chitinous walls. Its widest lumen is toward the chylific ventricle, and it gradually narrows to within about 3 mm. from the anal orifice, to which extends a narrow muscular tube. Shortly before reaching this tube the rectal bladder is provided with glandular, longitudinal folds like those mentioned in the pharynx.

Six ellipsoidal bodies, rectal cells (Fig. 4 *h*), equidistant from each other, form a sort of girdle around the widest part of the bladder. Similar organs have been observed long since in other insects, and much has been written about them, to which I can add but little. Omus has them. Their physiological action has not been sufficiently explained, though, in general, they are regarded as excretory organs.

The rectal cells of Amblychila are 2 mm. long, and about 0.9 mm. wide (Fig. 5), and have a chitinous, lemon-colored wall, consisting of four layers (Fig. 6). The central part is filled by a simple cell-layer, consisting of an aggregation of large, colorless cells, closely packed and therefore appearing oval-polygonal. The outermost layer of the wall is the narrowest, and is colorless and structureless; the second is one-half broader, colorless and structureless; the third is as broad as the two outer together, yellow, convex outwardly and structureless; the innermost is as broad as the second outer, yellow, and exhibits under high power, glandular canals running toward the large central cells. The latter are plainly nucleated.

Circulatory system. There is, as in all insects, a contractile (pulsating) dorsal vessel, with venous ostia and arterial branches; but it was impossible for me, in the numerous specimens received in a dampish condition, to find the dorsal vessel or its ramifications, which would have been easily done in living individuals.

Respiratory system. Amblychila has seven pairs of stigmata (nine in the larva). The tracheae present a diversified system of ramifications, with the occasional occurrence of dispersed tracheal expansions, or bulbs, in the smaller branchlets, as is the case in other insects. Correspondences occur between the tracheal system and many of the other organs (corpus adiposum, integument and muscles), whereby an aeration of the blood is not only possible in all parts of the body but also in the respective tissues themselves.

The respiratory system assists locomotion by considerably lessening the specific gravity of the body.

Muscular system. But little can be said about the muscular system of Amblychila, though a few general remarks may be useful and instructive. As in all arthropoda the muscles are individualized, consisting of a number of single fascicles of fibres. The wings are wanting and the elytra connate, consequently the muscles destined for the wings are rudimentary. A number of leg-muscles are inserted on both sides of interior prothoracic processes. Stout fascicles in the head move the oral organs of this carnivorous insect. Several ligaments and membranes connect the head with the thorax, and the latter with the abdomen. The pharyngeal muscles have been mentioned before.

As is the case in all arthropoda the muscular fibres are transversely striate. Since I received only dead specimens, I could find only striate muscular fibres; striate fibres also occur in living insects, however, as Franz Leydig and August Weismann showed in the larva of Corethra.

Nervous system. (Fig. 1.) I succeeded in tracing the nervous system in several individuals. Having macerated the bodies in water several days, I opened them from above, at the sides, and having carefully removed corpus adiposum, digestive

PLATE 1.

(*Drawn and engraved by C. F. Gissler.*)

EXPLANATION OF FIGURES.

Fig. 1. Nervous system of Amblychila. Natural size.

a, antennal nerve [natural position is behind the optic nerve]; *b*, eye; *c*, supraoesophageal ganglion; *d*, infraoesophageal ganglion; *e*, first thoracic ganglion; *f*, second thoracic ganglion; *g* to *k*, first to fourth abdominal ganglia; *l*, terminal cords; *m*, fifth abdominal ganglion; *n*, ventral pair of nerve cords arising from the infraoesophageal ganglion.

Fig. 2. Optic nerve with swelling and ganglionary expansion. Enlarged.

Fig. 3. Vertical section through cornea and crystalline lenses; the latter are convex, interior prolongations of the cornea. Enlarged.

Fig. 4. Alimentary canal. Slightly enlarged.

aa, pharynx; *a*, oesophagus; *b*, ingluvies; *c*, proventricular triturating muscular, apparatus; *d*, Malpighian vessels (shortened); *e*, accessory glands (shortened); *f*, chylific ventricle; *g*, rectal bladder; *h*, rectal cells.

Fig. 5. A rectal cell, moderately magnified.

Fig. 6. Wall of a rectal cell, highly magnified.

Fig. 7. Elytral pores.

a, small and plain pore of the elytron: *b*, large ring-pore of the elytron; *c*, large ring-pore interrupted by a concave groove.

Fig. 8. Anterior external coat of chylific ventricle.

a, fibrous network moderately magnified; *b*, one of the meshes highly magnified.

Fig. 9. Male sexual organs. Slightly enlarged.

a, testicle; *b*, vas deferens (the swollen part = vesica seminalis); *bb*, Ductus ejaculatorius; *c*, process of preputium; *cc*, base of penis; *cp*, preputium; *d*, penis; *e*, distending process; *ee*, corneous ridge of preputium.

Fig. 10. Chorion of egg. Magnified.

Fig. 11. Micropyle of chorion. Highly magnified.

Fig. 12. Chitinous process in head. Enlarged.

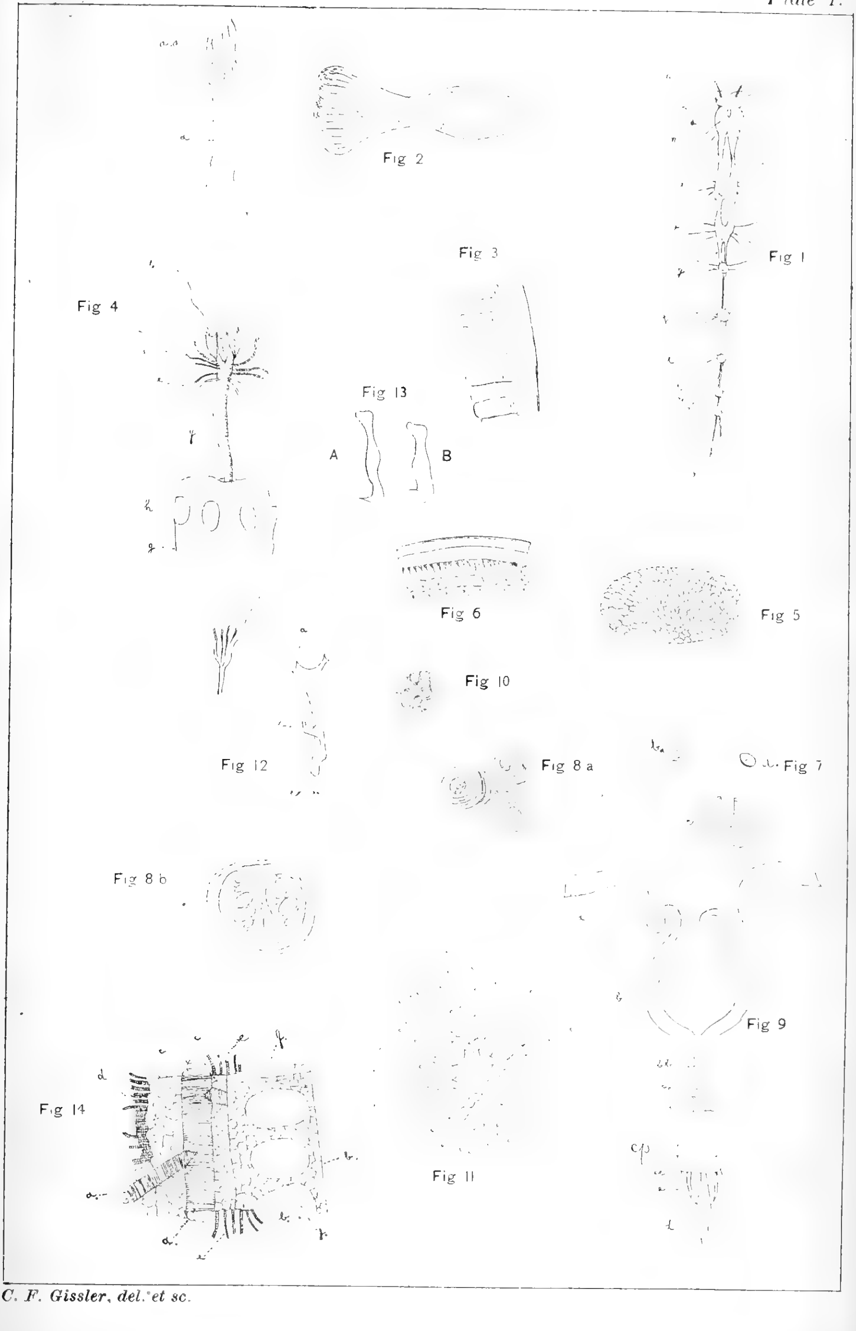
a, bifurcate insertion; *b*, process; *c*, membrane.

Fig. 13. Penis. Slightly enlarged.

A, of Amblychila; B, of Omus.

Fig. 14. Portion of pharynx. Moderately enlarged.

a, tracheal branch; *b*, longitudinal glandular fold; *c*, polygonal glandular cells; *d*, ring-muscles; *e*, longitudinal muscle-fibres; *f*, transverse glandular fold.



C. F. Gissler, del. et sc.

tract, genitals and side-muscles, the nervous cords, with their ganglia, can be seen with the naked eye, lying along the median line of the body on the under muscular sheet.

The supraoesophageal ganglion measures from its middle to the cornea of the eye a little less than 2 mm., and is more convex than the infraoesophageal ganglion, with which it is connate at the sides. The widest diameter of the infraoesophageal ganglion is 1 mm., and it is about 0.6 mm. thick. At the side of the supraoesophageal ganglion arises the optic nerve, and near the posterior part of the base of the latter, the antennal nerve. From the ventral surface of the infraoesophageal ganglion arise two pairs of fine nerve-threads, but whether they extend to the mouth-parts, or whether they are sympathetic branches, I cannot say. The infraoesophageal ganglion is connected with the first thoracic ganglion by two commissures, and the other ganglia are connected in the same way. There are five abdominal ganglia, of which the last two are nearer together than the others. The terminal commissures run, in the females, into the base of the ovipositor, but as this would be an anomalous place for a sixth ganglion, I think they subdivide themselves into smaller branches.

The soft tip of the terminal joint of the labial palpus is covered with an area of fine papillae.

Directly above the eyes in all Cicindelidae, and in the larvae of Amblychila, Omus, Tetracha and Cicindela, are three stout bristles. Judging from their position and constancy, probably they have a sensorial function, either as organs of touch, or, what is more likely, as auditory organs.

The biological notes of Prof. F. H. Snow and of Mr. H. A. Brous teach that Amblychila has "a very poor eye-sight and an acute sense of touch, chiefly concentrated in the vibratory antennae." Burmeister says,[1] "Organs of touch they (the antennae) cannot be, for their surface is too hard and horny, and besides, all insects have for this purpose organs furnished with a very delicate touching-substance . . ." The numerous bristles on the antennae of Amblychila and of other insects

[1] Burmeister: tr. by Shuckard, p. 485.

sufficiently warrant their being organs of touch and later investigations agree with this view.

The apparently typical, dorsal plates of the fifth abdominal segment of the larvae of Cicindelidae will have to be considered, I suppose, as organs with sensorial functions, but this supposition is in need of exact observation. They are usually regarded as claspers.[1]

Corpus adiposum. The adipose body does not present anything extraordinary. The larger lobes are above and at the sides of the digestive tract, and are dirty-white, presenting, when magnified, roundish globules enveloped in connective tissue. The globules consist of very tender and undulate lamellae. The larger lobes of the corpus adiposum are also enveloped in a sort of tissue, and here and there receive small tracheal branchlets, an arrangement which serves to keep the adipose body in position.

Numerous roundish, white corpuscles, of a diameter of 0.2 to 0.5 mm., are found dispersed over and between all the internal organs, undoubtedly organic matter secreted from the corpus adiposum through the general transelementation.

Female sexual organs. The cylindroid-oval eggs are apparently free, imbedded in the body cavity. In the condition in which I received the specimens, the finer ovarian membranes were wholly broken up. Specimens caught at a different season would undoubtedly have been more interesting. I found the eggs of equal size, and vainly searched for less developed ones. There are from three to six eggs in each individual. The length of the egg is about 4 mm., its width not quite 2 mm.

The brown coagulated deutoplasm, or yolk, has no yolk-membrane. It lies loose and considerably contracted in the hyaline chorion. The two poles of the deutoplasm are, in every instance, contracted to one side, which, for convenience, I will call the ventral side (Fig. 10, this page). Between the deutoplasm and the chorion are several yellow oil-globules, irregularly dispersed, having

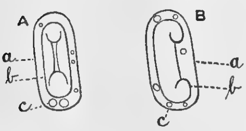


Fig. 10. A, ventral view; B, lateral view; *a*, chorion; *b*, deutoplasm; *c*, oil-globules.

[1] Horn: *l.c.*

been squeezed out of the yolk at the time of its contraction by alcohol. The chorion exhibits quite large, irregularly roundish cells (Pl. 1, Fig. 10), and as their cell-walls are elevated, this form of chorion may be called cancellate.

I succeeded in finding the micropyle in nearly all the chorions examined, after treatment with chloroform and alcohol, and preparation in glycerine. I recommend, therefore, eggs of Amblychila to microscopists who desire to examine micropyles. The large size of the chorion, and the ease with which it is removed from the yolk, considerably facilitate the finding of the micropyle (Fig. 11). The margin of the micropyle is circumscribed by a slightly thickened circumvolution or bead, the inner margin of which has six to seven incisures. From this circumvoluted margin radiate stolons, which meander through the granulations and rugosities of that portion of the surface of the chorion. This rugosity is coarser the farther it is from the micropyle, until it finally merges into the polygonal chorion-cells. By this zone, or areola of rugose surface, the micropyle is readily recognized, and cannot escape the eye of a close observer. I think the central disk is extremely finely porous, but as I could avail myself of no very high microscopic power, I could not settle this point. Through this perforation the spermatozoa probably gain access to, and fertilize the egg.

Male sexual organs.[1] The male sexual organs of Amblychila are quite large in comparison with the size of the insect. (Fig. 9.) The upper, terminal portion, which I consider the testicle, bends itself, with its thinner part to the right, and rests on the middle portion, the latter being bent to the left, over the base of the penis. The upper portion has a stout, longitudinal, muscular wrapper; the thinner middle portion has a thick wall with an apparently glandular epithelial lining. It is more transparent than the other portions. In its lumen, and on dissected parts, under the influence of acetic acid, a sheath or canal is visible, with its upper end bent over (like a parasitic nematode). This canal begins in the lower part of the thin, twisted portion of the middle section and can be traced

[1] To avoid reiterations concerning the morphology of the organs of copulation, I must again refer to Burmeister's Handbook of entomology.

downward into the terminal combined portion. This canal is the vas deferens, and its muscular, unpaired terminal part is the ductus ejaculatorius.

The middle portion, next below the testicle, on account of its histological structure, I consider a glandular tube, one of the accessory organs. *Carl F. Gissler.*

Brooklyn, E. D., N. Y.

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 232.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. PICKMAN MANN.

Nos. 1148 to 1266 are from **Can. entom.**, 1877, v. 9.

* 1148. **Bruner,** Laurence. Black variety of P. turnus. (Can. entom., 1877, v. 9, p. 20.)

Relative abundance of the black and the yellow varieties of *Papilio turnus* ♀ in different parts of Nebraska. [Feb., 1877.]

* 1149. **Grote,** A: Radcliffe. New Noctuae. (Can. entom., 1877, v. 9, p. 21–22.)

Describes *Glaea carnosa*, Fishia, *F. enthea* = 1 n. g., 2 n. spp. from Maine; notes on 3 spp. [Mar., 1877.]

* 1150. **Chambers,** Vactor Tousey. Tineina from Texas. (Can. entom., 1877, v. 9, p. 22–26, 71–74.)

Descriptive and synonymical notes upon about 16 spp. [Mar., May, 1877.]

* 1151. **Grote,** A: Radcliffe. Notes on a collection of Canadian moths made by Wm. S. M. D'Urban, and named by F. Walker. (Can. entom., 1877, v. 9, p. 27–29.)

Synonyms of species described by F. Walker, in the Canadian naturalist and geologist, v. 5, p. 91–96 and v. 6, p. 36–41; also of species labelled in the collection. [Mar., 1877.]

* 1152. **Edwards,** W: H: Descriptions of a new species of Pamphila from Colorado. (Can. entom., 1877, v. 9, p. 29–30.)

Describes *P. snowi* n. sp. [Mar., 1877.]

* 1153. **Saunders,** W: The Luna moth — Actias luna, Linn. (Can. entom., 1877, v. 9, p. 31–33, fig. 1.)

Description of imago and larva; figure of imago; food of larva. [Mar., 1877.]

* 1154. **Edwards**, W: H: Supplementary notes upon Argynnis myrina, with mention of the species bellona, atlantis and cybele. (Can. entom., 1877, v. 9, p. 34–36.)

Seasons of larvae and imagos, hibernation of larvae; egg of *A. bellona* described. [Mar., 1877.]

* 1155. [**Saunders**, W:] Book notices. (Can. entom., 1877, v. 9, p. 36–37.)

Notice of LeConte and Horn's Rhynchophora of America north of Mexico; of the works cited in this record, nos. 967, 845, 794; of Gentry's Life histories of the birds of eastern Pennyslvania, vol. 1. [Mar., 1877.]

* 1156. **Chambers**, Vactor Tousey. Correspondence. (Can. entom., 1877, v. 9, p. 38–40.)

[See Rec., no. 1123.] Preferred methods of preparing Tineina for study and preservation. [Mar., 1877.]

* 1157. **Caulfield**, Frank B. Notes on hybernating butterflies. (Can. entom., 1877, v. 9, p. 40.)

[See Rec., no. 651.] Dates at which *Vanessa j-album* and *V. antiopa* first emerge from their winter quarters. [Mar., 1877.]

* 1158. **Gentry**, T: G: Metamorphic changes of Platysamia cecropia. (Can. entom., 1877, v. 9, p. 41–50.)

Describes the egg and all stages of the larva; periodicity of changes; relation of larva and of color of cocoon to food plants, relation of food to sex; natural enemies. [Apr., 1877.]

* 1159. **Cassino**, S: E. The naturalists' directory. Containing the names of naturalists, chemists, physicists, and meteorologists, arranged alphabetically, with an index arranged according to departments. Salem, Mass., Naturalist's Agency, 1877. [2] + 46 + 20 + [10] p., interleaved in blank, 23 × 15.

* Notice. (Can. entom., 1877, v. 9, p. 50.) [Apr., 1877.]

States the addresses and specialities of 1431 naturalists, and indexes them by their specialities; states the addresses of about 600 chemists and physicists and of about 100 meteorologists. [Feb., 1877.]

* 1160. **Edwards**, W: H: Description of a new species of Hesperian from Texas. (Can. entom., 1877, v. 9, p. 58–59.)

Describes *Pamphila meskei*, n. sp. [Apr., 1877.]

* 1161. **Bell**, James Thompson. Correspondence. (Can. entom., 1877, v. 9, p. 59–60.)

Recommends more extensive publication of notices of the localities, habitats, food and habits of the rarer species of insects, and of the best methods of capture and preservation; likewise of notices of works useful to young collectors. [Apr., 1877.] [The author's name wrongly given as Jas. H. Bell.]

* 1162. **Worthington**, C: Ellis. Correspondence. (Can. entom., 1877, v. 9, p. 60.)

Notice of a cocoon of *Samia cecropia* containing two pupae. Correction of the article cited in this record, no. 1130. [Apr., 1877.]

* 1163. **Goodell**, Lafayette Washington. Notes on the early stages of some moths. (Can. entom., 1877, v. 9, p. 61–63.)

Describes larva and pupa of *Mamestra adjuncta*, *Apatela hamamelis* *Eupithecia absynthiata*, *Tetracis lorata*, *Ephyra myrtaria*. [May, 1877.]

* 1164. **Saunders**, W: On Deilephila chamoenerii [*sic*] and lineata. (Can. entom., 1877, v. 9, p. 63–67, fig. 2–5.)

Describes and figures the imagos of both species and the larvae of *D. lineata*; describes the larva of *D. chamaenerii*; mentions the food-plants. [May, 1877.]

* 1165. **Grote**, A: Radcliffe. Six new Noctuae. (Can. entom., 1877, v. 9, p. 67–71.)

Describes *Eustrotia mariae*, *Thalpochares orba*, *Spragueia plumbifimbriata*, Fruva (type: *Spragueia fasciatella*), *F. obsoleta*, Tripudia, *T. flavo-fasciata*, Antaplaga, *A. dimidiata* = 3 n. g., 6 n. spp.; note on the genus Glaea. [May, 1877.]

* 1166. **Harvey**, Leon Ferdinand, *M. D.* Description of a new Limacodes. (Can. entom., 1877, v. 9, p. 75.)

Describes *L. latomia* n. sp., from Texas. [May, 1877.]

* 1167. **Caulfield**, Frank B. Notes on some species of Meloe occurring in temperate north-eastern America. (Can. entom., 1877, v. 9, p. 75–80.)

Discrimination and synonymy of *M. angusticollis* Say = *M. rugipennis* Lec., and *M. americanus* Leach = *M. angusticollis* Lec.; collation of records of capture of the two species; seasons. [May, 1877.] [Is the author's name Caulfield or Caulfeild?]

* 1168. [**Saunders**, W:] Important notice. (Can. entom., 1877, v. 9, p. 80.)

Resignation of the Secretary-Treasurer of the Entom. Soc. Ontario, J. H. McMechan. [May, 1877.]

* 1169. [**Saunders**, W:] Book notices. (Can. entom., 1877, v. 9, p. 80.)

Notice of Packard's Half hours with insects (see Rec., no. 309, 994), and of Scudder's Report upon the orthoptera collected by the Wheeler expedition; mention by title of other papers by Scudder. [May, 1877.]

* 1170. [**Saunders**, W:] The United States Entomological Commission. (Can. entom., 1877, v. 9, p. 81–84.)

Notice of the appointment of the commission; assignment of work to the members; topics for investigation. [June, 1877.]

* 1171. **Grote**, A: Radcliffe. Notes and descriptions of new moths. (Can. entom., 1877, v. 9, p. 84–90.)

Describes *Dasychira lintneri*, *Lithophane baileyi*, *Apatela* (*Acronycta*) *falcula*, *Mamestra beanii*, *Ochria buffaloensis*, *Polia pallifera*, *Homoptera woodii*, *Tornos infumataria* = 8 n. spp.; describes *Aspilates pervaria* var. *interminaria* n. var.; remarks upon species of Euchaetes, Euclea, Gortyna, Endropia and other genera, and upon the success of "sugaring for Noctuae." [June, 1877.]

* 1172. **Caulfield**, Frank B., *and* **Pearson**, C. W. List of Bombycidae occurring on the Island of Montreal, P. Q. (Can. entom., 1877, v. 9, p. 90–92.)

Enumerates 60 species, with notes on abundance and seasons. [June, 1877.]

* 1172a. **Pearson**, C. W. List of Bombycidae occurring [at] Montreal. *See* **Caulfield**, F. B., *and* **Pearson**, C. W.

* 1173. **Austin**, E: Payson. Remarks on the synonymy of North American coleoptera. (Can. entom., 1877, v. 9, p. 92–94.)

Synonymy of certain species of Tachinus, Languria, Odontata, Chelymorpha, Graptodera, Leptura. [June, 1877.]

* 1174. **Harvey**, Leon Ferdinand, *M. D.* On species of Melipotis. (Can. entom., 1877, v. 9, p. 94–95.)

Describes *M. jucunda* var. *versabilis* n. var., and *M. sinualis* n. sp. [June, 1877.]

* 1175. **Harvey**, Leon Ferdinand, *M. D.* On an American species of Lophopteryx. (Can. entom., 1877, v. 9, p. 95–96.)

Describes *L. americana* n. sp. [June, 1877.]

* 1176. **Grote**, A: Radcliffe. On Pseudohazis hera, (Harris). (Can. entom., 1877, v. 9, p. 96.)

Synonymy of *Ps. hera* and *Ps. eglanterina*. [June, 1877.]

* 1177. [**Saunders**, W:] Catalogue of the lepidoptera of America north of Mexico. Part 1 — Diurnals; by W. H. Edwards. (Can. entom., 1877, v. 9, p. 97–98.)

Notice and commendation. [June, 1877.]

* 1178. **Andrews**, W: Valentine. New species of Noctuidae. (Can. entom., 1877, v. 9, p. 98–99.)

Describes *Acronycta walkeri*, *Orthosia lutosa* = 2 n. spp. [June, 1877.]

* 1179. **Packard**, Alpheus Spring, *jr.*, *M. D.* The Hessian fly, joint worm and wheat midge. (Can. entom., 1877, v. 9, p. 100.)

Request for specimens of the insects mentioned, in all stages of growth. [June, 1877.]

* 1180. **Andrews**, W: Valentine. [Long Island Entomological Society.] (Can. entom., 1877, v. 9, p. 100.)

Notice of formation, and list of officers of the society. [June, 1877.]

* 1181. **Moffat**, J: Albert. Correspondence. (Can. entom., 1877, v. 9, p. 100.)

Meloe captured 17 April. *Cicindela purpurea* ♂ *in copula* with *C. vulgaris* ♀. [June, 1877.]

* 1182. **Grote**, A: Radcliffe. On a new Canadian Crambus allied to conchellus. (Can. entom., 1877, v. 9, p. 101–102.)

Describes *Crambus interruptus* n. sp. [July, 1877.]

* 1183. **Monell**, Joseph. A new genus of Aphidae. (Can. entom., 1877, v. 9, p. 102–103.)

Describes Colopha, n. g. (type: *Byrsocrypta ulmicola* Fitch); bibliography of the species. [July, 1877.]

* 1184. **Grote**, A: Radcliffe. New Pyralides. 3. (Can. entom., 1877, v. 9, p. 103–107.)

Describes *Botis atropurpuralis*, *B. harveyana*, *B. flavidissimalis*, *B. catenulalis*, *B. tatalis*, *B. penumbralis*, *B. socialis*, *B. allectalis* = 8 n. spp.; describes or mentions other Botis and *Eurycreon communis*. [July, 1877.]

* 1185. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1877, v. 9, p. 108–110.)

Describes *Heliozella? aesella* n. sp.? "Do the Glyphipterygidae afford a passage from the Gelechidae to the Elachistidae?" [July, 1877.]

* 1186. **Harvey**, Leon Ferdinand, *M. D.* Description of a new Texan Anisota. (Can. entom., 1877, v. 9, p. 110–111.)

Describes *A. heiligbrodti* n. sp. [July, 1877.]

* 1187. **Dodge**, G: M. New species of orthoptera. (Can. entom., 1877, v. 9, p. 111–113.)

Describes *Caloptenus angustipennis*, *C. volucris*, *C. plumbum*, *Pezotettix abditum* = 4 n. spp., from Nebraska. [July, 1877.]

No. 60 was issued April 11, 1879.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., July, 1879. [No. 63.

Pupation of the Nymphalidae.

ABSTRACT.

There is no more interesting phenomenon in insect transformation than the withdrawal of the chrysalis from the shrunken larval skin, and its firm attachment to the button of silk previously spun by the larva, in those Rhopalocera which suspend themselves perpendicularly during pupation. For a century and a half Reaumur's account, namely, that the soft segments of the forming chrysalis acted the part of legs by grasping the larval skin between the sutures, has been accepted and generally copied. Dr. J. A. Osborne, of Milford, England, first drew attention, some two years ago (*Nature*, v. 16, p. 502–503), to the fact that there was a membrane concerned in the act, and Mr. W. H. Edwards, of Coalburgh, West Virginia, corroborates Dr. Osborne's statement by observations on some of our American species, recorded in the *Canadian Entomologist* of last December.

In a paper recently presented to the Washington Philosophical Society, at its meeting of June 7th, Prof. C. V. Riley records the results of a number of observations on this subject, and thus explains the philosophy of the act which has so long misled observers. His studies have been principally made with the larvae of *Vanessa antiopa*, and we give the results as we have gathered them from correspondence with him.

The principal means by which the chrysalis holds on, and rises at the critical moment, is a stout ligament, which is, virtually, the shed intestinal canal; not alone the lining, but the whole organ, which, as we know, becomes sub-obsolete in the imago state of so many Lepidoptera. The ilium and colon are more particularly serviceable, and the ligament holds with such force around the anus of the cast larval skin that it cannot well be severed. The rectum of the nascent chrysalis draws this in or lets it go by peristaltic action of the sphincter muscles, the whole ligament being drawn out as soon as the hooks of the cremaster reach the silk. In addition to this rectal ligament, which is of a reddish color, and which Prof. Riley considers the principal suspensor, there are two lateral ligaments, also quite long and strong, and of the color of the skin, which serve as auxiliaries. These are the shed linings of the tracheae issuing from the last or ninth pair of spiracles, which in the chrysalis become closed or blind. These ligaments may be called the tracheal ligaments, and seem to be somewhat specialized to aid in this important act. Lastly, there is the membrane proper referred to by Dr. Osborne, which is, virtually, but the anal portion of the inner lining of the skin itself, or corium, caught upon the knobs at the end of the ridges which usually form the ventral part of the cremaster. It consists chiefly of the skin that lines the region of the rectum and the anal prolegs, and takes on a more or less bifurcated form from the pulling power of the knobs during the act of withdrawal from the larval skin. The ligaments Prof. Riley considers constant physiological factors in the problem, most necessary in those species which have the knobs imperfectly developed; acting even during the larval molts, and so holding the shed skin of lepidopterous larvae that it is worked to the anus in a shriveled mass, as a stocking is pushed to the toes; whereas most other insects, especially those in which the metamorphosis is incomplete and the change in the intestinal canal but slight, crawl out of the exuviae rather than work them off, the anal parts not being held within the end of the casting skin, but really being the first parts detached. The membrane is a purely mechanical factor, and may not always be properly caught and drawn out. It may also be severed without necessarily causing the chrysalis to drop. Yet that it is an important aid to the rising of the chrysalis, there cannot be much doubt; and Prof. Riley finds, in the chrysalis of

Paphia glycerium, for instance, a totally different mechanical provision for clutching the membrane, namely, a notch between the ridges around the rectum and the base of the cremaster proper, in which the skin may be caught, the ridges being, in this species, very narrow, smooth, and shallow, and the ordinary ventral knobs obsolete.

Is this Euchaetes collaris (Fitch.) ?

The earliest mention of an Euchaetes larva distinct from that of *E. egle* (Drury), is in Mr. J. A. Lintner's Entomological Contributions, iii, p. 147, where it is stated that Prof. C. V. Riley had recently bred the larva of *E. collaris*, and found it very distinct from that of *E. egle*. But Prof. Riley has omitted to publish the differences, and the first account of the larva is given by Mr. G. H. Van Wagenen, in the *Canadian Entomologist*, Sept. 1877, v. 9, p. 170. As Mr. Lintner's description of the larva and pupa (given in Mr. Van Wagenen's article) differs, in many respects, from one I had previously drawn up from a living specimen, I am led to present this description in full. My observations agree with Mr. Van Wagenen's as to the solitary habits of the larva, but differ as to the food plant; yet his observations may prove that Apocynum is the proper food of the insect. As the existing descriptions of the moth appear to be at variance with one another, a description of the moth reared from the larva is added.

Mature larva. Testaceous, clothed with tufts of tawny plumose bristles; head a little paler. The eight ventral prolegs with a black spot at their external base. Each of the first three segments of the body with two black tubercles on each side bearing a few bristles; first segment with a dorsal fringe of bristles inclining forwards, second segment with two pairs of approximated dorsal tubercles which bear slender tufts of bristles extending 3 mm. beyond the head when the larva is at rest, third segment with two pairs of approximated dorsal tubercles which bear dense tufts of bristles, the bristles curving forwards slightly, and one third longer than those on the abdominal segments. The dorsal bristles of the second and third segments are slightly dusky towards the tip. The remaining segments each have twelve tubercles, disposed in two ranges on each segment, the tubercles alternating on the anterior and posterior portions of the segment, as in *E. egle*, the two dorsal tubercles of the anterior range being nearer the median line than are the corresponding ones of the posterior range. Most of the dorsal tubercles are of the color of the body, the others are black. These tubercles bear dense tufts of evenly cut bristles, the dorsal tufts of the last segment being a little longer. Length of larva when at rest 16 mm., including the long bristles which extend beyond the head, 19 mm.; length when in motion 22 mm., the body then tapering towards the head.

Feeds on *Asclepias cornuti*; described July 19th, 1875. The larva gradually cast its bristles, beginning with the anterior segments, and became a pupa on the 23d of July; the imago appeared on the afternoon of August 3d. Another larva, agreeing with the description, was found feeding on *Asclepias verticillata*, in 1876.

From the above description this larva will be seen to be very different from the mature larva of *E. egle*, as described by Harris (Ins. Inj. Veg., p. 359) and by Lintner (Ent. Contr., ii, p. 136), but in its *uniform* coloration to resemble the *young* larva of *E. egle* as described by Lintner (l. c.). The color of the bristles, however, is neither "white," as in the young larva of both species, nor "slate color," as in Mr. Van Wagenen's specimens.

Pupa-shell. Rufo-piceous; head, thorax and appendages, ninth segment and tip of abdomen, free from punctures. Metathorax and first segment of abdomen roughened and having a few punctures intermixed. The segments of the abdomen, from the second to the eighth, distinctly punctured, the margins smooth. Spiracles of the first segment of the abdomen hidden by the wings, the spiracles on the eighth segment imperfect. The wing-covers reach nearly to the tip of the fourth segment of the abdomen. The fifth and sixth segments have a pair of slight tubercles beneath. The eighth ventral segment has a slight groove in the median line beneath, and the tip has a similar groove; on each side of the latter the tip is slightly swollen. On the dorsal side the ninth segment has a row of hooklets at the tip, parallel to a similar row on the tip of the abdomen, both rows interrupted in the middle. Length 11 mm. The shell is split across the occiput and along the antennae exteriorly, the prothorax and mesothorax are split in the median line, the suture between the prothorax and mesothorax is somewhat broken, and the mesothorax is split from the metathorax. The metathorax and first segment of the abdomen are firmly united. In counting the segments of the abdomen I have followed the numbering which is usually employed.

Imago, ♂. Pale ashy-white, fringes paler than wings, anterior wings a little darker towards base and costa; back of abdomen dull orange yellow, with a row of black spots in the median line (a slate colored line supplying the place of the spot on the first segment), and two similar rows each side. Body beneath of the same color as wings. Antennae and clypeus dark slate color, palpi black at tip. Legs black, the tarsi ashy beneath, the anterior coxae mostly orange, as are also the thorax just under the wings, the base of the costa of the wings beneath, and the palpi excepting the tips. Length of fore wing 14 mm., of body 11 mm.; greatest breadth of fore wing 7 mm.; expanse 32 mm.

Mr. Lintner's specimen from Center, N. Y. (Ent. Contr., iii, p. 146), differs from mine in being a ♀, and expanding 1.62 in. [=41 mm.]. Mine agrees with Fitch's except in being slightly suffused with ashy, and in the tarsi being black above and ashy beneath. But Fitch does not mention the conspicuous color of the abdomen, and as his specimen came from Mississippi, it may not be identical with the northern species. I add, therefore, his description for comparison.

"*Hyphantria collaris* [Fitch, 3d Rept. p. 65, § 89]. A moth closely related to the preceding [*H. textor*] and doubtless possessing the same habits has been sent me from Mississippi and probably occurs throughout the Southern States. It is milk white and glossy, its head, neck, base of the outer edge of the fore wings and the anterior hips are pale ochre yellow, and its feet pale brown. Width 1.35 [=34 mm.]."

Waterbury, Conn. *W. H. Patton.*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 248.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B. Pickman Mann.

Nos. 1188 to 1266 are from **Can. entom.**, 1877, v. 9.

* 1188. **Edwards**, W: H: Notes on Limenitis proserpina and arthemis. (Can. entom., 1877, v. 9, p. 114.)

L. arthemis and *L. proserpina* raised from eggs of *L. proserpina*; geographical distribution of the latter species. [July, 1877.]

* 1189. **Grote**, A: Radcliffe. A new genus and species of Geometrae. (Can. entom., 1877, v. 9, p. 114–115.)

Describes Meskea, n. g., and *M. dyspteraria* n. sp., from Texas. [July, 1877.]

* 1190. **Bailey**, James Spencer, *M. D.* Center, N. Y., entomologically considered. (Can. entom., 1877, v. 9, p. 115–119.)

Location and character of the place; list of 57 butterflies and 39 moths captured there. [July, 1877.]

* 1191. **Bunker**, Robert. Notes on the food plant of Hemileuca maia. (Can. entom., 1877, v. 9, p. 119.)

Character of the region inhabited by *Hemileuca maia*; eggs laid on Aster and on Quercus. [July, 1877.]

* 1192. **Grote**, A: Radcliffe. Correspondence. (Can. entom., 1877, v. 9, p. 119–120.)

Mention of a few lepidoptera caught in camp at Lake Forest, Erie co., N. Y., 7 June, 1877. [July, 1877.]

* 1193. **Edwards**, W: H: Correspondence. (Can. entom., 1877, v. 9, p. 120.)

Edwards' name "Lintneria" for a genus of Hesperidae preoccupied by Butler for a genus of Sphingidae; replaced by "Systasea" Butl. [July, 1877.]

* 1194. **Bunker**, Robert. Effect of hot weather upon the transformation of the sphinxes. (Can. entom., 1877, v. 9, p. 120.)

Philampelus satellitia buried itself 31 July, pupated 1 Aug., imaginated 10 Sept., which "would seem to show that this species in a warm climate would become double brooded." [July, 1877.]

* 1195. **Bassett**, Homer Franklin. Remarks upon the Cynipidae. (Can. entom., 1877, v. 9, p. 121–122.)

The offspring of the bisexual generation of certain species is exclusively female ; it is judged that the offspring of the unisexual generation is the bisexual one. [Aug., 1877.]

* 1196. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1877, v. 9, p. 123–127.)

Describes *Gracilaria* (*Corisceum*) *quinquenotella* n. sp. ; remarks upon five other species of Gracilaria. [Aug., 1877.]

* 1197. **Siewers**, C: Godfrey. Notes on larvae — Fondness for water — Hints to beginners. (Can. entom., 1877, v. 9, p. 127–129.)

Some larvae need water to drink ; habits of certain species ; methods of rearing insects. [Aug., 1877.]

* 1198. **Lintner**, Joseph Albert. On a new species of Cossus. (Can. entom., 1877, v. 9, p. 129–130.)

Describes *Cossus centerensis* n. sp., from Center, N. Y. [Aug., 1877.] [The name of this author is given wrongly in Rec., no. 1049, 1097.]

* 1199. **Grote**, A: Radcliffe. Notice of Mr. Butler's Revision of the Sphingidae. (Can. entom., 1877, v. 9, p. 130–133.)

Notes, mostly synonymical, upon the work cited; describes Eusmerinthus n. g. (type : *Smerinthus geminatus*). [Aug., 1877.]

* 1200. **Couper**, W: List of Canadian diptera. (Can. entom., 1877, v. 9, p. 133–135.)

List of 143 species, compiled from British Museum catalogs for 1848 and 1849. [Aug., 1877.]

* 1201. **Grote**, A: Radcliffe. A new Plusia allied to hochenwarthi. (Can. entom., 1877, v. 9, p. 135–136.)

Describes *P. sackenii* n. sp., from Colorado. [Aug., 1877.]

* 1202. [**Saunders**, W:] Book notices. (Can. entom., 1877, v. 9, p. 137–138.)

Notice of Murray's Economic entomology — Aptera ; of Riley's 9th Annual report . . . Missouri [See Rec., No. 970] ; of Hill's photograph of *Harpalus caliginosus*. [Aug., 1877.]

* 1203. **Moffat**, J: Albert. An instance of retarded development. (Can. entom., 1877, v. 9, p. 138-139.)

An interval of over 20 months elapsed from the formation of the cocoon to the emergence of the imago of [*Cimbex americana*]. [Aug., 1877.]

* 1204. **Pearson**, G: W., *jr.* Melitaea phaeton. Can. entom., 1877, v. 9, p. 139.)

Melitaea phaeton very abundant at Montreal and at Ottawa, Canada, in the summer of 1877. [Aug., 1877.]

* 1205. **Bell**, James Thompson. How to destroy cabinet pests. (Can. entom., 1877, v. 9, p. 139–140.)

Successful use of potassic cyanide (KCN). [Aug., 1877.]

* 1206. **Zimmerman**, C: Diehl. [Meloe angusticollis.] (Can. entom., 1877, v. 9, p. 140.)

Meloe angusticollis feeding on *Anemone japonica.* [Aug., 1877.]

* 1207. **Moffat**, J: Albert. Limenitis proserpina. (Can. entom., 1877, v. 9, p. 140.)

Limenitis proserpina taken very rarely at Hamilton, Ont., and always in connection with *L. arthemis.* [Aug., 1877.]

* 1208. **Peck**, G: W. Captures at sugar. (Can. entom., 1877, v. 9, p. 140.)

Capture of *Ellibia versicolor*, *Everyx choerilus* and *E. myron*, at Morristown, N. J. [Aug., 1877.]

* 1209. **Dobree**, W. T. Agrotis fennica wanted. (Can. entom., 1877, v. 9, p. 140.)

Petition for specimens of *A. fennica.* [Aug., 1877.]

* 1210. **Edwards**, W: H: On the preparatory stages of Satyrus nephele. (Can. entom., 1877, v. 9, p. 141–143.)

Describes the egg, larva at all stages, and pupa and habits of the larva of *Satyrus nephele.* [Aug., 1877.]

* 1211. **Bruner**, Laurence. List of Acrididae found in Nebraska. (Can. entom., 1877, v. 9, p. 144–145.)

List of 95 species. [Aug., 1877.]

* 1212. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1877, v. 9, p. 145–147.)

Notes on one or more species related to *Batrachedra striolata*, and on *Perimede erransella.* [Aug., 1877.]

* 1213. [**Dodge**, C: Richards.] Ravages of white ants. (Field and forest, 1877, v. 3, p. 17.) (Can. entom., 1877, v. 9, p. 147.)

Books eaten by Termes in Liberia. [July, 1877.]

* 1214. **Bethune**, C: J. S., *compiler*. Insects of the northern parts of British America. From Kirby's Fauna boreali-americana: Insecta. (Can. entom., 1877, v. 9, p. 148–156.)

[Cont. from v. 7, p. 159; see Rec., no. 485.] Reprint of p. 257–270 of Kirby's work, comprising descriptions of 19 species of hymenoptera, with notes by the compiler. [Aug., 1877.]

Nos. 61–62 were issued June 13, 1879.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., August, 1879. [No. 64.

Notes on Butterflies of Massachusetts.

Date of the first appearance of butterflies, beginning with the earliest, as I have noted in 1878.

WOLLASTON, MASS.

Papilio antiopa, first of Ap.
Polygonia comma, 6 Ap.
" *progne*, 6 Ap.
Nymphalis j-album, 6 Ap.
Cyaniris lucia, 15 Ap.
Polygonia interrogationis, 20 Ap.
Cyaniris neglecta, 21 Ap.
Colias philodice, last of Ap.
Lycaena americana, first of My.
Ganoris rapae, first of My.
Vanessa atalanta (faded), 2 My.
Limochores taumas, 2 My.
Vanessa huntera (faded), 3 My.
Thorybes pylades, 7 My.
Amaryssus polyxenes, 18 My.
Phyciodes tharos, 21 My.
Erynnis ennius, 21 My.
Mitoura smilacis, 22 My.
Limochores mystic, 22 My.
Pamphila sassacus, 22 My.
Erynnis brizo, 22 My.
Erynnis persius, 22 My.
Ocytes metea, 23 My.
Brenthis myrina, 23 My.
Megisto eurytus, 24 My.
Euphoeades glaucus, 24 My.
Incisalia augustus, 25 My.
Atrytone zabulon, 25 My.
Pterourus troilus, 25 My.
Erynnis icelus, 25 My.
" *lucilius*, 28 My.
Everes comyntas, last of My.
Lerema hianna, 4 Jun.
Ancyloxypha numitor, 5 Jun.
Basilarchia disippe, 8 Jun.
Polites peckius.
Anthomaster leonardus.
Euphydryas phaeton, 19 Jun.
Limnoecia harrisii, 19 Jun.
Basilarchia astyanax, 19 Jun.
Epargyreus tityrus, 25 Jun.
Basilarchia arthemis, 29 Jun.
Argynnis cybele, 1 Jl.
Thecla calanus, 1 Jl.
Colias eurytheme, 8 Oct.

FOXBORO, MASS.

Brenthis bellona, first of Jun.

BELCHERTOWN, MASS.

Argus eurydice, about 1 Jl.
Limochores bimacula, about 1 Jl.
Hedone aetna, about 1 Jl.
Argynnis cybele, about 1 Jl.
" *aphrodite*, 6 Jl.
Chrysophanus epixanthe, 6 Jl.
Minois alope, 6 Jl.
Danaida plexippus, 6 Jl.
Strymon titus, 8 Jl.
(*Brenthis bellona*, 8 Jl.)
Euphyes metacomet, 9 Jl.

Callipareus melinus, 10 Jl.
Speyeria idalia, 10 Jl.
Thecla liparops, 15 Jl.
Vanessa cardui, 15 Jl.
Atrytone conspicua, 18? Jl.
Achalarus lycidas (faded), last of Jl.

NORTH LEVERETT, MASS.

(*Vanessa cardui*, 17 Jl.)
Chrysophanus hyllus, 12 Ag.

ATTLEBORO, MASS.

Euptoieta claudia, 3 Ag.

GRANBY, MASS.

Eurema lisa (faded), 22 Ag.
Junonia coenia, 24 Ag.

SOUTH HADLEY, MASS.

Feniseca tarquinius, 22 Ag.

I have caught in 1878 the following specimens of diurnal lepidoptera.

The superior figures against dates indicate the number of specimens taken if more than one.

The localities are all in Massachusetts, and are indicated by heavy type, thus: **A.** Attleboro; **B.** Belchertown; **F.** Foxboro; **G.** Granby; **H.** South Hadley; **L.** North Leverett; **T.** Mt. Toby; **W.** Wollaston.

Minoris alope. **B.** 8, 13, 15^{23}, 16 Jl.; **L.** 23, 24 Jl., 3 Ag.

Argus eurydice. **B.** 6–16 Jl.^{40}.

Megisto eurytus. **W.** 23 My.–15 Jun.^{60}; **T.** 17 Jl.

Danaida plexippus. **B.** 6, 18 Jl., 21 Ag. (larva); **L.** 17 Jl. (full grown larva), 5–14 Ag.^{4}; **W.** 20, 21 S., middle of O.

Basilarchia arthemis. **W.** 29 Jun., 3 Jl.

Basilarchia astyanax. **W.** 19^{2}, 20, 25, 29^{2} Jun., 1^{2}, 3 Jl.; **B.** 8, 10 Jl.; **L.** 20, 23 Jl.

Basilarchia disippe. **W.** 8, 10^{2}, 15, 19^{5}, 20 Jun.; **L.** 25 Jl., 5, 8, 9 Ag.; **B.** 24 Ag. (half grown larva on Populus).

Polygonia interrogationis. **B.** 26 Ag. (12 larvae on Humulus); **W.** Ag. 1877 (larvae), S. 1877.

Polygonia comma. **W.** Ap.^{12}, 6 Ap.^{2}; **B.** 11 Jl.

Polygonia progne. **W.** Ap.^{5}, 6 Ap.^{4}; **B.** 13 Jl.

Nymphalis j-album. **W.** 6, 10 Ap.; **L.** 17 Jl.; 3 Ag.

Aglais milberti. **W.** O. 1877.

Papilio antiopa. **W.** 6 Ap.^{5}, 29, 30^{3} Jun., 1 Jl.^{5}, O.^{10}; **B.** 8^{2}, 12, 13 Jl.; **L.** 23 Jl., 3, 8, 14 Ag.

Vanessa atalanta. **W.** 2, 3^{12}, 5^{3} May, 1 Jun., 12 O.; **B.** 8^{2}, 12, 13 Jl.; **L.** 23 Jl., 3, 8, 14 Ag.

Vanessa huntera. **W.** 3 My., S. and O.^{6}; **B.** 8, 10, 11^{2}, 13, 15 Jl.; **L.** 24^{6}, 29^{3} Jl., 4, 7, 8, 10, 13 Ag.

Vanessa cardui. **B.** 15 Jl.; **L** 17 Jl., 8^{5}, 9^{2}, 10^{3}, 12^{7}, 13 Ag.; **W.** S. and O.^{6}.

Junonia coenia. **G.** 24 Ag.; **W.** Ag. and S. 1876 and 1877^{5}.

Euptoieta claudia. **A.** A specimen taken 3 Ag. by W. W. L. Mason.

Speyeria idalia. **B.** 10 Jl.; **W.** Last of Ag. and first of S. (a few specimens).

Argynnis cybele. **W.** 1 Jl.; **B.** 6–15 Jl.^{10}; **L.** 18 Jl.–10 Ag.^{8}.

Argynnis aphrodite. **B.** 6–15 Jl.^{6}; **L.** 18 Jl.–10 Ag.^{10}.

Brenthis myrina. **W.** 23, 28^{4} My., 1^{2}, 3^{3}, 4, 5^{2}, 19^{3}, 25^{2} Jun., S.; **B.** 10 Jl.; **L.** 9^{2}, 13, 14 Ag.

Brenthis bellona. **F.** 12? Jun.; **B.** 8^{3}, 9^{2}, 13, 15^{9} Jl.; **L.** 29 Jl., 6 Ag.

Phyciodes tharos. **W.** 21–28 My.^{28}, 1–21 Jun.^{20}; **B.** 6 Jl.^{4}; **L.** 3, 5 Ag.

Limnoecia harrisii. **W.** 19 Jun.

Euphydryas phaeton. **W.** 19^{6}, 20^{42}, 21^{32}, 22^{2}, 24^{5}, 29 Jun.; **B.** 8 Jl.

Thecla strigosa. **W.** Jl. 1877^{2}; **B.** 15 Jun.

Thecla edwardsii. **L.** 18 Jl.^{5}.

Thecla calanus. **W.** 1 Jl.; **L.** 18 Jl.–Ag.^{8}.

Callipareus melinus. **B.** 10^{2}, 11^{2}, 15^{2}, 16 Jl.; **L.** 19, 29 Jl., 3^{2}, 8 Ag.

Mitoura smilacis. **W.** 22 My.^{2}, 29 Jun., 1, 3 Jl.

Incisalia augustus. **W.** 25 My.^{2}.

Strymon titus. **A.** Jl.; **B.** 8, 16 Jl.; **L.** 19 Jl.

Cyaniris neglecta. **W.** 21 Ap.–My.^{9}; **B.** 6, 11, 13, 15^{2} Jl.; **L.** Jl.

Cyaniris lucia. **W.** 15–21 Ap.^{35}.

Everes comyntas. **W.** My.^{4}, 3, 5, 14 Jun., 4 Jl.; **B.** 6, 11, 13, 15^{2} Jl.; **L.** Jl.

Chrysophanus hyllus. **L.** 12 Ag.

Lycaena americana. **W.** My.^{9}, 5^{2}, 7, 8 Jun., 4 Jl.; **B.** 6–15 Jl.

Lycaena epixanthe. **W.** Jl. 1877; **B.** 6 Jl.

Feniseca tarquinius. **H.** 22 Ag.

Colias philodice. **W.** My.^{8}, 3^{4}, 5, 6, 25, 26 Jun., 3, 4 Jl., O.; **B.** 6^{2}, 8^{2}, 9, 15 Jl.; **L.** 18, 24 Jl.

Colias eurytheme. **W.** 8 O.

Eurema lisa. **G.** 22 Ag.

Ganoris rapae. **W.** My^{6}, 3, 6 Jun.; **B.** 8, 13 Jl.; **L.** 5, 8, 12^{2} Ag.

Pterourus troilus. **W.** 25, 28 My., 10, 13 Jun.; **B.** 6, 8 Jl.; **L.** 18^{2}, 19^{5}, 23, 25, 29^{2} Jl., 5 Ag.

Euphoeades glaucus. **W.** 25, 27^{2} My., 4^{2}, 6, 8, 14, 20 Jun., 4 Jl.; **B.** 15 Jl.

Amaryssus polyxenes. **W.** 18 My., 19 Jun.

Epargyreus tityrus. **W.** 25 Jun.; **B.** 6^{4}, 8^{2}, 9, 11, 13^{4}, 15^{2}, 16^{3} Jl.; **L.** 18^{2}, 19, 24^{3}, 29 Jl.

Achalarus lycidas. **L.** Last of Jl.

Thorybes pylades. **W.** My.^{4}, 28^{3} My., 1^{2}, 4^{2}, 5, 6^{4}, 7^{2}, 8^{2}, 13^{2} Jun.; **B.** 6^{2} Jl.

Erynnis persius. **W.** 22 My.

Erynnis lucilius. **W.** 28 My.; **B.** 13, 15 Jl.; **L.** 5 Ag.

Erynnis icelus. **W.** 25 My., 6 Jun.^{2}.

Erynnis brizo. **W.** 22, 23^{5} My.

Erynnis ennius. **W.** 21 My.^{2}, Jl. 1877.

Ancyloxypha numitor. **W.** 5, 6, 7, 14^8 Jun.; **L.** 5 Ag.

Ocytes metea. **W.** 23 My.^{2}.

Atrytone conspicua. **L.** 17? Jl.

Atrytone zabulon. **W.** My.^{14}, 1^3, 3^4, 4^2, 6^3, 7^4, 8^3, 13^9, 19, 20 Jun.

Pamphila sassacus. **W.** 22 My., 4^4, 5^3, 6^3, 7^2, 8, 13^2 Jun.

Anthomaster leonardus. **W.** Jun.; 28 Ag.

Polites peckius. **W.** My., 1, 3^2, 7^4 Jun.; **B.** 6–15 Jl.; **L.** 8, 10, 12 Ag.

Hedone aetna. **B.** 6^2, 8–15^6 Jl.

Limochores mystic. **W.** 6, 8, 13^4, 14^5, 19^6, 25 Jun., 15 O.

Limochores bimacula. **B.** 6^5, 8^2 Jl.

Limochores taumas. **W.** My.^{9}, 3, 5, 6^2, 7^2, 13^2 Jun.; **B.** 8 Jl.; **L.** Jl. and Ag.

Euphyes metacomet. **B.** 13, 16 Jl.; **L.** 18^2, 19^2 Jl., 3 Ag.^{2}.

Lerema hianna. **W.** 4, 6, 7, 8, 13^3, 19 Jun.

F. H. Sprague.

Westward Progress of Eristalis tenax, Linn.

Reading lately the interesting account of the American occurrence of this insect (PSYCHE, 1878, v. 2, p. 188), I was led to examine my Syrphidae, collected during the past five years.

I find that I have taken nine specimens of *E. tenax*, now fully identified as such by Mr. Burgess' description and by comparison with five European instances. Of my local captures four are males and five females, and the dates are these: 1876, July 23, ♀; 1877, Sept. 2 and 16, ♂ ♂, Sept. 23, ♀, Oct. 14, ♂ ♂ ♀, Oct. 24, ♀; 1878, July 23, ♀. All these were taken within three miles of Galena, Illinois. *Thos. E. Bean.*

Galena, Ill.

The Ovipositor of Amblychila.

The eighth abdominal segment of Amblychila is withdrawn within the abdomen. Its ventral arc in the female has a deep median slit and extends beyond the dorsal arc. Enclosed within this segment, and extending as far as its ventral arc, there is apparent a large plate cleft into three pieces, which probably represent the dorsal and pleural pieces of a ninth abdominal segment. Underneath these are a pair of large and stout chitinous processes having an upward curve. These somewhat resemble the processes which form the ovipositor of Acrididae, and probably serve likewise to bore into the ground for the purpose of depositing the eggs. The position in which the eggs are laid appears to be similar to that of the Acrididae, for Mr. Williston stated (*Can. Entom.*, Sept. 1877, v. 9, p. 164) that "the eggs are deposited near the surface of the ground in groups of from one to two dozen." *W. H. Patton.*

BIBLIOGRAPHICAL RECORD.

(*Continued from page* 256.)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B: Pickman Mann.

Nos. 1215 to 1266 are from **Can. entom.**, 1877, v. 9.

* 1215. **Grote**, A: Radcliffe. New species of lepidoptera. (Can. entom., 1877, v. 9, p. 156–158.)

Describes *Scopelosoma tristigmata*, *Tarache abdominalis*, *Geometra rectaria*, = 3 n. spp. [Aug., 1877.]

* 1216. [**Saunders**, W:] Entomological Club of the American Association for the Advancement of Science. (Can. entom., 1877, v. 9, p. 158.)

Notification of the meeting of the Club, to be held at Nashville, Tenn., 28 Aug., 1877. [Aug., 1877.]

* 1217. **Saunders**, W: Clisiocampa sylvatica — The forest tent caterpillar. (Can. entom., 1877, v. 9, p. 158–159, fig. 6.)

Abundance of *C. sylvatica* near London, Ont., in 1877; habits, food-plants and ravages of the larvae; figure of a larva. [Aug., 1877.]

* 1218. **Denton**, J: Mabbot. Papilio thoas. (Can. entom., 1877, v. 9, p. 160.)

Eleven specimens caught near Amherstburg, Ont., 1 and 2 Aug., 1877. [Aug., 1877.]

* 1219. **Saunders**, W: Cisthene subjecta. (Can. entom., 1877, v. 9, p. 160.)

Two specimens caught [? at London, Ont.,] on Asclepias in July. [Aug., 1877.]

* 1220. **Bates**, James Elwyn. Melitaea phaeton. (Can. entom., 1877, v. 9, p. 160.)

Abundance of *M. phaeton*, and occurrence of one *Myrmeleon obsoletus* and of one *Psychomorpha epimenis* at South Abington, Mass., in 1877. [Aug., 1877.]

* 1221. **Saunders**, W: Amblichyla [*sic*] cylindriformis. (Can. entom., 1877, v. 9, p. 160.)

Acknowledgment of the receipt of a specimen. [Aug., 1877.]

* 1222. **Saunders**, W: Food plant of S. cecropia. (Can. entom., 1877, v. 9, p. 160.)

Larvae of *Samia cecropia* feeding on *Alnus glutinosa*. [Aug., 1877.]

* 1223. **Devereaux**, Willard Loomis. Miscellaneous. (Can. entom., 1877, v. 9, p. 160.)

Sphinx kalmiae and *S. myron* taken at sugar; *Catocala subnata* taken at mid-day, at swill. [Aug., 1877.]

* 1224. **Grote**, A: Radcliffe. A new lepidopterous insect injurious to vegetation. (Can. entom., 1877, v. 9, p. 161–163.)

Describes larva, pupa, cocoon, imago of *Nephopteryx* (*Dioryctria*) *zimmermani* n. sp., infesting trunks of Pinus. [Oct., 1877.]

* 1225. **Williston**, S: Wendell. On the habits of Amblychila cylindriformis. (Can. entom., 1877, v. 9, p. 163–165.)

Habits and food of larva and imago. [Oct., 1877.]

* 1226. **Edwards**, W: H: Description of the preparatory stages of Phyciodes harrisii, Scudder. (Can. entom., 1877, v. 9, p. 165–168.)

Habits, food and seasons; description of egg, of larva at all stages, and of pupa. [Oct., 1877.]

* 1227. **Grote**, A: Radcliffe. Notes on Catocalae. (Can. entom., 1877, v. 9, p. 168–170.)

Mentions some varying forms of five species. [Oct., 1877.]

* 1228. **Van Wagenen**, Gerrit Hubert. Notes on the larva and pupa of Euchaetes collaris. (Can. entom., 1877, v. 9, p. 170–171.)

Habits, food and seasons; description of larva, pupa and cocoon (by J. A. Lintner). [Oct., 1877.]

* 1229. **Wetherby**, A. G. Proceedings of the Entomological Club of the American Association for the Advancement of Science. (Can. entom., 1877, v. 9, p. 172-174.)

Proceedings of the meeting of 1877, at Nashville, Tenn., by the Secretary *pro tem.*; committee on nomenclature continued; ravages of *Nephopteryx zimmermani*; migrations of *Aletia argillacea* and of *Doryphora 10-lineata*. [Oct., 1877.]

* 1230. **Bean**, T: Ebenezer. Notes on some species of Homoptera. (Can. entom., 1877, v. 9, p. 174–177.)

Detailed comparisons of *Homoptera lunata*, *H. saundersii* and *H. edusa* with one another, tending to show that *H. lunata* is the female and the others are forms of the male of the same species. [Oct., 1877.]

* 1231. **Edwards**, W: H: Butterflies on Martha's Vineyard. (Can. entom., 1877, v. 9, p. 178.)

Relative abundance of nine species seen in July at Martha's Vineyard, Mass. [Oct., 1877.]

* 1232. **Dury**, C: Correspondence. (Can. entom., 1877, v. 9, p. 178.)

Catocala marmorata taken 2 July and 10 July, and *C. agrippina* taken at Avondale, Hamilton Co., Ohio. [Oct., 1877.]

* 1233. **Worthington**, C: Ellis. Correspondence. (Can. entom., 1877, v. 9, p. 178–179.)

[See Rec., no. 1194.] Seasons of *Philampelus achemon*; this species and *Deilephila lineata* may hibernate as imagos; *Pieris rapae* has reached Chicago, Ill. [Oct., 1877.]

* 1234. **Andrews**, W: Valentine. Dryocampa rubicunda, Fabr. (Can. entom., 1877, v. 9, p. 179–180.)

The larvae of this species, as described in Lintner's Entom. contr., 3 [See Rec., no. 26, 763] differ from larvae reared by the author; are they of another species, or do they vary? [Oct., 1877.]

* 1235. **Goodell**, Lafayette Washington. Food plants of Saturnia io. (Can. entom., 1877, v. 9, p. 180.)

Larvae abundant, in 1877, at Amherst, Mass., feeding on Trifolium, Lespedeza, Baptisia, Pyrus, Ribes, Symphoricarpus, Fraxinus, Quercus, Comptonia, Betula, Salix, Zea.

* 1236. **Entomological Society of Ontario**. Annual meeting [1877]. (Can. entom., 1877, v. 9, p. 181–189.)

Business reports; disposition of the Centennial collection of Canadian insects; annual address of the president, W: Saunders; ravages of *Clisiocampa sylvatica*, widening distribution of *Pieris rapae* and of *Doryphora 10-lineata*, progress of entomology during the past year; means against *Pieris rapae*. [Nov., 1877.]

* 1237. **Edwards**, W: H: Descriptions of new species of butterflies belonging to the N. American fauna. (Can. entom., 1877, v. 9, p. 189–192.)

Describes *Melitaea ulrica*, *M. dymas*, *Amblyscirtes nysa*, *Pholisora nessus* = 4 n. spp., from Texas. [Nov., 1877.]

* 1238. **Harvey**, Leon Ferdinand. On the black-wing group of the genus Catocala. (Can. entom., 1877, v. 9, p. 192–194.)

Arrangement of the 18 known N. A. species; describes *C. subviridus* n. sp. and *C. residua* var. [Nov., 1877.]

* 1239. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1877, v. 9, p. 194–196.)

Synonyms, food-plants and descriptive characters of a few Gracilaria and Antispila. [Nov., 1877.]

* 1240. **Grote**, A: Radcliffe. Notes on Noctuidae. (Can. entom., 1877, v. 9, p. 196–200.)

Notes synonymical and descriptive on a few Chytonix, Hadena, Mamestra, and on *Dryobota stigmata*; describes Pallachira, *P. bivittata*, *Agrotis trabalis*, *Caradrina bilunata* = 1 n. g., 3 n. spp. [Nov., 1877.]

* 1241. **Aaron**, Eugene M. Correspondence. (Can. entom., 1877, v. 9, p. 200.)

Inquiry concerning a "seeming growth" on the eyes of butterflies [see Rec., no. 1254]; butterflies captured in Tennessee; food-plant of *Lycaena comyntas*. [Nov., 1877.]

* 1242. **Bean**, T: Ebenezer. Pieris vernalis a variety of Pieris protodice. (Can. entom., 1877, v. 9, p. 201–203.)

Series of specimens captured or bred show all grades of transition from one form to the other. [Dec., 1877.]

* 1243. **Edwards**, W: H: An account of some farther experiments upon the effect of cold in changing the form of certain butterflies. (Can. entom., 1877, v. 9, p. 203–206.)

Experiments upon *Phyciodes tharos*, *Papilio ajax*, *Lycaena pseudargiolus*. [Dec., 1877.]

* 1244. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1877, v. 9, p. 206–208.)

Synonymical notes on species of Adela and Semele; re-describes *A. biviella* and *Pitys fasciella*; habits of *Xylesthia clemensella*. [Dec., 1877.]

* 1245. **Grote**, A: Radcliffe. Note on larval variation. (Can. entom., 1877, v. 9, p. 209–210.)

Classification of cases in which larvae that are very unlike produce imagos that are very like. [Dec., 1877.]

* 1246. **Bunker**, Robert. Notes on the egg, larva and pupa of Smerinthus modesta. (Can. entom., 1877, v. 9, p. 210–211.)

Description at all the immature stages; habits of larva. [Dec., 1877.]

* 1247. **Entomological Society of Ontario** — *Montreal Branch*. [4th annual general meeting.] (Can. entom., 1877, v. 9, p. 211–213.)

Business report. [Dec., 1877.]

* 1248. **Grote**, A: Radcliffe. Notes on lepidoptera. (Can. entom., 1877, v. 9, p. 213–215.)

Re-describes *Scopelosoma pettiti*; synonymical notes on Californian Hepiolus; describes *Lithophane viridipallens*, *Syneda alleni* = 2 n. spp. [Dec., 1877.]

No. 63 was issued July 11, 1879.

PSYCHE.

ORGAN OF THE CAMBRIDGE ENTOMOLOGICAL CLUB

EDITED BY GEORGE DIMMOCK AND B. PICKMAN MANN.

Vol. II.] Cambridge, Mass., Sept.–Dec., 1879. [Nos. 65–68.

Descriptions of some Larvae of Lepidoptera, respecting Sphingidae especially.

(*Continued from p. 65–79.*)

The first volume of the *Species général des Lépidoptères hétérocères*, by Dr. J. A. Boisduval, treats of the Sphingidae, Sesiidae and Castnidae in a systematic and descriptive manner, with scant reference to the descriptive literature, and is accompanied with plates, which have not been examined in the preparation of this article. Larvae of the North American species, genera and other groups of Sphingidae mentioned below are described more or less completely on the pages indicated. In the preparation of these descriptions Dr. Boisduval has been aided principally by the possession of a large number of original and unpublished figures made by Abbot; in addition to these he had some figures made by John Leconte and by other persons. The descriptions of families and tribes are reproduced here, in translation.

SPHINGIDAE. p. 2. "Larvae smooth, cylindrical, elongated, slightly swollen posteriorly, generally furnished with a horn on the segment before the hindmost, or sometimes with a little lenticular shield in place of the horn." "The larvae live solitarily, sometimes on trees or shrubs, sometimes on low plants."

SMERINTHIDAE (tribe). p. 8. Larvae with habits and with horn on eleventh segment as in other Sphingidae; particularly distinguished in most cases by having the head triangular and the skin shagreened or rugose.

Smerinthus. p. 17. General description.

S. populicola. p. 22–23. This is the *S. modesta* of Harris, the latter name being pre-occupied. Larva not described here.

S. juglandis. p. 27. Brief descr. of Abbot's figures.

S. opht[h]almicus. p. 34. Brief descr. by Lorquin.

S. pavoninus. p. 37. Brief descr. of Abbot's figure.

S. excaecatus. p. 38. Brief descr. from several of Abbot's figures.

S. geminatus. p. 39. Descr. [? from figure by Leconte].

S. astylus. p. 41. Very imperfect descr. from a coarse figure by Leconte.

S. myops. p. 42. Brief descr. from several figures by Abbot and Leconte.

Ceratomia. p. 53. General description.

C. amyntor [*C. quadricornis*]. p. 54. Descr.

EURYGLOTTIDAE (tribe). p. 58. Larvae with rounded head; skin smooth, never shagreened. Usually with a horn on eleventh segment, and in most cases with oblique lateral spots.

Macrosila. p. 60. General description.

M. tetrio. p. 61–62. Good descr. by General Brunet; Poey's figure [see PSYCHE, v. 2, p. 73] commended; a very fine figure by Brunet mentioned. Figured and descr. by Merian (Hist. ins. Surinam, pl. 5) as *Sphinx rustica.*

Amphonyx. p. 62. General description.

A. jatrophae. p. 65. Very brief descr. from Merian's coarse figure.

Sphinx. p. 69. General description.

S. carolina. p. 70–71. Brief descr. from Abbot's figures.

S. lycopersici. p. 72. Exceedingly brief descr. by Lorquin.

S. quinquemaculata. p. 76. Descr. from Abbot's figure.

S. rustica. p. 83. Brief but perhaps sufficient description. Madam Merian's figure (Hist. ins. Surinam, pl. 5) and description belong to *Macrosila tetrio.*

S. eremitus. Refers to Lintner's description [see PSYCHE, v. 2, p. 76.]

S. kalmiae. p. 92. Brief. descr.

S. cingulata. p. 96. Brief descr.

S. drupiferarum. p. 97–98. Descr. by comparison with *S. ligustri* previously described.

S. hylaeus. p. 99. Brief descr. from several figures.

S. plebeja. p. 100. Descr. from a very fine figure by Abbot.

S. cupressi. p. 102–103. Good descr. from a magnificent figure by Abbot.

S. catalpae. p. 103–104. Good descr. from a fine figure by Abbot.

S. conferarum. p. 105–106. Good descr. from several very fine figures by Abbot, which are unlike the figure published in Abb., pl. 42.

S. harrisii. p. 106–107. Brief descr.

S. jasminearum. p. 115. Descr. from a fine figure.

S. brontes. p. 116. Descr. from fine figures.

Anceryx. p. 119. General description.

A. ello. p. 120. Very brief description from Merian's figure [see PSYCHE, v. 2, p. 77].

A. alope. p. 121. Descr. from a very fine figure by General Brunet.

Pachylia. p. 134. General description.

P. ficus. p. 137. Very brief descr., after Merian.

Madoryx. p. 150. General description.

DEILEPHILIDAE (tribe). p. 158. Larvae, as far as known, smooth, with globular head; often ornamented with rather lively colors, and frequently with ocellate spots. Certain larvae, which might constitute a tribe by themselves, have the first three rings more slender than the rest, very retractile, and extensible like a trumpet. Some ordinarily have a horn on the eleventh segment. This horn, the use of which is unknown, is exceptionally replaced, in some species, by a little wart-like plate. In some other species the horn exists only in the earliest stage, and disappears completely from the adults.

Deilephila. p. 158–159. General description.

D. galii [*D. chamaenerii*], p. 170. Brief descr.

D. daucus. p. 174. This is the *D. lineata* of North America, but Boisduval separates it from the *D. lineata* of Europe. Descr. from several of Abbot's figures.

Philampelus. p. 192. General description.

Ph. labruscae. p. 192. Exceedingly brief descr., after Merian.

Ph. crantor [*Ph. achemon*]. p. 200. Good descr., from a very fine figure and a detailed description by Lorquin.

Ph. jussieaeae. p. 202–203. Good descr. by Lorquin.

Everyx. p. 208. General description.

E. myron. p. 210. Good descr.

E. choerilus. p. 211. Good descr.

Eucheryx. p. 219. General description.

Choerocampa. p. 223. General description.

Ch. tersa. p. 269. Descr. from several of Abbot's figures.

Macroglossidae (tribe). p. 289. Larvae, as far as known, generally green, more or less rugose-dotted, even sometimes appearing a little shagreened; attenuated anteriorly, with globose head. Generally with a more or less developed straight or curved horn on eleventh segment. Some have longitudinal lines, others have oblique lines also; some have ferruginous lateral spots.

Epistor. p. 296. General description of no avail.

E. lugubris. p. 297. Brief descr. from figures.

Pogocolon. p. 314. General description.

P. gaurae. p. 315–316. Good descr. from two figures by Abbot.

P. nessus. p. 317. Descr. from fine figure by Abbot.

Thyreus. p. 330. Brief general description.

Th. abbotti. p. 331–332. Brief descr. from several figures

Macroglossa. p. 332. Brief general description.

M. diffinis. p. 367. Descr. from figures by Abbot.

M. thysbe. p. 370. Descr. from a fine figure by Abbot.

M. etolus. p. 370. Descr. from a fine figure by J. Leconte.

In addition to the above-mentioned species and groups of Sphingidae, some description of whose larvae is given, the following species of North American Sphingidae are described without descriptions of their larvae:

Smerinthus oculata (Mex.) p. 29, *S. pseudambulyx* (Mex.) p. 29, *S. saliceti* (Mex.) p. 35, *S. cerisyi* (U. S.) p. 35, *S. ja-*

maicensis (Jam.) p. 36, *Amphonyx duponchelii* (Cuba) p. 65, *Sphinx afflicta* (Cuba, Haiti) p. 77, *S. ochus* (Mex., Hond.) p. 82, *S. lugens* (Mex., Hond.) p. 87, *S. andromedae* (Mex., Hond.) p. 89, *S. gordius* (Va.) p. 91, *S. sordida* (U. S.) p. 92, *S. canadensis* (Quebec) p. 93, *S. chersis* [*S. cinerea*] (U. S.) p. 93, *S. strobi* (Cal.) p. 100, *S. sequoiae* (Cal.) p. 101, *S. pinea* (N. Y.) p. 107, *S. lanceolata* (Mex.) p. 109, *S. collaris* (St. Dom., Jam.) p. 110, *S. cubensis* (Cuba) p. 117, *S. sesquiplex* (Mex., Guat.) p. 118, *Anceryx rimosa* (Cuba, Haiti, Braz.) p. 125, *A. merianae* (Nicaragua, Braz.) p. 128, *A. oenotrus* (Antilles, S. A.) p. 129, *A. melancholica* (Haiti, Cuba, Braz.) p. 130, *A. janiphae* (Haiti) p. 131, *A. rhaebus* (Mex., Hond.) p. 131, *A. obscura* (Antilles) p. 132, *A. guttulalis* (St. Dom.) p. 133, *A. pallida* (Cuba) p. 134, *Pachylia tristis* (Cuba, Braz.) p. 188, *P. inconspicua* (Jam.) p. 138, *Madoryx pseudothyreus* (Cuba) p. 156, *Deilephila calverleyi* (Cuba) p. 168, *Ambulyx rostralis* (Nicaragua, New Granada) p. 184, *A. strigilis* (Antilles, S. A.) p. 186, *Philampelus satellitia* (Antilles) p. 197, *Ph. pandorus* (U. S.) p. 197, *Ph. hornebeckiana* (St. Thomas) p. 201, *Ph. typhon* (Mex.) p. 204, *Everyx astyanor* (Mex.?) p. 211, *E. pholus* (W. I.) p. 212, *Eucheryx licastus* (St. Thomas, Braz.) p. 220, *E. croesus* (Antilles) p. 221, *Choerocampa caicus* (Cuba, S. A.) p. 249, *Ch. ceratomioides* (Guat., Mex., S. A.) p. 264, *Ch. laevis* (Mex.) p. 265, *Ch. druryi* (Mex.) p. 267, *Ch. robinsonii* (Cuba) p. 269, *Ch. aristor* (Guat., Columbia) p. 270, *Ch. crotonis* (Nicaragua, Columbia) p. 270, *Ch. nechus* (W. I., Antilles) p. 271, *Ch. eumedon* (Mex.) p. 272, *Ch. fugax* (Mex., Hond.) p. 274, *Ch. rhodocera* (St. Dom.) p. 276, *Ch. gundlachii* (Cuba) p. 277, *Ch. irrorata* (Cuba) p. 278, *Ch. porcus* (Haiti, Cuba, Braz.) p. 278, *Ch.? versicolor* (N. A.) p. 284, *Lapara bombycoides* (Canada) p. 292, *Arctonotus lucidus* (Cal.) p. 293, *Epistor camertus* (Antilles, S. A.) p. 298, *E. danum* (Cuba, Haiti, S. A.) p. 299, *Tricholon inscriptum* (U. S.) p. 302, *Pogocolon clarkiae* (Cal.) p. 316, *Oenosanda noctuiformis* (Antilles) p. 319, *O. spuria* (Mex.) p. 319, *Perigonia caliginosa* (Mex. Hond.) p. 324, *P. lusca* (Cuba, Haiti, S. A.) p. 325, *P. ilus* (Mex., Guat., Antilles) p. 326, *P. iloides* (Cuba)

p. 327, *P. undata* (Jam.) p. 328, *P. glaucescens* (St. Dom.) p. 328, *Macroglossa aedon* (Cuba) p. 357, *M. tantalus* (Antilles, S.? A.) p. 358, *M. sagra* (Cuba, Mex.) p. 360, *M. corvus* (Nicaragua, Columbia) p. 361, *M. phaeton* (Cal.) p. 362, *M. flavofasciata* (Hudson's Bay) p. 364, *M. thetis* (Cal.) p. 368, *M. gracilis* (U. S.) p. 371, *M. ruficaudis* (Canada) p. 371, *M. pyramus* (U. S.) p. 372, *M. fuscicaudis* (Ga.) p. 372. Several unrecognized species are noticed on p. 558.

In the portion of this volume devoted to the Sesiidae and Castnidae, only two species of North American larvae are described by attributing to them any characters additional to those of the family to which they belong. These are *Thyris fenestrina*, on p. 489, and *Th. vitrina*, on p. 490, the latter described from a figure by Abbot. The larvae of both families are characterized alike, as being pale or discolored, almost glabrous, having on their bodies a few very small tubercles, from each of which springs a very fine hair; the back of the first segment and that of the last each is covered with a scaly plate; the mandibles are strong, and the larvae live within the stems of vegetals. They show no trace of a horn on the eleventh segment.

Arctia isabella. Brief descr. in Harr. Ins. Inj. Veg., p. 355, fig.

I am not aware of any other published description. Mr. N. Coleman obtained larvae from eggs, and writes to me of them as follows: "At first they were very dark and as they grew showed quite black. I noticed after a while that a reddish ring appeared on some of them, and further watching showed that every fresh moulting developed a new red ring, till the fifth was reached. As they were kept in a box they did not grow as fast as those at liberty, for I captured full grown ones in the garden, and by the roadside while these were still small. Of the mature ones caught none had over five red rings, though Harris says they have six. In some cases, though not every one, the fifth red ring, reckoning from head back, has only two tufts of red, the rest being black." Harris says: "Hairs on first four and last two rings black, on intermediate rings tan-red." Two specimens in my collection agree with this description; the two others have the lowest tuft on each side of segment 10 red and the rest black; in one of the latter only the lowest tuft on each side of segment 5 is black, in the other the whole of segment 5 is black. (*B. Pickman Mann.*)

Euchaetes egle.

Mature larva. Body, legs, and head black, the body covered with long tufts of hair; the hairs on the anterior and posterior segments are black, and the anterior tufts are longer than those on the central segments. Two lateral white tufts or pencils from the breathing holes of the third segment, and two shorter ones from the dorsal part. The dorsal tufts of the central segments are ochre yellow. A double row of short lateral tufts runs the whole length of the body, in the vicinity of the breathing holes; the upper row black, the lower a dirty grey. On the tenth segment these tufts are rather longer and are white. Length 20 mm.; appearance stout.

The description of the larva of *E. collaris*, furnished by Mr. G. H. Van Wagenen to the *Canadian Entomologist*, shows what little ground ever existed for classing *E. collaris* as a variety of *E. egle.* The larvae are so unlike in appearance and habits as to suggest a generic difference.

(*W. V. Andrews*, March 1878.)

Parasa chloris.

A beautiful larva, but difficult to describe. The description in Stretch's admirable work, Zygaenidae and Bombycidae of N. A., is lamentably defective.

Mature. Onisciform, 19 mm. long. Head purplish brown. Four purple and three white lines drawn very close together, form a dorsal band running the length of the body. Subdorsal line bright red, from which arise six red spines (longest on central segments) studded with yellowish red spinelets; between the spines and on the fifth, sixth, eighth and ninth segments, are reddish spiny warts. The spines and warts are on elevated ridges. Beneath the sub-dorsal line are two pairs of purple, longitudinal lines on a yellowish ground; the pairs divided by a red line. The breathers are on a similar red line, and are guarded or ornamented by spiny warts; like those mentioned above. Legs of a sort of yellowish olive color; pro-legs, or rather tubercles, and underside of body of a reddish tinge. Varies considerably; one very beautiful variety has all the red of the typical larva replaced by brimstone yellow. Feeds on the oak (Quercus), on the pear tree (Pyrus), on wild cherry (Prunus), and on the wax myrtle (*Myrica cerifera*), in September. Pupa brown, of a parchmenty consistence, naked, egg-shaped. I have reared hundreds of this beautiful species, and in confinement it always forms its cocoon either adherent to the stem of the food plants, or, occasionally, draws two leaves together for a shelter. Indications are that in nature the cocoon is formed among loose rubbish on the ground. (*W. V. Andrews*, March 1878.)

Limacodus cippus.

In vol. 7 of Jardine's *Naturalist's Library*, p. 177, is a description of "*Limacodes cippus*, Cram." There are figures of both moth and caterpillar on p. 21, fig. 2. This is said to be a North American insect, and also to be found in Surinam.

Harris, Ins. Inj. Veg., p. 420, speaking of *L. cippus*, and giving a good figure of it, doubts, in a note, whether it be the Surinam *L. cippus*, but gives as its caterpillar one figured by Abbot. But this, from the description, is certainly not the caterpillar of the *L. cippus* figured by Harris. Indeed it seems to be one of the forms of *Parasa chloris*. I hope to be able to give you during the coming season an accurate description of *L. cippus* (the *Euclea querceti* of the G. & R. catalogue), but may say here that it is in shape much like *P. chloris*, a little flatter, and of an uniform rust red color. Certainly neither the moth nor caterpillar of Jardine is like our *L. cippus*= *E. querceti*; and while the drawing and description, in Harris, of the moth are good, that of the caterpillar is very erroneous.

Judging from both moths and caterpillars, *L. chloris* and *E. querceti* ought to be referred to the same genus. (*W. V. Andrews*, June 1878.)

Datana major.

I have never taken this caterpillar earlier than perhaps the second moult, when its appearance, described below, is very different from that of its mature state. Color, chocolate brown. Head, neck, legs, pro-legs, and anal shield dark coral red. Four bright yellow longitudinal lines alternate with the ground color, that covering the breathers being broadest. Two rows of small yellow spots underneath. Feeds on *Andromeda ligustrina* in Aug. and Sept. N. Y., N. J. (*W. V. Andrews*, March 1878.)

Anisota stigma.

Mature. Larva cylindrical, 63–69 mm. long, 13 mm. broad. Reddish brown, or bright fawn color, thickly covered with white granulations. Legs and pro-legs nearly concolorous with body. Head of a brighter brown, and shining. Six longitudinal rows of black spines, three on each side of the body (one sub-dorsal, one lateral, and one immediately beneath the breathers). Sub-dorsal spines on third segment long. Breathers black, with a rather faint white line running over them. In the early stages all the colors are somewhat lighter. Feeds on Quercus in September. Pupa black, rough, with terminal spike.

(*W. V. Andrews*, March 1878.)

Scolecocampa liburna.

I reared this moth from the larva many years ago, but had forgotten all the details. I am indebted to my friend Mr. G. R. Pilate, of Ohio, for the larvae from which the following description is made.

Length 38 mm., thickness 6 mm. Color, dirty white. Smooth and shining, with a few scattered hairs, Head and anal segment black. Contents of the intestinal canal showing through the skin of the dorsum. On each segment are twelve small black spots, two on each side of the dorsum, and four in the vicinity of the breathers. Legs and pro-legs light brown, the former rather darker than the latter. Feeds on decaying wood In confinement it fed all the winter, and probably does so under all circumstances. Imago early in June. (*W. V. Andrews*, June 1878.)

B. Pickman Mann.

An Account of the Collections which illustrate the Labors of Dr. Asa Fitch.

Having been requested by the family of the late Dr. Asa Fitch, State Entomologist of New York, to examine and report upon the condition of his great collection of insects, I visited "Fitch's Point," Salem, N. Y., on the 12th and 13th of November last and made as careful an investigation thereof as the time and circumstances allowed. Believing the accompanying facts of general interest to all naturalists I respectfully submit the following notes.

Dr. Asa Fitch's "general collection" of insects of all orders fills one hundred and six boxes ("cartons liégés" of Deyrolle, nearly all of double depth, size 26x19½ cm.), and is now in excellent condition, having only to the extent of perhaps fifteen per cent. suffered from a slight coating of dry mould, easily removed. No Anthrenus or other Dermestidae are to be detected among them. Very few, perhaps fifty in all, are broken or badly damaged, out of upwards of fifty-five thousand numbers. The collection, although largely from the United States, is by no means confined thereto, as it contains numerous specimens from all parts of the world, obtained by exchange with Drs. Sichel and Signoret and Messrs. Fairmaire, Andrew Murray and others. The coleoptera occupy eighteen boxes, orthoptera seven, neuroptera six, hymenoptera eight, diurnal lepidoptera four, and the heterocera seventeen. Both divisions of the hemiptera are nobly represented, the heteroptera filling fourteen, while the homoptera, to which group the doctor, as all are aware, devoted so much study, occupy twelve boxes, including all the types of the descriptions in the New York State Agricultural Reports. Diptera are contained in five boxes, while the remaining four include arachnida, myriapoda, crustacea, etc., mostly terrestrial and local.

In addition there are two large cases containing duplicates, by estimate over one hundred thousand pinned coleoptera, principally from New York state, and upwards of twenty thousand of other orders, as well as several trunks, boxes, etc., containing exchanges which seem never to have been incorporated with the general collection, to the number of perhaps two thousand. Some of these cases, especially among the New York duplicates, have been visited by *Dermestes lardarius* and badly injured, not exceeding twenty per cent. however. Several double boxes exhibit biological illustrations in the shape of galls, etc., generally well identified and labelled, but exposed to derangement unless very carefully managed in the process of transportation. A great number of specimens of Cecidomyia and allied genera had been carded and studied by Dr. Fitch with an astonishing amount of patient labor, but the too open boxes which contained them have been invaded by the little destroyer *Ptinus fur*, as we caught him *flagrante delictu.*

A few hundred interesting and chiefly minute specimens from Hong Kong, collected by the late Rev. M. S. Culbertson, are in fair preservation, but not incorporated with the general collection, as is the case also with a lot of larger forms from Brazil, obtained by Sr. A. de Lacerda.

One hundred and forty-eight note books, of about 10x15 cm. (from memory), and varying thickness, contain an exhaustive descriptive catalogue of the collection, each specimen with its date of capture, locality, etc., being numbered, beginning about the year 1833, and a brief diagnosis, followed by a fuller description and remarks, accompanying the majority of the New York species. The numbers of specimens referred to in the note-books reach as before stated fifty-five thousand (*circa*), although doubtless many specimens have either been exchanged or destroyed.

Dr. Fitch's family value the collection as it stands at the minimum rate established by the doctor himself, namely five thousand dollars, certainly no exorbitant price for the fruits of upwards of forty-five years' labor, and it is hoped that as none of his family inherit his love for the science it will soon pass into the hands of some institution of learning where experienced and careful manipulators will cherish and preserve this monument of patient industry, unrivalled on this continent at least.

A large and valuable library of works on entomology in various languages, containing many rare and curious volumes, and a valuable microscope by Nachét were likewise stored in the small wooden building or "office" a few metres back of the dwelling house, the latter within a few months of its centennial anniversary.

The faithful shepherd dog that for some years past accompanied the good doctor in his walks, sleeps nightly on the floor of the little office porch, guarding these treasures of science in their frail receptacle. *Francis G. Sanborn.*

The biological collection of insects belonging to the New York State Agricultural Society was arranged by Dr Fitch, about ten years ago, when he was still holding his position of Entomologist to the Society. It is arranged in six cases, attached to the railing of the second floor of the society's museum. In these cases are contained examples of the injurious insects of the state of New York, in their several stages, and in some instances accompanied by specimens of their depredations, displayed in the following order:

Case 1. Insects infesting grain and other crops; Case 2. Grass insects; Case 3. Insects of the garden; Case 4. Insects infesting fruit-trees; Case 5. Insects infesting fruit-trees; Case 6. Insects injurious to man and animals.

The number of specimens is about sixteen hundred. With the exception of perhaps one hundred specimens subsequently added, the present arrangement and labeling is that of Dr. Fitch; in the latter, a few changes would be required to make it conform to present nomenclature.

In a series of wall-cases occupying the western gallery of the third floor of the museum are contained the larger biological specimens illustrative of insect depredations on plants, timber, furniture, etc., and exhibiting the larval stage, in alcohol, of some of the larger forms.

The State Agricultural Society, recognizing the value of this collection, and the importance of its preservation from insect attack, upon the retirement of Dr. Fitch placed it under my care.

In the year 1874, four large hanging-cases of insects were purchased of Dr. Fitch, for the State Museum of Natural

History, catalogues of which were published in the Second and Fourth Annual Reports on the State Cabinet. Of these, the three cases of coleoptera and lepidoptera were speedily destroyed by the ravages of the museum pest, *Anthrenus varius*. The more valuable case of homoptera, containing a number of Fitch's types,[1] was rescued from entire destruction. Only about a fifth of the specimens, principally of the aphides and other small forms, was lost. The remainder have been re-arranged and are carefully preserved. *J. A. Lintner.*

Junonia Coenia in New England.

It is not surprising that this southern butterfly should be classed among the *rari papiliones* which occasionally extend their range to New England; for in its own home it is a very common insect, and the food plants of the caterpillar, Linaria and Gerardia, are found abundantly north of any locality at which the butterfly has been taken. Until recently, however, all the New England specimens I had seen were so rubbed as to render it probable that they had flown from a Southern station,—a hypothesis which the long winter life of the imago in the south rendered defensible. Now Mr. Charles A. Davis sends me an exquisite photograph of two specimens which he took at Portsmouth, N. H., in July 1876, in a condition so fresh that they must have been bred on the spot. On looking up the record of the specimens heretofore taken in New England and seen by me, I find they were all captured in August or September, and would naturally have been rubbed, if disclosed in July. It can therefore scarcely be doubted that the species breeds in New England. Whether, as appears to be the case in the south, the insect is double brooded and winters as a butterfly, remains to be determined; it is the purpose of this note to direct attention to this enquiry, and to ask any one obtaining eggs or caterpillars to send me specimens for illustration. As a working hypothesis, I venture to suggest that the insect is single brooded in New England, appearing as a but-

[1] See Fitch, Ann. Rep. State Cab. Nat. Hist., 1851, 43-70, for descriptions of types.

terfly in July, wintering in this condition and laying eggs in the spring.

For the interest of collectors I append a list of the localities at which the butterfly has been found in this region. It will be noticed that, as in the case of many other southern butterflies occasionally found here, its track is along the coast and up the valley of the Connecticut; most of the instances of capture are within sight of the sea, where, in marshy spots, one of its favorite food plants, the Gerardia, best flourishes; this indicates the most probably successful place of search for the caterpillar.

The New England captures known to me are the following: In Connecticut, Prof. S. I. Smith has seen several specimens from the vicinity of New Haven, taken the last of September; Mr. E. Norton has taken it at Farmington; and Mr. T. F. McCurdy found the species somewhat plentiful one autumn in the vicinity of Norwich. In Rhode Island, Col. T. W. Higginson reports several from Newport. In Massachusetts, Mr. R. Thaxter has taken it in the western part of the state, Mr. Bennett (according to Mr. C. A. Emery) captured a single specimen at Springfield; Prof. H. W. Parker (see PSYCHE, i, 26) took a female 25 July, and a somewhat worn male 4 Aug. and saw others on the latter day; Mr. F. H. Sprague took a number of specimens in Wollaston and Granby in August and September; Mr. F. G. Sanborn took it in early August on Cape Cod, and I caught one in the same region in September; Dr. T. W. Harris took a single specimen at Milton 19 Aug.; and Mr. R. Thaxter has taken and observed several in the vicinity of Newton, and especially about Prospect Hill in Waltham. In New Hampshire, I took a specimen many years ago at Hampton Beach on 12 Aug., then the northernmost point at which it had been found; but since then we have Mr. Davis's capture at Portsmouth in 1875 and July 1876 (three specimens taken), and Mr. R. Thaxter even reports it from Cape Meddock in Maine, not far north of Portsmouth, N. H., where it was taken 31 July 1874. Both Mr. Parker and Mr. Davis captured their specimens on thistle heads.

Samuel H. Scudder.

On the Spiracles of Coleoptera and on the Sound Produced by Polyphylla.

On 10 July 1874 I observed a male *Polyphylla variolosa* (Hentz) making a creaking noise while moving its abdomen up and down under the elytra. Examination of the specimen shows upon the outer face of the spiracle-bearing plate of the metathorax an oblong, slightly swollen area, free from pubescence, of a thin texture and pale color. This is covered by the elytra when the insect is at rest. At a corresponding point under the margin of the elytra is seen an area of similar size and of a pink color. The same structure is to be seen in the female Polyphylla, but what relation, if any, this has to the production of the sound it is difficult to understand.

The existence of mesothoracic and metathoracic spiracles in coleoptera has recently (*Amer. Nat.*, 1874, p. 532) been questioned, because of the absence of such spiracles in the larva. None are apparent upon the mesothorax of Polyphylla, but a more careful examination will discover that they are present here, since Strauss-Durckheim found them in Melolontha and Reinhard asserts their existence in the hymenoptera, notwithstanding that they are not externally visible. The metathoracic spiracles, however, are very obvious in Polyphylla, being placed at the inner margin of the membrane which forms part of the dorsal face of that plate which on its vertical face presents the structure noticed above. Behind these spiracles are situated seven additional pairs, a pair upon each segment of the abdomen excepting the last. The spiracles of the prothorax and of the basal segment of the abdomen are larger than the others, although, being concealed in the sutures, they are to be found only by dissection. In Tenebrio, and many other coleoptera, it is true, no metathoracic spiracles are apparent.

Dr. Packard states (l. c.) that in the coleoptera there are usually *eight* pairs of abdominal spiracles. This is manifestly incorrect in regard to the imago, for *in no adult hexapod insect* can more than *seven* pairs of abdominal spiracles be demonstrated. In larvae eight pairs is the maximum, but *functionally* the eighth pair belongs to the seventh segment and the first pair to the metathorax, and in changing to the imago each pair of spiracles is transferred to that segment to which it functionally belonged in the larva. The typical number of spiracles in insects is ten pairs, and none are ever present in excess of this number, or which are not homologous with some of these.

In Mr. Gissler's article in PSYCHE, vol. 2, p. 240, it is stated that the adult "Amblychila has seven pairs of stigmata." Desiring to find what had become of the missing spiracles of the larva, I examined some specimens collected in Kansas and kindly presented by Mr. S. W. Williston, of New Haven. Without attempting to find the minute mesothoracic pair, which are not present in the larva, the prothoracic pair and seven abdominal pairs were easily discovered, making *eight* in all. The metathorax of Amblychila is very much reduced dorsally, the wings are absent, and no spiracles are apparent on this segment. The pair under the posterior edge of the prothorax are, as usual, very large. The spiracles of the abdomen diminish in size to the last, which are nevertheless well developed.

W. H. Patton.

BIBLIOGRAPHICAL RECORD.

(*Continued from page 256.*)

The date of publication, here given in brackets [ ], marks the time at which the work was received by the Editor, unless an earlier date of publication is known to him. An asterisk * before a title is the Recorder's certificate of accuracy of quotation. Corrections of errors and notices of omissions are solicited. — B: PICKMAN MANN.

Nos. 1215 to 1266 are from **Can. entom.**, 1877, v. 9.

* 1252. **Westcott**, Oliver S. Food plants of H. maia. (Can. entom., 1877, v. 9, p. 220.)

[See Rec., no. 1191.] *Hemileuca maia* abundant in swampy localities. Does it not feed on other plants besides Quercus, Salix and Spiraea? [Dec., 1877.]

* 1253. **Peck**, G: Williams. [Captures of rare lepidoptera.] (Can. entom., 1877, v. 9, p. 220.)

3 species of Catocala and larvae of 4 species of Sphingidae captured in Roselle, N. J. [Dec., 1877.]

* 1254. **Grote**, A: Radcliffe. [A "seeming growth."] (Can. entom., 1877, v. 9, p. 220.)

[See Rec., no. 1241.] Suggests that the "growth" referred to is a pollen-mass. [Dec., 1877.]

* 1255. **Bethune**, C: James Stewart. A few common wood-boring beetles. (Can. entom., 1877, v. 9, p. 221–226, pl.)

Describes and figures *Monohammus scutellatus*, *Clytus speciosus*, *Orthosoma cylindricum*, *Clytus robiniae*, *Chrysobothris femorata*, *Saperda candida*, *Monohammus confusor*, *Oberea tripunctata* ; notes on larvae and habits of these species. [Jan., 1878.]

* 1256. **American** Entomological Society, *Philadelphia, Pa.* Notice of removal. (Can. entom., 1877, v. 9, p. 226.)

Announcement of the removal of the society to the building of the Academy of Natural Sciences of Philadelphia. [Jan., 1878.]

* 1257. **Grote**, A: Radcliffe. A new genus of Tortricidae. (Can. entom., 1877, v. 9, p. 227.)

Describes Exentera n. g. and *E. apriliana* n. sp., from N. Y. [Jan., 1878.]

* 1258. **Bean**, T: Ebenezer. Sexes of Homoptera lunata. (Can. entom., 1877, v. 9, p. 228.)

[See Rec., no. 1230.] Further observations tend to confirm those previously made. [Jan., 1878.]

* 1259. **Cassino**, S: E. Naturalists' directory. (Can. entom., 1877, v. 9, p. 228.)

Prospectus of a new edition, to appear about May 1878. [Jan., 1878.]

* 1260. **Edwards**, W: H: Description of preparatory stages of Neonympha sosybius. (Can. entom., 1877, v. 9, p. 229–231.)

Describes egg, all stages of larva, and pupa ; compares it with related species. [Jan., 1878.]

* 1261. **Chambers**, Vactor Tousey. Insects feeding on Gleditschia. (Can. entom., 1877, v. 9, p. 231–235.)

Observations on *Helice pallidochrella* (re-named *Gelechia gleditschiaeella*), *Agnippe biscolorella*, *Laverna gleditschiaeella*, two Buprestidae and some Formicidae. [Jan., 1878.]

* 1262. **Grote**, A: Radcliffe. On the genera Nola and Argyrophyes. (Can. entom., 1877, v. 9, p. 235–238.)

Describes *Nola sexmaculata* n. sp.; materially changes the description of the genus Argyrophyes [see Rec., no. 202], removing it to the Noctuidae, and remarking on its species. [Jan., 1878.]

* 1263. [**Saunders**, W:] Entomological pins seized for duties. (Can. entom., 1877, v. 9, p. 238–239.)

The U. S. Treasury Department forbids the importation of pins by package post. [Jan., 1878.]

* 1264. **Angus**, James. Catocala marmorata. (Can. entom., 1877, v. 9, p. 239–240.)

Record of captures of this species in N. Y., N. J., and Ohio. [Jan., 1878.]

* 1265. **Bailey**, James Spencer. Sphingidae at sugar. (Can. entom., 1877, v. 9, p. 240.)

List of 12 species taken at Center, N. Y. [Jan., 1878.]

* 1266. [**Saunders**, W:] Donation to Entomological Society of Ontario. (Can. entom., 1877, v. 9, p. 240.)

A collection of named microlepidoptera presented by V. T. Chambers. [Jan., 1878.]

* 1267. **Canadian** entomologist (The). Ed. by William Saunders; assisted by C. J. S. Bethune, E. B. Reed, and G. J. Bowles. Vol. 10. London [Ont.], [Entomological Society of Ontario], 1878. [4] + 244 p., 1 pl., 23 × 15.

Contains the articles cited in the Bibliographical record of PSYCHE, no. 1268–1372; index, p. 241–244.

* 1268. **Edwards**, W: H: Notes on Lycaena pseudargiolus and its larval history. (Can. entom., 1878, v. 10, p. 1–14, fig.)

Habits, food-plants, and description of all stages of larva of *L. pseudargiolus*; description of egg and of pupa; seasons and geographical distribution of the various forms of the species; description and figure of the secretory organs of larvae of Lycaena; manner in which ants obtain the secretion produced by the larvae; criticism of S. H. Scudder's views on the classification of butterflies [see Trans. Amer. Entom. Soc., 1877, v. 6, p. 69–80]. [See Rec., no. 1311.] [Feb., 1878.]

* 1269. **Saunders**, W: Notes on the larva of Lycaena scudderi. (Can. entom., 1878, v. 10, p. 14–15.)

Description of the larva, which feeds on *Lupinus perennis*, and is attended by ants. [Feb., 1878.]

* 1270. **Worthington**, C: Ellis. Miscellaneous memoranda. (Can. entom., 1878, v. 10, p. 15–17.)

Description of larva of *Arzama obliquata*; food-plants or seasons of *Hemileuca maia*, *Philampelus achemon*, *Smerinthus excaecatus*, *S. modestus*, *Daremma undulosa*, *Macrosila 5-maculata*, *Sphinx chersis*, *S. gordius*, *Apatela americana*, *Ennomos alniaria*; habits of *Erebus odora*; fungous growth on wings of *Papilio asterias*. [Feb., 1878.]

* 1271. **Grote**, A: Radcliffe. Description of a new Drepanodes. (Can. entom., 1878, v. 10, p. 17.)

Describes *D. fernaldi* n. sp., from Me. and Mass. [Feb., 1878.]

* 1272. **Grote**, A: Radcliffe. A new Hepialus from New York. (Can. entom., 1878, v. 10, p. 18.)

Describes *H. auratus* n. sp. [Feb., 1878.]

* 1273. [**Saunders**, W:] Entomological index to agricultural reports. (Can. entom., 1878, v. 10, p. 18–19.)

Notice of Townend Glover's "Manuscript notes . . . or Entomological index, to names, &c., in [the U. S.] agricultural reports, . . . " from 1854 to 1878. [Feb., 1878.]

* 1274. **Grote**, A: Radcliffe. Note on the structure of Nephopteryx zimmermani. (Can. entom., 1878, v. 10, p. 19.)

Describes Pinipestis, a new sub-genus. [Feb., 1878.]

* 1275. **Zimmerman**, C: Diehl. [Nephopteryx zimmermani.] (Can. entom., 1878, v. 10, p. 20.)

Food-plants and ravages of the species. [Feb., 1878.]

* 1276. **White**, F. Buchanan. [A "seeming growth" on the eye of Papilio philenor.] (Can. entom., 1878, v. 10, p. 20.)

[See Rec., no. 1241, 1254.] Suggests that the "growth" is the pollinia of some orchidaceous plant. [Feb., 1878.]

* 1277. **Saunders**, W: Observations on the eggs of Clisiocampa sylvatica and americana. (Can. entom., 1878, v. 10, p. 21–23.)

" The larvae of both these species mature early in the fall and hybernate inside the egg, waiting the warmth of spring before eating their way out." Many of the eggs are destroyed by a species of Trombidium. [Mar., 1878.]

* 1278. **Grote**, A: Radcliffe. New Pyralides. 4. (Can. entom., 1878, v. 10, p. 23–30.)

[See Rec., no. 1086, 1108, 1184.] Describes *Arta olivalis*, *Botis venalis*, *B. trimaculalis*, *B. fuscimaculalis*, *B. flavicoloralis*, *B. stenopteralis*, *B. talis*, *Eurycreon anartalis*, *Homophysa peremptalis*, *H. eripalis* = 10 n. spp.; remarks upon other species. [Mar., 1878.]

* 1279. [**Saunders**, W:] Obituary notices. (Can. entom., 1878, v. 10, p. 30–35.)

Brief biographies of Jared P. Kirtland, M.D., LL.D., b. 10 Nov. 1793, d. 11 Dec. 1877; Andrew Murray, F. L. S., b. 19 Feb. 1812, d. 10 Jan. 1878; and T: Vernon Wollaston, M. A., F. L. S., b. 1821 or 1822, d. 4 Jan. 1878; the latter two notices derived mostly from memoirs in *The entomologist*, ... [Mar., 1878.]

* 1280. **Bean**, T: Ebenezer. Northern occurrences of Papilio cresphontes. (Can. entom., 1878, v. 10, p. 35–36.

Citation of several records showing the occurrence of this species in W.

Va., Kans., Ill., Wisc., Conn., Mich. and Ont., and its feeding on Citrus, Zanthoxylum and Ptelea. [Mar., 1878.]

* 1281. **Worthington,** C: Ellis. Notes on Argynnis alcestis Edw. (Can. entom., 1878, v. 10, p. 37–38.)

Comparison of this species with *A. aphrodite*; time of appearance and geographical range of the species. [Mar., 1878.]

* 1282. **Entomological Society of Ontario** — *London Branch.* Annual meeting. (Can. entom., 1878, v. 10, p. 38.)

Election of officers. [Mar., 1878.]

* 1283. **[Saunders,** W:] Book notices. (Can. entom., 1878, v. 10, p. 39, 79, 119–120, 178–180.)

Mere notice of numerous works by A: R. Grote, V. T. Chambers and S: H. Scudder; of Field and forest, Jan.–Mar. 1878; Journal of the Cincinnati Society of Natural History, no. 1; and Bulletin of the Buffalo Society of Natural Sciences, v. 3, pt.5: reviews of Strecker's Lepidoptera rhopaloceres and heteroceres [see Rec., no. 79], pt. 14; of Cook's Manual of the apiary, 2nd ed.; of Lintner's Entomological contributions, no. 4; of Glover's Manuscript notes . . . Cotton, etc.; and of Strecker's Butterflies and moths of N. A. [See Rec., no. 996]. [Mar.–Oct., 1878.]

* 1284. **Riley,** C: Valentine. Pieris vernalis and P. protodice. (Can. entom., 1878, v. 10, p. 39.)

[See Rec., no. 1242.] Confirmation of the conclusion that *P. vernalis* is the spring form of *P. protodice*. [Mar., 1878.]

* 1285. **Thomas,** F. A. W. [Gall literature desired.] (Can. entom., 1878, v. 10, p. 40.)

Request for publications on galls, for use in preparing a report on the subject. [Mar., 1878.]

* 1286. **Goodell,** Lafayette Washington. [Captures of rare lepidoptera.] (Can. entom., 1878, v. 10, p. 40.)

Eubyja quernaria and *Aspilates lintneraria* captured at Amherst, Mass. [Mar., 1878.]

* 1287. **Chase,** Joseph Edwin. [Melitaea and Deilephila.] (Can. entom., 1878, v. 10, p. 40.)

Occurrence of *M. phaeton*, *M. harrisii* and abundance of larvae of *D. lineata* near Holyoke, Mass. [Mar., 1878.]

* 1288. **Bowles,** G: J: Samia columbia. (Can. entom., 1878, v. 10, p. 41, pl.)

Colored lithograph of the larva, drawn by Bowles; accompanying note by [W: Saunders]. [Apr., 1878.]

* 1289. **Caulfield,** Frank Butler. Notes on the larva of Samia columbia Smith. (Can. entom., 1878, v. 10, p. 41–42.)

Larva described and compared with larva of *S. cecropia*. [Apr., 1878.]

* 1290. **Fernald**, C: H: On the early stages of Samia columbia Smith. (Can. entom., 1878, v. 10, p. 43–48.)

Experiments in feeding the larvae with various plants; Prunus and Larix alone gave success. Egg and all stages of larva described; larva compared with that of *S. cecropia*. [Apr., 1878.]

* 1291. **Saunders**, W: On food plants of Papilio cresphontes (thoas). (Can. entom., 1878, v. 10, p. 48–50.)

Dictamnus added to the list of food-plants; localities at which *P. cresphontes* has been found in Canada. [Apr., 1878.]

* 1292. **Chambers**, Vactor Tousey. Tineina. (Can. entom., 1878, v. 10, p. 50–54.)

Notes on species of Gelechia, Hamadryas, Phaetusa, and Epicorthylis, especially *G. solaniella* (re-described), *G. hermanella* and *E. inversella*; generic diagnosis of Epicorthylis; *G. 4-maculella* re-named *G. pravinominella*. [Apr., 1878.]

* 1293. **Grote**, A: Radcliffe. Description of a new Grapholitha. (Can. entom., 1878, v. 10, p. 54–55.)

Describes *G. taleana* n. sp. [Apr., 1878.]

* 1294. **Harvey**, Leon Ferdinand. New Noctuae. (Can. entom., 1878, v. 10, p. 55–58, 80.)

Describes *Agrotis hilliana*, *Polia diffusilis*, *Tricholita fistula*, Copablepharon [type: *Ablepharon absidum*], *Heliophila amygdalina*, *Caradrina subaquila*, *C. clara*, *Graphiphora rubrica* = 1 n. g., 7 n. spp. [Apr., 1878.]

* 1295. **Riley**, C: Valentine. Egg-feeding mites. (Can. entom., 1878, v. 10, p. 58–59.)

[See Rec., no. 1277.] Citation of records of Acari feeding on eggs. [Apr., 1878.]

* 1296. **Andrews**, W: Valentine. Arctia antholea, Boisd. (Can. entom., 1878, v. 10, p. 59, 98.)

A. antholea = *Euprepia pudica*. [Apr., 1878.]

* 1297. **Van Wagenen**, Gerrit Hubert. Catocala marmorata. (Can. entom., 1878, v. 10, p. 59.)

C. marmorata and *C. relicta* captured at Rye, Westchester Co., N. Y. [Apr., 1878.]

* 1298. **Grote**, A: Radcliffe. Samia columbia. (Can. entom., 1878, v. 10, p. 59–60.)

An imago developed in a warm room in February; it has "the peculiar smell characteristic of [*S.*] *cecropia*." [Apr., 1878.]

* 1299. **Harrington**, W: Hague. [Melitaea phaeton.] (Can. entom., 1878, v. 10, p. 60.)

[See Rec., no. 1204.] Doubts the occurrence of *M. phaeton* near Ottawa, Ont. [Apr., 1878.]

* 1300. **Zimmerman**, C: Diehl. [Carpocapsa pomonella eaten by beetles.] (Can. entom., 1878, v. 10, p. 60.)

Larvae and pupae of *C. pomonella* eaten by *Tenebriodes laticollis*. [Apr., 1878.]

* 1301. **Peck**, G: Williams. [Papilio cresphontes.] (Can. entom., 1878, v. 10, p. 60.)

Four specimens captured and others seen in Fairfield Co., Conn., in summer of 1877. [Apr., 1878.]

* 1302. **French**, G: Hazen. Notes on the larva and chrysalis of Nephelodes violans. (Can. entom., 1878, v. 10, p. 61.)

Description of larva and pupa; food-plants and habits. [May, 1878.]

* 1303. **Bailey**, James Spencer. The beating net. (Can. entom., 1878, v. 10, p. 62–63, fig. 2–3.)

Description and figure of a beating net invented by T: B. Ashton. [May, 1878.]

* 1304. **Hulst**, G: Duryea. Larval and pupal history of Darapsa versicolor Harris. (Can. entom., 1878, v. 10, p. 64–66.)

Description of egg and pupa and all stages of larva; habits of larva. [May, 1878.]

* 1305. **Goodell**, Lafayette Washington. Notes on the early stages of some moths. (Can. entom., 1878, v. 10, p. 66–67.)

Description of larva of *Euloncha oblinita* and of larva and pupa of *Eumacaria brunnearia*, *Eubyja cognataria* and *Cymatophora crepuscularia*; food-plants and seasons. [May, 1878.]

* 1306. **Grote**, A: Radcliffe. New species of Acopa and Heliothis, and note on Hamadryas. (Can. entom., 1878, v. 10, p. 67–69.)

Characters of genus Acopa; describes *Acopa perpallida* and *Heliothis nuchalis* = 2 n. spp.; proposes the generic name Euclemensia [type: *Hamadryas? bassettella*] in place of Hamadryas pre-occupied. [May, 1878.]

* 1307. **Edwards**, W: H: Notes on Graptas comma and interrogationis. (Can. entom., 1878, v. 10, p. 69–74.)

Interrelation of the dimorphic forms *harrisii* and *dryas* of *G. comma*; interrelations of the dimorphic forms *fabricii* and *umbrosa* of *G. interrogationis*; results of breeding from eggs laid by each form. [May, 1878.]

* 1308. **Chambers**, Vactor Tousey. Micro-lepidoptera. (Can. entom., 1878, v. 10, p. 74–78.)

Describes larva, larval habits and imago of *Exartema fagigemmaeana* n. sp., larva and larval and imaginal habits of *Brenthia pavonacella*, and imago of *Strobisia albiciliaeella*; note on the systematic relations of Brenthia. [May, 1878.]

* 1309. **Grote**, A: Radcliffe. On a new arctian from Florida. (Can. entom., 1878, v. 10, p. 78.)

Describes as new an Euhalisidota from Florida, which may be *E. luxa*, previously described. [May, 1878.]

* 1310. **Couper**, W: Entomological collecting tour. (Can. entom., 1878, v. 10, p. 79.)

Announcement of a proposed tour along the coast and among the islands of the St. Lawrence river. [May, 1878.]

* 1311. **Edwards**, W: H: One word more on L. pseudargiolus. (Can. entom., 1878, v. 10, p. 80.)

[See Rec., no. 1268.] Dimorphism in *Lycaena pseudargiolus* seems to occur only in the males; the larvae feed on Cornus in spring, on Cimicifuga in summer, and on Actinomeris in fall. [May, 1878.]

* 1312. **Fernald**, C: H: Tortricidae. (Can. entom., 1878, v. 10, p. 81–84.)

Brief review of previous work on American Tortricidae; directions for preserving specimens; describes *Paedisca worthingtoniana* n. sp. [June, 1878.]

* 1313. **Siewers**, C: Godfrey. Notes on larvae, etc. (Can. entom., 1878, v. 10. p. 84–85.)

Describes larvae of *Callimorpha interrupto-marginata*, found feeding on *Eupatorium ageratoides*, and larva and imago of *Anisota* sp., found feeding on *Gymnocladus canadensis*; use of sand and butter-tubs for breeding-cages. [June, 1878.]

* 1314. **Hagen**, Hermann August. On the natural history of the gall insects. (Can. entom., 1878, v. 10, p. 85–94.)

Review of Adler's "Beiträge zur Naturgeschichte der Cynipiden" (Deutsche entom. Zeitschrift, 1877, v. 21, p. 209–247) and "Lege-Apparat und Eierlegen der Gallwespen (*l. c.*, p. 305–332, pl. 2) with a partial abstract, and with criticisms of a paper by P. Cameron (Scottish naturalist, Apr., 1878, . . .), "the substance of which [last] is incorporated and fully approved in the President's [J: O. Westwood's] address to the Entomological Society of London." [June, 1878.]

[Later, Mr. Cameron (Scott. nat., . . .) accepted Adler's conclusions, and these were confirmed by Mayr and Rudow. *H.A.H.*]

* 1315. **Grote**, A: Radcliffe. On Euproserpinus phaeton. (Can. entom., 1878, v. 10, p. 94–97.)

Statement of the misunderstandings which led to a dispute over the name of this species. [June, 1878.]

* 1316. [**Saunders**, W:] Entomological appointments. (Can. entom., 1878, v. 10, p. 97.)

Congratulations over the appointment of C: V. Riley to be entomologist in the U. S. Department of Agriculture. [June, 1878.]

* 1317. **Graef**, E: L: On a covering superior to paper for cork-lined boxes for the cabinet. (Can. entom., 1878, v. 10, p. 97-98.)

Recipe for a white wash to be applied to the cork. [June, 1878.]

* 1318. **Andrews**, W: Valentine. Erratum, etc. (Can. entom., 1878, v. 10, p. 98.)

[See Rec., no. 1296.] Occurrence of *Pieris rapae* and *Aethilla bathyllus* near Asheville, N. C., at an elevation of 1200 to 1500 metres; *Doryphora 10-lineata* not yet found there. [June, 1878.]

* 1319. **Jack**, J: G: [The mode of extrication of silk-worm moths from their cocoons.] (Can. entom., 1878, v. 10, p. 98-99.)

[See Rec., no. 1042, 1046.] *Actias luna*, *Telea polyphemus*, and other Bombycidae cut their way out of the cocoons by means of two spines on the submedian nerve of the fore wings. [June, 1878.]

* 1320. **Gott**, B: [Lophyrus abbotii attacking Pinus strobus.] (Can. entom., 1878, v. 10, p. 99.)

Description, habits and ravages of *L. abbotii*. [June, 1878.]

* 1321. **Bates**, James Elwyn. [Doryphora decemlineata eaten by fowls.] (Can. entom., 1878, v. 10, p. 100.)

A taste for the larvae and imagos of *D. 10-lineata* induced in domestic fowls, who aided afterwards in checking the increase of the pest; [see Rec. no. 980] both larvae and imagos of *D. 10-lineata* feed on *Solanum dulcamara*. [June, 1878.]

*[1] 1322. **Saunders**, W: The Achemon sphinx. (Can. entom., 1878, v. 10, p. 101-103, fig. 4-6.)

Describes and figures larva, pupa and imago. [July, 1878.]

*[1] 1323. **Dodge**, G: M: Variations in the wing expanse of Pezotettix. (Can. entom., 1878, v. 10, p. 103-105.)

The length of the wings varies greatly, suggesting the former identity of the genera Caloptenus and Pezotettix. [July, 1878.]

* 1324. **Edwards**, W: H: Description of the preparatory stages of Neonympha eurytris. (Can. entom., 1878, v. 10, p. 105-108.)

Describes egg, larva at all stages, and pupa; habits. [July, 1878.]

[1] Record made with the assistance of Mr. E: P. Austin.

*[1] 1325. **Andrews**, W: Valentine. Description of a new Bronchelia. (Can. entom., 1878, v. 10, p. 108–109.)

Describes *B. gravilinearia* n. sp. [July, 1878.]

*[1] 1326. **Chambers**, Vactor Tousey. Micro-lepidoptera. (Can. entom., 1878, v. 10, p. 109–114.)

Describes *Coleophora vernoniaeella* n. sp., and gives descriptive and other notes on *Coriscium 5-strigella* and several species of Coleophora. [July, 1878.]

* 1327. **Siewers**, C: Gorham. Wintering Vanessa antiopa. (Can. entom., 1878, v. 10, p. 115–116.)

Observations on the hibernation of the species. [July, 1878.]

* 1328. **Bethune**, C: James Stewart, *compiler*. Insects of the northern parts of British America. From Kirby's Fauna boreali-americana: Insecta. (Can. entom., 1878, v. 10, p. 116–118, 137–139, 213–217.)

[Cont. from v. 9, p. 156; see Rec., no. 485, 1214.] Reprint of p. 270–287 of Kirby's work, comprising descriptions of 8 spp. Hym., 17 Hem., 1 Hom., 2 Lep., with notes by the compiler. [Jul.–Nov., 1878.]

* 1329. **Entomological Club of the American Association for the Advancement of Science.** [Announcement of St. Louis meeting.] (Can. entom., 1878, v. 10, p. 118, 139.) [Jul.–Aug., 1879.]

* 1330. **Murray**, W: Papilio thoas. (Can. entom., 1878, v. 10, p. 120.)

Record of capture of two specimens near Hamilton, Ont. [July, 1878.]

* 1331. **Bailey**, James Spencer. [Smerinthus cerisyi.] (Can. entom., 1878, v. 10, p. 120.)

Capture of a specimen at Center, N. Y. [July, 1878.]

* 1332. **Speyer**, Adolf. The genera of the Hesperidae of the European faunal-region. (Can. entom., 1878, v. 10, p. 121–129, 144–154, 163–170.)

[Translated from the *Stettiner entom. Zeitung*, 1878, v. 39, p. 167–193, with introduction and notes by J. A. Lintner.] Relative value of the respective structural characters; faunal distribution; systematic synopsis of the examined species of the European region; diagnostic table of the genera of the European and North American regions; particular description of the several genera. Describes Catodaulis n. g. [=Daimia Murr.]. [Aug.-Oct., 1878.]

[1] Record made with the assistance of Mr. E: P. Austin.

* 1333. **Saunders**, W: The Abbot sphinx — Thyreus abbotii Swainson. (Can. entom., 1878, v. 10, p. 130–131, fig. 7.)

Describes larva, pupa and imago; figures larva and imago. [Aug., 1878.]

* 1334. **Edwards**, W: H: On the larvae of Lyc. pseudargiolus and attendant ants. (Can. entom., 1878, v. 10, p. 131–136, fig. 8.)

Food-plants and corresponding colors of the larvae; behavior of ants and larvae toward each other; parasites of the larvae and protection afforded by the ants; description of secretory organ on segment 11 and of tubes (figured) on segment 12 of the larvae. [Aug., 1878.] [See Rec., no. 1345.]

* 1335. **Edwards**, W: H: On the scarcity of Papilionidae. (Can. entom., 1878, v. 10, p. 140.)

Papilionidae and Pieridae (which hibernate as pupae) very scarce in 1878, where in 1877 they were very abundant; Nymphalidae and Satyridae (which hibernate as larvae or imagos) abundant. [Aug., 1878.]

* 1336. **Croft**, H: Holmes. [Food-plants of Doryphora decemlineata.] (Can. entom., 1878, v. 10, p. 140.)

D. 10-lineata eats Solanum, Datura and Hyoscyamus; insect destroyers of Ribes abundant in the season of 1878. [Aug., 1878.]

* 1337. **Fish**, C: [Lepisesia flavofasciata.] (Can. entom., 1878, v. 10, p. 140.)

A specimen captured at Oldtown, Maine, 28 May, 1878. [Aug., 1878.]

* 1338. **Heustis**, *Mrs.* Caroline Eliza. Some observations on Dermestes. (Can. entom., 1878, v. 10, p. 141–142.)

Experiments on means of destroying the pests; tallow served effectually to repel them. [Sept., 1878.]

* 1339. **Bailey**, James Spencer. Mammals attracted by sugar. (Can. entom., 1878, v. 10, p. 142–143.)

Mammals, reptiles, batrachia, scorpions and coleoptera attracted to sugared patches intended to attract lepidoptera only. [Sept., 1878.]

* 1340. **Devereaux**, Willard Loomis. Tetraopes tetrophthalmus Forst. (Can. entom., 1878, v. 10, p. 143.)

Larvae supposed to feed upon roots of Asclepias; larva of *Corymbites cylindriformis* attacking imago of *Harpalus pennsylvanicus*. [Sept., 1878.]

* 1341. **Boll**, Jacob. Papilio cresphontes Cram. (Can. entom., 1878, v. 10, p. 154–155.)

Larva trigoneutic and feeding on *Zanthoxylum carolinianum* in Texas; has a protective resemblance to the excrements of birds; a specimen remained in the pupa state more than one year. [Sept., 1878.]

* 1342. **Hagen**, Hermann August. On Mermis, a parasite of the larva of Carpocapsa pomonella. (Can. entom., 1878, v. 10, p. 155–157.)

Quotations from published articles, with comments, respecting the habits of Mermis. [Sept., 1878.]

* 1343. **French,** G: Hazen. A new species of Phigalia. (Can. entom., 1878, v. 10, p. 157–158.)

Describes *Ph. cinctaria* n. sp. [Sept., 1878.]

* 1344. **Worthington,** C: Ellis. On the emergence of lepidoptera from their cocoons. (Can. entom., 1878, v. 10, p. 158–159.)

Refers to previous observations and describes his own, showing how the imago emerges from the cocoon and that the liquid used to soften the fibres of the cocoon is held in a cell on top of the head. [Sept., 1878.]

* 1345. **Edwards,** W: H: On the honey tubes of some butterfly larvae. (Can. entom., 1878, v. 10, p. 160.)

[See Rec., no. 1334.] Quotes a statement by Zeller (?) respecting the structure and function of the honey-tubes in certain Lycaenid larvae. [Sept., 1878.]

* 1346. **Spiller,** A. J. [Exchange wanted.] (Can. entom., 1878, v. 10, p. 160.)

British offered in exchange for Canadian lepidoptera. [Sept., 1878.]

* 1347. **Hagen,** Hermann August. On the new carpet bug. (Can. entom., 1878, v. 10, p. 161–163.)

[See Rec., no. 1049.] *Anthrenus scrophulariae* observed at Buffalo, N. Y., in 1872; its habits known previously in Europe; migration of insects from west to east exceptional. [Oct., 1878.]

* 1348. **Entomological Club of the American Association for the Advancement of Science.** Annual meeting. (Can. entom., 1878, v. 10, p. 170–178, 190–192.)

Address of the president, increase in the number of known species of N. A. insects within forty years, progress made and making in the extent and value of entomological study and the publication of its results, commendation of biological investigations (by J. A. Lintner); exhibition of some lepidoptera from Ga., number of broods of certain Bombycids (by A: R. Grote and A. G. Wetherby); life history of *Lecanium acericorticis*, which injures Acer, and means of destroying this and similar insects (by Miss E. A. Smith, T: Bassnett and C: V. Riley); proposed constitutional amendment regarding a quorum; very brief remarks on Hornia, Corydalis and the manner in which Bombycidae emerge from the cocoon (by C: V. Riley); election of officers; methods and success of collecting at sugar (by J. A. Lintner, A. G. Wetherby, Miss E. A. Smith, E. B. Reed); Quercus injured by *Argyrolepia quercifoliana* (by Miss E. A. Smith); instinct or reason in insects. [Oct.–Nov., 1878.]

* 1349. **Saunders,** W: The annual address of the President of the Entomological Society of Ontario. (Can. entom., 1878, v. 10, p. 181–190.)

Notes on injurious insects especially *Anthrenus scrophulariae*, *Doryphora 10-lineata*, and *Pieris rapae*; entomological literature. [Nov., 1878.]

* 1350. **Cook,** Albert J: Lecanium tulipiferae. (Can. entom., 1878, v. 10, p. 191–195, fig. 1–6.)

Describes *L. tulipiferae* n. sp.; natural history of the species; male not observed; some male Coccidae are apterous; remedies. [Nov., 1878.]

* 1351. **Grote,** A: Radcliffe. Description of two new species of Catocala. (Can. entom., 1878, v. 10, p. 195–196.)

Describes *C. beaniana* and *C. westcottii* = 2 n. spp. [Nov., 1878.]

* 1352. **Mead,** Theodore Luqueer. Description of two new Californian butterflies. (Can. entom., 1878, v. 10, p. 196–199.)

Chionobas ivallda and *Chrysophanus editha* = 2 n. spp. [Nov., 1878.]

* 1353. **Entomological Society of Ontario.** Annual meeting. (Can. entom., 1878, v. 10, p. 199–200.)

Report; election of officers; exhibition of specimens. [Nov., 1878.]

* 1354. [**Saunders,** W:] Important announcement. (Can. entom., 1878, v. 10, p. 200.)

Resignation of the Secretary-Treasurer of the Entom. Soc. Ont., J. Williams; James H. Bowman elected Sec.-Treas. [Nov., 1878.]

* 1355. **Kellicott,** D: S. A new gall moth and notes on larvae of other gall moths. (Can. entom., 1878, v. 10, p. 201–204, fig. 1–2.)

Account of three hitherto described N. A. gall-moths; describes all the stages of *Gelechia gallaeasterella* n. sp. [Nov., 1878.]

* 1356. **French,** G: Hazen. Notes on Papilio cresphontes and Catocalae. (Can. entom., 1878, v. 10, p. 204–205.)

Position of the chrysalids of *P. cresphontes*; notes a few Catocala collected in Illinois. [Nov., 1878.]

* 1357. **Cresson,** Ezra Townsend. Description of new Ichneumonidae. (Can. entom., 1878, v. 10, p. 205–210.)

Describes *Mesostenus nubilipennis*, *M. candidus*, *M. fortis*, *M. diligens*, *M. audax*, *M. exaptus*, *M. saundersi*, *M. laticinctus*, *M. promptus*, *M. americanus*, *M. macilentus* = 11 n. sp. [Nov., 1878.]

* 1358. **Dury,** C: Notes on several species of coleoptera, with some account of habits, etc. (Can. entom., 1878, v. 10, p. 210–211.)

Habits of *Meg[a]lodacne ulkei*, *Bothrideres excavatus*, *B. geminatus*, *Omophron robustum*. [Nov., 1878.]

* 1359. **Bunker,** Robert. A few hints on collecting larvae of Darapsa versicolor. (Can. entom., 1878, v. 10, p. 211–212.)

Best method of collecting; manner in which the larvae move from branch to branch. [Nov., 1878.]

* 1360. **Davidson,** G: A remarkable entomological collection. (Can. entom., 1878, v. 10, p. 212.)

[From the (*London*) *Times*.] The collection of H: Edwards contains about 60,000 species and more than 200,000 specimens; valued at $12,000, or about cost price, the labor of 25 years not estimated. [Nov., 1878.]

* 1361. [**Pettit**, Johnson.] Personal. (Can. entom., 1878, v. 10, p. 217.)

Removal from Grimsby, Ont., to Buffalo, New York. [Nov., 1878.]

* 1362. **Harrington**, W: Hague. A cheap entomological cabinet. (Can. entom., 1878, v. 10, p. 217–218.)

Thin frames covered with paper and adapted to a cabinet without drawers. [Nov., 1878.]

* 1363. **Bethune**, C: James Stewart. The tomato worm (Sphinx quinquemaculata). (Can. entom., 1878, v. 10, p. 218–219.)

Abundance of the larvae at Port Hope, Ont. Four bushels [1.41 Hl.] gathered in one day off an acre and a quarter [0.5 Ha.] of tomatoes; autumnal appearance of the imago. [Nov., 1878.]

* 1364. **Howe**, Elliott. On L. lucia and pseudargiolus. (Can. entom., 1878, v. 10, p. 219.)

Date of first appearance of *Lycaena lucia* and *L. pseudargiolus* var. *neglecta* at Yonkers, N. Y., during 1878, unfavorable to the view of the unity of the forms; deep coloration not wholly the result of cold weather; *Neonympha canthus* and *Amblyscirtes vialis* common at Yonkers. [Nov., 1878.]

* 1365. **Bunker**, Robert. [Mode of extrication of silkworm moths from their cocoons.] (Can. entom., 1878, v. 10, p. 220.)

[See Rec., no. 1042.] Observations on *Telea polyphemus* and *Samia cecropia*. [Nov., 1878.]

* 1366. **Zimmerman**, C: Diehl. [Saperdas captured.] (Can. entom., 1878, v. 10, p. 220.)

Date of appearance and habitat of *Saperda candida*, *S. puncticollis* and *S. fayi*; habits of the last. [Nov., 1878.]

* 1367. **Saunders**, W: Notes on a winter holiday. (Can. entom., 1878, v. 10, p. 221–224.)

Notice of entomological collections at Albany, N. Y., and at Washington, D. C.; observations upon insects in Florida. [Jan., 1879.]

* 1368. **Edwards**, W: H: On the pupation of the Nymphalidae. (Can. entom., 1878, v. 10, p. 224–231.)

Notice of articles upon the subject by Dr. J. A. Osborne in *Nature*, 1877, v. 15, p. 7–, and in Entom. m. mag., Aug. 1878; observations on the process in *Grapta interrogationis* and *Danais archippus*. [Jan., 1879.] [See PSYCHE, 1879, v. 2, p. 249–251.]

* 1369. **Grote**, A: Radcliffe. New N. American lepidoptera, with notes on a few little known. (Can. entom., 1878, v. 10, p. 231–238.)

Describes *Emydia ampla*, *Lygranthoecia acutilinea*, *Asopia cohortalis*, *Agrotis piscipellis*, *Hadena senescens*, *H. algens*, *H. genitrix*, *Mamestra* *noverca, Apatela theodori* = 9 n. spp.; notes on other species, especially of Agrotis. [Jan., 1879.]

* 1370. **Chambers**, Vactor Tousey. Micro-lepidoptera. (Can. entom., 1878, v. 10, p. 238–239.)

Philonome clemensella and *Laverna circumscriptella*. [Jan., 1879.]

* 1371. **Wescott**, Oliver S. Memoranda. (Can. entom., 1878, v. 10, p. 240.)

Sphinx (*Argeus*) *labruscae* captured in Michigan, and *Erebus odora* in Wisconsin; polarity of a pair of setting pliers. [Jan., 1879.]

* 1372. [**Saunders**, W:] Obituary. (Can. entom., 1878, v. 10, p. 240.)

Obituary notice of W: Valentine Andrews, b. 11 Feb. 1811, d. 20 Oct. 1878. [Jan., 1879.]

Psyche [See Rec., nos. 641–715], 1877–1879, v. 2, contains nos. 1373 to 1446.

* 1373. [**Dimmock**, G: *and* **Mann**, B: Pickman.] Introduction to the second volume. (Psyche, 1877, v. 2, p. 1–2.)

* 1374. **Scudder**, S: Hubbard. The tube-constructing ground-spider of Nantucket. (Psyche, 1877, v. 2, p. 2–9.)

* 1375. **Mann**, B: Pickman. Bibliographical record. (Psyche, 1877, v. 2, p. 9–16, 24–32, 42–48, 54–64, 90–96; 1878, v. 2, p. 117–120, 127–136, 155–168, 191–200; 1879, v. 2, p. 207–208, 214–216, 223–224, 228–232, 244–248, 254–256, 261–264, 279–296.)

* 1376. **Packard**, Alpheus Spring, *jr.* Experiments upon the vitality of insects. (Psyche, 1877, v. 2, p. 17–19.)

* 1377. **Dimmock**, G: The effect of a few common gases on arthropods. (Psyche, 1877, v. 2, p. 19–22.)

* 1378. **Hagen**, Hermann August *and* **Packard**, Alpheus Spring, *jr.* Appendages homologous with legs. (Psyche, 1877, v. 2, p. 22–23.)

* 1379. **Hagen**, Hermann August. Mimicry. (Psyche, 1877, v. 2, p. 23.)

* 1380. **Osten Sacken**, C: Robert. Tachina parasitic on Phasmidae. (Psyche, 1877, v. 2, p. 23.)

* 1381. **Morrison**, Herbert Knowles *and* **Hagen**, Hermann August. Is Aletia argillacea winter-killed every year? (Psyche, 1877, v. 2, p. 23.)

* 1382. **Austin**, E: Payson. Finding of coleoptera. (Psyche, 1877, v. 2, p. 23.)

* 1383. **Osten Sacken**, C: Robert. Moulting of the larva of Pleocoma. (Psyche, 1877, v. 2, p. 23–24.)

* 1384. **Mann**, B: Pickman *and* **Morrison**, Herbert Knowles. Protrusile abdominal appendages of moths. (Psyche, 1877, v. 2, p. 24.)

* 1385. **Emerton**, James H: Cocoon-making and egg-laying of spiders. (Psyche, 1877, v. 2, p. 33–34.)

* 1386. **Thaxter**, Roland. List of Noctuidae taken about Newton, Mass. (Psyche, 1877, v. 2, p. 34–39.)

* 1387. **Mann**, B: Pickman. What are the causes of assembling among insects? (Psyche, 1877, v. 2, p. 39–40.)

* 1388. **Scudder**, S: Hubbard. A card catalogue of illustrations. (Psyche, 1877, v. 2, p. 40.)

* 1389. **Hubbard**, H: Guernsey. Beetles which infest elm-trees. (Psyche, 1877, v. 2, p. 40.)

* 1390. **Scudder**, S: Hubbard *and* **Mann**, B. Pickman. Attitudes in which some wasps are supposed to sleep. (Psyche, 1877, v. 2, p. 40–41.)

* 1391. **Hagen**, Hermann August. Prof. Zeller's review of Edwards' Butterflies of North America, vol. i. (Psyche, 1877, v. 2, p. 41–42.)

* 1392. **Hagen**, Hermann August. Extent of the North American faunal region southwards. (Psyche, 1877, v. 2, p. 42.)

* 1393. **Hagen**, Hermann August. Attachment of pollinia to insects. (Psyche, 1877, v. 2, p. 42.)

* 1394. **Scudder**, S: Hubbard. On the structure of the head of Atropos. (Psyche, 1877, v. 2, p. 49–51.)

* 1395. **Moody**, H: Loring. The larva of Chauliodes. (Psyche, 1877, v. 2, p. 52–53.)

* 1396. **Mann**, B: Pickman. Descriptions of some larvae of lepidoptera, respecting Sphingidae especially. (Psyche, 1877, v. 2, p. 65–79; 1879, v. 2, p. 265–272.)

* 1397. **Thaxter**, Roland. Additions to the list of Newton Noctuidae. (Psyche, 1877, v. 2, p. 80.)

* 1398. **Chambers**, Vactor Tousey. Notes upon the American species of Lithocolletis. (Psyche, 1877, v. 2, p. 81–87, fig. 1–4.)

* 1399. **Burgess**, E: On the structure of the head of Atropos. (Psyche, 1877, v. 2, p. 87–89.)

* 1400. **Scudder**, S: Hubbard. A plague of horse-flies. (Psyche, 1877, v. 2, p. 89.)

* 1401. **Scudder**, S: Hubbard. Recent progress of entomology in North America. First annual address of the president [of the Cambridge Entomological Club]. (Psyche, 1878, v. 2, p. 97–116.)

* 1402. **Thaxter**, Roland. Notes on some Noctuid larvae found about Newton, Mass. (Psyche, 1878, v. 2, p. 121–123.)

* 1403. **Emerton**, James H: Oviposition in spiders. (Psyche, 1878, v. 2, p. 123–124, fig. 5.)

* 1404. **Scudder**, S: Hubbard. Locusts in mid-ocean. (Psyche, 1878, v. 2, p. 124–125.)

* 1405. **Dimmock**, G: Chemical experiments on the respiration of insects. (Psyche, 1878, v. 2, p. 125–126.)
* 1406. **Leconte**, J: Lawrence. Stridulation of coleoptera. (Psyche, 1878, v. 2, p. 126.)
* 1407. **Andrews**, W: Valentine. Elytra of Dytiscus and Acilius. (Psyche, 1878, v. 2, p. 126.)
* 1408. **Williston**, S: Wendell. Mode of advent of Anthrenus scrophuluriae [*sic*]. (Psyche, 1878, v. 2, p. 126.)
* 1409. **Chambers**, Vactor Tousey. On larvae of Tineina, especially of Lithocolletis. (Psyche, 1878, v. 2, p. 137–153, fig. 6–8; 1879, v. 2, p. 227.)
* 1410. **Coleman**, Nathan. A singular place for rat-tailed larvae. (Psyche, 1878, v. 2, p. 154.)
* 1411. **Thaxter**, Roland. Interesting captures. (Psyche, 1878, v. 2, p. 154.)
* 1412. **Scudder**, S: Hubbard. Plantain beetles. (Psyche, 1878, v. 2, p. 154.)
* 1413. **Scudder**, S: Hubbard. Orthoptera of Florida. (Psyche, 1878, v. 2, p. 154.)
* 1414. **Osten Sacken**, C: Robert. Insects which live in resin. (Psyche, 1878, v. 2, p. 154.)
* 1415. **Osten Sacken**, C: Robert. Peculiarities of riparian insects. (Psyche, 1878, v. 2, p. 154.)
* 1416. **Morrison**, Herbert Knowles. Insect deformities. (Psyche, 1878, v. 2, p. 155.)
* 1417. **Edwards**, W: H: Life history of Danais archippus. (Psyche, 1878, v. 2, p. 169–178; 1879, v. 2, p. 213.)
* 1418. **Edwards**, W: H: Some synonyms of butterflies. (Psyche, 1878, v. 2, p. 178.)
* 1419. **Mead**, Theodore Luqueer. Notes on certain Californian diurnals. (Psyche, 1878, v. 2, p. 179–184.)
* 1420. **Webster**, C: E: Breeding habits of Callosamia promethea. (Psyche, 1878, v. 2, p. 185–188.)
* 1421. **Burgess**, E: Eristalis tenax Linn. in America. (Psyche, 1878, v. 2, p. 188.)
* 1422. **Cresson**, Ezra Townsend. Parasite on Magdalis. (Psyche, 1878, v. 2, p. 189.)
* 1423. **Cresson**, Ezra Townsend. Hymenopterous insect from stems of the black raspberry. (Psyche, 1878, v. 2, p. 189.)
* 1424. **Scudder**, S: Hubbard. A cardinal grasshopper. (Psyche, 1878, v. 2, p. 189.)
* 1425. **Mann**, B: Pickman. Prionus prolific. (Psyche, 1878, v. 2, p. 189.)
* 1426. **Scudder**, S: Hubbard: List of butterflies collected in Florida by Dr. Palmer. (Psyche, 1878, v. 2, p. 190.)

* 1427. **Morrison**, Herbert Knowles. [Dark variety of Pieris monuste.] (Psyche, 1878, v. 2, p. 190.)

* 1428. **Hagen**, Hermann August. Insects imported from Europe. (Psyche, 1878, v. 2, p. 191.)

* 1429. **Mark**, E: Laurens. The nervous system of Phylloxera. (Psyche, 1879, v. 2, p. 201–207, fig. 9.)

* 1430. **Gissler**, Carl Friedrich. On the repugnatorial glands in Eleodes. (Psyche, 1879, v. 2, p. 209–210, fig. 10.)

* 1431. **Hagen**, Hermann August. Attacks of native insects upon imported trees. (Psyche, 1879, v. 2, p. 210–211.)

* 1432. **Gardiner**, F:, *jr.* Coleoptera of the White Mountains. (Psyche, 1879, v. 2, p. 211–213.)

* 1433. **Parker**, H: Webster. Hawaiian butterflies. (Psyche, 1879, v. 2, p. 213.)

* 1434. **Austin**, E: Payson. Geographical distribution of North American coleoptera. Second annual address of the president [of the Cambridge Entomological Club]. (Psyche, 1879, v. 2, p. 217–223, p. 227–228.)

* 1435. **Riley**, C: Valentine. The nervous system and salivary glands of Phylloxera. (Psyche, 1879, v. 2, p. 225–226.)

* 1436. **Gissler**, Carl Friedrich. The anatomy of Amblychila cylindriformis Say. (Psyche, 1879, v. 2, p. 233–244, fig. 11 ["10"], pl. 1.)

* 1437. [**Riley**, C: Valentine.] Pupation of the Nymphalidae. Abstract. (Psyche, 1879, v. 2, p. 249–251.)

* 1438. **Patton**, W: Hampton. Is this Euchaetes collaris, Fitch? (Psyche, 1879, v. 2, p. 252–253.)

* 1439. **Sprague**, Frank Headley. Notes on butterflies of Massachusetts. (Psyche, 1879, v. 2, p. 257–260.)

* 1440. **Bean**, T: Ebenezer. Westward progress of Eristalis tenax, Linn. (Psyche, 1879, v. 2, p. 260.)

* 1441. **Patton**, W: Hampton. The ovipositor of Amblychila. (Psyche, 1879, v. 2, p. 260–261.)

* 1442. **Sanborn**, Francis Gregory *and* **Lintner**, Joseph Albert. An account of the collections which illustrate the labors of Dr. Asa Fitch. (Psyche, 1879, v. 2, p. 273–276.)

* 1443. **Scudder**, S: Hubbard. Junonia coenia in New England. (Psyche, 1879, v. 2, p. 276–277.)

* 1444. **Patton**, W: Hampton. On the spiracles of coleoptera and on the sound produced by Polyphylla. (Psyche, 1879, v. 2, p. 278–279.)

* 1445. **Mann**, B: Pickman. Systematic index to Psyche, vol. 2.

* 1446. **Dimmock**, G: Alphabetic index to Psyche, vol. 2.

No. 64 was issued August 9, 1879.

SYSTEMATIC INDEX TO PSYCHE, VOL. 2.

(According to the Dui decimal system.)

By B: PICKMAN MANN.

---

0. GENERAL.

01. BIBLIOGRAPHY.

1000a). Herrick, S. B., 864l. Hewitson, 875, 881. Heustis, 1338. Hill, F. C., (979f, 1202). Holden, 754, 755, 756. Horn, 801, 802, 806, 807, 810-815, (979f, 1155), 1000b, 1100. Howe, 1364. Hoy, 1251. Hubbard, 1389. Hübner, (716, 1077, 1085, 1101). Hulst, 1304. Huntington, 900, Hyatt, 729a. Jack, 1319. Jackson, 899. Johnson, 936, 938, 948, 955, 956. Joly, 876. Jousset de Bellesme, (871), 882. Judd, 1012. K———, C., 861bb. Katter, (1022a). Kayser, 1007 (862t, 1011). Kellicott, 1355. King, H. A., 990 (946f). King, N. H., 990 (946f). King, *Mrs.* V. O., 1041, 1054. Kingsley, 1011. Kirby, W:, (485, 1214, 1328 [1100]). Kirby, W. F., (818d), (1037a). Kirkwood, 794. Kowalewski, (874). Lacordaire, (1000a). Lakes, 953. LeConte, 803-805, 809, (818c), 842, 845 (1155), 972d, (979f, 1155), 1022b, 1115, 1406. Leidy, 833, 837, 883, 1022b. Lintner, 763, 849, (1037a, 1283), 1049, 1097, 1198, 1332, 1348. Livett, 923. Lockwood, 1001. Loomis, 867a. Lubbock, (861l, 865h, 867l), (910n), (1006). Lyman, 1066, 1067, 1127. M——, R., 864r. M———, S. R., 864f, (p). McCook, 816, 843, 844, 867q, 1022b, 1044. McLachlan, 820, 822. McLaren, 1046. Mann, 736, 1000b, 1037n, 1111, 1373, 1375, 1384, 1387, 1390, 1396, 1425, 1445. Mark, 1429. Marshall, 1051. Mayer, (1000a). Mead, 1069, 1133, 1352, 1419. Meek, 930. Megnin, 877. Merrick, 916. Minot, 1030, 1040. Michels, 867r. Moffat, 1181, 1203, 1207. Monell, 1183. Monteiro, (1037a). Moody, 1395. Morris, J: G., 946k, 1121, 1250. Morrison, 732, 737, 758, 839, 1381, 1384, 1416, 1427. Morse, 864n. Müller, F., 945, 1006, 1017. Mulligan 1002. Murray, A., 949, (979e, 1022a, 1202), 1033. Murray, W:, 1146, 1330. Murtfeldt, 1116, 1124. Norman, 1081. Norton, E:, 791. O———, 919. Orton, 861e. Osborne, 794, 1368. Osten Sacken, 733, 734, 854, 855, 1032, 1380, 1383, 1414, 1415. Packard, 795, 796, 854, 867p, 994 (979f, 1022a, 1169), 998, (1000a, 1058c, 1111), 1010, 1015, 1018, 1025, 1026, 1028, 1031, 1042, 1047, 1179, 1376, 1378. Palmer, 1037f. Parker, 1433. Pasteur, 861w. Patton, 1438, 1441, 1444. Peabody, 1103. Pearson, C: W., 1172. Pearson, G: W., *jr.*, 1204. Peck, C: H., 761b, 762b. Peck, G: W., 1096, 1134, 1208, 1253, 1301. Pennington, 794. Peters, 1021. Pettit, 1361. Pickering, 729b. Pignede, 910j. Pillsbury, 794 (979f, 1155). Plateau 830, (862k), 871, 878, 1022f, Potts, 1037b Preudhomme de Borre, 818a, b, c, d. Provancher, 765, 767-776, 778-787, 991, (764c), 992 (946f). Pusey, 794 (979f, 1155). Putzeys, 818c, 819, 824. Rambur, (820), (822). Randall, (721). Rathvon, 910l, 918, 920, 928, 933, 962, 964. Reed, 1136, 1267, 1348. Reuter, 757. Ridings, J., 846. Riley, 719, 763x, 794 (979f, 1155), 795, 796, 797, 798, 864c, n, p, x, y, 865a, i, k, o, q, 867g, h, j, s, w, 894, 970 (910i, 1000a, 1058c), 971 (979e, 1202), 981, 1000b, 1035, 1038, 1039, 1115, 1284, 1295, 1348, 1435, 1437. Robinson, 760. Roelofs, 818b. 827. Romaines, 931. Ryder, 1050, S———, J. R., 942. St. Cyr, 789. Sanborn, 903, 907, 1442. Saunders, W:, 925, 972b, c, 974, 976, 977, 979b, f, 985, 1082, 1115, 1128, 1131, 1136, 1153, 1155, 1164, 1168, 1169, 1170, 1177, 1202, 1216, 1217, 1219, 1221, 1222, 1236, 1263, 1266, 1267, 1269, 1273, 1277, 1279, 1283, 1291, 1316, 1322, 1333, 1349, 1354, 1367, 1372. Saussure, 791. Say, (967d). Schwarz, 1000b. Scott, (967c). Scudder, 591 (1000a), 716 (1077), 717, 720, 722-725, 728, 729b, c, 731, 735, 738-743, 745-747, 792, 821, 859, 860, 886, 890, (979f, 1169), 1000b, 1004, 1013, 1016, 1020, (1022a), 1029, 1037b, 1070, 1080, (1103, 1133), (1268), (1283), 1374, 1388, 1390, 1394, 1400, 1401, 1404, 1412, 1413, 1424, 1426, 1443. Seaman, 934. Seiss, 867k, u. Selys Longchamps, 818b, 829c, 868, 869, 870. Serville, (967c, m). Shoemaker, 861o. Siewers, 982, 1197, 1313, 1327. Slosson, 867d. Smith, Emily A., 1053, 1056, 1348. Smith, W., 793. Snow, 1036. Speyer, 1332. Sprague, F. H., 1439. Sprague, P. S., 721. Stauffer, 861f, 905. Staol, 748-753, 829a, 866. Stebbins, J. H., 1000b. Strecker, 79, (1283), 841, 996 (1283). Stuxberg, 754, 755, 756. Taschenberg, (1037a). Tenney, 1022e. Thaxter, 1386, 1397, 1402, 1411. Thomas, C., 794 (979f, 1155), 795, 796, 896. 993 (946f, 1037a). Thomas, F. A. W., 1285. Thompson, 861p. Thorell, 726, 857, (1037a), 1043. Treat, 999. Trouvelot, 1027. Tullberg, (1000a). Tupper, 865g. Turner, 1052. Uhler, 568 (967n, o), 718, 856. Van Lansberge, 825 Van Wagenen, 1228, 1297. W———, E., 914. W———, W. W., 861q. Walker, F., (1151). Walker, J. S., 946c. Wallace, 1034. Webster, C: E:, 1420. Weismann, (1022a). Welles, 943. Westcott, 1063. 1252, 1371 Westwood, (716), (967c), (1314). Wetherby, 979c, 1229, 1348, White, F. B., 1143, 1276. Whiteaves, 887a, 893. Whitman, 793, 995. Whitney, C: P., 1083. Whitney, F. A., 867b. Wilde, 1037k. Williams, A. D., 794. Williams, J., 978, 987, 988. Wilber, 794. Willcox, 836. Williston, 1037d, e, 1225, 1408. Wise, 793. Wood-Mason, 873, 879. Worthington, 940, 1112, 1130, 1162, 1233, 1270, 1281, 1344. Zabriskie, 1000d. Zaleski, 862r. Zeller, 1109, 1345, (1391). Zimmerman, 1206, 1275, 1300, 1366. Zirngiebel, 861i.

040. Polygraphy. Extracts, notices and reviews. (*See references in parentheses under authors, periodicals and society publications.*)

050. General periodicals. Argus [Albany, N. Y.], 849. Daily graphic, (972c). Home and school, (864l). Littell's living age, 1034. Macmillan's mag., 1034.

060. General societies. Centennial exposition [Philadelphia], 785, 1058a, 1059, 1128, 1236. PROCEEDINGS: of Institut canadien, 780.

2. THEOLOGY.

3. SOCIOLOGY.

4. PHILOLOGY.

5. NATURAL SCIENCE.

595005. Periodicals of entomology. Can. entom., 448 (1081), 476 (888, 1067, 1074), 533 (1074), (939, 940, 946*k*), 1058-1372 (1065), 1115 (972*d*), 1128 (972*b*), 1131 (974), 1139 (974), 1153 (976), 1155 (979*f*), 1164 (976), 1169 (979*f*), 1170 (979*d*), 1177 (979*f*), 1197 (982), 1202 (979*e*), 1205 (983), 1224 (981), 1229 (979*c*), 1236 (979*a*, *b*), 1247 (979*a*), 1255 (984). Col. Hefte, 825. Entomologist, 1279. Entom. mo. mag., (1368). Psyche, 680 (1004), 1022*a*, 1373-1446.

595006. Societies of entomology [*see also* **506**].

COLLECTIONS, 1367: of Entom. soc. Ontario, 972*b*, *c*, 1058*a*, 1236, 1266, 1353.

HISTORY: of Amer. entom. soc., 834*a*, 840*a*, 846, 1256; of Cambr. entom. club, 895*m*, 910*b*, 946*a*; of Entom. club A. A. A. S., 910*c*, 979*b*, 1037*n*, 1058*a*, 1115, 1216, 1229, 1329; of Entom. sect. acad. nat. sci. Philad., 834*a*, 840*a*, 846; of Entom. soc. Ontario, 972*b*, *c*, 979*a*, 1168, 1236, 1353, 1354; of same — London branch, 972*b*, 979*a*, 1282; of same — Montreal branch, 972*b*, 979*a*, 1247; of L. I. entom. soc., 1180.

PROCEEDINGS: of Cambr. entom. club, 1000*b*, 1022*b*, 1401, 1434; of Entom. club A. A. A. S., 775, 972*d*, 979*c*, 1059, 1115, 1229, 1348; of Entom. soc. Ontario, 972*a*, 979*b*, 1059, 1128, 1236, 1349.

PUBLICATIONS. Trans. Amer. entom. soc., 799-817, 1268. Repts. Entom. soc. Ontario, 626 (764*b*), 633 (910*i*), 972-978 (946*f*), 979-989 (946*f*). Anual. soc. entom. Belg., 818-833. Compt.-rend. soc. entom. Belg., 818, 823, 826, 829, 831.

595007. Education in entomology, 1037*g*. Entomological ignorance, 861*l*. Elementary information, 791, 991, 996. Schools, 1037*g*.

595009. History of entomology, 721, 1115, 1236, 1348, 1401. Tortricidae, 1312.

Special Entomology.

5951. HEXAPODA.

59511. HYMENOPTERA,

770, 856, 874, 993*e*, 1123, 1214, 1328. Fossil, 859.

Apidae. Apis, 863*l*, 864*l*, 978, 1006 [see also **638**]. Bombus, 1009. Xylocopa, 1052. Anthophora, 1401. Megachile, 767.

Vespidae, 791, 861*aa*. Vespa, 863*g*, 966. Polistes, 1376.

Eumenidae, 791. Odynerus, 1390.

Masaridae. Masaris, 791.

Crabronidae. Crabro, 1423.

Sphegidae. Sphex, 863*g*. Ammophila, 770, 1390. Pelopoeus, 1376.

Mutillidae. Mutilla, 800, 861*h*.

Formicidae, 859, 861*d*, *h*, *j*, *z*, 865*e*, 867*o*, 898, 910*n*, 1006, 1022*o*, 1261, 1268, 1334, 1401. Formica, 816, 843, 867*q*, 1022*b*, 1044. Lasius, 883.

Evaniidae. Foenus, 1390.

Ichneumonidae, 765, 771, 773, 786, 971*h*. Porizon, 978. Ophion, 733, 1130. Anomalon, 971*g*. Limneria, 971*c*. Pimpla, 978. Mesostenus, 1357. Ichneumon, 859, 1376.

Braconidae. Calyptus, 1422. Sigalphus, 978. Microgaster, 1026, 1051, 1055.

Proctotrupidae. Pteratomus, 1045.

Chalcididae. Eurytoma, 1401. Isosoma, 1179. Diomorus, 1423. Pteromalus, 1059. Coccophagus, 1053.

Cynipidae, 1022*b*, 1195, 1314. Cynips, 864*s*, 915, 1008.

Tenthredinidae, 1401, 1431. Cimbex, 1203. Pristiphora, 971*a*. Nematus, 864*s*, 971*a*, 986, 993*j*, 1079. Emphytus, 971*b*. Selandria, 993*j*. Tenthredo, 1405. Lophyrus, 971*c*, *d*, 1320. Phylloecus, 776.

Uroceridae, 776. Urocerus, 964. Tremex, 978.

59512. LEPIDOPTERA,

79 (1283), 763, 770, 841, 856, 902, 945, 993*e*, 996 (1283), 1060, 1150, 1192, 1270, 1305, 1328, 1344, 1384, 1401, 1426, 1431. Fossil 591 (1000*a*).

Rhopalocera, 179 (746), 716, 720, 735, 745, 747, 763(VIII), 792, 808, 817, 818*d*, 888, 951, 957, 961, 1000*b*, 1029, (1037*a*), 1067, 1074, 1133, 1144, 1177, 1231, 1237, 1241, 1243, 1258, 1335, 1368, 1391, 1417, 1418, 1419, 1426, 1439.

Nymphalidae, 1368, 1437. *Satyrinae.* Neonympha [Megisto], 1260, 1324, 1364. Satyrus, 1210. Oeneis [Chionobas], 821, 1005, 1352. *Danainae.* Danais [Danaida], 946*l*, 994, 1094, 1104, 1368, 1417, 1433. *Nymphalinae,* 961. Charaxes, 1398. Limenitis, 994, 1188, 1207. Grapta, 1307. Vanessa, 1135, 1157, 1327; [Aglais], 1069, 1405. Pyrameis [(Vanessa)] 729*b*, 1000*b*, 1013, 1020, 1433. Junonia, 1443. Prodryas, 1037*b*. Lethites, 716. Argynnis [Brenthis], 720, 817, 864*h*, 957, 1110, 1127, 1154, 1281. Melitaea, 946*t*, 1204, 1220, 1237, 1287, 1299. Phyciodes, 1137, 1226, 1243.

Lycaenidae, 957. *Theclinae.* Thecla, 745*b*, 951. *Lycaeninae,* 1022*b*, 1103, 1345. Lycaena, 1044, 1269; [Everes], 1125, 1241; [Cyaniris], 1000*b*, 1080, 1243, 1268, 1311, 1334, 1364; [Agriades], 720; [Glaucopsyche, Nomiades], 1070. Chrysophanus, 729*e*, 817, 1352.

Papilionidae. *Pierinae,* 1028. Callidryas, 181 (746). Colias, 729*e*. Pieris [Ganoris], 729*e*, 895*b*, 910*b*, 922, 977, 979*b*, 986, 1059, 1079, 1233, 1236, 1242,

59515. RHYNCHOTA,

718, 770, 789, 856, 1143, 1328.

HETEROPTERA

864*u*, 967 (1022*a*, 1155), 1415.

Pentatomidae. *Asopinae.* Podisus, 969*p*, 971*a*. Arma, 867*b*. Murgantia, 993*h*. *Pentatominae.* Cosmopepla [Eysarchoris], 779. Pentatoma, 779, 864*u*. Euschistus, 910*g*, 969*q*. Nezara, 969*q*.

Coreidae. Leptoglossus, 969*q*.

Lygaeidae. Blissus, 1401. Pachymerus, 859.

Pyrrhocoridae. Largus, 969*q*. Dysdercus, 969*t*.

Tingitidae. Tingis, 764*d*.

Phytocoridae, 757. Calocoris, 969*l*.

Anthocoridae. Anthocoris, 969*l*. Cimex, 861*k*, *r*, *bb*, 910*b*.

Reduviidae. Sinea, 910*f*. Reduvius, 962. Conorhinus, 946*c*.

Galgulidae. Galgula, 1397.

Belostomidae. Belostoma, 911, 971*i*, 1401.

Nepidae. Ranatra, 911.

Corisidae. Corixa, 1057.

HOMOPTERA

859.

Cicadidae. Cicada, 772, 865*m*, 867*a*, *d*, *k*, 1000*b*.

Membracidae. Entilia, 779.

Fulgoridae. Fulgora, 867*c*.

Aphididae, 985. Aphis, 969*g*. Eriosoma, 986. Colopha [Byrsocrypta], 1183. Chermes, 1431.

Phylloxeridae, 832. Phylloxera, 861*m*, *y*, 862*g*, 863*c*, 864*w*, 865*d*, 895*l*, 910*j*, 925, 937, 946*s*, 970*e*, 986, 1037*i*, 1429, 1435.

Coccidae. Aspidiotus, 1429. Lecanium, 965, 1053, 1056, 1348, 1350.

PHYSOPODA

859.

59516. NEUROPTERA,

718, 770, 783, 787, 856.

Phryganeidae, 781, 822, 859.

Panorpidae. Panorpa, 861*t*.

Hemerobiidae, 820, 864*d*. Myrmeleon, 1220. Chrysopa, 985. Berotha, 733. Mantispa, 771, 1000*b*, 1393.

Sialidae. Chauliodes, 1395. Corydalus, 865*q*, 971*i*, 1037*b*, 1115, 1348, 1401.

59517. PSEUDONEUROPTERA,

718, 783, 787, 856, 1392.

Odonata, 730. *Calopterygina*, 869. *Agrionina*, 787, 829*c*. Agrion, 988. *Gomphina*, 868. *Aeschnina*. Aeschna, 771. Allopetalia, 868. *Cordulina*, 870. *Libellulina*, 988. Libellula, 882, 890. —— Haplophlebium, 731 (747), 890.

Ephemerina, 876. Ephemera, 895*e*.

Perlina, 1378. Capnia, 782. Pteronarcys, 1401.

Psocina, 1394, 1399.

Termitina. Termes, 729*d*, 861*f*, *x*, 946*b*, 1000*b*, 1014, 1213, 1431.

59518. ORTHOPTERA,

717 (746), 748, 751, 752, 770, 778, 792, 856, 879, 1037*k*, 1169, 1388, 1413.

GRYLLODEA, 748(3), 829*a*.

Gryllotalpidae. Gryllotalpa, 867*e*, 1004.

Myrmecophilidae. Myrmecophila, 1022*b*.

Gryllidae. Gryllus, 741, 778, 1000*b*, 1030, 1405.

Anostostomidae, 752 (*c*).

LOCUSTODEA, 748(2), 753, 829*a*.

Decticidae. Eppia, 751(3).

Locustidae. Locusta, 884.

Conocephalidae, 722 (746).

Phaneropteridae. Arethaea, 752(*d*). Phylloptera, 1424.

Pseudophyllidae, 751(3).

Phyllophoridae, 752(*d*). Stålia, 722 (746).

ACRIDIODEA, 728 (746), 748(1), 751(3), 753, 775, 861*o*, 862*c*, *v*, 864*a*, *g*, 1000*b*, 1022*i*, 1040, 1211.

Tettigidae. Tettigidea, 792.

Acridiidae, 1401. Diponthus, 752(*b*). Rhomalea, 929. Aristia, 752(*d*). Acridium, 741, 778, 864*y*, 926; [Schistocerca], 1404. Caloptenus, 724 (746), 768, 778, 793, 794 (1155), 795, 796, 797, 798, 836, 861*v*, 862*d*, *h*, *l*, *m*, *r*, 863*f*, *k*, *m*, 864*c*, *y*, 865*i*, *k*, *n*, *o*, 867*g*, *h*, *i*, *w*, 891, 892, 894, 895*c*, *i*, 899, 900, 916, 946*e*, 970*d*, 971*h*, 975, 993*f*, 995, 1000*b*, *i*, 1025, 1035, 1039, 1040, 1059, 1062, 1187, 1323. Pezotettix, 724 (746), 792, 1062, 1098, 1187, 1323. Mazaea, 752(*d*).

Phymatidae. Protomachus, 752(*d*).

Eremobidae. Eremobia, 896.

Oedipodidae, 725 (746), 728. Arphia, 792. Oedipoda, 1040, 1089, 1098, 1401. Pachytylus, 923. Trimerotropis, 741, 1374. Spharagemon, 723 (746).

Truxalidae, 752(*b*). Gomphocerus, 792. Stenobothrus, 856.

PHASMODEA (**Phasmidae**), 748(3), 750. Autolyca, 1000*b*. Anisomorpha, 1000*b*.

MANTODEA (**Mantidae**), 873. Mantis (Stagmomantis), 867*u*, 906.

BLATTODEA, 729*c*, 749, 1016, 1022*f*. Blattina, 886, 890.

Periplanetidae. Periplaneta [Blatta], 865*p*, 871.

DERMATOPTERA

Forficulidae, 729*c*, 738, 739, 742, 747, 1000*b*, 1016, 1250. Forficula, 946*k*. Labia, 740.

59519. THYSANURA.

Poduridae, 1000*a*. Isotoma, 1026, 1378. Tomocerus, 854. Podura, 927.

5952. MYRIOPODA,

872.

CHILOPODA.

Lithobiidae, 754, 755, 756.

Geophilidae. Geophilus, 1037*p*.

9. HISTORY.

923. Biography of sociologists. Governors, 794. Davis, C. K., 793.

925. Biography of scientists, 996z. · Andrews, 1372. Austin, 1058*d*. Billings, 893. D'Urban, 1151. Hentz, 790. Hübner, 1101. Humphreys, 777*a*. Kirtland, 1037*c*, 1279. LeBaron, 1022*c*. Murray, 1037*c*, 1279. Newman, 1000*h*. Orton, 717, 718. Packard, 850, 852, 856. Palmer, 733. Pettit, 1361. Purves, 824. Thaxter, 735, 744. Walker, F., 764*d* (bis), 1151. Wollaston, 1037*c*, 1279.

Lists of scientists, 967*h*, 1159.

Lists of members of scientific societies. Entom. section acad. nat. sci. Philad., 840*a*. Soc. entom. Belg., 818*e*, 820*d*.

State entomologists. Georgia, 777*a*, Illinois, 993. Minnesota, 793. Missouri, 970, · 971. Ontario, 972, 979. United States, 795-798, 1037*j*, *o*.

Notices of private collections of insects, 1434. Edwards (H.), 1360. Fitch (A.), 1442. Janson, 847.

926. Biography of economists. *Lists of members of societies of useful arts.* Conference of governors, etc., 794.

[Bind this directory so that it can be unfolded to be read when the volume is closed.]

PAGING OF THE BIBLIOGRAPHICAL RECORD OF PSYCHE, VOL. 1.

Record nos.	Page nos.	Record nos.	Page nos.	Record nos.	Page nos.	Record nos.	Page nos.
1-4	3	142-144	54	290	115	506-524	174
5-7	4	145	56	291-308	116	525-532	176
8-10	7	146-147	59	309-312	118	533-537	179
11-16	8	148-155	61	313-314	120	538-549	180
17-23	11	156-169	63	315-317	none	550-559	182
24-26	12	170-172	64	318-320	125	560-566	188
27-33	15	173-182	71	321-329	127	567-578	190
34-37	19	183-189	72	330-336	128	579-584	192
38-39	20	190-201	79	337-344	132	585-586	195
40-41	23	202	80	345-359	134	587-600	196
42-45	24		86	360-367	136	601-611	198
46-55	27	203-210	86	368-374	140	612-617	200
56-60	28	211-218	88	375-380	142	618-620	205
61-64	31	219-225	94	381-397	148	621-633	206
65-70	32	226-236	100	398-416	150	634-640	208
71-79	36	237-242	102	417-433	156	641-666	214
80-92	38	243-247	104	434-446	158	667-685	216
93-103	44	248-253	107	447-449	163	679a	218
104-121	46	254-264	108	450-466	164	686-700	217
122-130	48	265-279	110	467-486	166	701-715	218
131-142	52	280-289	112	487-505	172		

PAGING OF THE BIBLIOGRAPHICAL RECORD OF PSYCHE, VOL. 2.

Record nos.	Page nos.	Record nos.	Page nos.	Record nos.	Page nos.	Record nos.	Page. nos.
716-717	9	852-854	64	990-994	164	1162-1177	246
718-729	10	855-856	90	995-1000	166	1178-1187	248
730-742	12	857-859	93	1001-1002	168	1188-1204	254
743-748	15	860-864	94	1003	191	1205-1214	256
748 (2-3)	16	865-866	96	1004-1019	192	1215-1220	261
749-752	34	867-868	117	1020-1029	194	1221-1239	263
753-758	26	869-877	118	1030-1038	196	1240-1248	264
759-765	28	878-882	120	1039-1052	198	1249-1254	279
766-774	30	883-889	127	1053-1058	200	1255-1271	280
775-780	32	890-904	128	1059-1062	207	1272-1289	282
781-788	42	905-915	130	1063-1070	208	1290-1308	284
789-794	44	916-934	132	1071-1084	214	1309-1324	286
795-802	46	935-946	134	1085-1092	216	1325-1342	288
803-806	48	947-954	136	1093	223	1343-1360	290
807-814	54	955	155	1094-1102	224	1361-1384	292
815-825	56	956-967	156	1103-1119	228	1385-1426	294
826-832	58	968-970	158	1120-1137	230	1427-1446	296
833-842	60	971-977	160	1138-1147	232		
843-851	62	978-989	162	1148-1161	244		

ALPHABETIC INDEX TO PSYCHE, VOL. 2.

BY GEORGE DIMMOCK.

NOTICE.

The Systematic index, the Correction of errors detected, and the Title-page, separately paged, are yet to appear, to complete the second volume of PSYCHE. The Systematic index is intended to be bound in before the Alphabetic index.

March, 1882

CORRECTION OF ERRORS DETECTED.

(See page 246 of volume 1. Titles of articles have been copied exactly, including their typographical errors. In the text and notes the names of genera and species have been spelled as they should be, assuming that with the fewest exceptions they must remain as originally given, notwithstanding etymological or other improprieties in their formation. Only those errors of typography are corrected here which are due to the editors or printers, and which would, if uncorrected, interfere with the proper understanding of the text.)

Errors in the text, not in columns. (See also, corrections on p. 126 and 168.)

Page	line				
10	1	for	Steirodonopes	*read*	Steirodonopis
"	— 5	"	Locustariae	"	Locustariæ
11	23	"	geographica	"	geographical
23	20	"	Liebow	"	Siebold
26	23	"	*acrtd-*	"	*acrid-*
29	1	"	*Tclea*	"	*Telea*
"	7	"	*oblinata*	"	*oblinita*
"	9	"	*uca*	"	*luca*
"	— 9	"	*d.*	"	*d* (bis).
30	— 9	"	*tuberculaus*	"	*tuberculatus*
38	—15	"	followed	"	follows,
41	— 7	"	*eri*	"	*erii*
48	— 8	"	characters, and	"	characters and
"	— 3	"	*clypeata* from Cal.,	"	*clypeata*,
55	8	"	Cymatodera;	"	Cymatodera
"	9	"	Trichodes	"	Trichodes;
67	— 5	"	variety by	"	variety, by
69	—14	"	pl. 26.	"	pl. 25.
71	—19	"	pearl-white, papillae	"	pearl-white papillae
76	—20	"	Length 77 mm.	"	Length 75 mm.
77	6	"	spingial	"	sphingial
"	— 5	"	1869	"	1859
80	— 1	"	Jan. 12, 1878.	"	Jan. 11, 1878.
83	—19	"	form.	"	form, 7 mm. long.
"	—17	"	"secondary"	"	intermediate
"	"	"	*cincinnatiella.*	"	*cincinnatiella*, 5 mm. long.
91	—18	"	Asilidae,	"	Asilidae
92	19	"	*signortii*	"	*signoretii*
109	—15	"	*Halesidota*	"	*Halisidota*
114	—14	"	*Phryganidea*	"	*Phryganidia*
117	9	"	Thc	"	The
119	—12	"	*	"	*876.
"	—11	"	Feb.	"	[Feb.
"	— 8	"	*	"	*877.
126	— 9	"	SCROPHULURIAE	"	SCROPHULARIAE
131	3	"	no. 968	"	no. 970
"	—24	"	eat	"	ate
"	—23	"	*grandis*	"	*grande*
132	9	"	North-west	"	North west
133	—15	"	venomous	"	venemous
154	12	"	*triloba*	"	*biloba*
"	22	"	collected	"	collected by Mr. R. Thaxter
"	"	"	*Anisobia*	"	*Anisolabis*
"	26	"	*Leptysina*	"	*Leptysma*
156	—11	"	*Pholisorapirus*	"	*Pholisora pirus*
159	1	"	*Laphrygma*	"	*Laphygma*
161	—17	"	*Tergrodera*	"	*Tegrodera*
"	— 9	"	p. 20-29.	"	p. 22-29.
168	— 7	"	* 1002.	"	*1002.
172	27	"	*areolalus*	"	*areolatus*

Page	line				
176	— 7	*for*	interior	*read*	exterior
193	— 9	"	xi,	"	x, i,
196	— 6	"	no. 7.	"	no. 7.]
199	—20	"	JA:	"	Jos:
199	— 4	"	H: TURNER.	"	H: W. TURNER.
211	14	"	*dasis*	"	*dasys*
214	7	"	**Can. Entom.**	"	**Can. Entom.,** v. **8.**
215	—12	"	*Catacala*	"	*Catocala*
216	26	"	(*Nematais?*)	"	(*Nemotois?*)
224	14	"	*cerisii*	"	*cerisyi*
"	15	"	JA:	"	Jos:
230	—10	"	*Phyprospus*	"	*Phyprosopus*
242	— 4	"	10	"	11 (twice)
244	15	"	Laurence	"	Lawrence
"	— 8	"	Descriptions	"	Description
"	— 4	"	luna,	"	luna
247	23	"	Odontata	"	Odontota
248	12	"	Albert	"	Alston
"	25	"	*atropurpuralls*	"	*atropurpuralis*
249	—17	"	England	"	Ireland
251	8	"	**(Fitch.)**	"	**(Fitch)**
255	6	"	(*Corisceum*)	"	(*Coriscium*)
"	—10	"	No. 970	"	no. 971
"	— 8	"	Albert	"	Alston
256	7	"	Albert	"	Alston
"	22	"	Laurence	"	Lawrence
258	—30	"	one.	"	one,^{s} indicating several.
"	—26	"	*Minoris*	"	*Minois.*
"	—24	"	23 My. [and] 17 Jl.	"	24 My. [and] 17 Jl.^{s}.
"	—15	"	**S**. 1877.	"	S. 1877.^{s}.
"	—14	"	6 Ap.^{2};	"	6 Ap.^{2}, 4 Jl.;
"	— 8	"	8^{3}, 12, 13 Jl.;	"	11 Jl., 24 Ag.
"	— 7	"	23 Jl., 3, 8, 14 Ag.	"	8 Ag.
"	— 3	"	O.^{6}.	"	O.^{s}.
259	5	"	S.;	"	S.^{s};
"	9	"	*Limnoecia*	"	*Limnaecia*
"	18	"	Jl.	"	Jl.^{s}.
"	20	"	11, 13, 15^{2} Jl.;	"	13^{2}, 15^{4}, 16 Jl.;
"	21	"	Jl.	"	18 Jl.
"	23	"	6-15 Jl.	"	6-15 Jl.^{s}; **L.** 3^{2} Ag.
260	1	"	5 Ag.	"	5 Ag.^{s}.
"	7	"	6-15 Jl.	"	6-15 Jl.^{s}.
"	12	"	Ag.	"	Ag.^{s}.
264	— 3	"	Hepiolus	"	Hepialus
269	15	"	p. 188,	"	p. 138.
279	—19	"	*page* 256.	"	*inserted slip* [Rec., no. 1249-1251].
280	— 6	"	Noctuidae	"	Bombycidae
285	3	"	*Tenebriodes*	"	*Tenebrioides*
"	—18	"	*Euloncha*	"	*Eulonche*
287	1	"	appointments.	"	appointment.
"	—12	"	sphinx.	"	sphinx. Philampelus achemon Drury.
289	— 9	"	*pennsylvanicus*	"	*pensylvanicus*
291	2	"	p. 191-195	"	p. 192-195
"	22	"	of three	"	of the three
296	28	"	p. 252-253	"	p. 251-253.

The article, Rec. no. 1069, is by T. L. Mead.

In line 2 of the inserted slip containing Rec., no. 1249-1251, *for* 256 *read* 264.

Errors in the text and systematic index, in columns.

Page	col.	line				
36	2	13	*for*	*ornithogalli*	*read*	*lineatella*
37	1	28	"	*tristignata*	"	*tristigmata*
213	1	4	"	*Paronomus*	"	*Paranomus*
257	2	—21	"	*Limnoecia*	"	*Limnaecia*
300	1	10	"	**5197.**	"	**55197.**
304	1	— 7	"	Cynipidae	"	**Cynipidae**

Errors in Psyche advertiser.

Date.	page.	line.		
Jan.-Feb. 1877	[3]	—3	*for* GOLEOPTERA	*read* COLEOPTERA
"	[4]	—3	" nsects	" insects
Sep.-Oct. 1877	3	—2	" Council	" Executive Committee.
May-Aug. 1878	1	2	" *MARCH & APRIL*	" *MAY-AUGUST*

	page.	col.	line		
Mch.-Apr. 1878	4	2	30	*for* *coerosternus*	" *caerosternus*
"	5	2	—10	" *piccolominii*	" *picolominii*
"	6	2	—29	" *myctophagidae*	" *mycetophagidae*
"	6	2	— 7	" *polymachus*	" *polymoechus*
May-Aug. 1878	4	2	— 4	" *phyllecthris*	" *phyllechthrus*
"	5	1	15	" Fustiger's species	" the species of *fustiger*
Sep.-Dec. 1878	6	2	19	and 31, *for* 9.7.)	" 9.7.
"	6	2	28	*for* Proc.	" (Proc.
Jan. 1879	8	1	18	" Psyche	" (Psyche

In the Alphabetic index:

Anisobia	*should read*	Anisolabis
Anthophora sponsa, 100.	" "	Anthophora sponsa, 101.
Botis langdonalis, 231.	" "	Botis langdonalis, 232.
" penitalis, 215.	" "	" penitalis, 216.
Catocalirrhus nubilis, 332	" "	Catocalirrhus nubilis, 232.
Cirrophanus	" "	Cirrhophanus
Colias keewaydin, 31.	" "	Colias keewaydin, 41.
Corisceum	" "	Coriscium
Dichroptus, 16.	" "	Dichroptus, 15.
Emprepis	" "	Emprepes
Euchaeryx	" "	Eucheryx
Gortyna, 214 247.	" "	Gortyna, 214, 247.
Halesidota	" "	Halisidota
Limnoecia	" "	Limnaecia

[see also under Melitaea harrisii and Phyciodes harrisii.]

Lithobius, 26, 27.	*should read*	Lithobius, 26, 26-27.
Lithophane thaxteri, 27.	" "	Lithophane thaxteri, 37.
Lycosa, 160, 156.	" "	Lycosa, 106, 156.
Mygale, 13, 136.	" "	Mygale, 11, 136.
Nematais	" "	Nemotois
Oedipoda venusta, 17.	" "	Oedipoda venusta, 16.
Parthenos nubilis, 88,	" "	Parthenos nubilis, 38.
Philampelus achemon, 6	" "	Philampelus achemon, 68.

[in the following lines, *for* v. ac 8, *read* v. ach-; *and for* jussieae h- *read* jussieacae,]

Phygadeuon, 80.	*should read*	Phygadeuon, 30.
Pseudothaytira	" "	Pseudothyatira
Sphinx azaliae	" "	Sphinx azaleae
Steirodonopes	" "	Steirodonopis
Systacea	" "	Systasea
Tarache obatrla	" "	Tarache obatra
Tarentua	" "	Tarentula
Tenebrio tenebriiodes	" "	Tenebrio tenebrioides
Zonocerus, 27.	" "	Zonocerus, 26.
Zophodia dentator	" "	Zophodia dentata

Every reference to a genus or species on p. 280 (except to Monohammus scutellatus) should be added, and also the following references:—Amblychila, 167. Asida, 197. Drassus, 123. Drosophila, 131. Erebus, 279. Forficula, 279. Lestes, 43. Melolontha, 125. Pinipestis, 282. Prodenia lineatella, 36. Trictenotoma, 48.

The reference to Asilus, p. 197, should be stricken out.

The Editor was misled by a supposed etymology into directing that Limnaecia should be changed to Limnoecia in the Correction of errors detected in the first volume of Psyche.