

6-
461
P974
v.4
Ent.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

VOLUME 4.

1883-1885.

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Cham-*
paign, Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*;
FRANCIS HUNTINGTON SNOW, *Lawrence, Kansas*;
W: TRELEASE, *Madison, Wisc.*

CAMBRIDGE, MASS., U. S. A.

CAMBRIDGE ENTOMOLOGICAL CLUB.

1890.



DATES OF ISSUE.

Nos.	Pages.	For	Issued.
105—106	1— 20	Jan.-Feb. 1883.	5 May 1883.
107—108	21— 40	Mar.-Apr. “	4 June “
109—110	41— 60	May-June “	12 July “
111—112	61— 80	July-Aug. “	14 Sep. “
113—114	81—100	Sep.-Oct. “	16 Nov. “
115—116	101—120	Nov.-Dec. “	11 Feb. 1884.
117—118	121—140	Jan.-Feb. 1884.	8 Apr. “
119	141—152	Mar. “	3 May “
120	153—164	Apr. “	14 June “
121	165—176	May “	11 July “
122—123	177—192	June-July “	23 Aug. “
124—125	193—212	Aug.-Sep. “	3 Nov. “
126—128	213—236	Oct.-Dec. “	16 Mar. “
129—131	237—268	Jan.-Mar. 1885.	4 Aug. “
132—134	269—300	Apr.-Jun. “	25 Nov. 1886.
135—137	301—328	July-Sep. “	21 Feb. 1887.
138—140	329—354	Oct.-Dec. “	Jan. 1890.

For the contents of the volume arranged in alphabetic order of authors, see nos. 4058-4300 of the Bibliographical record, on pages 339-350.**

The following list gives an explanation of the initials appended to the different numeros of the Bibliographical record, and at the same time serves as a list of persons who have contributed to the record. The number following each name indicates the number of contributions from each.

<i>A. K. D.</i>	Anna Katherina Dimmock.	15	<i>H. O.</i>	Herbert Osborn.	1
<i>G. D.</i>	George Dimmock.	427	<i>H. A. R.</i>	Henri Albert Robin.	2
<i>H. E.</i>	Henry Edwards.	50	<i>F. G. S.</i>	Frank George Schaupp.	1
<i>R. H.</i>	Roland Hayward.	9	<i>S. H. S.</i>	Samuel Hubbard Scudder.	1
<i>S. H.</i>	Samuel Henshaw.	4	<i>W. T.</i>	William Trelease.	27
<i>B. P. M.</i>	Benjamin Pickman Mann.	651	<i>H. W. T.</i>	Henry Ward Turner.	2
<i>E. L. M.</i>	Edward Laurens Mark.	8	<i>S. W. W.</i>	Samuel Wendell Williston.	1
<i>H. M.</i>	Hermann Müller.	1			

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 105-106.

JANUARY-FEBRUARY 1883.

CONTENTS:

ADVERTISEMENTS	2
THE SCALES OF COLEOPTERA.— <i>George Dimmock</i>	3-11
INTRODUCTION TO THE FOURTH VOLUME	12-13
PROCEEDINGS OF SOCIETIES.— <i>Cambridge Entomological Club</i>	13-14
BIBLIOGRAPHICAL RECORD, no. 3101-3161	15-18
ENTOMOLOGICAL ITEMS— <i>Society Meetings</i>	19-20

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

EARLY STAGES OF BUTTERFLIES WANTED.

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,
Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

GALLS AND GALL INSECTS.

The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera*, *Coleoptera*, *Hemiptera* and *Diptera*. Correspondence in reference to Gall growths, or other vegetable abnormalities, is invited.

CHARLES V. RILEY,
1700 Thirteenth St., N. W.,
Washington, D. C.

TORTRICIDAE WANTED.

I am desirous of obtaining as many North American TORTRICIDAE as possible, for the purpose of studying this family. I shall be glad to name and return any TORTRICIDAE forwarded to me for this purpose, save such as may prove new and desirable to retain for description.

Pack carefully, and direct to
PROF. C. H. FERNALD, Orono, Me.

LEPIDOPTERA.

Living cocoons, pupae and ova of American lepidoptera bought or exchanged for other species, by Monsieur ALFRED WAILLY, (Membre-laureat de la Société d'Acclimatation de France),

Tudor Villa, Tudor Road, Norbiton,
Kingston-on-Thames, England.

NORTH AMERICAN FERNS.

Check lists of the Ferns of North America north of Mexico, enumerating 31 genera, 132 species and 15 varieties, on one octavo page. Will be sent by mail on receipt of the price, 15 cents per dozen copies.

S. STEBBINS, Springfield, Mass.

PSYCHIE.

THE SCALES OF COLEOPTERA.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

Altho the following paper is mainly a description of a few forms of scales of coleoptera, on some of which the scales have not before been noticed, and on others of which they have been more or less fully described, a brief outline of the history and bibliography of the knowledge of the scales of insects in general and of coleoptera in particular may not be amiss as an introduction to these descriptions.

According to Mayer¹ and Schneider² the scales of lepidoptera were first mentioned, by Fabricius, in 1600, were later mentioned by Malpighi, in 1650, and since then by many other observers. Up to the beginning of the present century the literature of this subject is of little importance except historically, and I will cite only the names of Bonanni, Ledermüller, Réaumur, Rösel and Swammerdamm, who made mention, to a greater or less extent, of the

scales of lepidoptera in their works. During the present century the literature of this subject has increased rapidly, and among the authors of leading papers which treat mainly or considerably of the scales of lepidoptera are, in chronological order, Deschamps (1835),³ Bowerbank (1838),⁴ Craig (1839),⁵ Ratzeburg (1840),⁶ de la Rue (1852),⁷ Semper (1857),⁸ Kettelhoit (1860),⁹

³ Deschamps, B. Recherches microscopiques sur l'organisation des ailes des lépidoptères. (Ann. sci. nat., 1835, s. 2, v. 3, p. 111-137.)

⁴ Bowerbank, J. S. On the structure of the scales on the wings of lepidopterous insects. (Entom. mag., 1838, v. 5, p. 300-304.)

⁵ Craig, E. On the configuration of the scale of butterflies' wings, as exhibited in the microscope. (Edinb. philos. mag., 1839, s. 2, v. 15, p. 279-282, fig.)

⁶ Ratzeburg, J. T. C. Die Forstinsekten . . . Bd. 2, 1840.

⁷ de la Rue, W. On the markings on the scales of *Amathusia horsfieldii*. (Trans. micros. soc. Lond., 1852, v. 3, p. 36-40, pl. 2.)

⁸ Semper, C. Beobachtung über die Bildung der Flügel, Schuppen und Haare bei den Lepidopteren. (Zeitschr. f. wiss. Zool., 1857, v. 8, p. 326-339, pl. 13.)

⁹ Kettelhoit, T. De squamis lepidopterorum. Dissertatio . . . Bonnae, 1860.

¹ Mayer, F. J. C. Ueber den Staub der Schmetterlingsflügel. (Allgem. med. Central-Zeit., 1860, jahrg. 29, p. 772-774.) *Hagen, Bibl. entom.*

² Schneider, R. Die Schuppen an den verschiedenen Flügel- und Körpertheilen der Lepidopteren. Dissertatio . . . Halis Saxonium, 1878. Also (Zeitschr. f. ges. Naturw., 1878.)

Mayer (1860),¹ Landois (1871),¹⁰ and Schneider (1878).² Even special modifications of scales, called by Scudder¹¹ androconia, have been found on the males of a large number of butterflies, and have given rise to considerable discussion in regard to their function. Androconia were first discovered about 1825 by Baillif, who termed them plumulae. They have been discussed since in papers by numerous writers, among whom may be mentioned Deschamps³, Schneider,² Watson (1865-1869),¹²⁻¹⁵ Wonfor (1868-1869),¹⁶ Anthony (1872),¹⁷⁻¹⁸ Fritz Müller (1877),¹⁹ Scudder (1877),¹¹ Weismann

(1878)²⁰ and Aurivellius (1880).²¹ Weismann believes that it is not impossible that these scales give out an ethereal oil secreted by the cells at their bases. Without discussing the correctness of Weismann's view, the extensive literature devoted to the scales of lepidoptera, of which I have given only the outline, shows how broad the subject is. But how is it with the scales of insects other than lepidoptera? Are forms as interesting as androconia waiting the search of thoro investigators?

Leeuwenhoek, in 1680, and Swammerdam,²² in the next century, figure the scales of the wings and body of *Culex*, and Weismann,²³ in 1864, speaks of scales on *Sarcophaga carnaria*. These are all the references which I know to diptera having scales and I

¹⁰ Landois, H. Beiträge zur Entwicklungsgeschichte der Schmetterlingsflügel in der Raupe und Puppe. (Zeitschr. f. wiss. Zool., 1871, v. 21, p. 305-316, pl. 23.)

¹¹ Scudder, S. H. Antigeny, or sexual dimorphism in butterflies. (Proc. Amer. acad. arts and sciences, 1877, v. 12, p. 150-158.)

¹² Watson, J. On certain scales of some diurnal lepidoptera. (Mem. Lit. and phil. soc. Manchester, 1865, s. 3, v. 2, p. 63-70.)

¹³ Watson, J. On the microscopical examination of plumules. . . (Entom. mo. mag., 1865, v. 2, p. 1-2, fig.)

¹⁴ Watson, J. On the plumules or battledore scales of *lycaenidae*. (Mem. Lit. and phil. soc. Manchester, 1869, s. 3, v. 3, p. 128-133, pl. 1-3.)

¹⁵ Watson, J. Further remarks on the plumules or battledore scales of some of the lepidoptera. (Mem. Lit. and phil. soc. Manchester, 1869, s. 3, v. 3, p. 259-269, pl. 5-7.)

¹⁶ Wonfor, F. W. On certain butterfly scales characteristic of sex. (Quart. journ. micros. sci., 1868, n. s., v. 8, p. 80-83, pl. 1; 1869, v. 9, p. 19-22, p. 426-428.)

¹⁷ Anthony, J. The markings on the battledore scales of some of the lepidoptera. (Mo. micros. journ., 1872, v. 7, p. 1-3, pl. 1-2.)

¹⁸ Anthony, J. Structure of battledore scales. (Mo. micros. journ., 1872, v. 7, p. 250.)

¹⁹ Müller, Fritz. Ueber Haarpinsel, Filzflecke und ähnliche Gebilde auf den Flügeln männlicher Schmetterlinge. (Jena. Zeitschr. f. Naturw., 1877, bd. 11, p. 99-114.)

²⁰ Weismann, A. Ueber Duftschuppen. (Zool. Anzeiger, 1879, Jahrg. 1, p. 98-99.)

²¹ Aurivellius, C. Ueber sekundäre Geschlechtscharaktere nordischer Tagfalter. (Bihang till k. Svenska vet.-akad. handlingar, 1880, bd. 5, n:o 25.)

²² Swammerdam, J. Buch der Natur. . . Leipzig, 1752.

²³ Weismann, A. Die nachembryonale Entwicklung der Musciden. . . (Zeitschr. f. wiss. Zool., 1864, bd. 14, p. 187-336.)

will add here to their number, that I have found scales upon the legs of a species of *Ploas* from Germany.

Scales have been examined, but not extensively studied, which were obtained from *thysanura* (*Lepisma*, *Machilis* and *Podura*). L. Landois²⁴ speaks of scales in *Phthirus*, but it is evident from his description that they are not homologically and structurally like the scales of lepidoptera. Leydig,²⁵ to whose paper I shall have occasion to refer later, mentions scales resembling those of lepidoptera on spiders of the genus *Salticus*. Claus²⁶ says the *phryganidae* are "with hairy or scaly wings," but I know of no special studies made upon the scales of these insects. As far as I have been able to discover, scales have only been recorded on hemipterous insects in the case of the curious dimorphic form of *Aphis aceris* (originally described by Thornton, in 1852, as *Phyllophorus testudinatus*) which is figured and briefly described by Packard,²⁷ and have never been recorded from hymenoptera.

I come now to what is more strictly the subject of this paper, the scales of

coleoptera, the literature of which I have, as far as possible, seen and studied.

The earliest mention that I have found of scales on coleoptera is in 1762, by Geoffroy,²⁸ who not only mentioned scales on several *curculionidae*, but also noticed those of *dermestidae* and *scarabacidae*. The next notice of scales of coleoptera is in 1773, by Drury,²⁹ in his description of *Entimus imperialis*, where he alludes to the scales upon this species of *curculionidae*. In 1777, Lindenberg³⁰ figured and briefly described *Entimus imperialis* and the scales which render it so brilliant. In 1780 the same author³¹ gave quite an extended description, accompanied by colored figures, of the scales of *Entimus*. Lindenberg's last paper is partly devoted to a curious consideration of the question why insects and small animals, some of them requiring a microscope to reveal their beauty, were made even more beautiful than larger animals. Since the above-mentioned papers were published, many

²⁴ Landois, L. Untersuchungen über die auf dem Menschen schmarotzenden Pediculinen. Anatomie des *Phthirus inguinalis* Leach. (Zeitschr. f. wiss. Zool., 1864, v. 14, p. 1-41, pl. 1-5.)

²⁵ Leydig, F. Zum feineren Bau der Arthropoden. (Müller's Archiv, 1855, p. 376-480, pl. 15-18.)

²⁶ Claus, C. Grundzüge der Zoologie. 4te Aufl. 1880.

²⁷ Packard, A. S. Guide to the study of insects . . . Salem, 1869, p. 520-521.

²⁸ Geoffroy, E. L. Histoire abrégée des insectes qui se trouvent aux environs de Paris . . . v. 1, 1762. [See especially p. 69, 78-79, 114, 115, 277, 282-283, 288, 289, 293, 293, 295 and 299.]

²⁹ Drury. Illustrations of natural history . . . v. 1, 1773.

³⁰ Lindenberg. Beschreibung eines brasilischen Rüsselkäfers. (Der Naturforscher, 10tes Stück, Halle, 1777, p. 86-87, fig.)

³¹ Lindenberg. Ausführlichere Beschreibung des . . . brasilischen Rüsselkäfers, nebst einigen Betrachtungen. (Der Naturforscher, 14tes Stück, Halle, 1780, p. 211-220, fig.)

popular descriptions and brief notes upon the scales of coleoptera have been printed, especially in handbooks for microscopists, but the important contributions to the subject are in Dujardin's Manual for the microscope,³² in Deschamps' Recherches on the elytra of coleoptera³³ and lastly in Fischer's somewhat extensive dissertation³⁴ on the scales of coleoptera, published in 1846. Fischer's dissertation was based upon a large collection of coleoptera of Europe, which he examined and considered by families. He classified the scales of *curculionidae* into four groups and made a fifth group of the kind of scales found on *Anthrenus*. These divisions will be considered later, in connection with the form and structure of the scales.

I will begin the descriptive part of my paper with an explanation of the hairs of *Cicindela dorsalis*, for I wish to say a good deal about scale-like hairs in this paper, since the scales of coleoptera are simply flattened hairs of a more or less complex nature. In the progress of this paper I hope to be able to point out affinities, not pre-

viously noted, between hairs and scales of coleoptera.

HAIRS OF *CICINDELA DORSALIS*.

The white hairs which clothe the sides of the thorax of *C. dorsalis* and are abundant upon nearly all parts of the under side of this insect, even upon its legs and upon some of its mouth-parts, owe their white color to the presence of air in their interior.

In transverse section these hairs—for they are scarcely flat enough to be termed scales—are circular, ellipsoidal (as in fig. 1, *d*) or with a slight tendency to be triangular. The central

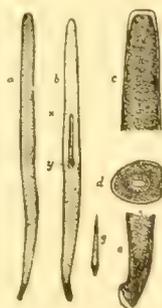


Fig. 1. Hairs of *Cicindela dorsalis*: *a*, from thorax; *b*, same partly deprived of air; *c*, apical end of same; *d*, transverse section of same; *e*, basal end of same; *g*, hair from antenna. Enlargement: *a*, *b* and *g*, 100 diam.; *c*, *d* and *e*, 300 diam.

³² Dujardin, F. Nouveau manuel complet de l'observateur au microscope. Avec atlas. Paris, 1843.

³³ Deschamps, B. Recherches microscopiques sur l'organisation des élytres des coléoptères. (Ann. sci. nat., 1845, s. 3, v. 3, p. 354-363.)

³⁴ Fischer, L. H. Microscopische Untersuchungen über die Käferschuppen. Dissertation . . . Freiburg, 1846, fig. Reprint (Isis, 1846, v. 6, p. 401-421, fig.)

portion is a canal, about one-fourth the diameter of the whole hair, and is filled with air. This canal is surrounded by very minute cavities forming a sort of pith-like substance filled with air and extending outward to the outer chitinous covering of the hair. The cavi-

ties or interstices of the pith-like portion open into the central canal of the hair, but are prevented from direct communication with the outer air by the thin sheath of chitin which forms the outer covering of each hair. Each hair is closed at the apex (fig. 1, *c*) by this outer, impervious chitin layer and at its basal end (fig. 1, *e*) by a thickening of the chitin sheath to such an extent as to entirely close the central canal, with its surrounding pith-like substance, from the outer air. This structure, together with the mode of closing of the basal end, leaves the nature of the development of the hair very apparent. It is a closed sacciform appendage of the external chitinous covering of the insect, as are the scales of lepidoptera, coleoptera and diptera. The knob formed by the basal end (fig. 1, *e*) of the hair is inserted into a pit in the chitin covering of the insect, almost exactly as the corresponding part of the scales of other insects are attached.

The structural points above described were obtained in two ways; first, by sectioning the hairs with the microtome, and, second, by carefully observing under the microscope the action of different reagents on the hairs. I obtained a few good transverse sections of hairs taken from the sides of the thorax, and, by examination of these sections, verified the existence of an open central canal. Fig. 1, *d*, shows one of these sections which was about 0.01 mm. in thickness and about 0.02 mm. in average diameter, drawn with the camera.

The expulsion of the air from these hairs, when they were broken at any point, was readily effected by chloroform or alcohol, and scarcely less readily by glycerin, by turpentin, or even by water, but if the hair had not been injured at any point the air was not driven out by any of these reagents, even after several days action. When the air has been expelled from a hair, the latter becomes transparent, and is colorless with directly transmitted light in all parts except where the chitin is thickened to close the base; this chitin is slightly brown. By obliquely transmitted light, obtained by Aubé's illuminating apparatus, the hairs which have been deprived of air exhibit a slightly bluish shade. Fig. 1, *b*, represents a hair of which the distal end has been deprived of air, the part from *x* to *y* is partly deprived of air and the basal portion is still filled with air. Sometimes, especially when glycerin or turpentin is used to expel the air, a part of the air will remain collected in the central canal (fig. 1, *x* to *y*) quite a while after it has left the cavities of the pith-like portion. The clearly defined outline of this column of air led to the suspicion of an open canal, the presence of which was later proved by sections.

The hairs from different parts of *C. dorsalis* vary little in form and size. Those from the thorax and from the under side of the abdomen are club-shaped (fig. 1, *a* and *b*), are from 0.28 to 0.35 mm. in length, and from 0.015 to 0.025 mm. in diameter. They taper gradually and slightly from the middle toward

both ends; the apex is usually truncated (fig. 1, *c*). The basal part forms a slight neck just above the point of insertion (fig. 1, *e*). These hairs are but slightly curved, but are so inserted as to lie nearly flat on the surface of the insect. The hairs (fig. 1, *g*) from the antennae are the smallest of the white hairs on *C. dorsalis*. They are only about 0.07 mm. long and scarcely 0.01 mm. in diameter near the base, from which they taper to their acute tip. The longest hairs are those from the labial palpi, of which the second joint only is densely hairy. These hairs are from 0.30 to 0.50 mm. long, and about 0.015 mm. in diameter near their base, from which they taper gradually to a fine, acute apex. They are considerably curved and slenderly filiform.

Between and upon the hairs of this beetle are yellow, amorphous masses, quite transparent, and apparently secreted from the surface of the insect, altho they may be remnants of some matrix in which the hairs are packed during the pupal state of the insect. Fischer mentions substances of apparently similar nature in his dissertation,³⁴ and Hagen,³⁵ in 1882, further discusses them. These masses on *C. dorsalis* often take beautifully clear impressions of the hairs themselves, and are insoluble in water, alcohol, turpentin, glycerin or chloroform.

With the exception of the elytra, labrum and parts of the mandibles, all

white portions of *C. dorsalis* owe their creamy whiteness to the hairs described above; these hairs are set on shining, cupreous or green-bronze surfaces.

The hairs upon the sides of the thorax of *C. vulgaris* and *C. puritana* are similar in structure and general form to hairs from the same region in *C. dorsalis*, but they are smaller in *C. puritana* (0.18 mm. long by 0.01 mm. in diameter) and slimmer in *C. vulgaris* (0.55 mm. long and about 0.01 mm. in diameter); in the latter species they are not so abundant.

Taking the families of coleoptera in their systematic order, I examined next the scales of

ANTHRENUS SCROPHULARIÆ.

The figuration of the whole body and even of the legs of this insect is due to scales which are not imbricated as are



Fig. 2. Scales of *Anthrenus*: *a*, of *A. scrophulariæ*; *b*, arrangement of same on portion of an elytron; *c*, scales of *A. varius*. Enlargement: *a* and *c*, 100 diam., *b*, 50 diam.

the scales of lepidoptera. The basal end of each scale is inserted in a cavity which is at the bottom of a funnel-shaped deepening of the chitinous surface of the insect, and the scales are arranged to a certain extent, altho rather irregularly, in lines. Fig. 2, *b* shows

³⁴ Hagen, H. A. On the color and the pattern of insects. (Proc. Amer. acad. arts and sciences, 1882, v. 17, p. 234-267.)

their order on a portion of an elytron, the little circle about the base of each scale showing the limits of the funnel-shaped depression in which each scale is inserted. These scales are about 0.05 mm. long by 0.03 mm. wide. They are of three different colors—white, light brown and black—and they all contain air. These scales were described by Fischer and I introduce and figure them here (fig. 2, *a*) only because they furnish a good example of what Fischer termed fibrous scales (Faser-schuppen).

Of other species of *dermestidae* I only examined *Dermestes lardarius* and *Anthrenus varius*, for I have had access to but a portion of my collection, which I hope to examine more thoroughly later. The former species was clothed with hairs only.

SCALES OF ANTHRENUM VARIUS.

The figuration of *A. varius* is due, like that of *A. scrophulariae*, to scales which do not imbricate. The scales of *A. varius* (fig. 2, *c*) are narrower than those of *A. scrophulariae*, being about 0.05 mm. long by 0.015 mm. wide. In color they are either dark brown, yellow or white; and they are striate, but the striae, about six in number, are rather obscured by the presence of much air in the scales until the latter are treated with liquid reagents. The fine notching at the apical end of scales of *A. varius* is not so evident as it is in those of *A. scrophulariae*, as can be seen by com-

paring fig. 2, *a* with fig. 2, *c*, both of which figures are equally enlarged.

At this point may be noted the presence of two sorts of hairs on the larvae of certain *dermestidae*, as described by De Geer,³⁶ Dujardin³² and Thevenet,³⁷⁻³⁸ and the existence of scales on the larvae of *Attagenus pellio*, as described and figured by Dujardin,³² the latter species being, so far as I can discover, the only coleopteron from the larva of which scales are known.

The *scarabaeidae* contain a number of genera in which scales are the rule rather than the exception, and, among them, for the first time, comes the consideration of brilliantly colored scales, those of the genus *Hoplia*.

SCALES OF HOPLIA COERULEA.

This well-known European insect is light metallic blue above and silvery beneath, but when deprived of the scales to which its metallic coloration is due, it is brown. The scales of the elytra and upper surface of the thorax are imbricated; those of the abdomen, legs and under side are not imbricated.

The scales of *H. coerulea* vary in form from round to ovate and lanceolate, most

³⁶ De Geer, C. Mémoires pour servir à l'histoire des insectes . . . v. 4, 1774, p. ——— pl. 8, fig. 4-6.

³⁷ Thevenet, J. Note sur les poils de la larve de *l'anthrenus verbasci*. (Ann. Soc. entom. Fr., 1874, s. 5, v. 4; Bull, p. 84, 97.)

³⁸ Thevenet, J. Note sur les poils de la larve du *megatoma serra*. (Ann. Soc. entom. Fr., 1874, s. 5, v. 4; Bull., p. 112.)

of those from the upper side being usually nearly round and smooth (fig. 3, *a*), while those of the under side are more variable in shape and are always



Fig. 3. Scales of *Hoplia coerulea*: *a*, from elytron; *b*, from under side of thorax; *c*, from femur; *d*, fine structure to be seen in *a* with high powers. Enlargement: *a*, *b* and *c*, 100 diam.; *d*, 500 diam.

covered with spines or hairs (fig. 3, *b* and *c*). The scales upon the legs are most variable of all in form; common among them are lanceolate forms (fig. 3, *c*), covered with fine hairs. The average size of the scales is about 0.10 mm. long by 0.05 mm. wide, and they are attached to the insect by a more or less prolonged basal portion (fig. 3, *a-c*); they lie very flatly pressed upon the surface of the insect.

Most of the scales of the dorsal surface of the thorax and of the elytra, when viewed by transmitted light, are bright canary yellow, but many of them are tinged with carmine red. Viewed by reflected light, or upon a dark background, the parts before yellow are bluish, or dark and nearly invisible, while all the parts before reddish are now dark and more or less indistinct (or rarely greenish if they were purplish-red before). If the stage of the microscope is now revolved, and the light to

be reflected from the scales is thus brought from a different direction in regard to the scales, some of the parts before dark become bright bluish while others just before blue become darkened, but in no case do parts of a scale which were reddish by transmitted light become bluish by reflected light. If the light is not excluded from above the stage of the microscope, when examining these scales by transmitted light, places will be discovered, where the scales are injured or where they are turned up at their margins, in which bright blue, or rarely green, will be seen. In all cases where I speak of transmitted light I have excluded the light from above the stage of the microscope, and where I speak of reflected light I have excluded light from below the stage of the microscope.

If the scales are in any way injured or cracked, as they usually are in removing them from the insect, water will readily enter them and discharge the air from them. Scales thus treated with water are, by transmitted light, sky blue, sometimes tinged with carmine red, the latter color being in portions of the scales which had not been thoroughly penetrated by the water, for while the water is entering the scales they become reddish for a time before changing to blue. Boiling the water a minute causes all red to disappear but seems to have no further action on the scales; their structure is not altered, as the water inside such minute cavities is not readily boiled. By reflected light many scales that have been treated with water are dark greenish.

Glycerin produces nearly the same effects in these scales as water does; its action is, however, slower and gives more opportunity to examine the scales during the process of saturation. Light transmitted through scales that are treated with glycerin is nearly colorless, and reflected light from scales thoroughly penetrated with glycerin is, for the most part, colorless; sometimes, however, it is greenish in spots, and these spots are usually where a tinge of red remains, when viewed by transmitted light.

In absolute alcohol the scales show, by transmitted light, a more reddish tinge than they show in water; in chloroform the tinge is more purplish than in water, altho the purple is very pale; in turpentin and in oil of cloves the scales are transparent and colorless. Scales moistened with any of these reagents and put over a dark or black surface are light metallic green; if dry scales are put over dark surfaces they are light metallic blue. Redried from water, alcohol or chloroform these scales regain their original colors, showing that it is a coloration due to the structure of the scales and not due to any pigment in them. In further proof of this I exposed the scales to dry chlorin gas and the color remained unaltered. Solutions of chlorin or of hypochlorites fail to destroy the coloration, for after they are washed out and the scales again dried the colors reappear as bright as at first.

Dry scales heated slightly over flame suddenly lose all their metallic coloration, and, while retaining their form,

become brownish grey by transmitted or reflected light; they are apparently charred sufficiently to lose their color without having their structure greatly altered.

In structure these scales are readily seen to be little flattened sacs; wherever they are injured, especially if they are broken off near the base, the edges of the upper and lower sides appear distinctly. The inner structure of these scales is not easily discoverable. They appear to be filled with a very delicate network (fig. 3, *d*), which is always reddish after the yellow has left the scales. If glycerin is used as a reagent in treating the scales their reddish network, even in scales originally yellow, remains long after the yellow has disappeared. The yellow occupies the interspaces of the network. The network itself, under high powers, appears as if it were caused by retiform designs in reddish oil between the layers of the scales, but the fact of the reappearance of the color after treating the scales with solvents for oil, *e. g.*, chloroform, shows that it is not oil. From the appearance of scales charred to different extents I am inclined to think this network to be formed by thickenings of the chitin walls of the scales themselves. If this be the case, the thickenings project only inward from these walls, and are found in corresponding figures upon both upper and under walls of the scales. The colors red and yellow by transmitted light may exist where only the upper or under half of the scale is present.

(*To be continued.*)

PSYCHE.

CAMBRIDGE, MASS., JAN.—FEB. 1883.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

INTRODUCTION TO THE FOURTH VOLUME.

PSYCHE enters upon its fourth volume under auspices in many regards more favorable than those which have attended the inauguration of earlier volumes. The material support upon which the CAMBRIDGE ENTOMOLOGICAL CLUB, as publisher, can count, while not sufficient to defray the expenses of publication, bids fair to leave the friends of PSYCHE with smaller deficits to meet than heretofore. The explanation should be made that the CLUB, while devoting all its available means to the publication of PSYCHE, is obliged to rely upon private benefactors to make up its arrears of funds from time to time; else it would be obliged to suspend the execution of its work. The Managing Editor, having faith in the good-will of his fellow-entomologists, and of patrons of science, assumes the responsibility of expenditures which exceed the resources of the Club. Contributions to the Permanent Publication Fund of PSYCHE are earnestly solicited.

In editorial support the management feels especially rich, referring with pride to the published list of associate editors. Without this support the task of issuing a fourth volume of PSYCHE would not have been accepted by the undersigned, who appreciate the diffi-

culties of performing their part well under the pressure of their other occupations, and with the limited resources at the command of the CLUB.

PSYCHE will be devoted, as heretofore, to the presentation of entomology in its higher and more philosophical aspects. It will leave to other magazines the bare descriptions of new species, and contests over priority and synonymy, as well as competition for the earliest announcement of news. As the official publication of the CAMBRIDGE ENTOMOLOGICAL CLUB, it will contain the minutes of the meetings of the CLUB, and serve as a medium of communication between the members. Although the CAMBRIDGE ENTOMOLOGICAL CLUB is a society bearing a local name, its members are chosen without local limitation, and PSYCHE will endeavor to represent the interests of scientific entomology wherever pursued, and to advance, impartially, the welfare of all societies having the same objects in view. Welcoming to its columns original articles of a character suited to its aims, I will seek to present to its readers such notices of, or extracts from, articles of like character, appearing in other publications, as will make it most valuable to the philosophic entomologist. Brief items, and condensed abstracts of the proceedings of scientific societies in all parts of the world, so far as they are related to general entomology, would be thankfully received by the editors. Official notices of the times and places of meetings of entomological societies will be inserted in our column devoted to that purpose, free of charge.

The form of the BIBLIOGRAPHICAL RECORD, being in accordance with the highest thought upon the subject in the world,* will remain unchanged; but the matter will be made more valuable than heretofore, by the exercise of a selection from among the works to be noticed by preference. While it has long been evident that the space which could be devoted to the Record in PSYCHE was insufficient for the publication of complete lists of

*See PSYCHE, March 1880, v. 3, p. 44.

even those writings which it would be most appropriate to notice, the Editor of the Record has not withheld from publication such articles as came to hand, even though of minor importance. He will in the future preserve these in manuscript, indexed as well as may be, for reference, and publish the record only of the more important articles. Should means, from sources yet unknown, be afforded for the presentation of a complete work, none would appreciate the value of it more than he. In order to perfect this record, the editor respectfully requests that copies of publications containing entomological articles may be sent by the authors or the publishers, or by friends of *PSYCHE*, to the Library of the CAMBRIDGE ENTOMOLOGICAL CLUB, where they will be at the disposition of the subscribers to *PSYCHE*, throughout North America, under the rules of the CLUB.

B: PICKMAN MANN.
GEORGE DIMMOCK.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

12 JAN. 1883.—The 89th meeting of the Club, the sixth annual meeting since the incorporation of the Club, was held at 16 Quincy St., Cambridge, 12 Jan. 1883. Nine persons (eight of whom were members) were present.

The Secretary stated that Miss Cora H. Clarke had been transferred, 10 Jan. 1883, at her own request, from the list of associate members to the list of active members.

The following persons were elected to active membership: H: Savage, of Boston, Mass.; Prof. Stephen Alfred Forbes, of Normal, Ill.; W: Hague Harrington, of Ottawa, Canada; Prof. G: Macloskie, of Princeton, N. J.; Prof. Francis Huntington Snow, of Lawrence, Kansas.

The annual reports of the Secretary, of the Treasurer and of the Librarian were read and approved, the approval of the Treasurer's report being subject to the action of the Auditing Committee.

A motion was carried "that the Club re-

sume the publication of *PSYCHE*, beginning with no. 105, of vol. 4 (the no. for Jan. 1883), and that, with the exceptions herein-after stated, vol. 4 be published in similar style, typographically and otherwise, as vol. 3.

"Exception 1. That the price of subscription be raised to two dollars per year, five dollars per volume of three years, and that subscribers can have, after payment of their subscriptions, if they so desire, in addition to their regular copy, a copy printed on one side of the paper, for pasting the slips of the Bibliographical Record.

"Exception 2. That the editors to be elected be recommended to make the Bibliographical Record more current, if possible, and to omit publishing the record of notes and items of minor value which are contained in the popular and daily press."

Other changes proposed in *PSYCHE* were, after some discussion, left to the discretion of the editors.

The following officers were elected for the ensuing year: President, B: P. Mann; Secretary, G: Dimmock; Treasurer, S: Henshaw; Librarian, C. C. Eaton; members at large of the Executive Committee, R. Hayward and E: L. Mark.

A motion was carried to elect a managing and an associate editor of *PSYCHE*, these editors to have full power to add to their number. B: P. Mann was elected managing editor, and G: Dimmock associate editor, for the ensuing year.

The retiring President, Mr. S: H. Scudder, delivered his address, entitled "On mesozoic cockroaches." The address was a general review of what is known of cockroaches of this age and a comparison of their forms with other fossil and living forms. The address was illustrated with many figures and with numerous specimens of fossils.

Mr. W: Trelease communicated (by the Secretary) the following note:

"At the November meeting of the Club, in 1881, I showed a specimen of ant architecture which was further described in *PSYCHE* for Feb. 1882. At the time this was written I had forgotten that Mr. Walsh has recorded

(Pract. entom., v. 2, p. 40) cases constructed by *Myrmica lineolata*? Say over an aphid on *Cornus stolonifera*, and by a *Formica* over an aphid on *Salix*. A case of the same kind on a species of alder is recorded by Mr. Win. Couper as occurring near Toronto, in Canada. Lubbock (Scientific lectures, p. 71) states that "sometimes the ants even build covered ways up to and over the aphides, which, moreover, they protect from the attacks of other insects."

Mr. J: G. Jack stated that he had seen *Vanessa antiopa*, with unrolled proboscis, apparently sucking the sweet excretion about aphides, and had noticed similar actions in *Limnitis dissipus* and *L. arthemis*.

Mr. A. F. Foerste communicated (by Mr. W: Trelease and the Secretary) a note concerning the habits of *Alaus oculus*. This note chiefly described the habit of feigning death and the reluctance to spring in this species of *clateridae*. Mr. G: Dimmock said he had noticed that *A. oculus* disliked to spring.

Mr. S: H. Scudder spoke of some specimens of lepidoptera, in different stages, which were for sale by Dr. W: Wittfeld, of Georgiana, Brevard Co., Fla.

Mr. S: H. Scudder said, in reply to a question, that all *hesperidae* spin light cocoons, and that a few other butterflies allied to the *hesperidae* spin delicate cocoons. From these cocoon-spinning forms there is a gradual transition through forms which hang their pupae with a loop to forms which suspend their pupae by the tip of the abdomen only.

9 FEB. 1883.—The 90th meeting was held at 19 Brattle Square, Cambridge, 9 Feb. 1883. In the absence of the President Mr. S: H. Scudder was chosen chairman. Six persons (five of whom were members) were present.

The Secretary read a letter from Mr. S: Henshaw, who regretted that he was not able to accept the office of Treasurer to which he had been elected at the last meeting. [Mr. B: P. Mann will remain acting Treasurer, therefore, until a new election is held.]

A proposition to hold a special meeting of the Club at Minneapolis, Minn., on the day

preceding the meeting of the American Association for the Advancement of Science, with other propositions in relation to the proposed meeting, was referred to the Executive Committee with full power to act, but with the recommendation that the Committee should correspond with Mr. J. A. Lintner, who has already been asked to call a meeting of entomologists at that time and place, so that there might be no interference with the meeting to be called by him.

Mr. Mann communicated (through the Secretary) some notes in regard to the arrangements necessary to be made for the issue of volume 4 of PSYCHE, and further remarks were made by the Secretary upon the same subject.

The following persons were elected to active membership: August F. Foerste,* of Dayton, Ohio; C: Diehl Zimmerman, of Buffalo, N. Y.; Capt. T. J. Mathews, of Grayville, Ill.; Theodor Pergande, of Washington, D. C.

Mr. G: Dimmock called attention to a paper by Dr. Hermann Henking, entitled, "Beiträge zur Anatomie, Entwicklungsgeschichte und Biologie von *Trombidium fuliginosum* Herm." (Zeitschrift f. wissensch. Zool., 1882, v. 37, p. 553-663, pl. 34-36), outlining briefly the scope of the paper, and especially noticing a method of coloration by an alcoholic borax-carmin solution, as described by Dr. Henking.

Mr. S: H. Scudder exhibited some plates from a paper on fossil neuroptera now in preparation, and a colored plate to illustrate the life-history of a species of *Retinia*, the pine-moth of Nantucket.

Mr. Roland Thaxter called attention to a species of *Nonagria* which he had studied. The larva bores in rushes from which it probably emerges as pupa. The question of how the egg survives the winter in the flooded and frozen marshes brought out some discussion.

Mr. S: H. Scudder exhibited a large number of figures of fossil coleoptera from Florissant, Col.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Adolph, E. Vorläufige mittheilung über die flügel der dipteren. (Zool. anzeiger, 13 Nov. 1882, jahrg, 5, p. 609-610.)
Nature of the wings of diptera. G: D. (3101)

Agricultural ant of Texas (The). (Journ. applied sci., Oct. 1881, v. 12, p. 155, 21 cm.)
Notes on the habits of *pogonomyrmex barbatus*. G: D. (3102)

Anderson, Joseph, jr. On the emergence of butterflies. (Entomologist, Nov. 1882, v. 15, p. 260-261.)

How different butterflies behave just after leaving the pupal skin. G: D. (3103)

Anderson, Joseph, jr. Singular habit of *afatura iris*. (Entomologist, Aug. 1882, v. 15, p. 188.)

A. iris, after emerging from pupa, hangs to the pupal case with head uppermost for five or six hours, then with head downward a similar time. G: D. (3104)

Ashmead, W: Harris. Another chalcid friend of the orange grower. (Florida agriculturist, 13 July 1881, no. 165, v. 4, no. 9, p. 65, col. 4-5, 28 cm.)

Describes *coccophagus flavoscutellum* n. sp. parasitic on *lecanium hesperidum*. B: P. M. (3105)

Ashmead, W: Harris. On the cynipidous galls of Florida. Paper no. 1. (Monthly proc. entom. sect. acad. nat. sci. Philad., May 1881, p. 9-14.)

Describes *cynips q. virens*, *c. q. batatoides*, *c. q. succinipes*, *c. q. foliata*, *c. q. lanigera* = 5 n. sp., from *quercus virens*; note on *c. q. ficus*. B: P. M. (3106)

Ashmead, W: Harris. On the cynipidous galls of Florida. Paper no. 2. (Monthly proc. entom. sect. acad. nat. sci. Philad., June 1881, p. 15-20.)

Describes *cynips q. catesbaei* from *quercus catesbaei*; *c. q. turneri* and *c. q. aquatica* from *q. aquatica*; *spathegaster q. laurifoliae*, *c. q. confusa* and *c. q. rugosa* from *q. laurifolia*; *c. q. cinerea* from *q. cinerea* = 7 n. sp.; and *sejus cynipidis* n. sp., parasitic on *spathegaster q. laurifoliae*. B: P. M. (3107)

Ashmead, W: Harris. On a gigantic chalcid fly inhabiting Florida. (Can. entom., May, 1881, v. 13, p. 89-90.)

Describes *smicra gigantea*, new species. G: D. (3108)

Ashmead, W: Harris. Injurious and beneficial insects found on the orange trees of Florida. (Can. entom., Aug. 1879, v. 11, p. 159-160.)

Describes *acarus? gloverii*, *ophelinus aspidioticola*, *lecanium phyllococcus* and *typhlodromus olliivorus* [sic] = 4 new species. G: D. (3109)

Ashmead, W: Harris. On a mite preying on the orange scale insect. (Can. entom., May 1879, v. 11, p. 93-94.)

Describes *oribates! aspidioti* new species, which preys upon *aspidiotus gloverii*. G: D. (3110)

Ashmead, W: Harris. On a new species of *aphis* affecting the pine. (Can. entom., April 1881, v. 13, p. 67-68.)

Describes *lachnus australi*, new species from *pinus australis*, in Florida. G: D. (3111)

[Ashmead, W: Harris.] The orange pyralid moth. *Anaeglis demisalis* Lederer. (Florida agriculturist, 6 July 1881, v. 4, p. 60. col. 2-4, 62 cm.)

Describes habitation, habits, imago and larva of *anaeglis demisalis*. B: P. M. (3112)

Ashmead, W: Harris. The plum aphid in Florida. (Pacific rural press, 2 July 1881, v. 22, p. 8. col. 4, 30 cm.)

Describes *aphis ryanicolens* [sic] n. sp., and mentions other *aphidae* found on *prunus* in Flo: 1: list of insect enemies of *aphidae* observed; means against *aphidae*. B: P. M. (3113)

Ashmead, W: Harris. On some new species of *chalcididae* from Florida. (Can. entom., June 1881, v. 13, p. 134-136.)

Describes *eurytoma vagabunda*, *decatoma flavca*, *d. querci*, *d. lanuae*, *d. phellos*, *d. foliatae*, and *d. batagoides* = 7 new species. G: D. (3114)

Ashmead, W: Harris. On two new chalcid flies from Florida parasitic upon the larvae of syrphus flies. (Can. entom., Aug. 1881, v. 13, p. 170-172.)

Describes *spalangia? syrphi* and *pteromalus quadrimaculatae*, 2 new species of *chalcidae* parasitic on the larvae of *syrphidae*. A. K. D. (3115)

Ashmead, W: Harris. Two new orange insects. (Florida dispatch, 7 July 1881, v. 6, no. 4, p. [1], col. 3, 27 cm.)

[From the Florida agriculturist.] Describes *spalangia syrphi* and *s. quadrimaculatae* = 2 n. sp. parasitic respectively on *syrphus pensylvanicus* and *syrphus quadrimaculatae*. [In manuscript correction by author, the name of *spalangia quadrimaculatae* is changed to *pteromalus quadrimaculatae*.] B: P. M. (3116)

Horn, G: H: Revision of the genera and species of the tribe *hydrobiini*. (Proc. Amer. philos. soc., 21 Feb. 1873, v. 13, p. 118-137.)

Rev. by G: H: Horn. (6th ann. rept. trustees Peabody acad. sci., for 1873, 1874, p. 93.)

Rev., by E. C. Rye. (Zool. rec. for 1873. . . Van Voorst, Lond., 1875, v. 10, p. 212-214)

Tabular separation of the genera, synoptic tables, descriptions of the genera and species of *berosus*, *chaetarthria*, *laccobius*, *philhydrus*, *hydrobius*, *limnocharis*, and *helopeltis* n. g. S: H. (3117)

Le Conte, J: Lawrence. Tabular synopsis of the *rhyrachophora* of America. Proc. Amer. philos. soc., 5 Jan. 1877, v. 16, p. 417-424.)

Tabular statement of the number of genera and of the geographical distribution of the and subfamilies, with remarks. S: H. (3118)

Linstow, O: Compendium der helminthologie. Ein verzeichniss der bekannten helminthen, die frei oder in thierischen körpern leben, geordnet nach ihren wohnthieren, unter angabe der organe, in denen sie gefunden sind, und mit beifügung der literaturquellen. Hannover, Hahn, 1878. t.-p. cover, 22+382 p., 24X15; t. 17X10. 8 M.

Contains introduction, with bibliography; list of animals (including 47 orthoptera, 4 neuroptera, 73 coleoptera, 19 hymenoptera, 65 lepidoptera, 7 diptera, 6 hemiptera, 3 myriapoda and 10 arachnida) with the helminths which are found in them. Free-living helminths and literature concerning them. Index. G: D. (3119)

Lintner, Joseph Albert. Description of a new species of *eudamus*. (Can. entom. April 1881, v. 13, p. 63-65.)

Describes *e. electra*, new species from Hamilton, Ontario, Canada. G: D. (3120)

Lintner, Joseph Albert. On the life duration of the heterocera, moths. (Can. entom., Nov. 1881, v. 13, p. 217-220.)

Rev. (Amer. nat., Nov. 1881, v. 15, p. 912.)

Paper read before the American association for the advancement of science, at Cincinnati, August 1881; containing notes on the longevity of heterocerous lepidoptera. A. K. D. (3121)

Lockwood, S: Mussel and insect climbers. (Amer. nat., Sept. 1881, v. 15, p. 737.)

The black mussel, *mytilus edulis*, climbs in a similar manner, with its byssus, as does the larva of *aspidisca salicella*, with its silk. G: D. (3122)

Marx, G: On some new tube-constructing spiders. (Amer. nat., May 1881, v. 15, p. 396-400, fig. 1-8.)

Describes and figures nests of two species of spiders for which the author proposes, without describing the species, the names *tarentula* [sic] *nidifex* (♀ figured) and *t. pikei* (♂ and ♀ figured). G: D. (3123)

Mead Theodore Luqueer. *Limenitis eros* versus var. *floridensis*. (Can. entom., April 1881, v. 13, p. 79-80.)

Criticism of H. Strecker's "On a lately described species of *limenitis*" (Can. entom., Feb. 1881, v. 13, p. 29-30) [Rec., 2733]. G: D. (3124)

Meeting of the sub-section of entomology of the American association for the advancement of science. (Can. entom., 1881, v. 13; Sept., p. 179-189; Oct., p. 214-216.)

Report of proceedings and discussions at the meeting, including address of the president, J. G. Morris, in full (p. 184-185). A. K. D. (3125)

Migration of butterflies. (Amer. nat., July 1881, v. 15, p. 577.)

Notes migration of *pieiris monuste* in South Carolina. G: D. (3126)

- Moffat, J:** Alston. [*Calosoma scrutator*.] (Can. entom., Jan. 1881, v. 13, p. 18-19.)
Large numbers of *C. scrutator* driven ashore on Lake Erie; notes on their odorous discharge. *G. D.* (3127)
- Moffat, J:** Alston. Entomological notes. (Can. entom., Aug. 1881, v. 13, p. 175.)
Note on the occurrence of *saperda fayi* in large numbers. *A. K. D.* (3125)
- Moffat, J:** Alston. [*Papilio cresphontes*.] (Can. entom., May 1881, v. 13, p. 115.)
Notes on larvae, pupae, and imago of *P. cresphontes*. *G. D.* (3129)
- Moffat, J:** Alston. Swarming of *archippus*. (Can. entom., Feb. 1880, v. 12, p. 37.)
Assembling of *danais archippus* in great numbers near Hamilton, Ontario, Canada. *G. D.* (3130)
- Mojsisovics, August.** Leitfaden bei zoologisch-zootomischen präparirübungen für studirende. Leipzig, *W. Engelmann*, 1879 [Dec. 1878]. t.-p. cover, 8+232 p., 24×16, t 18.5×11.4. 110 fig. 8 M.
Modes of dissecting animals; dissection of arthropoda [p. 183-100] especially illustrated by mode of dissection of *melolontha vulgaris*, of which the heart, male and female sexual organs, mouth-parts, and digestive system are illustrated. *G. D.* (3131)
- Morris, J:** Godlove. [Address as president of the entomological subsection of the American association for the advancement of science, at its Cincinnati (Ohio) meeting (1881).] (Can. entom., Sept. 1881, v. 13, p. 184-189.)
Obituary notice of S: S. Haldeman, and notice of the working entomologists of the United States forty years ago; number of entomological students and the extent of their writings now in the United States; notices of the entomological journals of North America and their special work; suggestions for the further advancement of our knowledge of North American insects and entomological collections. *A. K. D.* (3132)
- Moseley, H. N.** Notes on the species of *peripatus* and especially on those of Cayenne and the West Indies. (Annals and mag. nat. hist., Apr. 1879, s. 5, v. 3, p. 263.)
Gives notes on various species of *peripatus*, with especial reference to the number of pairs of legs. *R. H.* (3133)
- [**Müller, Hermann.**] Häufiges auftreten von *chlorops nasuta* Schrnk. (Entom. nachrichten, 1 Jan. 1881, jahrg. 7, p. 17.)
Great periodical abundance of the above species in Lippstadt, Germany. *G. D.* (3134)
- Murray, W:** [*Papilio cresphontes*.] (Can. entom., June 1880, v. 12, p. 120.)
Emergence of *papilio cresphontes* from pupa in January. *G. D.* (3135)
- Myers, Justus Matthew Theobolt.** Habits of *xylotrechus convergens*. (Amer. nat., Feb. 1881, v. 15, p. 151.)
Brief notes on habits of the larva of this beetle, which feeds upon red haw [*perataegus tomentosa*]. *G. D.* (3136)
- Packard, Alpheus Spring, jr.** The brain of the embryo and young locust. (Amer. nat., May 1881, v. 15, p. 372-379, pl. 4-5.)
Structure of the brain of young of *caloptenus spretus*, studied by sections. A continuation of author's "The brain of the locust" (*op. cit.*, April, p. 285-302, pl. 1-3) [Rec. 3138]. *G. D.* (3137)
- Packard, Alpheus Spring, jr.** The brain of the locust. (Amer. nat., April 1881, v. 15, p. 285-302, pl. 1-3.)
Structure of the brain of *caloptenus spretus* studied by sections. Continuation by author under title, "The brain of the embryo and young locust" (*op. cit.*, May, p. 372-379, pl. 4-5) [Rec., 3137]. *G. D.* (3138)
- Packard, Alpheus Spring, jr.** *Scolopen-drella* and its position in nature. (Amer. nat., Sept. 1881, v. 15, p. 698-704, fig. 1.)
Discusses structure and affinities of *scolopen-drella*, which the author decides to belong to a suborder of *thysanura*, equivalent in rank to *collembola* and *cinura*. *G. D.* (3139)
- Ragusa, Enrico.** Note su alcuni lepidotteri siciliani. (Naturalista siciliano, Nov. 1881, an. 1, no. 2, p. 36-38, pl. 3, figs. 1-3.)
Figure 1 and describes a hermaphrodite of *rhodocera cleopatra*; notes on some other species of sicilian lepidoptera, and their aberrant forms. *G. D.* (3140)
- Ragusa, Enrico.** Un *papilio machaon* Lin. lillipuziano. (Naturalista siciliano, Oct. 1881, an. 1, no. 1, p. 24, pl. 1, fig. 9.)
Describes and figures a specimen of *papilio machaon* with an alar expanse of only 42 mm. *G. D.* (3141)
- Reed, Edmund Baynes.** *Cupes capitata*. (Can. entom., Aug. 1881, v. 13, p. 176.)
Abundance of *cupes capitata* in London, Ont. *A. K. D.* (3142)
- v. Reizenstein, L.** A new moth. *Smerinthus cablei*. (Scribner's monthly [N. Y.], Oct. 1881, v. 22, p. 864-866, fig.)
Describes larva and imago (figured) of *S. cablei* n. sp., feeding on *pouteria* in Louisiana; list of the 7 U. S. species of *smerinthus*; systematic relations of this species. *B: P. M.* (3143)
- Religious culture of the young.** The world we live in. Study 22. The animal kingdom, except man. Articulates. (Free religious index, 17 Nov. 1881, v. 13, p. 238-29 cm.)
Questions, selected quotations, and suggestions for teaching a class about insects, crustacea, spiders and worms. *G. D.* (3144)

- Rupertsberger, Mathias.** Biologie der käfer Europas. Eine uebersicht der biologischen literatur gegeben in einem alphabetischen personen- und systematischen sach-register nebst einem larven-cataloge. Linz a. d. Donau, 1880. t.-p. cover, 12+295 p., 21.5×14, t 18×11. Pap., 6 M.
Rev., entitled "Natural history of coleoptera." (Amer. nat., May 1881, v. 15, p. 384.)
Bibliography of the writings on the biology of the European species of coleoptera, under the names of the authors and under the names of the families, genera, and species; notes in regard to the best figures of the larvae and pupae. *A. K. D.* (3145)
- Saunders, W:** Annual address of the president of the Entomological society of Ontario. (Can. entom., Oct. 1881, v. 13, p. 197-205.)
General account of the late progress of entomology, especially in an economic direction. *A. K. D.* (3146)
- Saunders, W:** Entomology for beginners. (Can. entom., June 1881, v. 13, p. 117-119.)
Describes larva, and figures and describes imago of *alaus oculatus*; figures *lucanus dama*, of which larva and imago are described. *G: D.* (3147)
- Saunders, W:** Entomology for beginners. The legged maple borer, *ageria aceris*, Clemens. (Can. entom., April 1881, v. 13, p. 69-70, fig. 6.)
Figures and describes larva, chrysalis, imago, and borings in wood, of *ageria aceris*. *G: D.* (3148)
- Saunders, W:** Entomology for beginners. The red-humped apple tree caterpillar, *notodonta concinna*. (Can. entom., July 1881, v. 13, p. 138-140.)
Describes and figures mature larva, chrysalis, and imago; mode of destroying the larvae. *A. K. D.* (3149)
- Saunders, W:** Entomology for beginners. The satellite sphinx, *philampelus satellitia* Linn. (Can. entom., March 1881, v. 13, p. 41-43, fig. 4-5.)
Figures and briefly describes the larva, pupa and imago of *philampelus satellitia*. *G: D.* (3150)
- Schilde, Johannes.** Eine hornlose raupe von *smereinthus populi*. (Entom. nachrichten, 15 March 1881, jahrg. 7, p. 100.)
Deformity of larva of *smereinthus populi*. *G: D.* (3151)
- S[immonds], P. L.** Insects as food. (Journ. of applied sci., 1881, v. 12: June, p. 82-84, 102 cm.; July p. 98-100, 134 cm.; Aug. p. 113-114, 79 cm.)
Compiled accounts of the uses of insects as food in ancient and modern times. *G: D* (3152)
- Schönfeldt.**— Ein monströser *prionus insularis* Motsch. (Entom. nachrichten, 15 April 1881, jahrg. 7, p. 121.)
Left antenna absent. *G: D.* (3153)
- Speyer** ["Speier"], Adolph. Ein lepidopterologischer rückblick auf den sommer kes jahres 1879. (Entom. nachrichten, 1881, jahrg. 7: 15 May. p. 145-152; 1 June, p. 157-162.)
On the abundance of *vanessa cardui* and *plusia gamma* during 1879. *G: D.* (3154)
- Stein, R:** Tenthredinologische studien. I. Die parthenogenesis von *hylotoma rosa* L. (Entom. nachrichten, 15 Oct. 1881, jahrg. 7, p. 288-294.)
Experiments on parthenogenesis of *h. rosa*; from these and other experiments the author concludes that probably "the possibility of parthenogenetic multiplication is peculiar to all or at least to most *tenthredinidae*." *G: D.* (3155)
- Strecker, Herman.** Description of a new species of *trochilium*. (Can. entom., July 1881, v. 13, p. 156.)
Describes *trochilium grande* n. sp., from Texas. *A. K. D.* (3156)
- Tallant, W. N.** [*Terias nicifpe.*] (Can. entom., May 1881, v. 13, p. 115.)
Terias nicifpe rare about Columbus, Ohio, in 1879, and abundant in 1880. *G: D.* (3157)
- Todd, James E.** *Asilus* and *libellula*. (Amer. nat., Dec. 1881, v. 15, p. 1005.)
Asilus captures a *libellula*. *G: D.* (3158)
- Todd, James E.** Terns as fly-catchers. (Amer. nat., Dec. 1881, v. 15, p. 1005.)
Hydrochelidon lariformis catches and eats dragon-flies. *G: D.* (3159)
- United States national museum** (*Smithsonian institution*), Washington, D. C. No. 4. Circular concerning the department of insects. [Wash.], 1 Jan. 1882. 1 p., 25×16.
Reprint. (Proc. U. S. nat. mus., for 1881, 1882, v. 4; App., no. 4.)
Abstract. (Psyche, Feb. [24 May] 1882, v. 3, p. 315.)
Notice, by S. F. Baird, of C: V. Riley's private collection of insects, deposited in the U. S. national museum; request for contribution of specimens to the museum. *B: P. M.* (3160)
- Weidinger, G.** Libellenschwarm. (Entom. nachrichten, 15 June 1881, jahrg. 7, p. 187-188.)
Flight of males of *libellula quadrimaculata* over Dresden, Saxony, on 28 May 1881. *G: D.* (3161)

ENTOMOLOGICAL ITEMS.

DR. ANTON STUNBERG, of Stockholm, has been appointed director of the natural history museum in Göteborg, Sweden, to fill the place of Prof. A. W. Malm, who died in March 1882.

MR. CHARLES FISH, of Brunswick, Me., has been obliged to give up the study of the *pterophoridae* and has transferred his collection of that family to Prof. C. H. Fernald, of Orono, Me.

THE NECROLOGY for the preceding year, which has annually formed a part of the Bibliographical Record for each February numero of PSYCHE, will be a part of the March numero this year.

MR. HENRY G. DAMMER, 938 Broadway, St. Louis, Mo., is desirous of obtaining specimens of lepidoptera, including European species. Catalogs from the eastern United States are particularly desired.

PROF. E. METSCHNIKOFF, the widely known author of papers on the embryology of insects, has left the University of Odessa, Russia, and Prof. W. Salensky of the University of Kasan is called to fill his place.

MR. L. O. HOWARD, has found that pyrethrum increases the heart-beat of the larvae of *plusia brassicae* from its normal rate of from 44 to 68 beats per minute to 150 to 164 beats, after which it subsided to 140 beats and just before death to 130 beats per minute.

AN INTERESTING series of papers by Rev. W. W. Fowler, under the title "Natural localities of British coleoptera" is in progress in *The Entomologist*. Altho the species treated of are British the methods of collecting described in the paper make it well worth perusal.

DR. M. SCHLUGIN recommends, in the *Zoologischer Anzeiger*, a mixture of paraffin and ceresin as an imbedding material in cutting sections with the microtome. Ceresin is similar to wax but firmer and more tenacious. This mixture is somewhat hard, but if a softer one is desired a little vaselin is added.

PRESERVATION OF HONEY. Honey, according to A. Vogel, contains on an average one per cent of formic acid. Observing that crude honey keeps better than that which has been clarified, E. Mylius has tried the addition of formic acid, and found that it prevents fermentation without impairing the flavor of the honey.—*Sci. amer.*, 18 Nov. 1882, v. 47, p. 324.

THE U. S. Commissioner of Agriculture authorizes the editors of PSYCHE to announce that copies of his annual Reports for 1881-1882 will be sent to any entomologist who applies for them. Mr. Mann has made out a list of most of the principal entomologists, to whom the reports have been sent, and will be pleased to see that copies are sent to any others who may wish them.

AT THE meeting of the Academy of Natural Sciences of Philadelphia, 30 May 1882. Professor Leidy called attention to the abundance of the ant *Lasius interjectus* in the neighborhood of Philadelphia. It is habitual with this ant to care for an Aphis and a Coccus, both of which it guards in flocks. He described a particular nest under a flat stone, containing six distinct and closely crowded groups of the pale yellowish Aphis, and five of the red Coccus.—*Amer. nat.*, Jan. 1883, v. 17, p. 118.

COLLECTING COLEOPTERA. "The large coarse tufts of grass that are to be found in almost every field are very productive if cut round with a sharp knife, lifted gently, and then inverted and shaken over paper. This is a very good method of collecting in winter, as it is almost certain to produce something, if all else has failed. Almost any beetle may be found in this way, as the tufts are favourite hibernating places; *staphylinidae*, however, especially *Steni*, are the commonest."—W. W. Fowler in *The Entomologist*, Oct. 1882, v. 15, p. 231-232.

PROTECTIVE CHANGE of color in a spider.—I suppose you know the little flower spiders, that conceal themselves in the flowers, and seize any unwary insect that may chance to come within their reach. I have generally

found them white and yellow. I suspected they changed their color, and by experiment. I find that this is so. If I take a white one and put it on a sunflower, it will get quite yellow in from two to three days. I believe they capture almost anything, but they seem to be partial to the bees. I found one the other day with a wasp, the latter was not yet dead, but it was tightly held by the throat by the spider. The next day the wasp was found lying dead under the flower.—James Angus, in *Amer. naturalist*, Dec. 1882, v. 16, p. 1010.

NOTICE TO SUBSCRIBERS.

The concluding numbers of volume three of *PSYCHE*, for the publication of which the undersigned is responsible, will be issued as rapidly as possible. It was deemed, however, inadvisable for the club to delay longer commencing volume four. As usual, the cause of the delay in the issue of *PSYCHE* has been the lack of good material for publication. Articles of the greatest permanent value in entomology are hard to obtain for the reason that they are not hurried into print by their authors to gain priority.

GEORGE DIMMOCK.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

13 Oct. 1882.	9 Mar. 1883.
10 Nov. "	13 Apr. "
8 Dec. "	11 May "
12 Jan. 1883.	8 June "
9 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p. m., on the days following:—

25 Oct. 1882.	28 Feb. 1883.
22 Nov. "	28 Mar. "
27 Dec. "	25 Apr. "
24 Jan. 1883.	23 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.	10 Mar. 1882.
11 Nov. "	14 Apr. "
9 Dec. "	12 May "
13 Jan. 1882.	9 June "
10 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.	12 June 1882.
---------------	---------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

3 Oct. 1882.	6 Feb. 1883.
7 Nov. "	6 Mar. "
5 Dec. "	3 Apr. "
9 Jan. 1883.	1 May "

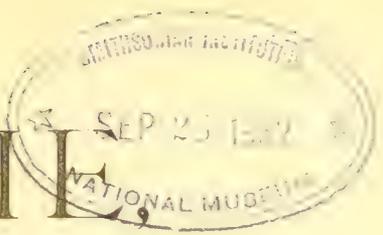
G. J. BOWLES, *Secretary*.

THE REGULAR meetings of the Brooklyn Entomological Society will be held at 9 Broadway, Brooklyn, E. D., N. Y., on the days following:—

28 Oct. 1882.	31 Mar. 1883.
25 Nov. "	28 Apr. "
30 Dec. "	26 May "
27 Jan. 1883.	30 June "
24 Feb. "	

F. G. SCHAUPP, *Secretary*.

PSYCHE



A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lausing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 107-108.

MARCH-APRIL 1883.

CONTENTS:

ADVERTISEMENTS	22
THE SCALES OF COLEOPTERA.— <i>George Dimmock</i>	23-27
HOMINIVOROUS HABITS OF LUCILIA MACELLARIA. "THE SCREW WORM"— <i>Francis Huntington Snow</i>	27-30
FALSE DATES	31-32
PROCEEDINGS OF SOCIETIES.—Academy of Natural Sciences of Philadelphia	32
NECROLOGY FOR 1879, 1880, 1881 AND 1882—BIBLIOGRAPHICAL RECORD, no. 3162-3234	33-38
ENTOMOLOGICAL ITEMS—Society Meetings	39-40

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

1883 Subscriptions not discontinued are considered renewed.

1883 Commencing with the numbers for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

1883 Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Page.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

EARLY STAGES OF BUTTERFLIES WANTED.

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,
Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

GALLS AND GALL INSECTS.

The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera*, *Coleoptera*, *Hemiptera* and *Diptera*. Correspondence in reference to Gall growths, or other vegetable abnormalities, is invited. CHARLES V. RILEY,
1700 Thirteenth St., N. W.,
Washington, D. C.

TORTRICIDAE WANTED.

I am desirous of obtaining as many North American TORTRICIDAE as possible, for the purpose of studying this family. I shall be glad to name and return any TORTRICIDAE forwarded to me for this purpose, save such as may prove new and desirable to retain for description.

Pack carefully, and direct to
PROF. C. H. FERNALD, Orono, Me.

LEPIDOPTERA.

Living cocoons, pupae and ova of American lepidoptera bought or exchanged for other species, by Monsieur ALFRED WAHLY, (Membre-Lauréat de la Société d'Acclimatation de France).

Tudor Villa, Tudor Road, Norbiton,
Kingston-on-Thames, England.

NORTH AMERICAN FERNS.

Check lists of the Ferns of North America north of Mexico, enumerating 31 genera, 132 species and 15 varieties, on one octavo page. Will be sent by mail on receipt of the price, 15 cents per dozen copies.

S. STEBBINS, Springfield, Mass.

PSYCHE.

THE SCALES OF COLEOPTERA.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

(Continued from page 11.)

SCALES OF HOPLIA.

A few only of the scales from the upper side of this insect are colorless, and, as these seem to be undeveloped or immature, I tried no experiments upon them.

The scales of the under side of *H. coerulea* are purple, purplish red, red, bluish and colorless by transmitted light, and by reflected light they are silvery white with a tendency to metallic green in places. The scales of the tip of the abdomen, altho really dorsal in position, are covered with spines, are mostly reddish or purple by transmitted light, and are metallic green by reflected light. Some of the scales of the legs are like those from the rest of the under surface of the insect; others of them are lanceolate (fig. 3, *c*), and colorless or milk-white, but covered with longer spines or hairs than the more circular forms of scales. The hairs of this insect have fine branches, as do the hairs of all *scarabacidae*, according to Fischer and according to my own observations.

Water, alcohol, chloroform and similar reagents render the scales of the under side colorless and transparent, the colors returning as soon as the scales are dried.

In finer structure the scales of the under side are different from those of the upper side in being clothed with the before-mentioned spines or fine hairs, and in the absence of the fine internal network, which is here replaced in some scales by a more irregular internal marking of like nature.

The scales of *Hoplia modesta*, from this country, are confined to the tip of the abdomen and to the under side of the insect. They are all gray or milk-white by transmitted light, and silvery by reflected light. They are narrower than those from corresponding parts of *H. coerulea*, but are otherwise alike in structure and need no further mention here.

SCALES OF POLYPHYLLA.

The whitish spots upon the elytra of *Polyphylla variolosa* are produced by lanceolate scales, the opaque whiteness of which is caused by the large amount of air contained in them. As they present no characters of special interest not to be found in scales of other coleoptera described in this paper I have not drawn them or further studied them.

SCALES OF VALGUS SQUAMIGER.

Nearly every part of *V. squamiger* is covered with scales which are of two colors, an opaque dark brown and a semi-opaque white. The scales are somewhat rolled and are very brittle, so that when they are pressed beneath a cover-glass upon the microscope slide they usually split at the edges. The unbroken scales are nearly round, about 0.14 mm. long by 0.08 to 0.12 mm. wide, and until they are deprived of air but little structure is visible. When they are deprived of air they are seen to be covered with dense, rather long hairs, — to be in fact almost



Fig. 4. Scale of *Valgus squamiger*. Enlarged 100 diam.

shaggy. Fig. 4 represents an unbroken scale that has been treated with alcohol to remove the air. The hairs, as will be seen by the figure, are arranged, somewhat roughly, in transverse or oblique lines; but what is more curious, the basal ends of these hairs seem to be connected, in each line, with one another, and finally each of these bands of hairs, which may contain from two to twenty hairs, seems to connect by its basal line with a branch going to the basal end, or stem, of the scale. These branches unite as they approach the basal end of the scale until they form one trunk. These ramifications are delicate brown and are beautiful on a prep-

aration of the scales in Canada balsam. In fig. 4, which was made too small to show them correctly, they are proportionally far too coarse, and are not tapered as regularly as they should be from base to tip.

I have not found this ramified structure in any scales except those of *Valgus*, and in them I have not studied it to any extent. It appears as if the cavity of the scale, once open and probably opening into the large hairs, had closed gradually, leaving channel-like folds between the hairs and from them to the stem of the scale. These channels are apparently entirely closed now, altho I made no sections of these scales to absolutely prove this point.

HAIRS OF PSILOPTERA.

The under side of the abdomen and other parts of *Ps. drummondi* are clothed with brownish-yellow hairs, which are set upon a smooth, nearly black surface, and consequently the hairs appear of a light bronze color.



Fig. 5. Hair of *Psiloptera drummondi*. Enlarged 100 diam.

Seen under the microscope these hairs or scales—for they seem to be as much

scales as they are hairs—are sword-shaped (see fig. 5), and of a yellowish color. Their length is from 0.25 mm. to 0.30 mm., their width about 0.01 mm., and they are covered with longitudinal striae, which are usually about 0.001 mm. apart. These hairs or scales are easily seen to contain air by using water or alcohol to drive it out. I introduce them here only to illustrate this somewhat common form of appendage intermediate between scales and hairs. I have found no other squamiform appendages on the limited number of *buprestidae* which I have examined.

No description has been given, as far as I can discover, of scales in *clateridae*, altho the generic names *Chalcolepis* and *Chalcolepidius*, and the specific names of *Adelocera lepidoptera*, *Lacon leprosus*, *Meristhus lepidotus*, *Monocrepidius lepidus*, *Cryptohypnus squamifer*, and others, would imply that the presence of scales had been either suspected or verified. That the scales of *clateridae* are interesting in form and structure can be seen by the following descriptions of scales of *Chalcolepidius*, of *Alaus* and of an undetermined species of European *clateridae*.

SCALES OF CHALCOLEPIDIUS.

Nearly the whole surface of *C. rubripennis*, except its elytra, is thickly covered with scales, which give to the parts thus covered a peculiar metallic or bronzed aspect, with colors changing from blue to greenish or reddish.

The scales from all parts of this insect are very much alike, varying little in form (see fig. 6, *a*, *b*, and *c*). They are all of ovate form, more or less elongate, with the larger end toward their shank or stem, which is nearly always broken off in removing them from the insect; they are very flat, scarcely convex above, but do not rest very tightly pressed upon the surface of the insect. Their length is from 0.09 to 0.15 mm., their width from 0.02 to 0.04 mm., and their thickness is about 0.0025 mm.

These scales when removed and examined under the microscope are uniformly brown, except with very obliquely transmitted light, when they are sometimes purplish. If, however, they are put upon a black surface and illumi-

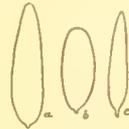


Fig. 6. Different forms of scales from *Chalcolepidius rubripennis*. Enlarged 100 diameters.

nated from above they are brilliant with blue, red and green, the color depending upon the position of the surface of the scale with reference to the light. Put in direct sunlight, on a black surface, and the microscope focussed somewhat above them, the light is decomposed in fine lines of brilliant blue, green and red, as if series of solar spectra were drawn up near each other, thus indicating striation of the scale-surface. The scales have a very slight tendency to longitudinal folding, but no striae, or really distinct

folds, are visible upon them. The shank and a little of the basal portion of the scales are hollow; whether the whole scale is hollow I have not determined.

Treatment with water, alcohol, glycerin or turpentin does not seem to affect the scales of *Chalcolepidius*, which appear to contain no air. They are not bleached by chlorin bleaching reagents.

SCALES OF ALAUS.

The two velvety black spots upon the dorsal surface of the thorax of *A. oculatus*, to which this insect owes its specific name, are formed of scales, as are also all the white portions of the beetle, the ground color of the whole insect being a slightly shining black. The same remarks apply to *A. myops*, the scales of which are like those of *A. oculatus* in every respect.

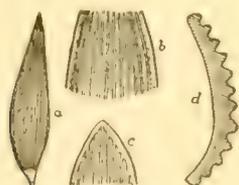


Fig. 7. Scales of *Alaus oculatus*: *a*, brown scale; *b* and *c*, portions of white scales to show cross-bands; *d*, transverse section of a brown scale. Enlargement: *a*, 100 diam.; *b* and *c*, 300 diam.; *d*, 500 diam.

The form of all the scales of *A. oculatus* is scaphoid, with the concave side toward the insect. The scales are striate on the convex side, but smooth on the concave side. Fig. 7, *a*, illustrates their form, the lower end being the one attached to the insect. In some cases

the shank by which the scale is attached is proportionally longer than is shown in the figure. These scales are inserted by their shanks in holes irregularly distributed in the chitinous covering of the insect. The irregular arrangement, peculiar form and striation, and mode of insertion of the scales of *A. oculatus* forcibly remind one of the leaves in a bed of lily-of-the-valley (*Convallaria*) when these leaves are blown toward one direction by a gentle breeze.

The scales of *A. oculatus* are all of about the same size—about 0.20 to 0.23 mm. long by 0.04 to 0.05 mm. wide, and 0.005 mm. in greatest thickness—from whatever part of the insect they are taken. Those which form the two black thoracic spots are deep brown when seen under the microscope, and the others are opaque white when dry. The striae of these scales are about 0.0025 mm. apart, and converge somewhat toward each end of the scales. The striae of the white scales are a little less distinct than are those of the dark scales, the whole white scale, to appearance, when viewed with a low-power microscope, being covered with minute cross-lines, so numerous as to give the scale an opaque white color. Under higher magnifying power these transverse lines present an appearance as in fig. 7, *b* and *c*. The longitudinal striae are above the transverse lines, i. e., on the convex side of the scales, while the cross-lines extend as interrupted, transverse bands across the lower or concave part of the scales. No transverse bands are visible, even after re-

moving the air, in the brown scales. In the white scales the bands usually start out from or beneath the marginal longitudinal stria of the upper side of the scale, and extend beneath the other lon-

gitudinal striae toward the middle of the scale (see fig. 7, *b* and *c*); exceptionally, however, they begin beneath one of the other longitudinal striae.

(*To be continued.*)

HOMINIVOROUS HABITS OF *LUCILIA MACELLARIA*, "THE SCREW-WORM."

BY FRANCIS HUNTINGTON SNOW, LAWRENCE, KANSAS.

I have from time to time had occasion to note the depredations of the screw-worm upon horses and cattle in this state, but until recently have not received positive evidence of its attacks upon human subjects in any locality so far north as Kansas. But early in September, 1882, I received from Mr. S. D. Osborn, the postmaster at Varck, in Southeastern Kansas, specimens "of the worms which came from the nostrils of Milton Carter." These proved to be the larvae of *Lucilia macellaria* Fab., the so-called "screw-worm." Upon further inquiry I learned that upwards of one hundred full-grown maggots escaped from the nose of this patient, who finally recovered from the serious illness consequent upon their ravages. I also ascertained that Mr. Carter had long been afflicted with an offensive nasal catarrh, which made his nostrils an attractive place for the oviposition of the fly, and that he had fallen asleep in the woods in the daytime only a few days before the first appearance of the symptoms produced by the presence of the larvae.

Several other instances of the attacks of *Lucilia* upon man soon came to my knowledge, most of which led to fatal results. Among these I will select the case attended by Dr. J. B. Britton, of Mapleton, in southeastern Kansas, who reported it in full at the session of the Southeast Kansas District Medical Society, in January, 1883. From this report I condense the following account: "On the evening of August 22d, 1882, Mr. M. E. Hudson complained of a peculiar sensation at the base of the nose and along the orbital processes, which was first followed by inordinate sneezing, and later by a most excruciating pain over the os frontis, also involving the left superior maxillary. This patient also had suffered, and was still suffering, from an aggravated form of nasal catarrh. The discharge was quite purulent, of a yellowish color frequently tinged with blood, with a disagreeable odor and at times intolerably offensive. On the 24th there was a profuse discharge of much purulent matter from the nostril and mouth, when all pain instantly

subsided. This discharge continued for three days, during which time as much as sixteen ounces escaped, increasing in consistency until it was pure pus. The odor becoming much more offensive, his cough was more troublesome and fever increased to such an extent as to produce slight delirium for twelve hours. What was thrown off was with much difficulty expectorated, and was sanious, containing microscopic particles of osseous matter, together with flakes of plastic exudation. The os hyoides was evidently destroyed. The patient had spoken with difficulty for thirty-six hours and there was much trouble in swallowing. The soft palate had evidently given way and there was an entire inability to protrude the tongue or use it in speech.

“About this time a worm similar to a maggot dropped from his nose. That was the first indication or suspicion that there was anything of the kind present. There was not, as in some other cases reported, any swelling, or movements traceable under the skin, nor was there at any time any complaint of the patient, calculated to lead to a knowledge of their presence. After the appearance of the first, I expected more, and was surprised to see them drop from the nostrils and wiggle from the mouth without any discomfort to the patient until they came in contact with the Schneiderian membrane, when they annoyed him greatly, and every effort was made on his part to expel them; but so soon as expelled, no further trouble was manifested until another

would get into the nostril. Every effort was made on my part to discover them under the tissue, but the soft palate being destroyed to a great extent, and the palatine arch apparently lowered, it was with much difficulty that an examination could be made. The worms were evidently burrowing under the palatine fascia, as it presented a honey-combed appearance and in places patches were totally destroyed as large as a dime [18 mm.]. They continued to drop from the mouth and nose, forced from the nostrils by the efforts of the patient, for the following forty-eight hours, during which time 227 were counted and the estimated number exceeded 300. At this time the whole of the soft palate was destroyed. The patient lived four days after the last worm came away.

“I put five of the worms in dry earth and in fourteen days from the time they dropped from the nostril there hatched out three flies.

“Upon a very minute and careful examination after death I was astonished to find that all the tissue covering the cervical vertebrae, as far down as I could see by throwing the head back and compressing the tongue, was wholly destroyed and the vertebrae exposed. The palatine bones broke with the slightest pressure of the finger. The os hyoides was destroyed and the nasal bones loose, only held in position by the superficial fascia.

“My own theory is that the fly deposited the eggs while the patient was asleep, probably the day previous to

the peculiar sensation and sneezing first complained of. At that time they had acquired vitality enough to annoy him while in contact with the sound flesh. So soon as they came in contact with the unsound flesh, or that affected with the catarrh, being as it must have been gangrenous, they gave no further trouble."

Dr. Britton forwarded to me specimens of the fly, bred as above stated, which I identified as *Lucilia macellaria* Fab. In order, however, that there might be no possibility of error, I submitted them to Dr. S. W. Williston, of New Haven, Conn., who corroborated this determination and furnished the following notes concerning the species: "The specimens are evidently *Lucilia* (*Campomyia*) *macellaria* Fab., a fly common from the Argentine Republic to Canada, and which from its variations has probably received more specific names (20!) than any other American fly. It belongs to the *Muscidae* (true) and is not far from *Musca*. Their hominivorous propensities have gained for them the synonyms of *Lucilia hominivorax* Coquerel, and *L. hominivorus* Cenic (S. America)."

In the Peoria (Ill.) Medical Monthly for February, 1883, Dr. Joshua Richardson, of Moravia, Iowa, has an article upon "The screw-fly and its ravages," from which I make the following extracts: "While travelling in Kansas in the latter part of last August a citizen of this place had the misfortune to receive while asleep a deposit of eggs from this fly. He had been troubled

for years with catarrh, hence the attraction to the fly. He returned home a few days after the accident and shortly after began complaining of a bad cold. Growing rapidly worse, I was called to attend him. Monday, my first day, his appearance was that of a man laboring under a severe cold. Had slight congestion of the lungs, and moderate grade of fever. His nose seemed greatly swollen and he complained of a smarting, uneasy feeling in it, and general misery through the head. Gave him treatment to relieve the congestion and fever. Tuesday saw him again. His nose and face were still more swollen, and in addition to the other symptoms he was becoming slightly delirious and complained a great deal of the intense misery and annoyance in his nose and head. A few hours after, I was sent for in haste with the word that something was in his nose. I found on examination a mass of the larvae of this fly (or "screw-worms" as they are commonly called in the south) completely blocking up one nostril. On touching them they would instantly retreat *en masse* up the nostril. Making a 20 per cent solution of chloroform in sweet milk I made a few injections up both nostrils, which immediately brought away a large number, so that in a few hours I had taken away some 125 of them. By Wednesday evening erysipelas had begun, implicating the nose and neighboring portions of the face. Another physician was called. By continual syringing with a strong antiseptic solution of

salyeilate of soda, bicarbonate of soda and carbolic acid we hoped to drown out the remaining larvae. But they had by this time cut their way into so many recesses of the nose and were so firmly attached that we were unable to accomplish much. Finally we resorted to the chloroform injections, which immediately brought away a considerable number. Friday I was able to open up two or three canals that they had cut, extracting several more that had literally packed themselves one after another in these fistulous channels. His speech becoming suddenly much worse, I examined the interior of his mouth and found that a clear-cut opening had been made entirely through the soft palate into his mouth and large enough to insert the end of a common lead pencil. Saturday the few remaining larvae began changing color and one by one dropped away. On Sunday for the first time hemorrhage from both nostrils took place, which continued at intervals for three days but was not at any time severe. On this day the patient began to improve, the delirium and erysipelas having subsided, leaving but little or no annoyance in his head. In a few days he became able to go about home, and even to walk a distance of half a mile to visit a friend and return. But while there he began complaining of a pain in the neighborhood of his left ear, apparently where the eustachian tube connects with the middle ear. It proved to be an abscess. Being already so reduced by the first attack, he was unable to withstand the

second, and died after an illness of nearly three weeks, completely exhausted by his prolonged sufferings. Three days before his death the abscess discharged its contents by the left nostril. The quantity of pus formed was about $2\frac{1}{2}$ ounces [78 grams].

“In all about 250 larvae were taken away from him during the first attack, and, as the visible results, not only had they cut the hole through the soft palate, but had also eaten the cartilage of the septum of the nose so nearly through as to give him the appearance of having a broken nose. The case occupied, from the first invasion of the fly to its final result, nearly two months. He doubtless would have recovered but for the formation of the abscess, which, from all the symptoms, was caused by one or more of the larvae having found their way up the left eustachian tube.”

Dr. Richardson also quotes the Rev. William Dixon, of Green, Clay Co., Kansas, as giving the following account of his own experience :

“While riding in his buggy a few years ago in Texas, a screw-fly attacked him flying up one nostril. He blew it out, when it dashed up the other and deposited its eggs before he was able to expel it. Not realizing the danger he did nothing for about three days, when the pain became so great that he hastened to Austin to consult a physician. His soft palate was almost destroyed before the larvae, over 200 in number, were expelled.” This was the only one of twelve cases known to Dr. Richardson in which the patient recovered.

PSYCHE.

CAMBRIDGE, MASS., MAR.—APR. 1883.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

FALSE DATES.

So far as our examination has gone, we have not learned that it was the custom of any scientific periodical to publish the actual date of its issue in a systematic manner, before such a practice was adopted in PSYCHE. Whether PSYCHE was or was not a pioneer in this direction is of little importance compared with the importance of the principle thus illustrated. We are pleased to notice the adoption of this practice in one and another of our contemporaries. PSYCHE has practised it from the outset.

With the concluding numero of its last finished volume (December 1882), the *Canadian entomologist* began to print, on the numero, the date of printing of each numero of its issue. How much better it would be to announce, in one numero, the date of actual issue of the preceding! Accidents frequently occur, after a signature, or a numero, is partly or even wholly printed, to delay its issue beyond the expected date, and the signatures cannot be, in that case, thrown away, or their date changed, without loss or trouble which will rarely be incurred. No reliance, in most cases, therefore can be placed on such an announcement. As an announcement of date of printing and not of date of issue, it has no value in a question of priority. The announcement,

if intended as a statement of the date of issue, is positively false, in that it is made in advance of issue; however strictly the fact may be made subsequently to coincide with the announcement. In case, however, the announcement is made after the event, it has a positive value.

It is rarely the case that so excellent an opportunity of illustrating the evils of the practice of putting the date on the signature to which it refers is given, as in the statements of dates of issue which are appended to the last two volumes of the Proceedings of the Boston society of natural history. It is probable that a similar discrepancy between the pre-announced and the actual dates of issue occurs in the issue of the proceedings of many other societies, but in general there is no means of detecting the discrepancy. Even here it is not until two or three years after the issue of the first signatures before the true date of issue is made known. Meanwhile, what misunderstandings might arise, either controversially or privately, from the erroneous impression conveyed by the dates printed on the signatures! It will be noticed, in the lists given below, especially from volume 20 of the Proceedings, in how many cases the announcement is false, and how great, in many cases, is the discrepancy.

Dates of actual publication of the Proceedings of the Boston society of natural history, v. 20 and 21, as compared with the dates printed on the signatures.

Volume 20.

	Announced date,	Actual date of issue.	Discrepancy in days.
p. 1-32,	Dec. 1878	[1 Jan. 1879].	1
p. 33-48,	[22] Jan.	1879.	0
p. 49-80,	Jan.	[5 Feb.] 1879.	5
p. 81-96,	Feb.	[1 Mch.] 1879.	1
p. 97-112,	Mch.	[4 Apr.] 1879.	4
p. 113-128,	[4] Apr.	1879.	0
p. 129-144,	Apr.	[18 June] 1879.	49
p. 145-160,	May	[18 June] 1879.	18
p. 161-176,	July	[4 Aug.] 1879.	4
p. 177-192,	Sept.	[24 Oct.] 1879.	24
p. 193-208,	[20] Oct.	1879.	0
p. 209-224,	Oct.	[20 Nov.] 1879.	20

	Announced date.	Actual date of issue.	Discrepancy in days.
p. 225-272,	[20] Nov.		1879.
p. 273-288,	Dec.	1879 [5 Feb. 1880].	36
p. 289-304,	Feb.	1880 [17 Dec. 1879].	-46!
p. 305-320,	Jan.	[5 Feb.] 1880.	5
p. 321-352,	Mch.	[7 Apr.] 1880.	7
p. 353-368,	May	[20 Oct.] 1880.	142
p. 369-384,	Aug.	[23 Oct.] 1880.	50
p. 385-400,	Oct.	[3 Nov.] 1880.	3
p. 401-416,	Nov.	1880 [5 Jan. 1881].	30
p. 417-448,	May	[25 June] 1881.	25
p. 449-464,	June	[23 July] 1881.	23
p. 465-480,	[23] July	1881.	0
p. 481-496,	July	[5 Aug.] 1881.	5
p. 497-506,	Sept.	[5 Nov.] 1881.	30

Volume 21.

p. 1-16,	[23] July		1881.	0
p. 17-32,	July	[16 Aug.] 1881.	16	
p. 33-48,	[16] Aug.		1881.	0
p. 49-80,	Aug.	[5 Nov.] 1881.	66	
p. 81-112,	Sept.	[5 Nov.] 1881.	36	
p. 113-128,	Oct.	[5 Nov.] 1881.	5	
p. 129-144,	[21] Nov.		1881.	0
p. 145-160,	[28] Nov.		1881.	0
p. 161-176,	[15] Dec.		1881.	0
p. 177-208,	Dec.	1881 [7 Jan. 1882].	7	
p. 209-240,	[30] Jan.		1882.	0
p. 241-256,	[7] Feb.	1882	[1882].	(?)
p. 257-272,	Feb.	[4 Mch.] 1882.	4	
p. 273-288,	[10] Mch.		1882.	0
p. 289-304,	[18] Apr.		1882.	0
p. 305-320,	[19] May		1882.	0
p. 321-336,	[27] May		1882.	0
p. 337-352,	[15] June		1882.	0
p. 353-368,	June	[6 July] 1882.	6	
p. 369-384,	[17] July		1882.	0
p. 385-400,	[6] Sept.		1882.	0
p. 401-416,	[12] Oct.		1882.	0
p. 417-432,	Oct.	[3 Nov.] 1882.	3	
p. 433-448,	Jan.	[5 Feb.] 1883.	5	
p. 449-464,	[21] Feb.		1883.	0
p. 465-475,	21 Mch.		1883.	0

We commend it to the attention of the editors, not only of the periodicals mentioned, but also of others, whether it would not be well to adopt the principle illustrated in *PSYCHE*, of giving, at the earliest opportunity, in a systematic manner, the dates of issue of parts *already issued*, and omitting dates of prospective issue.

B: P. M.

PROCEEDINGS OF SOCIETIES.

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

8 AUG. 1882. — The Rev. H: C. McCook described the raids of *Formica sanguinea* upon *F. fusca* — raids in which the black slaves assist their red masters. Reds and blacks shared the labor of raising the young. The nests of *F. fusca*, conspicuous in places where there were no red ants, were hard to find where the latter were common. An attempt to introduce the red ant into a city yard failed through the attacks of the common pavement ant, *Tetramorium caespitum*.

3 OCT. 1882. — Dr. Skinner remarked that the organ of offence of the larva of *Papilio*, usually believed to be solid, is really hollow, rolled in and out upon itself.

10 OCT. 1882. — Rev. H: C. McCook presented a paper upon the snares of orb-weaving spiders, and described four species of *Epeira*.

31 OCT. 1882. — Rev. H: C. McCook drew attention to the use of ants as insecticides by the Chinese, and stated his belief that as no American species lived on trees, the probabilities were against their usefulness for a similar purpose.

7 NOV. 1882. — Rev. H: C. McCook presented a paper on "Ants as beneficial insecticides" and advocated the importation of the ant used in China for the protection of orange trees.

14 NOV. 1882. — Mr. Thomas Meehan stated that the nest of the wood pewee [*contopus virens*] is held together by cobwebs.

5 DEC. 1882. — Dr. Horn remarked upon the singular distribution of the apterous water-beetle *Amphizoa*, one species of which inhabits California, a second the district northward of that state as far as Vancouver's island, while a third has been found high up in the mountains of Tibet.

23 JAN. 1883. — Dr. Skinner stated that *Argynnis cybele*, instead of carefully depositing its eggs, as is usual with butterflies, dropped them from a distance upon the herbage. — Compiled from *Amer. nat.*, April 1883, v. 17, p. 462-466.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

NECROLOGY FOR 1879.

ADDITIONAL TO REC., 1501-1518, 1555, 2125-2142, AND 2648-2653.

Berce, Jean Étienne, biog. sketch of.

CLEMENT, X. L. Notice nécrologique sur Jean Étienne Berce. (Ann. soc. entom. France, 1880, s. 5, v. 10, p. 177-180.)

Mr. Berce, a lepidopterist, was b. at Saint Dié, dept. Vosges, France, 24 April 1803 [not 1802]; d. 29 Dec. 1879, at Paris, France. [See Rec., 2126.] G: D. (3162)

Boisduval, Jean Baptiste Alphonse Déchaffour, biog. sketch of.

GIRARD, Maurice. Notice nécrologique sur le Dr. de Boisduval. Extrait du Journal de la société centrale d'horticulture de France, 3e série, II, 1880, p. 422-426. Paris, 1880. 6 p., 22X14, t 17X9.5.

[See Rec., 2127 and 2648.] G: D. (3163)

NECROLOGY FOR 1880.

ADDITIONAL TO REC., 2143-2168 AND 2654-2655.

Guenée, Achille, biog. sketch of.

MABILLE, Paul. Notice nécrologique sur Achille Guenée. (Ann. soc. entom. Fr., s. 6, v. 1, p. 5-12.)

[See Rec., 2149.] G: D. (3164)

Haldeman, S: Stehman, biog. notice of. (Can. entom., Sept. 1881, v. 13, p. 184-185.)

BRINTON, D. G. Samuel Stehman Haldeman. (Proc. Amer. philos. soc., Feb. 1881, v. 19, p. 279-285.)

HART, C: H: Samuel Stehman Haldeman. (Penn. monthly, Aug. 1881, v. 12, p. 584-601.)

Dr. Haldeman was b. 12 Aug. 1812 at Locust Grove, Lancaster Co., Pa.; d. 10 Sept. 1880, in Chickis, Pa. [See Rec., 2151.] G: D. (3165)

Kiesenwetter, Ernst August Hellmuth, biog. sketch of.

KRAATZ, Gustav. Denksblätter an H. v. Kiesenwetter. (Deutsche entom. zeitschr., 1880, jahrg. 24, p. 323-336.)

The above notice includes a list of Kiesenwetter's papers. [See Rec., 2157.] G: D. (3166)

Kirschbaum, Carl Ludwig. [Biog. notice]. (Entom. mo. mag., July 1880, v. 17, p. 47.)

[See Rec., 2158.] G: D. (3167)

Mulsant, Étienne, biog. sketch of.

FELISSIS-ROLLIN, J. Notice nécrologique sur Étienne Mulsant. (Ann. soc. entom. Fr., 1880, s. 5, v. 10, p. 403-412.)

LOCARD, A. Étienne Mulsant, sa vie et ses œuvres. Notice biographique. Avec portrait. Lyon, 1882. (55 p.) 8°.—Zool. anzeiger, 19 June 1882, jahrg. 5, p. 294.

B. 2 March 1797, at Marnand, canton of Thizy, near Villefranche, dept. Rhône, France; d. 2 Nov. 1880, at Lyons, France. [See Rec., 2161.] G: D. (3168)

[**Ougspurger, Philibert Friedrich**, biog. notice of.] (Psyche, March 1881, v. 3, p. 191.)

[See Rec., 2162.] G: D. (3169)

Snellen van Vollenhoven, S: Constant, biog. sketch of.

DOHRN, Carl Anton. Snellen van Vollenhoven, ein gedenkblättchen. (Entom. zeitung. . . . Stettin, 1881, p. 371-375.)

[See Rec., 2165.] G: D. (3170)

NECROLOGY FOR 1881.

ADDITIONAL TO REC., 2656-2672.

[**Blackburn, J: Bickerton**, biog. notice of.] (Entom. mo. mag., Dec. 1881, v. 18, p. 164.)

C[ARRINGTON], J: T. John Bickerton Blackburn. (Entomologist, Dec. 1881, v. 14, p. 301-302.)

[See Rec., 2657.] G: D. (3171)

- [**Blackwall, J.**, biog. notice of.] (Entom. mo. mag., July 1881, v. 18, p. 45.)
CAMBRIDGE. Octavius Pickard. John Blackwall, obituary notice. (Entomologist, July 1881, v. 14, p. 145-150.)
Born 23 Jan. 1785, at Crumpsall Old Hall, near Manchester, England; d. 11 May 1881, at Llanwrst, Wales. [See Rec., 2356.] *G. D.* (3172)
- DE **Chaudoir, Maximilien**, biog. sketch of. SALLÉ, Auguste. Notice nécrologique sur le baron Maximilien de Chaudoir. (Ann. soc. entom. Fr., 1881, s. 6. v. 1, p. 181-188.)
Baron de Chaudoir was b. 12 Sept. 1816, at Iwnitz, near Jitomi, in Wolhynia; d. 6 May 1881, at Amélie-Bains, Pyrénées-Orientales, France. Sallé gives a list of Chaudoir's entomological papers. [See Rec., 2358.] *G. D.* (3173)
- [**Garneys, W.**, biog. notice of.] (Entom. mo. mag., 1881, v. 18: Nov., p. 144; Dec., p. 163-164.)
CARRINGTON, J. T. William Garneys. (Entomologist, Dec. 1882, v. 14, p. 302.)
[See Rec., 2360.] *G. D.* (3174)
- [**Giebel, Christoph Gottfried Andreas**, biog. notices of.] (Amer. nat., Feb. 1882, v. 16, p. 174.) (Entom. mo. mag., Feb. 1882, v. 18, p. 215.) (Zeitschr. f. d. ges. naturw., Nov.-Dec. 1882, bd. 54, p. 613-637.)
[See Rec., 2661.] *G. D.* (3175)
- [**Gray, J.**, biog. notice of.] (Entom. mo. mag., Jan. 1882, v. 18, p. 190-191.)
Entomologist, d. 27 Nov. 1881, at Claygate, Esher, England, aged 69 years. *G. D.* (3176)
- [**Hensel, Reinhold**, biog. notice of.] (Zool. anzeiger, 14 Nov. 1881, jahrg. 4, p. 604.) (Naturae novitates, Nov. 1881, no. 23, p. 192.)
Once professor in the agricultural academy in Proskau, Silesia; d. 5. Nov. 1881, in Oppeln, Silesia. *G. D.* (3177)
- [**Koch, Gabriel**, biog. notice of.] (Entom. mo. mag., March 1881, v. 17, p. 240.)
[See Rec., 2005.] *B. P. M.* (3178)
- [**Mniszech, Georges Vandalia**, biog. notice of.] (Amer. nat., Jan. 1882, v. 16, p. 65.) (Zool. anzeiger, 20 March 1882, jahrg. 5, p. 148.)
Coleopterist, d. 17 Nov. 1881, in Paris, France. *G. D.* (3179)
- [**Putnam, Joseph Duncan**, biog. notice of.] (Amer. nat., Jan. 1882, v. 16, p. 65.)
[See Rec., 2006.] *G. D.* (3180)
- Rolleston, G.**, biog. notice of.
F[LOWER], W[.] H[.]. George Rolleston. (Proc. roy. soc. Lond., Dec. 1881, v. 33, p. 24-27.)
Prof. Rolleston was b. at Maltby, England, 30 July 1829; d. 1881. *G. D.* (3181)
- Rosenhauer, Wilhelm Gottlieb**, biog. notice of.
DOHRN, Carl Anton. Wilhelm Gottlieb Rosenhauer. (Entom. zeitung . . . Stettin, 1881, jahrg. 42, p. 488.)
[See Rec., 2965.] *G. D.* (3182)
- Rothenbach, Johann Christian**, biog. notice of.
JAEGLI, F. Nachruf. (Mitth. schw. entom. ges., Nov. 1881 [Jan. 1882], v. 6, p. 243-250.)
Entomologist; b. 6 Dec. 1796, in Alsatia; d. 9 Sept. 1881, in Aarberg, Switzerland. *G. D.* (3183)
- DE **Rougement, Philippe**, biog. notices of.
TRIBOLET, ———. Philippe de Rougement. Notice biographique. (Mitth. schw. entom. ges., Feb. [May] 1882, v. 6, p. 257-261.)
TRIBOLET, ———. Philippe de Rougement. Notice biographique. (Neuchatel, 1882. (15 p.) 8°.—Zool. anzeiger, 19 June 1882, jahrg. 5, p. 294.)
Prof. de Rougement was b. at St. Aubin, Switzerland, 17 April 1830; d. in Neuchatel, 27 May 1881. Tribolet's notice gives a list of de Rougement's papers. *G. D.* (3184)
- [**Whitman, Allen**, biog. notice of.] (Boston [Mass.] d. advertiser, 14 Nov. 1881, no. 22843, v. 138, no. 115, p. 2, col. 2, 5 cm.) (Amer. nat., Jan. 1882, v. 16, p. 86.)
B. in East Bridgewater, Mass., in 1836; d. Nov. 1881, in St. Paul, Minn. *G. D.* (3185)
- [**Zaddach, Ernst Gustav**, biog. notices of.] (Naturae novitates, June 1881, no. 12, p. 104.) (Zool. anzeiger, 11 July 1881, jahrg. 4, p. 364.) (Entom. nachrichten, 1 Aug. 1881, jahrg. 7, p. 232.) (Psyche, July-Sept. 1881 [March 1882], v. 3, p. 259.)
ALBRECHT, P. Prof. Dr. G. Zaddach. Gedächtnisrede geh. in d. phys.-ökon. ges. Königsberg. (10 p.)—Aus: Schrift. d. phys.-ökon. ges. Königsberg, jahrg. 22, p. 119-128.—Zool. anzeiger, 19 June 1882, jahrg. 5, p. 294.)
Professor of zoology in Königsberg, Prussia; b. 7 June 1817, in Dantzig, Prussia; d. 5 June 1881, in Königsberg. *G. D.* (3186)

NECROLOGY FOR 1882.

[**Balfour**, Francis Maitland, biog. notices of.] (Athenaeum, 29 July 1882, p. 148, col. 1, 20 cm.) (Zool. anzeiger, 14 Aug. 1882, jahrg. 5, p. 436.) (Naturae novitates, Aug. 1882, no. 16, p. 152.) (Amer. nat., Oct. 1882, v. 16, p. 843.) (Kosmos, 1882, jahrg. 6, bd. 12, p. 39-42.) (Arch. f. mikros. anat., 1882, bd. 21, p. 828-835.)

FOSTER, Michael. Francis Maitland Balfour. (Nature, 3 Aug. 1882, v. 26, p. 313-314.)

GRIFFITH, G. Francis Maitland Balfour. (Nature, 17 Aug. 1882, v. 26, p. 365.)

GAMGEE, Arthur. The researches of Francis Maitland Balfour. (Nature, 24 Aug. 1882, v. 26, p. 406-407.)

F. M. Balfour, professor of animal morphology at Cambridge, England, was killed by a fall on the south side of Mont Blanc, 19 July 1882; age 30 or 31 years.

G. D. (3187)

[**Belgrave**, Gustaf Wilhelm, biog. notice of.] (Nature, 22 Feb. 1883, v. 27, p. 399.)

Swedish entomologist; d. 7 Dec. 1882, at Clifton, Bosque Co., Texas, where he had resided for several years.

G. D. (3188)

[**Cornalia**, Emilio, biog. notices of.] (Zool. anzeiger, 19 June 1882, jahrg. 5, p. 316.) (Naturae novitates, July 1882, no. 13, p. 128.)

Professor Cornalia, director of the Museo civico in Milan, was b. in 1825; d. 8 June 1882.

G. D. (3189)

[**Darwin**, C: Robert, biog. notices of.] (Athenaeum, 29 April 1882, p. 541-542, 70 cm.); 13 May 1882, p. 604-605, 50 cm. [latter notice includes a list of papers relating to Darwin and Darwinism in periodicals of England and America.] (Sci. american, 29 April 1882, v. 46, p. 256, col. 2, 27 cm.) (Ann. and mag. nat. hist., May 1882, s. 5, v. 9, p. 402-404.) (Naturae novitates, May 1882, no. 9, p. 95.) (Nature, 1882, v. 26: 18 May, p. 49-51; 25 May, p. 73-75; 1 June p. 97-100; 15 June, p. 145-147; 22 June, p. 169-171.) (Amer. nat., June 1882, v. 16, p. 487-490.)

ALLEN, Grant. Obituary. Charles Darwin. (Academy, 29 April 1882, v. 21, p. 306-307, 77 cm.)

C[ARRINGTON], J: T. Charles Robert Darwin. Obituary notice. (Entomologist, May 1882, v. 15, p. 97-102.)

E[DWARDS], H: Obituary. Charles Robert Darwin. (Papilio, May 1882, v. 2, p. 81.)

GRAY, Asa. Charles Darwin. Biographical notice. (Amer. journ. sci. and arts. 1882, s. 3, v. 24, p. 453-463 ["From Proc. amer. acad. arts and sci., v. 17".])

[**Darwin**, C: Robert, biog. notices of.] HUXLEY, T: H: Charles Darwin. (Nature, 27 April 1882, v. 25, p. 597.)

QUATREFAGES, A. (Comptes rendus acad. sci. France, 1 May 1882, v. 94, p. 1216-1222.) Eng. tr. (Ann. and mag. nat. hist., June 1882, s. 5, v. 9, p. 467-474.)

The following notices are compiled from the *Zoologischer anzeiger*.

ANON. (Ibis, 1882, s. 4, v. 6, p. 479-484.)

BACON, G. W., comp. Life of Charles Darwin. With British opinion on evolution. London, Bacon, 1882. 52 p., 8°. IS DE CANDOLLE, Alphonse. Darwin, considérée au point de vue des causes de son succès et de l'importance de ses travaux. (Arch. sci. phys. et nat., Genève, May 1882, s. 3, v. 7, p. 481-495.)

CARUS, Julius Victor. Charles Robert Darwin. (Unsere zeit, 1882, p. 200-226.)

CHUN, Carl. Charles Darwin [with portr.]. (Humboldt, 1882, jahrg. 1, p. 279-284.)

FOURNÉ, Édouard. Charles Darwin, étude critique. Paris, impr. Chaix, 1882. 20 p., 8°. [Extr. de la Revue médic. franç. et étrang.]

HUXLEY, T: H.: G. J. ROMANES, Archibald GEIKIE and W. T. T. DYER. Memorial notices of Charles Darwin [with portr.]. Lond., 1882. [Reprinted from Nature.] 8°.

LE ROY, J. J. Charles Darwin. Eene levensschets. [Tweede, met een levensbericht van Darwin vermeerderde uitgave van "Bondige uiteenzetting van het Darwinisme."]. Deventer, W. Hulshcer GJzn, 1882. 172 p., 8°. fl. 1.65.

MAGGIORANI, C. Commemorazione di Carlo Darwin. (Atti real. accad. Lincei, Transunti, 1882, s. 3, v. 6, p. 217-219.)

MANTEGAZZA, P. Commemorazione di Carlo Darwin. Pisa, 1882. 16°.

MOLESCHOTT, J. Charles Darwin. Denkrede. Giessen, 1882. 8°.

PROOST, M. A. Darwin et les progrès de la zoologie. Bruxelles, 1882. 69 p., 8°.

RAUWENHOFF, N. W. P. Charles Robert Darwin. Rede bij de opening der ioode algemeene vergadering van het Provinciaal Utrechtsch genootschap van kunsten en wetenschappen te Utrecht den 27 Juni 1882, uitgesproken. Utrecht, L. E. Bosch & Zorn, 1882. 29 p., 8°.

SCHAAFFHAUSEN, H. Charles Robert Darwin. Ein nachruf. [no imprint, no date.] [1882!]

SICARD, Henri. Charles Darwin. Lyon, impr. Giraud, 1882. 8 p., 8°. [Extr. du Lyon médical, 7 May 1882.]

- [**Darwin**, C.: Robert. Biog. notices of.]
 THOMSON, G.: M. Charles Darwin.
 (New Zeal. Journ. Sci., 1882, v. 1, p. 133-136.)
- TOMMASI, S. Carlo Darwin. Napoli, 1882, 11 p., 8°.
- WILLIAMS, S. Fletcher. Darwin and Darwinism. ([Yorkshire] Naturalist, 1882, v. 8: Sept., p. 17-24; Oct., p. 36-43.)
- ZACHARIAS, O. Charles R. Darwin und die culturhistorische bedeutung seiner theorie vom ursprung der arten. Mit bildn. Berlin, *E. Staude*, 1882, 83 p., 8°. M. 1.20.
 Darwin, naturalist and originator of the "Darwinian" theory of the origin of species, was b. in Srewsbury, England, 12 Feb. 1809 d. at Down, Beckenham, Kent, England, 19 April 1882. *G: D.* (3192)
- [**Gurlt**, Ernst Friedrich. biog. notice of.]
 (Zool. anzeiger, 23 Oct. 1882, jahrg. 5, p. 556.)
 Dr. Gurlt, veterinary pathologist and anatomist, and entomological author, b. 13 Oct. 1791, at Drenkau, near Grüneberg, Germany; d. 15 Aug. 1882, in Berlin, Germany. *G: D.* (3191)
- [**Hey**, W.: biog. notice of.] (Entom. mo. mag., Jan. 1883, v. 19, p. 192.)
 C[ARRINGTON], J.: T. Obituary. William Hey. (Entomologist, Dec. 1882, v. 15, p. 287-288.)
 Archdeacon Hey, coleopterist, was b. at Ockbrook, Derbyshire, England; d. 22 Nov. 1882, at York, England, in the 72nd year of his age. *G: D.* (3192)
- Jobson**, J. W., biog. notice of.
 C[ARRINGTON], J.: T. J. W. Jobson. (Entomologist, March 1882, v. 15, p. 71.)
 Entomological collector; d. in Leyton, England, 10 Feb. 1882. *G: D.* (3193)
- [**Labrey**, Beebee Bowman. biog. notice of.]
 (Entom. mo. mag., June 1882, v. 19, p. 22.)
 F. J. Beebee Bowman Labrey. (Entomologist, June 1882, v. 15, p. 141-142.)
 B. 30 June 1817, in Liverpool, England; d. 26 April 1882, at Disley, Cheshire, England; prepared a work illustrating the plumules of some families of butterflies. *G: D.* (3194)
- [**Malm**, August Wilhelm. biog. notice of.]
 (Naturae novitates, March 1882, no. 6, p. 64.) (Zool. anzeiger, 19 June 1882, jahrg. 5, p. 316.)
 SPANGBERG, Jacob. August Wilhelm Malm. (Entom. tids., 1882, arg. 3, p. 157-159; Résumé, p. 161-162.)
 Professor Malm, zoologist and director of the Göteborg natural history museum, was b. in 1821; d. 4 March 1882, in Göteborg, Sweden. *G: D.* (3195)
- Moss**, H.: biog. notice of.
 C[ARRINGTON], J.: T. Henry Moss. (Entomologist, May 1882, v. 15, p. 119.)
 Mr. Moss, lepidopterist, d. at Oldham, England, 17 April 1882, at the age of 91 years. *G: D.* (3196)
- [**Norman**, G.: biog. notice of.] (Entom. mo. mag., Sept. 1882, v. 19, p. 96.)
 Lepidopterist and hemipterist; b. 1 Jan. 1824, in Hull, England; d. 5 July 1882, in Peebles, England. *G: D.* (3197)
- [**Pritchard**, Andrew. biog. notices of.]
 (Academy, 2 Dec. 1882, v. 22, p. 401, col. 1, 4 cm.) (Athenaeum, 2 Dec. 1882, p. 740, col. 1, 2 cm.) (Naturae novitates, Dec. 1882, no. 24, p. 227.) (Zool. anzeiger, 5 Feb. 1883, jahrg. 6, p. 80.) (Amer. nat., Feb. 1883, v. 17, p. 231-232.)
 Microscopist and author upon infusoria and insects; b. in 1804; d. in London, England, 24 Nov. 1882. *G: D.* (3198)
- [**Putzeys**, Jules. biog. notices of.] (Entom. mo. mag., Feb. 1882, v. 18, p. 215-216.)
 (Naturae novitates, Feb. 1882, no. 3, p. 31.) (Zool. anzeiger, 20 March 1882, jahrg. 5, p. 148.) (Amer. nat., April 1882, v. 16, p. 330.)
 Coleopterist; d. 2 Jan. 1882, in Brussels, Belgium, in the 73rd year of his age. *G: D.* (3199)
- [**Reinhardt**, Johann Th., biog. notices of.]
 (Zool. anzeiger, 27 Nov. 1882, jahrg. 5, p. 644.) (Naturae novitates, Nov. 1882, no. 22, p. 208.) (Amer. nat., Jan. 1883, v. 17, p. 116.)
 Dr. Reinhardt, professor and inspector in the museum of natural history in Copenhagen, d. 23 Oct. 1882, aged 65. *G: D.* (3200)
- [**Schmidt**, Franz. biog. notices of.] (Zool. anzeiger, 10 July 1882, jahrg. 5, p. 364.)
 (Naturae novitates, July 1882, no. 15, p. 144.)
 Dr. Schmidt, lepidopterist, d. 15 June 1882, in Wismar, Germany. *G: D.* (3201)
- [**Schmidt-Göbel**, Hermann Max. biog. notices of.] (Zool. anzeiger, 23 Oct. 1882, jahrg. 5, p. 556.) (Naturae novitates, Oct. 1882, no. 21, p. 200.)
 Dr. Schmidt-Göbel, coleopterist and economic entomologist, d. 17 Aug. 1882, at Klosterneuburg, near Vienna, Austria, aged 73. *G: D.* (3202)
- [**Siewers**, C.: Godfrey. biog. notices of.]
 (Cincinnati [Ohio] commercial, 8 Sept. 1882, p. 4, col. 8, 18 cm.; p. 5, col. 4, 1 cm.) (Papilio, Oct. 1882, v. 2, p. 145.) (Psyche, June [13 Oct.] 1882, v. 3, p. 359-360.)
 DURY, C.: Obituary. (Can. entom., Sept. 1882, v. 14, p. 176.)
 Entomologist; b. 21 May 1815, on the island of Santa Cruz, in the West Indies; d. 6 Sept. 1882, at Newport, Ky. *G: D.* (3203)

[Sinclair, Robert W., biog. notice of.]

C[ARRINGTON], J. T. Obituary. Robert W. Sinclair. (Entomologist, March 1882, v. 15, p. 71.)
Entomologist; d. in Dublin, Ireland, 28 Jan. 1882, aged 22 years. *G. D.* (3204)

[Tariel, Ernest, biog. notice of.] (Feuille d. jeunes naturalistes, April 1882, ann. 12, p. 75.)

Entomologist; d. at Rouen, France, in 1882, in the 21st year of his age. *G. D.* (3205)

[Thompson, C. Wyville, biog. notice of.] (Naturae novitates, March 1882, no. 6, p. 64.) (Entom. mo. mag., April 1882, v. 18, p. 264.) (Amer. nat., May 1882, v. 16, p. 435.)

MOSELEY, H. N. Obituary. Sir Charles Wyville Thompson. (Academy, 18 March 1882, v. 21, p. 196, col. 1-2, 39 cm.)

In early life a collector of lepidoptera, later a general zoologist; b. in Boynside, Linlithgow, Scotland; d. 10 March 1882, in London, England, aged 52 years. *G. D.* (3207)

[Thwaites, G. H. K., biog. notices of.] (Athenaeum, 14 Oct. 1882, p. 500, col. 1-2, 8 cm.) (Naturae novitates, Oct. 1882, no. 21, p. 200.) (Entom. mo. mag., Nov. 1882, v. 19, p. 142.)

For a long time director of the botanical garden at Peradeniya, Ceylon; entomologist; d. 11 Sept. 1882, in Kandy, Ceylon, in his 72nd year. *G. D.* (3207)

[DE Tinseau, Robert, biog. notice of.] (Feuille d. jeunes naturalistes, April 1882, ann. 12, p. 75.)

Coleopterist; d. at Hyères, France, 13 March 1882. *G. D.* (3208)

[Troschel, Franz Hermann, biog. notices of.] (Zool. anzeiger, 27 Nov. 1882, jahrg. 5, p. 644.) (Naturae novitates, Nov. 1882, no. 23, p. 216.) (Amer. nat., Jan. 1883, 2, 17, p. 116.)

Professor of zoology at Bonn, Germany, founder of the "Archiv für naturgeschichte"; b. at Spandau, Germany, 10 Oct. 1810; d. in Bonn, 6 [?] 4] Nov. 1882. *G. D.* (3200)

Wales, G.; biog. notice of.

STANTON, H.: Tibbats. George Wales. (Entom. mo. mag., Feb. 1883, v. 19, p. 211-212.)

Lepidopterist; d. at Gateshead, Durham Co., England, 30 Oct. 1882, in the 80th year of his age. *G. D.* (3210)

[Westring, Niklas, biog. notices of.] (Zool. anzeiger, 23 Oct. 1882, jahrg. 5, p. 556.) (Naturae novitates, Oct. 1882, no. 20, p. 192.)

SANDAHL, Oskar Th. Niklas Westring. (Entom. Tids., 1882, arg. 3, p. 9-12; Résumé, p. 99.)

Entomologist, especially arachnologist; b. 13 Nov. 1797, in Göteborg, Sweden; d. 28 Jan 1882, in Göteborg. *G. D.* (3211)

BIBLIOGRAPHICAL RECORD.

Coquillett, Daniel W.: Notes and descriptions of a few lepidopterous larvae. (Papilio, 26 April 1881, v. 1, p. 56-57.)

Describes larvae of *chamyris cerintha*, *apatele brumosa*, *heliolithis luteitinctus*, *scoliopteryx libatrix*, *catocala coccinea*, *caterwa catenaria* and *cupifluecia interruptofasciata*. *H. E.* (3212)

Crotch, G.: Robert. On the arrangement of the families of coleoptera. (Proc. Amer. philos. soc. Phila., 7 Feb. 1873, v. 13, p. 73-87.)

Coleoptera divided into *rhyuchophora* and *coleoptera genuina*; the latter subdivided into *heteromera* and *isomera* on tarsal and antennal characters. *H. W. T.* (3213)

Edwards, W.: H.: Description of new species of butterflies. Chiefly collected by Mr. Morrison in 1880. (Papilio, 26 April 1881, v. 1, p. 43-48.)

Describes as new *anthocaris morrisoni* from California; and *melitaea perdiccas*, *m. colon*, *pyrgus philetas*, *copaeodes eunus*, *pamphila siris*, *p. mardon*, all from Oregon. *H. E.* (3214)

Edwards, H.: Descriptions of new species and varieties of *arctiidae*. (Papilio, 10 March 1881, v. 1, p. 38-39.)

Describes as new *euprepia opulenta*, *arctia incorrupta*, *a. achaia* var. *barda*, *antarctio punctata* var. *proba*, *halesidota ingens*, all from Pacific states. *H. E.* (3215)

Edwards, H.: Notes on the Pacific coast species of *hepialus* with descriptions of new forms. (Papilio, 10 March 1881, v. 1, p. 35-36.)

Describes as new *hepialus rectus*, *h. anceps*, *h. imutilis*; suggests that many so-called Californian species are but variations from one type. *H. E.* (3216)

Edwards, H.: Notes on the Pacific coast species of *orgyia*, with descriptions of larvae and new forms. (Papilio, 26 April 1881, v. 1, p. 60-62.)

Describes as new *orgyia gulosa* and *o. cana*; describes larvae of *o. vetusta* and *o. gulosa*; contends for the difference of these species, which have previously been confounded; suggests that *o. badia* H.: Edw. and *o. nova* Fitch. = *o. antiqua* Linn. *H. E.* (3217)

Edwards, H.: On some apparently new forms of diurnal lepidoptera. (Papilio, 26 April 1881, v. 1, p. 50-55.)

Describes as new *anthocaris coloradensis*, *cocononympha californica* var. *pulla*, *melitaea dzwinellei*, *m. baroni*, *m. rubicunda*, *m. anicia* var. *wheeleri*, *thecla citina*, *th. spadix*, *th. nelsoni* var. *exoleta*, *th. muiri*, *th. irus* var. *mossii*, *th. tacita*, *lycaena speciosa* ♀; the male of *l. speciosa* previously described suggests that *melitaea baroni* and *m. rubicunda* are probably varieties of *m. quino* Behr. *H. E.* (3218)

Fernald, C. H.: Notes on Fitch's species of tortricids. (Papilio, 10 March 1881, v. 1, p. 36-37.)

Notifies some errors in Fitch's descriptions of moths in his reports as state entomologist of New York; refers *crocota persicana* to the genus *Psycholoma*, *lozotactia cerasiavarana* to *cacoclia*, and *argyrotopia quercifoliata* to *tortrix*; correct error of Miss E. A. Smith in 7th rept. of state entomologist of Illinois, concerning *tortrix flaccidana*. H. E. (3219)

French, G. Hazen. Notes on *catocala sappho* Strecker. (Papilio, 26 April 1881, v. 1, p. 57.)

Gives reason for considering *catocala sappho* as a distinct species, and announces its capture in Texas, Georgia and Illinois. H. E. (3220)

Grote, A.: Radcliffe. A *chorentes* on *silphi-um integrifolium*. (Papilio, 10 March 1881, v. 1, p. 40.)

Describes as new *chorutes silphiella*, found by D. W. Coquillett in Illinois. Gives description also of the larva (quoting Coquillett), which forms its nest by fastening the terminal leaves together. H. E. (3221)

Grote, A.: Radcliffe. Descriptions of *geometridae*, chiefly collected by Mr. Pilate. (Papilio, 10 March 1881, v. 1, p. 40-42.)

Describes as new *plagadis florentaria*, *aspilates gausaparia*, *delinia glomeraria*, and *d. septemfaria*, all from Ohio. H. E. (3222)

Grote, A.: Radcliffe. New noctuidae from Washington Territory. (Papilio, 26 April 1881, v. 1, p. 58-59.)

Describes as new *manestra liquida*, *valeria conserta*, *hadena semilunata*. Compares *m. liquida* with *m. illucina* and *m. legitima*, and *h. semilunata* with *h. inordinata*. H. E. (3223)

Grote, A.: Radcliffe. New noctuids, with a list of the species of *oncocnemis*. (Papilio, 10 March 1881, v. 1, p. 33-35.)

Describes as new: *oncocnemis major*, *o. aqualis*, *hadena cymosa*, *deva palligera*. Compares *o. major* and *o. aqualis* with *o. chandleri*, compares *h. cymosa* with *h. arctica* and *d. palligera* with *d. purpurigera*. Gives a list of the 18 North American species of *oncocnemis*. H. E. (3224)

Grote, A.: Radcliffe. New species of *dicopis*, *chytonix* and *spragucia*. (Papilio, 26 April 1881, v. 1, p. 48-50.)

Describes as new *dicopis depilis* from Ohio, *chytonix sensilis* from Massachusetts, and *spragucia parvialis* from Florida. H. E. (3225)

Hagen, Hermann August. *Papilio ecclipsis*, a doubtful or lost N. American butterfly. (Papilio, 10 March 1881, v. 1, p. 42.)

Rev. by A. G. Butler, entitled "On *papilio ecclipsis*. Linn." (*op. cit.*, 26 Apr. 1881, p. 59.)

Calls attention to an insect figured under the above name by Peticier in his *Gazophylacium*, pl. 10, fig. 6, and asks for information on the subject. H. E. (3226)

Maus, W. Hermaphroditen von *saturnia pavonia* L.: *carpini* S. V. (Entom. nachrichten, 15 Dec. 1881, jahrg. 7, p. 355-356.)

Notes on hemaphrodites of *s. pavonia*. G. D. (3227)

Neumoegen, Berthold. Description of a remarkable new geometrid. (Papilio, Sept. 1881, v. 1, p. 145-146.)

Describes *aspilates viridifuraria* from southern Colorado. H. E. (3228)

Neumoegen, Berthold. A little beauty from northern Arizona. (Papilio, Oct. 1881, v. 1, p. 149.)

Describes *sphinx (hyleicus) dollii*, a new species allied to *s. sequoiae* Boisid. H. E. (3229)

Schneider, Friedrich Emil Robert. Die schuppen an den verschiedenen flügel- und körpertheilen der lepidopteren. Dissertation inauguralis zoologica . . . in Academia Fredericiana Halensi cum Vitebergensi associata ad summum in philosophia honores rite impetrandos . . . [Separat-abdruck aus der Zeitschrift für die gesammten naturwissenschaften, 1878, reihe 3, bd. 3, s. 1-59, taf. 1-3.] Halis Saxonum, 1878. t.-p. cover, [4+] 59 [+1] p., 22×14, t 17×9.7: 3 pl.

Notice. (Bericht . . . der entomologie, 1877-1878, p. 424-425.)

Discusses the form and size of the scales on different parts of lepidoptera. G. D. (3230)

Schroeder, G. Merkwürdige abnormalität. (Entom. nachrichten, 1 May 1880, jahrg. 6, p. 94.)

Leistus rufomarginatus with a four-jointed branch on one antenna. G. D. (3231)

Williston, S.: Wendell. [*Eristalis tenax*.] (Can. entom., Aug. 1881, v. 13, p. 176.)

Occurrence of *eristalis tenax* in New Haven [Conn.], Wash. Terr., and Kan. A. K. D. (3232)

Williston, S.: Wendell. The North American species of *conops*. (Trans. Conn. acad., March. 1882, v. 4, p. 325-342.)

Account of all the (15 recognizable and 6 irrecognizable) N. A. species of *conops*, describing 7 new species; remarks on the specific characters; synoptical table of the American genera of *conopidae* and of 14 N. A. species of *conops*. B. P. M. (3233)

Worthington, C.: Ellis. Differences without distinctions. (Can. entom., June 1881, v. 13, p. 123-126.)

Discusses the confusion which exists in the designation of varieties of insects; proposes to classify actual varieties as seasonal, climatic, dimorphic, occasional and melanic or albic. G. D. (3234)

ENTOMOLOGICAL ITEMS.

ACCORDING TO the daily press, buffalo gnats [*Simulium* sp.] are doing great damage to live stock in Desha and Chicot counties, Arkansas.

THE BUFFALO society of natural sciences has had a bequest from Dr. Hayes, said to amount to \$150,000, which is not, however, available at present.

PROF. J. T. REINHARDT, who died 23 Oct. 1882, is succeeded, in his place as inspector of the zoological museum in Copenhagen, by Dr. Christian Lütken.

THE FRENCH association for the advancement of the sciences will hold its annual congress, 16 August, this year, at Rouen. The section of zoology will be presided over by Dr. Jousset de Bellesme.

BENJAMIN COOKE, for several years President of the Northern entomological society and later Vice President of the Lancashire and Cheshire entomological society, died at Southport, England, 4 Feb. 1883, aged 66 years.

COUNT H. ZU SOLMS-LAUBACH has lately published a pamphlet on the origin, domestication and cultivation of the fig-tree, which contains much of interest on the subject of caprifigation. An abstract of the pamphlet is given in *New Remedies* for April 1883.

REV. HENRY C. McCook, of Philadelphia, is engaged upon an illustrated book on "American spiders and their spinning work," and hopes to have a volume on the "Industry and habits of orbweavers" ready by midsummer.—*Science*, 23 March 1883, v. 1, p. 207.

THE PAPER by Prof. F. H. SNOW in PSYCHE (vol. 3, no. 98) on *Trogoderma tarsale* is noticed in the *American naturalist* for Feb. 1883 (p. 199), where it is stated that this species is "the most common museum pest in this country," and that it is by far the most dangerous enemy to collections of insects in Washington, D. C.

EMBRYOLOGY OF THE SILK-WORM.—This has been studied by S. Salvatico, who finds that the amnion appears as a membrane with large nucleated cells like those of the serous membrane, but without pigment. The malpighian vessels originate in the ectoderm. He did not note the early appearance of the rudiments of the genital glands, which was observed by Balbiani in *Tinea crinella*.—*Amer. nat.*, April 1883, v. 17, p. 444.

PROF. XAVER LANDERER writes, in the *Deutsch-Amerikanische Apotheker-Zeitung* for 1 March 1883, that "the largest and heaviest grasshoppers are sought out in Arabia, Egypt, etc. The wings, feet, heads, etc. are torn off and the remaining fleshy part put in vinegar and used as pickles. In Abyssinia I had such sour grasshoppers prepared with aromatic herbs, set before me, and they tasted finely and would be eaten with appetite by all who did not know what they really had before them."

PROF. F. W. MAEKLIN died January 8th of this year at Helsingfors, Finland, at the age of 61 years. He was known to American coleopterists by his papers on *Strongylium* and *Statira*, and by his descriptions of a large number of coleoptera (mostly *Staphylinidae*) from the extreme north-western portions of our country. One of his earlier and little known papers, a dissertation on representative (vikarierande) forms among northern coleoptera (published in the Swedish language, Helsingfors, 1855) is quite interesting to American coleopterists, and was translated into German by F. von Sacken in the *Stettiner Entomologische Zeitung* for 1857.—*Amer. naturalist*, April 1883, v. 17, p. 424.

WE ARE indebted to Mr. G. Barricelli, of Holden, Mo., for several numbers of his "Silk-culture directory," and for two nos. of the "American silk and fruit culturist" containing articles by him. Mr. Barricelli evidently has a good practical knowledge of silk-raising, notwithstanding some of the curious statements, from a purely scientific standpoint, made in his papers. His "Silk-

culture directory" is still more curious from a typographical and literary standpoint. Altho we think silk-raising will not become a great industry in this country for years, on account of the high price of labor, yet agitation in the interest of silkworm-raising may do good. In families comprising a number of otherwise unemployed persons the small profits to be derived from the rearing of a few thousand silk-worms may be worth the labor.

THE *Deutsch-Amerikanische Apotheker-Zeitung*, for 1 March 1883, gives M. Serpin's mode of making insect powder from tar. "The process depends upon converting gas-tar from fluid into solid condition, but taking care that the tar retains all the efficacious properties which it had in liquid form. The conversion is brought about by careful heating of the tar over a moderate coke or coal fire to 20°-40° C. A proper quantity of lime or finely powdered gypsum is mixed with it. A pulverisable mass is now obtained, which is rubbed through a sieve, and after completely cooling, the powder is mixed with ammoniac sulphate, ferrous sulphate, bits of glass, and sodic sulphate, all in pulverized condition."

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

13 Oct. 1882.	9 Mar. 1883.
10 Nov. "	13 Apr. "
8 Dec. "	11 May "
12 Jan. 1883.	8 June "
9 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p. m., on the days following:—

25 Oct. 1882.	28 Feb. 1883.
22 Nov. "	28 Mar. "
27 Dec. "	25 Apr. "
24 Jan. 1883.	23 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.	10 Mar. 1882.
11 Nov. "	14 Apr. "
9 Dec. "	12 May "
13 Jan. 1882.	9 June "
10 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.	12 June 1882.
---------------	---------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

3 Oct. 1882.	6 Feb. 1883.
7 Nov. "	6 Mar. "
5 Dec. "	3 Apr. "
9 Jan. 1883.	1 May "

G. J. BOWLES, *Secretary*.

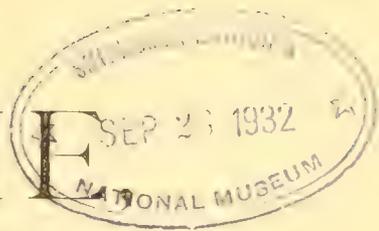
THE REGULAR meetings of the Brooklyn Entomological Society will be held at 9 Broadway, Brooklyn, E. D., N. Y., on the days following:—

28 Oct. 1882.	31 Mar. 1883.
25 Nov. "	28 Apr. "
30 Dec. "	26 May "
27 Jan. 1883.	30 June "
24 Feb. "	

F. G. SCHLAPP, *Secretary*.

No. 105-106 were issued 5 May 1883.

PSYCHE



A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 109-110.

MAY-JUNE 1883.

CONTENTS:

ADVERTISEMENTS	42
THE SCALES OF COLEOPTERA.— <i>George Dimmock</i>	43-47
ON AN EGG-PARASITE OF THE CURRANT SAW-FLY (NEMATUS VENTRICOSUS)— <i>Joseph Albert Lintner</i>	48-51
THE TARSAL AND ANTENNAL CHARACTERS OF PSOCIDAE— <i>Hermann August</i> <i>Hagen</i>	52
THE CHIGOE IN AFRICA	52
REARING LEPIDOPTERA	53
BOOK NOTICES	53-54
PROCEEDINGS OF SOCIETIES.—Cambridge Entomological Club—Linnean Society of London	54
BIBLIOGRAPHICAL RECORD, no. 3235-3282	55-58
ENTOMOLOGICAL ITEMS—Notices to Entomologists—Society Meetings	59-60

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, . . . 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

EARLY STAGES OF BUTTERFLIES WANTED.

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,
Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

GALLS AND GALL INSECTS.

The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera*, *Coleoptera*, *Homoptera* and *Diptera*. Correspondence in reference to Gall growths, or other vegetable abnormalities, is invited.

CHARLES V. RILEY,
1700 Thirteenth St., N. W.,
Washington, D. C.

TORTRICIDAE WANTED.

I am desirous of obtaining as many North American TORTRICIDAE as possible, for the purpose of studying this family. I shall be glad to name and return any TORTRICIDAE forwarded to me for this purpose, save such as may prove new and desirable to retain for description.

Pack carefully, and direct to
PROF. C. H. FERNALD, Orono, Me.

LEPIDOPTERA.

Living cocoons, pupae and ova of American lepidoptera bought or exchanged for other species, by Monsieur ALFRED WAILLY, (Membre-Lauréat de la Société d'Acclimatation de France),

Tudor Villa, Tudor Road, Norbiton,
Kingston-on-Thames, England.

NORTH AMERICAN FERNS.

Check lists of the Ferns of North America north of Mexico, enumerating 31 genera, 132 species and 15 varieties, on one octavo page. Will be sent by mail on receipt of the price, 15 cents per dozen copies.

S. STEBBINS, Springfield, Mass.

PSYCHÉ.

THE SCALES OF COLEOPTERA.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

(Continued from page 27.)

The brown scales are lustreless and without cross-bands, while the white scales, as long as they are filled with air, are silvery. This fact and other reasons lead me to believe that the cross-bands are partial separations of the lower lamina of the scale, and are the cause of the silvery lustre of the white scales. I reserve, however, further discussion of the production of silvery surfaces for the last portion of this paper.

To get at the finer structure of these scales transverse sections of some of the brown ones were made; one of these sections is shown in fig. 7, *d*. Altho numerous sections as thin as 0.0025 mm. were examined, I could find no longitudinal canals or passages, but the lower lamina of the scale is somewhat more transparent than the upper lamina; on the latter portion are the longitudinal striae, seen in transverse section in fig. 7, *d*. Sections of the white scales are similar in form, but are so transparent in the fluids in which I was obliged to study them that I could find no air cavities.

Treatment with reagents give positive proof that both the white and brown scales contain air. Alcohol or water rapidly discharges air from cavities within them; glycerin expels it only less

rapidly. Scales regain their air readily when dried from water or alcohol. After treatment with any liquid the white scales become very transparent, showing that they contain no coloring matter; when mounted in Canada balsam they are almost invisible.

ELATERIDAE, SPECIES UNDETERMINED.

Fig. 8 represents the scales from an undetermined species of *elateridae*, from Leipzig, Germany. I figure them here because I have found in no other coleoptera scales of similar form. They



Fig. 8. Scales of an undetermined species of *elateridae*; *a*, seen from above; *b*, lateral view. Enlarged 100 diam.

are, however, similar in structure to the brown scales of *Alaus oculatus*, but they have in addition a prolongation of the distal end of the scale into a sort of short filament.

SCALES OF PTINUS ?RUTILUS.

A species of *Ptinus*, probably *P. rutilus*, which was found in great numbers

in a dry-goods store in Leipzig, Germany, furnishes interesting forms of scales. This coleopteron is clothed with brown hairs, one of which is figured (fig. 9, *c*) and among these hairs are scales (fig. 9, *a* and *b*). The relative size of the hairs and scales of this species of *Plinus* may be seen from fig. 9, where both are drawn enlarged 100 diameters. These scales have from two to seven long apical points, are attached by a little stem at the base, and are 0.06 to 0.09 mm. in length by 0.01 to 0.03 mm. wide. Their color is light brown, which is apparently produced, for the most part, by somewhat irregular longitudinal stripes or thickenings upon the inner surface of the scales. These scales are filled with air.



Fig. 9. Scales and hair of *Plinus ? rutilus*: *a* and *b*, scales from elytron; *c*, hair from elytron. Enlarged 100 diam.

SCALES OF CLYTUS ROBINIAE.

Nearly all the yellow stripes upon *C. robiniae* owe their entire coloration to the scales with which they are covered. This can be seen best by scraping all the scales from the insect, after which, with the exception of the legs and a few yellow stripes on the elytra, it is black. Most black parts of the insect are, however,

improved in depth of color by being clothed with black scales. The yellow stripes upon the thorax are produced entirely by yellow scales which are set upon a black background. The whole richness of coloration of *C. robiniae* is produced by the scales with which it is clothed, as can perhaps be most strikingly illustrated by removing the scales from one half of a specimen and leaving the other half intact. In the same way the ground color of the European *Saprosca scalaris* is black, its beautiful coloration being due to a dense coating of scale-like hairs.



Fig. 10. Scale of *Clytus robiniae*. Enlarged 100 diam.

The black or brown scales from the upper surface of the thorax or from the elytra of *C. robiniae* resemble, at first glance, those of *Alaus oculatus*, but upon closer examination they prove to be quite different. Their form is approximately an elongated parallelogram (see fig. 10), with the shank or point of attachment at one of the acute angles. The striae originate at and near the shank and terminate along the opposite end of the scale, thus differing entirely, in this respect, from the scales of *Alaus*.

The scales of *C. robiniae* are 0.15 to 0.18 mm. long by about 0.02 mm. wide. Under the microscope they are dark brown or light yellow, according to whether they are from the black or yellow parts of the insect. Both the yellow

and the brown scales have the same form and structure, and both contain air, as can be readily seen by the action of water upon them. Neither the brown nor the yellow scales can be bleached by chlorin.

Of the numerous scales of *curculionidae*, the family of coleoptera in which the possession of scales may be said to be almost a rule, I have chosen for especial study the

SCALES OF ENTIMUS IMPERIALIS.

This species has the most brilliant, and, in some respects, the most interesting scales and hairs of any coleopteron which I have examined. Nearly its whole surface, above and beneath, is covered with lines or masses of minute

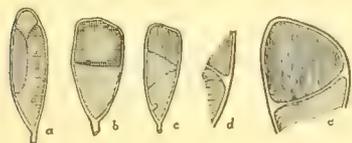


Fig. 11. Scales of *Entimus imperialis*: on *a*, *b* and *c* vertical lines indicate blue, horizontal lines indicate carmine red, and oblique lines yellow; where two kinds of lines cross, one color is tinged with the other; on *d* and *e* the fine lines represent the finer striation of the inner layer of the scales. Enlargement: *a*, *b* and *c*, 100 diam.; *d* and *e*, 300 diam.

scales, glistening by reflected light with the brightest colors, and these colors are heightened by the shining black background which the surface of the insect affords. Hairs and scales cover its legs, and the hairs, as will be seen later, are of the same nature as are the scales.

The form of these appendages is extremely variable. Their greatest width is about 0.06 mm., and from this

width gradations may be found down to hairs of a diameter of less than 0.01 mm. The length of such as are typically scales (fig. 11, *a*, *b* and *c*) is 0.15 to 0.18 mm. The hairs attain a length of 1.3 mm.

Both hairs and scales are colored in the same way and with the same colors, chiefly red, blue and yellow, by transmitted light, and green and purple by reflected light. Whatever the color by reflected light, its complementary color appears by transmitted light; predominant is red by transmitted, and green by reflected light. Thus one sees the origin of the green color on the coleopteron itself. Green, yellow, red, blue and purple often appear on a single scale, and these colors change if the light is changed from transmitted to reflected; they are especially brilliant upon a black background. Some scales are of a single color, usually red. On figure 11, *a*, *b* and *c*, I have attempted, as far as is possible without colored figures, to show the distribution of colors in three scales. Even colored figures would have poorly represented some of the brilliant variations which the scales present.

More careful microscopical examination sufficed, even with low powers, to show that the scales have the appearance of being filled with pigments, separate colors usually in distinct compartments allotted to them. Sometimes, however, similar colors, like yellow and yellowish red (see basal part of fig. 11, *a*), or like blue and purple, are in the same compartment. Sometimes there is a tinge of color near

the margin of a compartment different from the color of the middle of the compartment, as in the upper part of fig. 11, *b*. The extreme margin of the scales is always transparent and colorless, and sometimes, as if by a flaw, a little transparent spot extends into the colored portion of the scale, as near the base of fig. 11, *c*. At all points along the margin where different compartments meet the marginal transparent portion seems to extend inward, and with higher magnifying powers a very thin, transparent partition can be seen extending between the compartments. This partition is clearly and perhaps too strongly represented on fig. 11, *d* and *e*. If a part of a scale, especially near its base, is broken, two edges can be readily seen, showing the scale to be hollow, and the color sometimes fails near the broken edges. Everything indicates pigment coloration, but experience with the colored scales of *Hoplia* teaches the application of reagents. Treatment with the simplest of all reagents, water, dispels all the illusion in regard to enclosed pigments. Every scale that is not absolutely perfect, becomes, in a few moments, transparent and almost colorless, a slight yellow remaining, the water having entered the cracks and broken places in the scales. Is the pigment dissolved or changed chemically by the water? This is negatived by a few experiments similar to those tried on the scales of *Hoplia*. The scales when redried from volatile liquids regain their original coloration, the same colors and shades in their respective compartments and locations. Chlorine

or sulphuric anhydrid (SO_2) fails to bleach the scales; acids and alkalies do not change their colors. Uninjured scales are not penetrated by liquids and remain colored in them. The coloration is surely due, then, to physical causes, that is to some form of interference of light.

The hairs are colored similarly to the scales, although the finer hairs appear to the naked eye, or to a simple lens, as silvery white, even when seen on a black surface. In the hairs the colors often alternate in the same general manner as they do in the scales, but, as is usual in the scales, yellow, or yellowish-red, is generally nearest the basal portion of the hair. The external transparent sheath or wall of the hairs, corresponding, as seen under the microscope, to the transparent margin of the scales, varies much in thickness; in some cases the coloration fills nearly the whole hair, in other cases the channel through the hair is very small and consequently the color line very narrow in the hair. When treated with water or other liquids broken hairs are rendered transparent in the same manner as injured scales.

When filled with water the hairs and scales still show, sometimes quite distinctly, the partitions between their different compartments. In rare cases liquids fail to pass a partition, leaving one part of a scale or hair colored after another part has been rendered transparent. Thus it is evident that, however thin the partitions may be, they are water-tight when uninjured; they are, nevertheless, apparently usually broken through, the scales themselves

being so brittle that few can be removed without breaking. My experiments were all made with scales from a specimen dried at least over ten years; possibly a fresh specimen would have less brittle scales.

Further microscopic examination of narrow scales and hairs reveals a longitudinal striation, the striae of which are from 0.0015 to 0.0020 mm. (or even further) apart. This striation, which for greater distinctness I will call the "coarser striation," is present on hairs, less marked on elongated scales, and not generally observable on broad scales (such as represented in fig. 11, *b*). This coarse striation is visible after the color has been removed from the scales and hairs by reagents. It is easily seen to be external on the cylindrical hairs, extending beyond the colored portion of the hairs.

Still higher magnifying power brings to view a second striation, which I will call the "finer striation." This striation was much more difficult to see than the coarser striation, the striae being very delicate and only 0.0008 to 0.0009 mm. apart. Unlike the coarser striation, the finer striation is more evident on broad scales and least evident or not discernible, at least with the objectives at my command, on narrow scales and on hairs. The finer striation is further unlike the coarser striation in following no definite direction on the scale, sometimes being in one direction in one portion of a scale and in another direction in another part of the same scale. In any single compartment of a scale the direction of the finer striation is approximately the same,

sometimes a little curved, resembling, as seen under the microscope, the furrows of the finger-tips. In adjacent compartments of a scale the finer striae are sometimes at right angles to each other, though oftener in the same direction. I have attempted to represent, on fig. 11, *d* and *e*, the finer striation upon two scales, but the striae, although proportionately about the right distance apart, are themselves relatively coarser than in nature. The finer striation may be at right or at oblique angles (probably also parallel) to the coarser striation. The finer striation is most evident in blue or purplish parts of scales, altho it exists in other parts; probably the darker background makes it more plainly visible on blue portions. The finer striae appear to be formed of rows of dots, but my objectives failed to determine this with certainty. The finer striation is invisible on scales treated with liquid reagents to remove the air.

Both finer and coarser striation are found on the under as well as the upper side of the scales. At the edges of the scales the coarser striation curves and appears upon the transparent border of the scales, the finer striation (see fig. 11, *e*) curves to meet the margins of compartments; the coarser striation is evidently an external, longitudinal plication of the scale-membrane, limited in extent by the size of the scale itself, the finer striation is a plication or figuration of the inner side of the scale-membrane, limited in extent by the outline of the compartment to which it belongs.

(*To be continued.*)

ON AN EGG PARASITE OF THE CURRANT SAW FLY (*AMELITUS VENTRICOSUS*).

BY JOSEPH ALBERT LINTNER, ALBANY, N. Y.

[Read before the American Association for the Advancement of Science, at its Montreal meeting, 29 August 1882.]

Dr. Asa Fitch, in his 12th Annual report on the insects of New York for the year 1867 (Trans. N. Y. state agric. soc. for 1867, 1868, v. 27), p. 931-932, made the following reference to this insect:

“As none of the foreign accounts which we have seen allude to any parasitic enemy of this currant saw-fly, it seemed quite improbable that it would in this country meet with any such enemy, to lighten from us the task of combatting it and diminishing its devastations. But our valued friend J. A. Lintner, of Schoharie, greets us with the glad tidings that he has discovered we have such a foe to this formidable scourge. An egg parasite of this saw-fly inhabits our state, an exceedingly minute hymenopterous insect, which inserts its eggs into those of the saw-fly, that its young may subsist upon and consume the contents of those eggs. This diminutive little fly has probably existed hitherto upon the eggs of some one of our American saw-flies similar in size to those of the currant saw-fly; and it has now discovered that the eggs of this newly arrived foreigner are equally well adapted to its wants. And so multiplied has this little friend of the gardener become, that in Utica Mr. Lintner finds that among fifty eggs of a saw-fly upon a currant leaf, there will not be more than four or five that will hatch currant worms, all the rest being occu-

ried by the little maggot, the young of this parasite. At Schoharie, also, where the saw-fly has arrived more recently than at Utica, he finds this parasite is now beginning to appear. Everywhere this little creature is no doubt following upon the tracks of the saw-fly, and within a very few years after the one arrives in any place the other will be there also, and will speedily become so multiplied as to quell and extinguish it. This is a most important discovery, and renders it quite probable that in this country this currant worm can never be but a temporary evil. Whenever circumstances favor it and enable it to multiply and become numerous in any section of our country, this little enemy, its mortal foe, will speedily be there to subdue and stamp it down. Thus nicely are the works of nature balanced, and no creature is permitted to usurp a place in her domain which does not belong to it.”

The specimens of the parasite obtained by me, at the time referred to in the above notice, were submitted to a friend who had made study of the group to which they belong, who believed them to be an undescribed species, and was only able to give them a doubtful generic reference. They were subsequently destroyed, and from that time until the present year (an interval of fourteen years), although I have con-

tinued to search for them, I have been unable to obtain the species.

Its rediscovery by me the present year, and the determination of the species, lend additional interest to the notes upon it that I made at its first observation, at Utica, N. Y., in June 1866, and I therefore transcribe them from my note-book:—

I had collected a number of currant leaves upon which the currant saw-fly had deposited eggs, and was counting the eggs upon each to obtain the average number per leaf, when I noticed an occasional brown egg among them, appearing somewhat abnormal in shape. On placing them under a lens a resemblance to a pupal form was detected. I at once suspected the presence of the parasite for which we had been hoping. Although there seemed to be but the merest chance of discovering at large an insect so minute as this must necessarily be, I instituted a careful search of the currant bushes in the garden, and in a short time had the great gratification of discovering a minute speck moving among the eggs, which under my lens revealed a form which left scarce room for doubt of its parasitic character. During the day I detected several more of the kind upon the leaves containing egg-deposits, affording strong evidence of their relationship. A few days thereafter (perhaps a week), in a small phial in which I had placed some eggs that I suspected of having been parasitized, I had the delight of seeing several of the familiar forms of my currant-leaf acquaintances, and the ruptured pupa

cases from which they had evidently escaped.

The following year (1867) there was a marked diminution in the number of currant-worms observed, and a corresponding increase in parasitized eggs. Many of the leaves had not been visited by the parasite, but of those that gave evidence of such visit, the work of destruction was almost complete, for of several leaves bearing each from thirty to forty eggs, all but five or six were transformed into parasitic pupae.

In June 1868, I was able to make, at Schoharie, N. Y., the following observations upon the oviposition of the parasite within the eggs of the currant saw-fly:—

In a small phial in which had been placed some parasitized eggs of the saw-fly, a male and female parasite had emerged. That I might observe their actions I introduced a piece of currant leaf having upon it some eggs which I had just seen deposited. No evidence was given that the female was aware of the presence of the eggs, but after several minutes traveling around the glass, she moved upon the leaf, and in passing over and beneath it, seemed to meet with them accidentally. She paused, and then began a careful inspection, walking over them several times, and constantly palpating them with her antennae. Then, satisfied with her examination, she attached herself to one of the eggs, appressed the tip of her abdomen to it, and remained in this

position motionless for the space of two-and-a-half minutes, during which time an egg, doubtless, was inserted, although the pocket lens with which the observation was made did not disclose the fact. The motion of her antennae then recommenced, and I expected to see the operation just witnessed repeated upon another egg; but, to my surprise, she merely changed position—again applied the tip of her abdomen to a different part of the same egg, and remained at rest for about the same space of time as before. Three times I witnessed this performance, and it is therefore probable that three parasitic eggs were placed within the one of the currant-fly. Unfortunately an interruption prevented me from noticing if the remaining currant-fly eggs were similarly parasitized, and the number of eggs introduced in each; and much to my regret, the eggs were accidentally destroyed before my observations could be made upon their transmutation into parasitic pupae. The pupa cases are dark brown, disclosing some of the outlines of the contained pupae, somewhat flattened, broader than the original egg, but of about its length. The insect is apparently one of the *chalcididae*, having a broad head, long and elbowed antennae, ovoid anterior wings, nearly veinless, beautifully iridescent, delicately fringed and haired; the posterior wings are almost linear; the abdomen is short, not reaching the tips of the wings.

This year (1868) is probably the first appearance of the parasite at Schoharie, as I could only discover about

a dozen individuals. Its progress seems to be from west to east, corresponding with that of the currant-worm.

The rediscovery of the parasite the present year (1882) was made in my garden at Albany, upon a solitary currant bush growing there. The parasitized eggs were enclosed in a bottle, and in a few days the insects emerged. That I might multiply and aid in the distribution of an insect which had already shown its capability for usefulness, I visited another garden in the city to obtain eggs of the currant-fly for parasitization by my confined individuals. To my surprise, the parasite was here found in strong force, for in the examination of a long row of currant bushes containing many eggs, I could not find a single egg-bearing leaf which had not been visited, and the destruction of the eggs ensured. A large number of leaves were collected, each bearing perhaps from forty to fifty parasitized eggs. Reserving a few of these for study and for propagation, the remainder were made up in small parcels of about a half-dozen each, and mailed to entomological friends in various parts of the United States and Canada, with the request that they be pinned upon currant-bushes among the leaves where the currant-fly eggs were to be found. The introduction of parasites in this manner into localities where they had not previously occurred, has been shown to be practicable; and in consideration of the great importance of parasitic aid in the destruction of our

insect pests, I sincerely hope that my efforts to distribute this very efficient parasite may prove, from observations to be made hereafter, to have been successful.

Examples of the insect were sent by me to Mr. L. O. Howard, of the Department of agriculture at Washington, a gentleman who has made special study of the family to which it pertains, viz., the *chalcididae*. He informs me that there is no doubt of its being the species described and named by Dr. C. V. Riley in 1879 (Can. entom., Sept. 1879 v. 11, p. 161-162) as *Trichogramma pretiosa*, examples of which had been reared, at Washington, from eggs of the cotton-worm moth, *Aletia argillacea* Hübn., collected in Alabama. The description is reproduced, with additional information, in Prof. J. H. Comstock's Report upon cotton insects (Washington, 1879), p. 193. It has since been extensively reared from eggs of the same moth collected in Florida, by Mr. H. G. Hubbard. It has also been bred at the U. S. Department of agriculture from eggs of an unknown noctuid moth occurring on orange trees, and from *Aleyrodes*.

Dr. Riley, from some structural features, thought that it might be necessary to establish a new genus for this species and one or two closely allied ones, but Mr. Howard finds it to be a true *Trichogramma*, as at first referred.

Another species of the genus, *T.*

minuta Riley,¹ has been reared from the eggs of one of our common butterflies, of extensive distribution, *Limenitis disippus*. Parasitized examples of these eggs have given from four to six specimens of the minute creature, which, notwithstanding its specific name of *minuta*, exceeds in size the microscopic *T. pretiosa*, the latter being only about 0.25 mm. in length.

In connection with the above notice of the egg-parasite of the currant-fly, it may be of interest to offer the following note of the oviposition of the currant-fly as observed by me, as its method has not to my knowledge been previously published:

June 7, 1868. *Nematus ventricosus* was seen to deposit thirty eggs upon a single currant leaf within one hour. In the act of ovipositing, it curved the tip of its abdomen downward and forward, directing its ovipositor toward its head, in which position the end of the egg is seen to protrude and attach itself to the leaf-nervure, when the ovipositor is withdrawn, and the egg left in position. Moving backward a very little, another egg is similarly deposited, and in like manner the operation is continued, until the leaf has its assigned quota, or the supply of eggs is exhausted. The eggs produced their larvae on June 14th.

¹ *Third Annual report on the insects of Missouri*, 1871, p. 153, fig. 72.

THE TARSAL AND ANTENNAL CHARACTERS OF *PSOCIDÆ*.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

[Reprint from Entom. mo. mag., June 1882, v. 19, p. 12-13.]

By a mere chance I see that a statement recently published by me concerning the tarsal structure of *psocidæ* confirms, in a most satisfactory manner, that made by Prof. Westwood in 1857 (Proc. Ent. soc. Lond., series 2, vol. iv, pp. 63, 64) regarding certain coleoptera.

Being occupied with the *atropina*, I was astonished to find that the young forms have only two-jointed tarsi (instead of three-jointed, as is found in the imago), but the last joint, internally, in the middle, shows a more or less visible division, where the 3rd joint (the median) will be formed, and just below it are one or two small bristles. I have observed this in *A[tropos] divinatoria* (reared by myself), *succinica*, and *oleagina*, and also in *Hyperetes tessellatus*. So long as the young have only two-jointed tarsi, the antennae have also less joints. Thus, in *A. divinato-*

ria the latter have only 12 instead of the 15 of the imago; in *Hyperetes* the proportions are 13 to 23. But, although the third (middle) joint of the tarsi is produced by a division of the apical, it is just the contrary with the antennae. In these the two thick basal joints, and the apical joint are not divided; but in some species all the intermediate joints are so. *Hyperetes* is in the latter case, all the 10 intermediate joints being divided in the imago, as I can show from preparations. It is a remarkable fact that the mysterious *Hyperetes* shows, in its earlier stages, precisely the normal number (13) of joints for the *psocidæ*. I am not prepared to give an opinion as to this genus. Other genera, such as *Caccilius*, commonly considered to have only two-jointed tarsi, possess a small aborted third joint, just as occurs in many coleoptera.

Cambridge, Mass., 1st April, 1882.

THE CHIGOE IN AFRICA.—It is stated in Burton and Cameron's "To the Gold Coast for Gold" that the chigoe (*Pulex penetrans*) has been recently introduced and has spread all over the West African seaboard and far into the interior. At the time of Captain Burton's first visit (1862) it was unknown

on the west coast; but now it ranks with the indigenous red, white and black ants, centipedes, scorpions, venomous spiders and flies of the tsetse group, as among the chief plagues of that region.—*Amer. naturalist*, June 1883, v. 17, p. 664.

PSYCHE.

CAMBRIDGE, MASS., MAY—JUNE 1883.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

REARING LEPIDOPTERA.

It will be gratifying to those entomologists who recognise the great importance of the knowledge of the early stages of insect life, to learn of the attention that is being given to this department of study by Mr. S. L. Elliot, of New York City. For the last few years, this gentleman has been indefatigable in his lepidopterological studies, and especially in larval collections and breeding from the egg. Fortunate in the ability to devote his entire time to the work, and actuated by an enthusiasm that scarcely recognises the need of any respite from the absorbing "labor of love"—very valuable and important results have already followed his labors. The life-histories of a number of rare species have been worked out. New species have been discovered, and so-called species shown to be simple varieties. Immense numbers of larvae have been collected and reared upon their food-plants, descriptions of the new forms, with the aid of Mr. Henry Edwards, have been taken, and thousands of perfect insects have been obtained for the cabinets of those who prize perfect forms. His success in carrying lepidoptera

through their winter pupation, by means of a method and appliances devised by himself, has never, we believe, before been equalled. Several thousands of pupæ have been carried through the past winter with scarcely any loss except that unavoidably resulting from parasitic attack. We know of no one else in the United States, who is rearing the larvæ of lepidoptera so successfully and on so large a scale.

F. A. L.

BOOK NOTICES.

It is understood that Mr. Wm. Saunders, of London, Ontario, has in preparation and has nearly completed a volume upon "The Insects of our Fruits and Fruit-trees." The great need of the information that this volume will present, has long been felt, and it is very gratifying to know that the want is soon to be supplied. The larger portion of it is already in type. Much labor has been bestowed upon its preparation to render it as complete as possible and perfectly reliable. It will make a volume, as we learn from the author, of nearly 450 pages. Almost every species noticed will be illustrated, requiring for the purpose over 400 figures. It will be issued by the well known publishing-house of Lippincott & Co., of Philadelphia, in their best style, and will be offered to the public at a price (probably \$3) that will bring it within the reach of all who need it. From the distinguished ability of the author, his familiarity with fruit-culture, and the special efforts made by him to render the volume all that it should be, we are confident that it will prove to be a standard work upon the subject of which it treats, and that it cannot fail of commanding an extensive sale.

F. A. L.

[Mr. Saunders' book has been issued since the above notice was written.]

The third part of the third volume of the Proceedings of the Davenport Academy of Natural Sciences, which came to hand in April, is devoted to the memory of Joseph

Duncan Putnam, who was foremost among the members of that society in securing for it a scientific standing as a publishing society. Besides the proceedings of the meeting held in Mr. Putnam's memory, the letters sent to his bereaved relatives by his scientific associates, and the resolutions passed by several scientific societies upon hearing of his death, Prof. Herbert Osborn, with the assistance of Dr. H. A. Hagen and others, has prepared for publication the notes upon and figures of American *solpugidae*, which Mr. Putnam had made, and which now form an interesting contribution to the study of a heretofore neglected family of American arthropoda. To this paper is added a bibliography of the *solpugidae*, compiled from Mr. Putnam's by Miss Julia E. Sanders. This bibliography comprises 224 titles, with notes, and is arranged in chronological order.

G: D.

Cambridge, Mass., 14 April 1883.

A paper with the title *Rovardszati lapok* (Journal of entomology) has lately made its appearance in Pesth, Hungary. It is, however, a mistake to bury interesting entomological matter in pages printed in a language which few outside of Hungary can read.

G: D.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

9 MARCH 1883.—The 91st meeting of the Club was held at 19 Brattle Square, Cambridge, 9 March 1883, at 8 p. m. In the absence of the President, Mr. S: Henshaw was chosen Chairman. Seven persons (five of whom were members) were present.

The additions to the library of the Club were announced by the Librarian.

Mr. G: Dimmock read a paper on "The scales of coleoptera," including in the paper observations in regard to the scales of other insects. Microscopical preparations and fig-

ures of many forms of scales were shown. [The paper is now appearing with illustrations, in PSYCHE.]

Mr. S: H. Scudder exhibited a figure, by Brongniart, of a very large fossil walking-stick, described under the name of *Titanophasma fayoli*.

Mr. S: H. Scudder showed a few photographs of regions in Colorado where fossil insects had been found.

LINNEAN SOCIETY OF LONDON.

6 FEB. 1883. . . . A paper was read "On the pairing of *Tegenaria guyonii* and description of certain organs in the male abdominal sexual region," by J. Maule Campbell. Two cases were related in which during confinement the males killed the females after union and an instance was also given of an attempt to impregnate an immature female which was also destroyed by the male. In neither case could hunger have been the cause of the attack. The writer explained these occurrences and also the accounts of females destroying males after union on the ground "That those instincts which are habitually practised throughout the far greater portion of the life of the species, and on which its existence is dependent would scarcely be suspended for a longer period than necessary for the sexual union." Some of the habits of spiders and especially of this species were mentioned as bearing on these sexual conflicts, and the specific benefits which would arise from them were referred to. The paper concluded by a note on some glands situated on the convexity of the abdominal sexual region. The ducts, considerably convoluted, open through transparent tubular spines which are arranged transversely to the axis of the body of the spider. These organs are supposed by Mr. Campbell to be a kind of spinning organ. Two papilla-like processes below the opening of the genital sinus were also described. — *Zool. anzeiger*, 5 March 1883, jahrg. 6, p. 127-128.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

- Bachmann, O:** Leitfaden zur anfertigung mikroskopischer dauerpräparate. München, R. Oldenbourg, 1879. t.-p. cover, 8+196 p., 24×15, t 17×10; 87 il. Pap., 4 M.
General instructions for making microscopic preparations: p. 68-99 treats especially of entomological preparations. G: D. (3235)
- Barrett, C: G.** Hints as to the best means of rearing larvae of *tortricidae*. (Entom. mo. mag., Jan. 1883, v. 19, p. 172-176.)
General directions for rearing the different forms of larvae of *tortricidae*. G: D. (3236)
- Bell, James Thompson.** How we captured a hornet's nest. (Can. entom., May 1881, v. 13, p. 114.)
Hornets (*vespa*) killed by injecting chloroform into their nest. G: D. (3237)
- Berg, Carlos.** Contribuciones al estudio de las *cicadidae* de la República Argentina y países limitrofes. "(Anal. soc. cient. argent., 1882, t. 14, p. 38-48.)"
Separate. Buenos Aires, 1882. t.-p. cover, 16 p., 25×16, t 18×11.
Describes 11 species (from South America and Mexico); 6 are new species as follows: *tettigades papa*, *tympanoterpes elegans*, *praarna uruguayensis*, *p. montevidensis*, *carineta platensis*, and *derotettix* (nov. gen.) *mendosensis*. G: D. (3238)
- Bergroth, E.** Zur geographischen verbreitung einiger odonaten. (Entom. nachrichten, 15 March 1881, jahrg. 7, p. 85-88.)
Notes on numerous species of *odonata*. G: D. (3239)
- Bertholet, A.** [Présentation d'une section d'un sapin du Risoud pénétrée par les fourmis.] (Bull. soc. vaudoise des sci. nat., Oct. 1881, s. 2, v. 17; Procès-verbaux, p. 35-36.)
Mode in which species of *camponotus* had formed galleries in a spruce tree. G: D. (3240)
- Bethune, C:** James Stewart, compiler. Insects of the northern parts of British America. From Kirby's Fauna boreali-americana: Insecta. (Can. entom., 1870, v. 2: April, p. 76-82; May, p. 89-93; July, p. 105-110; Sept.-Oct., p. 142-145; Dec., p. 168-176; 1871, v. 3: June, p. 27-32; Sept., p. 88-94, 114-116; Oct., p. 134-137, 155-156; Nov., p. 172-176, 186-192; Dec., p. 211-217, 227-233; 1872, v. 4: Feb., p. 31-36; March, p. 52-57; May, p. 93-96; June, p. 111-118; Aug., p. 151-155; Sept., p. 175-179; Oct., p. 196-198; Dec., p. 231-235; 1873, v. 5: May, p. 96-99; June, p. 115-117; July, p. 129-132; Oct., p. 193-196; Nov., p. 210-213; 1875, v. 7: June, p. 109-113; Aug., p. 156-159; 1877, v. 9: Aug. p. 148-156; 1878, v. 10: June, p. 116-118; July, p. 137-139; Nov., p. 213-217; 1878, v. 11: Aug., p. 146-154; 1881, v. 13: Aug., p. 162-170.)
Reprint of the parts of W: Kirby's "Fauna boreali-americana", . . . which apply to the insects of the northern parts of British America, together with notes, by the compiler, on the species and their synonymy. [See PSYCHE, Rec., nos. 455, 1214, and 1325.] A. K. D. (3241)
- Bieler, S.** [Appareil buccal de divers insectes.] (Bull. soc. vaudoise des sci. nat., Dec. 1880, s. 2, v. 17; Procès-verbaux, p. 6.)
Chiefly concerning the trophi of *pulex*. G: D. (3242)
- Butler, Arthur Gardiner.** Notes on some North American lepidoptera. (Papilio, July 1881, v. 1, p. 103-106.)
Describes *anceryx edwardsii* as a new species, and states that the insect known as *oenosanda noctuiformis* Walk. is a new species, and that its generic name should be *cautelitia*; gives comparative and other notes on *hemaris cynoglossum*, *pteronon clarkiae*, *deidamia inscripta*, *choerocampa tersa*, *dellephila lineata*, *philampelus achemon*, *smerinthus ophthalmicus*, *sphinx oreodaphne*, s. *perlegans*, and refers *darapsa versicolor* to the genus *ampelophaga*. H: E. (3243)

Edwards, H: A new genus and some new forms of North American *zygaenidae*. (Papilio, 31 May 1881, v. 1, p. 80-81.)

Describes *penethria* n. g. *zygaenidae*, *p. majuscula*, *p. parvula*, *gnophaula vernicalata* var. *continua*, *lycomorpha constans* and *l. desertus*. H: E. (3250)

Edwards, W: H: On *pietris bryoniae* Ochsenheimer, and its derivative forms in Europe and America. (Papilio, June 1881, v. 1, p. 84-99, pl. 2-3.)

Gives full and careful examination and diagnosis of all species or varieties, both European and American, allied to *pietris bryoniae*, with comparative notes on their resemblances and probable origin. Gives 18 colored figures, on two plates, of summer and winter forms.

H: E. (3257)

Edwards, W: H: Some remarks on the alleged abnormal peculiarities of *argynnis myrina*. (Papilio, Sept. 1881, v. 1, p. 134-141.)

Paper read before the Permanent sub-section of entomology of the American association for the advancement of science, at Cincinnati, O., 19 Aug. 1881. Combats the opinions expressed by S: H. Scudder in his "The curious history of a butterfly" (Amer. nat., Sept. 1872, v. 6, p. 513-518) [Rec., 3274], with reference to the hibernation and other habits of *argynnis myrina* and *a. bellona*. H: E. (3258)

Fernald, C: H: Notes on "The *tortricidae*, *tineidae* and *pterophoridae* of South Africa. Lord Walsingham, M. A. F. Z. S." &c. (Papilio, Dec. 1881, v. 1, p. 219-220.)

Notice of T: de Grey's [Lord Walsingham] "The *tortricidae*" etc.; explanation of the synonymy of *evartoma* Clem. = *ecopsis* Zell. B: P. M. (3259)

French G: Hazen. Larvae of two species of *euclea*. (Papilio, Sept. 1881, v. 1, p. 144-145.)

Describes larvae of *euclea paenulata* and *e. monitor*. H: E. (3260)

French, G: Hazen. Notes on the larvae of some moths. (Papilio, 31 May 1881, v. 1, p. 81-82.)

Describes larva of *arctia decorata* and *cynatophora pampinaria*. H: E. (3261)

French, G: Hazen. A parasite in *aegeria syringae*. Harris. (Papilio, July 1881, v. 1, p. 106.)

Records the existence of *phaeogenes ater* Cress. (fam. *ichneumonidae*) in the larva of *aegeria syringae*. H: E. (3262)

French, G: Hazen. Some new varieties of *catocala*. (Papilio, July 1881, v. 1, p. 110-111.)

Describes as new *catocala lachrymosa* var. *evolina*, *c. lachrymosa* var. *zelica*, *c. innubens* var. *hinda*, all from Illinois. H: E. (3263)

Grote, A: Radcliffe. Moths collected by Prof. Snow in New Mexico, with list of *eudriini*. (Papilio, Oct. 1881, v. 1, p. 174-178.)

Describes as new *halosidota labecula*, *quadrina* n. gen. (*dryocampini*), *g. diazoma*, *rhododipsa miniana*, *bessula* n. gen. (*noctuidae*), *bluxa*, *emplotica cephaloria*, *e. ferrevaria*, *botis lorialis*; notices occurrence of *lygranthoccia spraguei* and *botis volupialis*; gives list of the tribe *eudriini*, and diagnoses the genera *euschiropterus*, *copidryas*, *eudryas* and *ciris*. H: E. (3264)

Grote, A: Radcliffe. New western moths. (Papilio, 31 May 1881, v. 1, p. 75-78.)

Describes *trionemis* as a new genus of *noctuidae* and describes as new species *thyatira lorata*, *bombocia scitocircularis*, *agrotis clodiata*, *hadena cinifacta* and *trionemis saporis*, from Washington Territory, *nola fuscata* from Colorado, and *melipotria honesta* from Oregon; re-describes *agrotis havillae*, and points out its distinctness from *a. clandestina*. H: D. (3265)

Grote, A: Radcliffe. Note on *agrotis repentis*. (Papilio, Sept. 1881, v. 1, p. 126-128.)

Endeavors to establish the difference between *agrotis repentis* and *a. messoria*; notices other forms resembling these species, and states that *a. cochranii* Riley = *a. repentis* G. & R., *acronycta populi* Riley = *a. lepusculina* Guen., *prodenia autumnalis* Riley = *laphygma frugiperda* Abb. & Sm., *xytina cinerea* Riley = *x. antennata* Walk., and probably *agrotis scandens* Riley = *a. messoria* Harr. and *plusia brassicae* Riley = *p. ni* Hübn. H: E. (3266)

Grote, A: Radcliffe. Professor Riley on *dakruma*. (Papilio, Sept. 1881, v. 1, p. 142-144.)

Contends that *dakruma* is a good genus, in opposition to a statement of C: V. Riley that it should be merged in *zophodia*. H: E. (3267)

Gundlach, Juan. An annotated catalogue of the diurnal lepidoptera of the island of Cuba. Based on Kirby's Synonymical catalogue. (Papilio, July 1881, v. 1, p. 111-115.)

Enumerates 53 genera and 145 species of diurnal lepidoptera, known to the author to exist in Cuba. H: E. (3268)

Kellicott, D: Simons. The larvae of *catocala flebilis* and *catocala amatrix*. (Papilio, Sept. 1881, v. 1, p. 141-142.)

Gives full description of larva and chrysalis of these species, *c. flebilis* feeding on *coryo alba* and *c. amatrix* on *populus grandidentata*. H: E. (3269)

Langdon, Frank W. Bibliography of the Cincinnati fauna. (Journ. Cincinnati soc. nat. hist., April 1883, v. 6, p. 5-39.)

The part devoted to insects, by C: Dury, contains titles, references and notes on papers by James Angus, C: Dury, A: R. Grote, F: W. Langdon, J. W. Shorten, C: G. Siewers, Herman Strecker, J: A. Warder, A. G. Wetherby and Harold B. Wilson. G: D. (3270)

Lintner, Joseph Albert. Corrections. (Papilio, July 1881, v. 1, p. 122.)

Corrects some trifling errors in his "On some species of *nisoniades*" (*op. cit.*, 31 May 1881, v. 1, p. 69-71). [Rec., 3272] and enunciates an opinion on permanency of nomenclature. *H. E.* (3271)

Lintner, Joseph Albert. On some species of *nisoniades*. (Papilio, 31 May 1881, v. 1, p. 69-74.)

Corrections by author. (*op. cit.*, July 1881, v. 1, p. 122.)

Describes as new *nisoniades naevius*, *n. petronius*, *n. sommus*, all from Florida; gives comparative notes on *n. propretius*, *n. juvenalis*, *n. icelus*; establishes as a good species *endamus nevada* Scudder, and notes the occurrence in N. York of *endamus proteus*. *H. E.* (3272)

Neumoegen, Berthold. A new *hemileuca* from south-eastern Arizona. (Papilio, Oct. 1881, v. 1, p. 172-174.)

Describes as new *hemileuca yarapai*; compares it with *h. juno* and *h. dido*. *H. E.* (3273)

Scudder, S: Hubbard. The curious history of a butterfly. (Amer. nat., Sep. 1872, v. 6, p. 513-518.)

Separate. [Salem, Mass., 5 Oct. 1872]. 6 p., 24×15, t 17×9.7.

Germ. tr., by A. Speyer, entitled "Seltsame geschichte eines tagfälters" . . . (Verh. k.-k. zool.-bot. ges. Wien, 1873, bd. 23; Abh., p. 145-152.)

Notice, by W. F. Kirby. (Zool. rec., for 1872, 1874, v. 9, p. 343.)

Notice, by E. Burge:ss. (5th ann. rept. Peabody acad. sci., for 1872, 1873, p. 107, 108.)

Crit. rev., by W. H. Edwards, entitled "Some remarks on the alleged abnormal peculiarities of *argynis myrina*." (Papilio, Sep. 1881, v. 1, p. 134-141.)

"There are two sets of individuals [of *breathis bellona*], each following its own cycle of changes, apparently with as little to do with the other set as if it were a different species; each set has its own distinct seasons and thus gives rise to the apparition of two or three successive 'broods' in the course of the year." Explanation of the relations of these apparent broods. [For further notice, see title of Speyer's translation (Rec., 3277).] *G. D.* (3274)

Scudder, S: Hubbard. A new and unusually perfect carboniferous cockroach from Mazon Creek, Ill. (Proc. Bost. soc. nat. hist., [6] Sep. 1882, v. 21, p. 391-396.)

Description of *Aoblatina mazona*, n. sp. *G. D.* (3275)

Scudder, S: Hubbard. Notes on some of the tertiary neuroptera of Florissant, Colo., and Green River, Wyoming Terr. (Proc. Bost. soc. nat. hist., [12] Oct. 1882, v. 21, p. 407-409.)

General discussion of the tertiary neuroptera from the above regions. *G. D.* (3276)

Scudder, S: Hubbard. Seltsame geschichte eines tagfälters aus dem American naturalist, September, vol. 6, 1872, übers., und mit bemerkungen versehen von Dr. Ad. Speyer in Rhoden. (Verh. k.-k. zool.-bot. ges. Wien, 1873, bd. 23; Abh., p. 145-152.)

Separate. [Wien, 1873]. 8 p., t 17×10.5. Reprint. (Deutsche entom. zeitschr., 1875, bd. 19, p. 145-155.)

Notice. (Psyche, June 1875, v. 1, p. 78; Rec., 190.)

Germ. tr., by A. Speyer, of author's "The curious history of a butterfly" (Amer. nat., Sep. 1872, v. 6, p. 513-518) [Rec., 3274], with an additional note by author. *G. D.* (3277)

Spångberg, Jacob. Species jassi generis homopterorum. (Öfversigt af kongl. vetenskaps-akademiens förhandlingar, 1878, n:o 8.) Stockholm, 1878. p. 3-40, 22×14, t 17.5×10.

Describes 51 (25 new) species of *jassus*, of which 3 (*j. melanotus* and *j. fuscipennis* = 2 new) species are from the United States, and 5 (*j. pustulatus* and *j. flaviceps* = 2 new) species are from Mexico. *G. D.* (3278)

Spångberg, Jacob. *Psocina* Sueciae et Fenniae. Öfversigt af Sveriges och Finlands psociner. (Öfversigt af kongl. vetenskaps-akademiens förhandlingar, 1878, n:o 2.) Stockholm, 1878. p. 5-29, pl. 1-2, 22×24.

Synoptic tables for separating the genera and species of *psocidae* of Sweden and Finland, with figures to illustrate the venation of the wings. [Some of the species are also found in the United States.] *G. D.* (3279)

Spångberg, Jacob. Homoptera nonnulla americana nova vel minus cognita. (Öfversigt af kongl. vetenskaps-akademiens förhandlingar, 1879, n:o 6.) Stockholm, 1879. p. 17-26, pl. 15-16, 22×14, t 17.5×10.

Describes and figures *jassus borealis* (n. sp.) from North America and *j. gratiosus* (n. sp.) from Mexico, besides species of *gypona*, *petalopota*, *terulid*, and *jassus* from other localities. *G. D.* (3280)

Spångberg, Jacob. Species gyponae generis homopterorum. (Bihang till k. svenska vet.-akad. handlingar, band 5, n:o 3.) Stockholm, 1878. 76 p., 22×14, t 17.5×10.

Describes 69 (55 new) species of *gypona* and notes 11 species unknown to him. The species described are as follows: United States, 10 (15 new); Mexico, 10 (6 new) of which 2 species are also found in South America; South America, 60 (34 new); and Tahiti (?), 1 new species. *G. D.* (3281)

Stretch, R: H. Notes on the genus *clisiocampa*, Curtis. With description of new species. (Papilio, 31 May 1881, v. 1, p. 63-64.)

Describes as new *clisiocampa fragilis*, *c. constricta*, *c. strigosa*, *c. erosa*, *c. thoracica*; describes larva and cocoon of *c. californica*, *c. constricta*, *c. erosa*; gives notes and synonymy of *c. americana* and *c. dissidia*, and records singular habit of larva of *c. californica*. *G. D.* (3282)

ENTOMOLOGICAL ITEMS.

PROF. WILHELM PETERS, director of the zoological museum of the university of Berlin died 20 April 1883. He was born 22 April 1815, at Koldenbüttel, Kreis Eiderstedt, Germany.

MR. A. W. P. CRAMER notes in the *Bulletin of the Brooklyn Entomological Society* for April 1883, the capture of two specimens of *Catocala unijuga* on shipboard, in mid-ocean off the coast of Newfoundland.

IN THE seventeenth annual course of lectures to mechanics at the Sheffield scientific school, New Haven, Conn., lately completed, Dr. E. H. Jenkins delivered a lecture on the agency of insects in the fertilization of flowers.

THE ENTOMOLOGICAL Society of France, in its last meeting in February, gave the Dollfus prize to M. Bedel, author of the "Faune der coléoptères du bassin de la Seine," for the part of his work devoted to the rhyncophora which appeared in the annals of the society for 1882.

WE ARE glad to see that the Ottawa field naturalists' club maintains such activity. Excursions, the publication of its transactions, soirees, and prizes for collections and original work, stimulate the members to industry. Mr. W. H. Harrington is the secretary, and Messrs. Harrington, J. Fletcher and J. B. Tyrrell are leaders in entomology.

THE WORCESTER (Mass.) Lyceum and natural history association held its annual meeting 12 May 1883. From a two and one-half column review of the reports of its different officers, as given in the *Worcester daily spy* of 14 May, we learn that Mr. F. G. Sanborn gave, during the past year, a course of 8 lessons on entomology to 10 students. We are glad to see the progress made by the association in popular instruction in natural science and we know from personal experience the fitness of Mr. Sanborn, who is curator of the association's museum, for the work of exciting interest among young people in the study of natural history.

THE *Deutsch-Amerikanische Apotheker-Zeitung*, 1 Apr. 1883, jahrg. 4, p. 49, states that Dr. E. F. Brush, of New York, recommends a concentrated tincture of common black ants as a remedy for scurvy, or the ants themselves may be used for that purpose. He bases his recommendation on observations made among the wood-choppers in Maine, who are very apt to be affected with scurvy on account of being restricted for long times to feeding on preserved food and eat masses of black ants as a remedy. The editor of the D.-A. A.-Z. says this is only on account of the formic acid contained in the ants, and altho it may be the most convenient way of getting this acid in the woods it is not necessary to eat ants for the purpose.

WE HAVE lately received the first four numbers of "Natura. Maandschrift voor Natuurwetenschappen," a new monthly issued by the natural science society of Ghent, Belgium. The name of J. MacLeod in the list of working members of the society, as well as the contents of the numbers received, promise that the new journal will not lack entomological papers. The price of *Natura* is seven francs per year.

THROUGH LACK of familiarity with the literature of the subject, Mr. R. H. Stretch has redescribed (*Papilio*, Feb. [March] 1883, v. 3, p. 41-42), the anal appendages of the male of *Leucarctia acraea*. These were originally described by H. K. Morrison (*Psyche*, Oct. 1874, v. 1, p. 21-22), who also found similar organs in *Danaïs archippus*, *Agrotis plecta*, and *Euplexia lucipara*. This organ in *Danaïs* is briefly described in E. Burgess' "Contributions to the anatomy of the milk-weed butterfly, *Danaïs archippus*" (Boston, 1880), without mention of its earlier discoverer. Similar organs have been described and figured by C. G. Siewers (Canadian entomologist, March 1879, v. 11, p. 47-48) who found them in males of *Callimorpha interruptomarginata*, and concluded that they aided the insect in flight. Siewers' article is noticed in the *Entomologist's* monthly magazine, June 1879, v. 16, p. 19.

NOTICES TO ENTOMOLOGISTS.

In accordance with a resolution passed at a meeting of the Entomologists in attendance at the Montreal meeting of the American Association for the Advancement of Science, in August, 1882, authorizing me to call and "to provide for similar meetings for Entomological discussions at the future annual gatherings of the Association," I herewith name Wednesday, August 15th, 3 o'clock, P. M., as the time for the first of the series of the Minneapolis (Minn.) meetings,—the place of meeting to be named hereafter.

All interested in Entomology are respectfully invited to attend the meetings and participate in the discussions.

J. A. LINTNER.

Albany, June 1, 1883

A special public meeting of the Cambridge entomological club will be held in Minneapolis, Minn., at 2 P. M., on Tuesday, 14 August, to which meeting all members and other persons interested in entomology are invited.

B: PICKMAN MANN, *Pres.*
G: DIMMOCK, *Sec.*

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

13 Oct. 1882.	9 Mar. 1883.
10 Nov. "	13 Apr. "
8 Dec. "	11 May "
12 Jan. 1883.	8 June "
9 Feb. "	

G. DIMMOCK, *Secretary.*

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p. m., on the days following:—

25 Oct. 1882.	28 Feb. 1883.
22 Nov. "	28 Mar. "
27 Dec. "	25 Apr. "
24 Jan. 1883.	23 May "

EDWARD BURGESS, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

14 Oct. 1881.	10 Mar. 1882.
11 Nov. "	14 Apr. "
9 Dec. "	12 May "
13 Jan. 1882.	9 June "
10 Feb. "	

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

12 Dec. 1881.	12 June 1882.
---------------	---------------

JAMES H. RIDINGS, *Recording Secretary.*

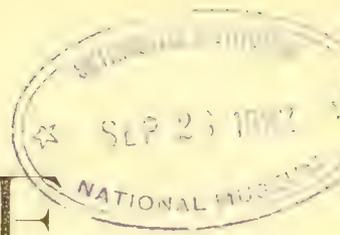
THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

3 Oct. 1882.	6 Feb. 1883.
7 Nov. "	6 Mar. "
5 Dec. "	3 Apr. "
9 Jan. 1883.	1 May "

G. J. BOWLES, *Secretary.*

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary.*



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 111-112.

JULY-AUGUST 1883.

CONTENTS:

ADVERTISEMENTS	62
THE SCALES OF COLEOPTERA— <i>George Dimmock</i>	63-71
THE CLASSIFICATION OF THE TINEIDAE <i>Victor Tousey Chambers</i>	71-74
CAPTURES OF FENISECA TARQUINIUS FABR.— <i>Joseph Albert Lintner</i>	75
PROCEEDINGS OF SOCIETIES.—Entomological Society of London—Zoological Society of London—Linnean Society of New South Wales	75-76
BIBLIOGRAPHICAL RECORD, no. 3283-3291	77-78
ENTOMOLOGICAL ITEMS—Society Meetings	79-80

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

PSYCHE.

THE SCALES OF COLEOPTERA.

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

(Continued from page 47.)

GENERAL SUMMARY.

After the preceding descriptions of some forms of scales among coleoptera, I wish to consider the subject more generally. First to be considered is the question, in what families of coleoptera have scales been found. Fischer mentioned scales as occurring in *teredyles*, *clavicornes*, *lamellicornes* and *curculionides*,—or to use the modern equivalents for the families in which he found scale-bearing species,—in the *cleridae*, *ptinidae*, *dermestidae*, *byrrhidae*, *scarabaeidae* and *curculionidae*. To this list I would add with certainty the *elateridae*, basing this addition on the scales of *Chalcolepidius* and *Alaus* described in this paper. According to my views of what constitutes a scale I would add further the *cerambycidae*, and with some doubt the *buprestidae*. The scales of *Clytus robiniae* described in this paper, it seems to me, can scarcely be called hairs, altho to the naked eye or to a low-power lens they appear like hairs. They are too much flattened and the striae end in the manner in which they do in scales. The question whether the sword-shaped appendages of *Psiloptera drummondii*

are really scales or hairs is less easily settled but I should be inclined, from the arrangement of their striae, to term them scales. The form of scale from *Alaus* is readily seen, by the figure of its transverse section (fig. 7, *d*), to be too flat to be termed a hair, and this or similar forms are not uncommon among coleoptera.

The question of the morphological identity of scales and hairs of insects has been long since settled, so that the question of whether an appendage is a scale or hair has little importance. The extremely minute spines or hairs upon the wings of diptera, hymenoptera and other insects are simply another form of scales. It is only in insects where certain kinds of brilliant coloration have been developed that one finds scales. This leads to a consideration of how hairs and scales of insects affect coloration. They may simply cover a surface of the same color as their own; in such cases hairs may, according to the angle in which they stand, their abundance or their length, give rise to appearances which we designate as pubescent, velvety, pilose, sericeous, etc.; scales under similar circumstances may give rise to similar appearances, but are

most often imbricated and usually cause more lustre than hairs. Hairs or scales may be of a different color from the surface on which they are placed. If they are numerous and opaque they may entirely conceal the surface on which they are inserted, as the white hairs hide the bronze surface of the sides of the thorax in *Cicindela dorsalis*, and as the white scales of *Alaus oculatus* hide the black surface beneath the rings on the thorax; or they may only partly conceal the surface of the insect, giving rise to coarser and finer mixtures and shades of color. Opaque scales, or hairs, of more than one color, may cause figuration, whether they imbricate as on the wings of lepidoptera, or are separated as on *Anthrenus scrophulariae*.

The possibilities of varying effects of color are many with opaque scales and hairs, but with transparent ones, especially if they are colored, the effects of color can be multiplied still further. With hairs the effects are not so remarkable as with scales. The scale, by its form, increases the number of layers of the surface of an insect which are available for colorational purposes. Where the surface of an elytron had previously a cuticular and hypodermal layer, by the addition of a scale of the simplest type there is an addition of two cuticular and, theoretically at least, two hypodermal or sub-cuticular layers; in all six layers, without counting overlappings of imbricated scales. Some of these surfaces may have pigments, striae, hairs and other appliances to produce colors, and other surfaces may

have other striae and contrivances to act on the colors produced. The numerous modifications need not be enumerated here. I have alluded to special effects of coloration in describing the scales of different insects and shall again refer to some of them when discussing the modes by which the scales themselves are colored. I may add here that the general effect of transparent scales is to produce metallic coloration.

The kinds of coloration in coleoptera have been neatly tabulated by Fischer, according to the families of these insects. I translate his table, making in it, a few alterations based upon my own observations and indicated by italics. (*See next page.*)

Next to the consideration of how the color and presence of scales and hairs affect the appearance of surfaces to which they are attached is the not less interesting question of the causes of coloration in scales themselves. But before considering the causes of color, properly speaking, a few words are appropriate on the causes which produce silvery and milk-white appearances in scales and on insects. Leydig was the first, in 1855, to call attention to the presence of air between or beneath their chitin layers as a cause for certain silvery spots and scales on insects. He speaks of air in the finer pore-canals of *Ixodes testudinis*, giving these canals a black appearance, but causing the whitish grey color of the skin. So too he mentions silvery scales on a spider, *Salticus*, and glistening hairs on another spider, *Clubione*

	COLORS		By special epidermal structures such as						
	One	Several	In the substance	Hairs	Scales	Forming designs	Metallic lustre	Surface hairy ¹	
Curabici	Commonly	More rarely	Always	<i>Sometimes</i>	Never	Not rarely	Very often	Rarely	
Hydrocuthari	More rarely	Commonly	"	Never	"	"	Very rarely	"	
Baachelytrini	Commonly	"	Usually	Rarely	"	Not commonly	Not rarely	Commonly	
Stemoxi	More rarely	"	"	"	<i>Sometimes</i>	Commonly	Commonly	"	
Malhendemattici	"	"	Always	Never	Never	Not commonly	"	"	
Terepyles	Commonly	"	"	<i>Sometimes</i>	Rarely	Not rarely	Very rarely	"	
Claviones	"	"	Very commonly	Usually	Commonly	Very commonly	Not commonly	"	
Palpiones	"	"	Rarely	Always	Never	Rarely	"	Rarely	
Lanelliformes	More rarely	Commonly	Usually	Rarely	Often	Commonly	Very many	Commonly	
Melanosomatici	Always	Never	—	—	—	—	Never	Never	
Faxicerattici	Commonly	More rarely	Always	Never	Never	Rarely	Very rarely	Rarely	
Tenebrionini	"	"	"	"	"	"	"	"	
Helopii	More rarely	Commonly	"	"	"	"	Rarely	Very rarely	
Trachelini	"	"	"	Almost always	Rarely	Not rarely	Never	Commonly	
Vesicantes	Usually	Very rarely	Always	Never	"	Very rarely	Usually	Rarely	
Stenelytrini	Commonly	More rarely	"	"	"	Not rarely	Commonly	"	
Circulionides	Rarely	Usually	Rarely	Commonly	Very commonly	Very commonly	"	Commonly	
Xylophagi	Usually	Rarely	Always	Never	Never	Not rarely	Never	"	
Longicornes	Rarely	Usually	Commonly	Commonly	<i>Sometimes</i>	Very commonly	Very rarely	Usually	
Chrysomelini	Commonly	More commonly	<i>Usually</i>	<i>Rarely</i>	Never	"	Very commonly	Very rarely	
Erotylini	"	Commonly	Always	Never	"	Rarely	Very rarely	Rarely	
Coecelini	Rarely	Usually	"	"	"	Usually	Never	"	
Pselaphii	Commonly	Commonly	"	"	"	Never	"	Commonly	

¹ Without regard to coloration or figuration.

claustraria, which appendages owe their silvery whiteness to air within them. Again he mentions hairs which contain air on spiders of the genera *Epeira* and *Theridium*. Then further, when considering the insects, Leydig writes that it is not difficult to see that the silvery under surface of *Hydrometra paludum* is due to the pore-canals being filled with air. He goes on to say "In a similar way the wings of *Notonecta glauca* seem to enclose air, and I suspect also that the white color of the hairy powder of many *aphidae* and *coccidae* is brought about by like causes." Further on he writes, "If one regards the color of scales it can inhere as diffuse material in the substance of the scale itself, or it appears under the form of molecular pigment, which is deposited in the cavities of the scales, or finally the cavities are filled with air which gives a snow-white appearance to the scale." Again Leydig writes that when Fischer says, in speaking of "granulation-scales" (i. e., such scales as those of *Hoplia trifasciata*), "that the 'upper or granulation layer' dissolved visibly in water, but quickly in alcohol or ether, and then only the 'striate basal layer' remained, the words show that he has certainly seen but incorrectly explained that change which the scale undergoes upon the loss of air, in so far as he assumed a 'granulation layer' which dissolves in water!"

Leydig accounted for silvery glistening scales and surfaces, and for milk-white coloration among insects, but he

fails to account for the difference between these two kinds of coloration. The white scales of *Pieris rapae* and the silvery scales on the under side of the posterior wings of *Argynnis idalia* both contain no appreciable coloring matter, and both contain air; both, too, are simply milk-white by transmitted light. The difference is that there must be in the silvery scales a polished surface towards the observer. Ground glass does not appear silvery, but what is the surface of the smoothest polished plate of glass but finely ground glass? Ground glass differs from polished glass only in degree; in ground glass the scratches are so coarse and so abundant as to turn most of the light-waves into the glass again, where they are lost. In polished glass the scratches are still present, but have become so small that even the waves of light are large in proportion to them, and so the light-waves reflect as if from a theoretically flat surface. But something more than a polished glass is needed to reflect much light, for most of the light passes through the glass; something non-transparent must be behind the glass. In the common mirror it is a mercury amalgam: in the butterfly's silvery scale it is a layer of cavities filled with air. This layer of cavities is not transparent for the same reason that ground glass is not. If we treat the scale with chloroform it has an analogous effect to that of treating the back of a common mirror with nitric acid, thus dissolving off the amalgam. In both cases a non-trans-

parent body is converted into a transparent one, and a mirror, which, whatever be the materials of which it is made, if approximately perfect has a silvery appearance from the *amount* of reflected light, is reduced to a slightly reflecting surface. But let the scale dry again from its bath, as Fischer apparently did not do, and the mirror will again appear. Both silvery and milk-white colorations are then only optical effects produced by reflected light.

Still another kind of appearance is seen in the scales of *Hoplia* and of *Entimus*. These scales are brilliantly colored, yet their color is in the one case entirely lost, in the other case greatly changed by wetting with almost any liquid, but when redried the colors reappear with all their previous brilliancy. This coloration also resists all forms of bleaching. It must therefore be produced by some decomposition of light. Whatever acts upon the light must be within the scale, not upon the outside, for all those scales which remain perfectly sealed, so that the liquid does not enter them, retain their color even surrounded by liquid. This proves that the color is not due to external striation, where such exists. The finer striation of the scales of *Entimus* is evidently internal, from its relations to the differently colored internal cavities of the scales. Besides this striation the interior of the scale is evidently filled with a pith-like substance into which liquids enter with equal readiness in all directions; this pith-like portion apparently has

some direct influence upon the production of the coloration, for wherever it is injured or has shrunk away from the basal end of a scale there is no longer coloration in that place. Perhaps it is a necessary filling to cause the striae to refract the light, the same as air-cavities are necessary as a backing to produce the silvery color in the scales of lepidoptera. The striae themselves are very fine, but whether they are the causes of color is hard to determine without more accurate instruments of measurement than I have at my command. As near as I could determine they are 0.0008 to 0.0009 mm. apart. The wave length of a ray of light from Fraunhofer's *A* line of the spectrum is, according to Willigen, .00076092 mm., and the wave length at the H_1 line is, according to the same authority, 0.00039713 mm.; the difference being 0.00036379 mm., or the difference of wave length between violet and red light. To determine the *place* in the spectrum to which the striae of these scales correspond would require, of course, much finer measurements.

The kinds of coloration of scales thus far described are what Hagen has termed "optical colors."

The second kind of coloration is what Hagen terms "natural colors," of which he distinguishes two kinds—dermal, where "the pigment is deposited in the form of very small nuclei in the cell, or in the product of cells, in the cuticula," and hypodermal, where "the pigment is a homogeneous fatty substance, a kind of dye somewhat

colored scales, such as some species of *Plusia* present, but I had none at hand to examine.)

I may here note an interesting object on which to try this mode of color-separation—this object is the head of a freshly killed larva of *Smerinthus*. Upon the application of strong alcohol the tubercles lose their milky whiteness from the loss of air, thus proving optical coloration. Chlorin bleaching-fluids rapidly destroy the green color of the fluids of the head, proving it to be hypodermal, while the outer chitin-shell, or covering of the head, resists all bleaching action, remaining green until it is macerated.

After what has been given already in the descriptive portion of this paper there is little to be said, based on my own work, in regard to the structure of scales. A point worthy of mention is perhaps this, that I have found but one insect having scales or hairs, in which these appendages did not contain more or less air. This insect is *Chalcolepidius*. The elytra themselves, in many cases where they are white (e.g., in *Cicindela dorsalis*), have spaces within them, besides the tracheae, reserved for air, as well as spaces for the fluids of the body. When so-called "blooms" are present, as upon the dorsal surface of the abdomen of some species of *Tabanus*, this bloom is often produced by very minute thin-walled hairs. Where very light colors, and white, whether milk-white or silvery-white, are present in insects, the existence of air beneath the cuticula is the rule.

I cannot yet wholly understand why the scales of lepidoptera discharge the air contained in them so much more readily, when subjected to treatment with alcohol and chloroform, than do the scales of coleoptera, while, on the other hand, water will drive out the air from scales of coleoptera much quicker than from scales of lepidoptera. There are several things which might cause these phenomena, but I am inclined to the opinion, without having *proved* its correctness, that their cause is the presence of more oil in the scales of lepidoptera than in those of coleoptera. This would coincide with the greater lustre of lepidopterous scales, and with other points in their appearance. Perhaps the entrance of the shank of the scale is only closed with an oily mass, for I have never seen the scale of a lepidopteron resist entirely the entrance of fluid, as is often the case with the scales of coleoptera.

The striae upon scales of lepidoptera have long been a subject of investigation, but, as far as I know, no one, up to 1880, published the fact that their striae were upon the outside, or upon the side turned away from the wing. In Burgess' paper on *Danais*,⁴¹ in that year, he figures transverse sections of the scales of that butterfly, and calls attention to the fact. Without having seen Burgess' paper, in the following year, I noticed that the striae upon the scales of the proboscis of *Culex* were on the outside, and so

⁴¹Burgess, E. Contributions to the anatomy of the milk-weed butterfly, *Danais archippus*. (Anniv. mem. Bost. soc. nat. hist., 1880.) Separate, p. 6, note; pl. 1, fig. 6 and 6a.

figured them in my dissertation⁴² and in *Psyche*.⁴³ By the transverse section of a scale of *Alaus*, figured in this paper, it will be seen that there too the striae are upon the outer surface. That I have found to be the case with the principal or external striae, in all beetle-scales which I have examined. It is, briefly expressed, only the development of a mechanical law, which extends to many surfaces which shrink by drying or cooling. It can be easily illustrated by partly filling a bladder with water and allowing it to dry upon a board. The main folds will be, of course, upon the exposed upper side, and the longitudinal ones will be the more prominent.

Another easy way to prove that the striae upon the scales of the wings of lepidoptera are upon the side away from the wing is to take impressions of the scales upon a surface of collodion. These impressions are readily taken by pressing quite lightly a dry butterfly's wing upon a microscope slide which has been moistened with a solution of collodion in ether. The wing should be removed before the collodion has become thoroughly dry, when beautiful impressions of the outer surface of the scales will remain on the collodion surface, and may be mounted for future study. A very little practice will enable one to remove the wing at the proper moment; if left too long the greater part of the scales will be re-

moved from the wing and adhere to the collodion. In order to take impressions of the under sides of scales, the latter should be transferred, by a process described by Berge,⁴⁵ and later by H. Landois,⁴⁶ and others, to a piece of paper, and the impression on collodion then taken from these inverted scales. The process of transferring the scales to paper or other surfaces, first used to get prettily colored figures of butterflies, consists, leaving out details, in gumming the wing of a butterfly upon paper with gum arabic or glue, and, after thorough drying, removing the wing, leaving the scales attached to the paper. From such "butterfly pictures" impressions of the under surface of the scales can be readily taken.

By rubbing anilin colors into impressions of the striae of the scales of insects I hope later to gain further knowledge of the external configuration of insect scales.

Fischer, in his dissertation, mentioned that branching or notched hairs seemed a characteristic of the *scarabacidae*, and I have only found them in that family of coleoptera, although, outside of coleoptera, they are not rare (e. g., in *Bombus* and other hymenoptera). Among the *scarabacidae* this notching, or covering of the surface of the hairs with secondary hairs, extends also to the scales, and we have some that, like those of *Hoplia*, seen in fig. 3 *b* and *c* (p. 10), present the general appearance of cactus leaves.

⁴²Dimmock, G. The anatomy of the mouth-parts and of the sucking apparatus of some diptera. Dissertation . . . Leipzig university . . . 1881. Pl. 1, fig. 8, 12-15.

⁴³Dimmock, G. Anatomy of the mouth-parts and of the suctorial apparatus of *Culex*. (*Psyche*, July-Sept. 1881 [7 March 1882], v. 3, p. 231-241, pl. 1.)

⁴⁵Berge, T. Taschenbuch für Käfer- und Schmetterlingssammler . . . Stuttgart, 1847, p. 55-62.

⁴⁶Landois, H. Neue methode schmetterlinge zu copiren. (*Zeitschr. f. wissensch. zool.*, 1890, v. 16, p. 133-134.)

There is little need of comment upon Fischer's classification of scales of coleoptera into conchiform scales (Muschelschuppen), metallic scales (Metallblattschuppen), granulated scales (Granulationsschuppen), piliferous and shaggy scales (Haar- und Zottenschuppen) and fibrous scales (Faserschuppen). Leydig, as quoted above, destroyed the value of the division of granulated scales, and I have found that the division of fibrous scales owes its origin to what Fischer would call "granulations," that is to air-spaces, only that, in this case the granulations are arranged longitudinally in stripes. I can present no new classification of scales, if such a classification is possible, without studying more forms.

Before concluding this paper I will add a note on the mode which I have employed to gather scales, and some other minute objects of like nature, together upon one place on a microscope

slide. The process consists in putting the scales in a drop of some quickly evaporating substance—chloroform is best for most purposes—on the slides. The scales will form in a kind of whirlpool, nearly all the scales finally settling down, as the liquid evaporates, in one place on the slide. Rapping the slide gently sometimes aids in the collecting together of the scales, and the tip of the scalpel used to scrape the scales from the insect can be washed in the drop of chloroform, thus saving every scale when they are from a rare specimen from which one desires to remove only a few scales. By inclining the slide gently, the mass of floating scales can be made to settle on the exact centre of the glass. One part of Canada balsam added to several hundred parts of chloroform will cause the scales to stick firmly to the slide.

(To be continued by a notice of some literature seen since preparing the original paper.)

THE CLASSIFICATION OF THE TINEIDAE.

BY VACTOR TOUSEY CHAMBERS, COVINGTON, KY.

My attention has just been called to an article by Mr. Grote in *Papilio*, vol. 3. On page 43 he writes "I do not wish to enter into an argument as to the best classification of the *tineidae*, but disagreeing with Mr. Chambers, I do not think any one would take *Anaphora* for any thing but a tineid;" and on page 38 he writes, "So far as I have studied them we appear to be able to classify our moths under *sphingidae*—*tineidae*", &c., &c., naming the families usually adopted. I refer to this subject because the first of these above-quoted passages

conveys the impression that I have stated that *Anaphora* ought to be placed elsewhere than in *tineidae*, and because the second quotation gives me an opportunity to write more fully than I have elsewhere done as to the classification of the *tineidae*; an opportunity that I desire because two such distinguished entomologists as Lord Walsingham and Mr. Grote have, very courteously of course, taken me to task for the expression of opinions as to the classification of the *tineidae* which are by them considered more or less

heterodox. I am not aware that I have anywhere expressed such an opinion as is by implication at least attributed to me in the above quotation as to the position of *Anaphora*. Mr. Grote was, I suppose, thinking of some remarks by me in an article in a previous number of *Papilio*, which was written in response to one by Lord Walsingham. His Lordship had stated that "It is surely easier at first sight to separate these [tineid] genera from those of other families" &c., than to locate or separate certain other genera of those other families, thus seeming to convey the idea that there is a something, *je ne sais quoi*, about the tineid genera referred to by him which made it comparatively easy, "at first sight," to refer them to the *tineidae*; and if Mr. Grote will look at my paper in *Papilio* a little more carefully he will see that my remarks upon *Anaphora* hinge upon the words of Lord Walsingham, "at first sight;" and that while I do not deny the tineid affinities of *Anaphora* I was unable to see with Lord Walsingham this indefinable and to me inappreciable something which makes the location of the tineid genera among the *tineidae* easy "at first sight" as compared with the genera of other families mentioned by his Lordship; and I instanced *Anaphora* as a tineid genus which at first sight—by one who was unacquainted with it—was more likely to be referred to the *noctuidae* than to the *tineidae*. And I am yet of that opinion. There is something in the size, form, and color, especially of the darker species of *Anaphora*, that "at

first sight" is much more suggestive of the *noctuidae* than it is even of the true *tineidae*, to which examination shows that it belongs: and if there is anything about *Anaphora* that "at first sight," or "second sight" either, shows it to belong to any other section of *tineidae* than that which contains *Tinea* proper, I don't know what it is. If there is anything under the sun about *Anaphora*, or for that matter about a true *Tinea*, say *T. tapetzella*, which at first sight, or upon the most careful examination, suggests that it is more closely allied to *Gracilaria*, *Lithocolletis*, *Gelechia*, *Cemlostoma*, or any of the host of smaller *tineidae* than it is to *Noctua*, I have failed to detect it, and if no resource was left to me but to either place *Anaphora* in *noctuidae*, or in the same family with *Phyllocnistis* or any of the genera of smaller moths known to me, then I should unhesitatingly refer *Anaphora* to the *noctuidae*. *Anaphora* no doubt belongs to the *tineidae*, restricted to the allies of *Tinea* by Mr. Stainton in his *Insecta Britannica*, v. 3, but neither Lord Walsingham nor Mr. Grote uses the name *tineidae* in this sense in the papers above quoted. Both, in the papers in *Papilio* above mentioned, have discarded even Stephens' distinction between *tineidae* and *hyponomentidae*, and include under the name *tineidae* all or nearly all of the genera included by Stephens in both of his families, with some others not mentioned by him, thus placing *Cemlostoma*, *Nephtica*, *Tischeria*, *Phyllocnistis*, *Aspidisca*, *Heliodines*, *Lithocolletis*, *Gracilaria*,

Gelechia, and a host of other genera, so numerous that time fails me to mention them, possessing among themselves the most varied structure and metamorphoses, along-side of *Anaphora*, *Tinea*, *Exapate*, *Ochsenheimeria*, &c., as genera of equal value in the same family, the *tineidae*!

Lord Walsingham does indeed, in *Papilio*, refer to certain sub-groups of the family *tineidae*, but still he evidently considers them minor groups and looks upon the *tineidae* as a homogeneous group or family in the same sense with *noctuidae* or *geometridae*. To my view it (the *tineidae* of these authors) is about as heterogeneous a group of moths as that would be which should contain the *bombycidae*, *noctuidae*, *geometridae*, *tortricidae* and *pyralidae* thrown into one: the species or genera comprised in it have no unity of structure, habit, metamorphosis, life-history, habitat, or ornamentation, and a family which comprises the genera referred to above (and others equally heterogeneous) might just as consistently contain all lepidoptera heterocera at once: it would then scarcely be more mixed than it is now. I don't like to dissent from such able and distinguished entomologists as Lord Walsingham and Mr. Grote, but truth is better even than good company.

I have stated elsewhere that I thought Stephens' classification of the *tineidae* thoroughly vicious. This language is too strong. I will say rather that I think his classification radically bad in so much as it gives too much weight to the presence of both pairs of palpi, and their size — it is too much a palpal classification — not consistently carried out, and one which it seems to me im-

possible to carry out consistently. Still it was a step in the right direction, and infinitely better than the arrangement which places all of the genera known to Stephens and many others in a single family. The objection to Stephens' arrangement is that it does not recognise families enough, and my objection to Mr. Stainton's classification is that it recognises perhaps too many. Mr. Stainton's *tineidae* (restricted) seems to be a good and natural family of equal or nearly equal value with the *noctuidae*, but his *gracilaridae* and *lithocolletidae*, together with *Phyllocnistis*, instead of forming two families and part of a third, form together a single, well defined family. The structure and metamorphoses of the larvae and pupae seem to me to separate these moths from all of the known *tineidae*, and to unite them in a single natural group having family characters more than usually well marked. Whether the structure of their larvae and pupae are the result of evolution from some lower form, or of degradation from some higher one, that evolution or degradation has evidently been along the same lines in all of the genera included in the group, and shows a near relationship between them as well as a different development from anything that is known elsewhere among lepidoptera: for the course of development from the egg to the imago is different entirely from that of all the other groups of the order, and the eggs themselves are of different shape, size and consistency from those of all the other small moths known to me. They form, therefore, in my opinion, a family at least as dis-

distinct and well limited as the true *tineidæ* or even more so. The *nepticulidæ* seem to me to form another natural family. The immense host comprised in Mr. Stainton's families *hyponomeutidæ*, *gelechidæ*, *glyphipterygidæ*, *colcophoridæ*, form at least one other family, if not more than one, though I incline to include the last three, at all events, in a single family. A large number of genera of his family *elachistidæ* may probably be included in the *gelechidæ*, but there will still remain many of the others which are difficult of location, unless each of them shall itself be held of family rather than of generic value. Thus *Tischeria* seems to me especially to stand alone. Mr. Stainton places it in *elachistidæ*; Dr. Clemens thought it belonged in *lithocolletidæ*, an opinion in which I also was at one time inclined to concur, when looking only to some of the characters of the imago: but those of both larva and imago separate it *toto coelo* from *lithocolletidæ*, and those of the larva separate it from all other lepidoptera: its labrum and maxillæ are as much like those of some coleoptera. *Cemiostoma* also is *sui generis* or rather *sui familiae*. Mr. Grote rightly attaches much importance to theuration of the wings, but, judged by this test, *Cemiostoma* seems to me to stand, if not alone, at least in no close relationship to any other genus. Our American species, *C. albella*, even differs from the European *C. laburnella*, as figured by Mr. Stainton in *Insecta Britannica*, v. 3, in that *albella* has the median vein of the primaries furcate at the base, as well as in other minor respects. The pupæ are in some respects singular,

and in the larva the structure of the trophi is as distinct and unique as it is in *Tischeria*. Mr. Stainton places *Cemiostoma* in his family *Lyonetidæ*, along with *Bucculatrix* (the affinities of which are rather with *Nepticula*) and *Phyllocnistis* (which I think belongs with *Coriscium* and *Lithocolletis*). In the same family he places *Lyonetia* and *Opostega*, the affinities of which are yet doubtful, the latter probably belonging near *Phyllocnistis*. It seems to me that this family (*lyonetidæ*) cannot stand; and there still remain, especially among the lower genera of *elachistidæ*, many forms as to the proper location of which I am not able to form an opinion. But with what sort of consistency and upon what scientific principles all of these multitudes of such diverse structure, metamorphosis, life-history, habitat, form and ornamentation, can be thrown into a single group, the equivalent of a single family of the higher heterocera, I cannot comprehend; but it seems to me — with the greatest deference for such authorities as Lord Walsingham and Mr. Grote — that in all of the particulars just enumerated, the insects associated by them under the common family name *tineidæ* present family characters in variety as great as or even greater than all other heterocera combined.

Like Mr. Grote I do not desire any controversy on this subject, and have written above all that I desire to say or shall say upon it, and here take my farewell of it, hoping that nothing I have written will be considered to be in the least degree wanting in respect to either of the distinguished gentlemen above-named.

PSYCHE.

CAMBRIDGE, MASS., JULY—AUG. 1883.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

CAPTURES OF FENISECA TARTINIUS Fabr.

An example of this butterfly, which is generally regarded as a rarity by collectors, was captured at Center, N. Y., 25 May 1878, by Mr. O. von Meske—its first observation for this locality. It had been taken in two instances, many years ago, by Mr. Charles H. Peck, at Bath, near Albany, and had also been observed by him in Sandlake, N. Y., and Elizabethtown, N. Y., flying about bushes of alder (*Alnus serrulata* Ait.). Its appearance so early in the season seems to indicate two broods of the species—the second occurring, in the state of New York, during the first half of August. On the 1st day of August (1877) while riding at a brisk pace through the Raven Pass in Essex County, N. Y., en route to the Adirondack Mountains, a fresh example of the species was swept in my net, fortunately in hand, by Mr. Verplanck Colvin, from the back of one of the horses. This was but the third example that had come into my possession, and the first to display the delicate tracery of its under-wings in all its beauty. Subsequently, and during the two weeks following,

several specimens (perhaps a dozen) were taken by Mr. E. L. Graef, of Brooklyn, L. I., at Beede's, head of Keene Valley. They were fluttering about the alders, upon which probably their eggs are deposited and their larvae feed. The locality would seem to be a particularly favorable one for them. The elevation of Beede's above tide water, as obtained from Mr. Colvin, superintendent of the Adirondack Survey, is 1240 feet [378 M.].—*J. A. Lintner.*

PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

17 JAN. 1883.—It was announced that the prize of £50, offered by Lord Walsingham, for the best essay on *Sclerostoma syngamus*, had been awarded to Dr Mégnin, of Paris (two competitors); no essay regarding *Strongylus pergracilis* had been received,

The following officers were elected:—President, J. W. Dunning; Treasurer, E. Saunders; Secretaries, E. A. Fitch and W. F. Kirby; Librarian, F. Grut.

5 FEB. 1883.—Mr. Billups exhibited an exotic orthopterous insect of the family *locustidae*, found living in a hot-house at Lee; it was strongly carnivorous in its habits.

Mr. Peringuey communicated notes on the habits of several South African species of *Pausanus*, and especially in connection with their powers of crepitating, and carnivorous propensities.

7 MARCH 1883.—Dr. Sharp exhibited a dissection of the prosternum of an *Elatér*, and called attention to the peculiar condition of the prothoracic stigma, which was closed by a perfect trap-door. He thought this arrangement might be useful in excluding parasites when the beetle was on its back, after the manner of its kind.

2 MAY 1883.—This being the 50th anniversary of the foundation of the society, the President read a historical sketch, in which he succinctly embodied all points of interest concerning its career, and the benefits it had

conferred upon entomological science in general. Only six of the original members still survive, viz.: Prof. C. C. Babington, the Rev. L. Blomefield, Sir S. S. Saunders, Mr. W. B. Spence, Mr. G. R. Waterhouse, and Prof. Westwood. He expressed a hope that the number of members would be very largely increased before the end of the jubilee year. In concluding his address, he suggested that Prof. Westwood be elected titular Life-President of the society, accompanying his suggestion by eulogistic remarks on the career of our veteran entomologist, and his labors in the cause of entomology. This was adopted by acclamation.

The meeting was then made "special," in order to consider certain proposed alterations in the by-laws. Some of the propositions were adopted, others rejected. The chief resultant alterations were as follows:—No "subscribers" will be henceforth elected: the "Transactions" will be sent without further payment to all members not in arrear with their subscriptions: notice is to be given of names proposed to be substituted for those recommended for officers and council before the annual meeting, such proposed substitutions (if any) to be notified by circular to the members.—Selected from *Entomologist's mo. magazine*.

ZOOLOGICAL SOCIETY OF LONDON.

19 DEC. 1882.—Mr. Arthur G. Butler read a paper in which he gave an account of a collection of spiders made by the Rev. Deans Cowan in Madagascar. In addition to many interesting and singular forms were specimens of the curious tailed species, *Arachnoura scorpionides* from central Madagascar. Six new species were described.

5 JUNE 1883.—Mr. G. French Angas exhibited a collection of butterflies made during a recent visit to the island of Dominica. W. I.

A communication was read from the Rev. O. P. Cambridge on some new genera and

species of spiders. Eight spiders, representing as many new genera, were described: two of them belonged to the family *theraphosidae*, one to the *drassidae*, and the others to the *thomisidae*. Three of these species were from Ceylon, three from Caffraria, one from New Zealand, and one from California.

A communication was read from Mr. Herbert Druce, containing descriptions of some new species of moths of the families *zygaenidae* and *arctiidae*, mostly collected in Ecuador, by Mr. C. Buckley. The number of new species described was fifty, belonging to twenty-four genera.

A paper was read by Messrs. Godman and Salvin, containing remarks on the variations of certain species of butterflies of the genus *Agrias*.—Selected from *Zool. anzeiger*, 1883, jahrg. 6.

LINNEAN SOCIETY OF NEW SOUTH WALES.

25 APRIL 1883.—Mr. Macleay exhibited specimens of a small moth (*tineidae*), the larva of which was at present creating great havoc in the vegetable gardens in and about Sidney, completely eating up the leaves of the cabbages and cauliflowers, and rendering the entire crop utterly useless. The caterpillar, a number of which were exhibited, is an active, slightly hairy, green worm, the pupa is also green and is fastened on the under side of the leaf on which it has fed. by a cocoon of beautiful open lace work. The rapidity with which this insect seems to reproduce itself is most astounding, and accounts for the short work it makes of a bed of cabbages. The insect was, it is said, first noticed last year, and then not in destructive numbers, so that it will probably be found to be an importation.

Professor Stevens exhibited a chrysalis of a *Danais*, secured by a silk line to a leaf of an exotic *Pelargonium*.—*Zool. anzeiger*, 9 July 1883, jahrg. 6, p. 376.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Brooklyn entomological society. *Brooklyn, N. Y.* Check list of the macro-lepidoptera of America, north of Mexico. Brooklyn, N. Y., Jan. 1882. t-p. cover, t-p. + [2] + 25 + 4 p., 24 X 15.

List of lepidoptera rhopalocera and of sphingidae, sesiidæ, zygaenidae, bombycidae, noctuidæ and geometridæ; enumerating about 3088 species; index of genera. B: P. M. (3283)

Bush, Mrs. A. E. Trees attractive to butterflies. (*Amer. nat.*, July 1881, v. 15, p. 572.)

Attraction of butterflies by *pinus insignis*. G: D. (3284)

Butlerow, A. Eine beobachtung mehr. (*Deutscher bienenfreund*, 15 March 1881, jahrg. 17, p. 81-83.)

Age at which worker bees undertake different parts of their work. G: D. (3285)

Cambridge. Octavius Pickard. External parasites of spiders. (*Entomologist*, Sept. 1882, v. 15, p. 216.)

Parasitism of *arodactyla degener* on various spiders. G: D. (3286)

Neumoegen, Berthold. A new species of *antarectia* from Mount Hood, Oregon. (*Papilio*, 31 May 1881, v. 1, p. 79-80.)

Describes as new *antarectia rubra*, ♂ ♀; compares it with *a. punctata*, Pack. H: E. (3287)

Riley, C: Valentine. Lepidopterological notes. (*Papilio*, July 1881, v. 1, p. 106-110.)

Advance reprint of extracts from Bulletin no. 6, U. S. entom. comm. [Rec., 3290], p. 59-58, 78, 82-83; states that *plusia brassicae* is not *p. ni*, and that *gortyna nebris*=*g. nitela*; contends that *atelia argillacea* Hübn is not the *anomis xyliana* of Say; gives notes on *pempelia grossulariæ*, *penthina vitivorana*, *euryptychia salignæna*, *anchlytopera fragariæ*, *tortrix cinderella* and *octa compta*; describes the egg of the last-named species. H: E. (3288)

Trelease, W: On the structures which favor cross-fertilization in several plants. (*Proc. Bost. soc. nat. hist.*, [12] Oct. 1882-Jan. [5 Feb.] 1883, v. 21, p. 410-440, pl. 6-8.)

Includes notes on fertilization of plants by insects. G: D. (3289)

United States entomological commission. Bulletin no. 6. General index and supplement to the nine reports on the insects of Missouri. By C: V. Riley, M. A., Ph. D. Wash., 24 Mch. 1881. t-p. cover, t-p., 178 p., 23 X 15.

Extracts, by author, entitled "Lepidopterological notes." (*Papilio*, July 1881, v. 1, p. 106-110.)

Rev., entitled "Index to Riley's nine reports on the insects of Missouri." (*Amer. nat.*, Oct. 1881, v. 15, p. 801.)

a. Introduction, p. 5-7. b. Tables of contents of the reports, p. 9-45. c. Corrections of errata, p. 46-51. d. Notes and additions [of the more important facts ascertained about insects treated in the reports, with later or more correct nomenclature], p. 52-63. e. Descriptions of new species and varieties [reprinted from the reports, with notes and corrections], p. 64-90. f. List of descriptions of adolescent states [referring to previously published descriptions of the same, when any exist], p. 91-95. g. List of descriptions, mostly amplified, of species not new, p. 96-97. h. List of illustrations [arranged in serial order, designating those not original], p. 98-118. i. Classified list of illustrations [in systematic order], p. 119-123. j. General index, p. 125-166. k. Index to plants and food-plants, p. 167-177. l. Errata [in this work], p. 178. B: P. M. (3290)

United States entomological commission [C: V. Riley, A. S. Packard, jr., Cyrus Thomas] (*Department of the interior*). 2d report for the years 1878 and 1879, relating to the Rocky Mountain locust, and the western cricket and treating of the best means of subduing the locust in its permanent breeding grounds, with a view of preventing its migrations into the more fertile

portions of the trans-Mississippi country, in pursuance of appropriations made by Congress for this purpose. Wash., 1880 [Mch. 1881]. 18+322+80 p., 17 pl., each plate with 1 leaf explanation, 24×15; map 1, in 6 pts., each 56×43; map 2-4, 24×31; 10 fig.

Notice. (Springfield [Mass.] d. republican, 5 Oct. 1880, p. 5, col. 1, 7 cm.)

Extract, entitled "The Rocky Mountain locust." (Colonies and India, 30 April 1881, p. 15, 25 cm.)

Extract from chap. 13, by Riley, entitled "Larval habits of bee-flies." (Amer. nat., June 1881, v. 15, p. 438-447, pl. 6.)

Rev. (Amer. nat., July 1881, v. 15, p. 554-555.)

Germ. tr. of part of p. 260, entitled "Epicauta vittata aus eiern zu erziehen." (Entom. nachr., 1 Aug. 1881, jahrg. 7, p. 228.)

Separate of chap. 13, author's ed., by Riley, with half-t.-p. cover and half-t.-p., entitled "The Rocky Mountain locust. Further facts about the natural enemies of locusts." [Wash.], 1880. +p. 259-271, pl. 16, with 1 leaf expl. of pl., 23×15.

Separate of chap. 14, author's ed., by Riley, with half-t.-p. cover and half-t.-p., entitled "The Rocky Mountain locust. Permanent courses for the government to adopt to lessen or avert locust injury." [Wash.], 1880. +p. 271-322, 23×15; map 1, in 6 parts, each 56×43.

Separate of appendix 2, author's ed., by Scudder, with half-t.-p. cover and half-t.-p., entitled "List of orthoptera collected by Dr. A. S. Packard, jr., in the western United States in the summer of 1877." [Wash.], 1880. +p. 23-28, pl. 17, 24×15.

Separate of appendix 4, author's ed., by Mann, with half-t.-p. cover and half-t.-p., with same title. [Wash.], 1880 [18 Mch. 1881]. +p. 33-56, 24×16.

a. T.-p., table of contents, letter of transmittal, preface, p. 1-18. b. Chap. 1: Additions to the chronology of locust ravages [for 1878 and 1879] (by Packard and Riley), p. 1-14. c. Chap. 2: The relation of the locust and its ravages to agriculture and the settlement of the territories [plans for reducing the numbers of the locusts] (by Thomas), p. 14-31. d. Chap. 3: Facts concerning and laws governing the migrations of locusts in all countries [with definition of limits and characterization of permanent breeding-grounds, and references to literature] (by Thomas), p. 31-72. e. Chap. 4: Habits or characteristics of locusts in all countries within their areas of permanent distribution, so far as these relate to their movements [phenomena and causes of migration] (by Thomas), p. 72-108. f. Chap. 5: Influence of meteorological conditions on the development and migrations of locusts [with statistical tables] (by Thomas), p. 109-155. g. Chap. 6: The southern limits of the distribution of the Rocky Mountain locust [with history of locust invasions in New Mexico] (by Pack-

ard), p. 156-166. h. Chap. 7: Summary of locust flights from 1877 to 1879 (by Packard), p. 160-163, map 2-4. i. Chap. 8: The western cricket [habits, ravages, food, enemies and parasites of *anabrus purpurascens* and a. simplex, anatomy and geographical distribution of the species of *anabrus* (by Packard); synopsis of the species of and genera allied to *anabrus* (by Thomas)], p. 163-178, fig. 1-5. j. Chap. 9: The air-sacs of locusts with reference to their powers of flight (by Packard), p. 178-183, pl. 1. k. Chap. 10: Histology of the locust (*caloptenus*) and the cricket (*anabrus*) [with bibliography of the histology of insects] (by C. S. Minot), p. 183-222, fig. 6-8, pl. 2-8. l. Chap. 11: The brain of the locust [anatomy and histology, with list of works on the internal structure of the brain of crustacea and insects] (by Packard), p. 223-242, fig. 9, pl. 9-15. m. Chap. 12: Locust ravages in California [generic and specific characters of *camnula pellucida*; reprint of original descriptions of this species under the names of *ocidipoda pellucida*, o. atrox and c. tricarinata; its ravages and enemies; description of *ocidipoda oblitterata* n. sp.; notes on *anabrus haldemani* and *cratypedes putnami*] (by Riley and Thomas), p. 242-259, fig. 10. n. Chap. 13: Further facts about the natural enemies of the locusts [retardation of development in *epicauta vittata*, and its advantages to the species; description (by H. G. Hubbard) of early stages and habits of *chauliognathus pennsylvanicus* and of ovip. stium and eggs of *mallophora oreina*; parasitism of *systoechus oreas* and *tridities mus* on eggs of *camnula pellucida*; description and figures of larva, pupa and imago of these parasites; review of previous knowledge on the habits of larvae of *bomblyliidae*, and addition thereto; great abundance of *gordius* and *trombidium* in California in 1879; *camnula pellucida* attacked by chalcid flies and by *larva tarsata*; *caloptenobia ovivora* = *scelio* ("sparasion") *famelicus*] (by Riley), p. 259-271, pl. 16. o. Chap. 14: Courses that may be adopted by the general government to lessen locust injury (by Riley), p. 271-322, map 1. p. Appendix 1: Miscellaneous data and replies to circular no. 1, p. 3-22. q. App. 2: List of the orthoptera collected by Dr. A. S. Packard in the western United States in the summer of 1877 [describing *bradynotes opimus*, *pezotettix pacificus* (fig.), *gomphoceris shastonis* (fig.), *circotettix maculatus* (fig.), *trimerotropis latifasciata*, t. similis, t. caeruleipes, psinidia wollula (fig.) = S. n. spp., and figuring *melanopus cinereus*, m. devastator, m. atlantis, m. packardii, *pezotettix borekii*, *camnula atrox*, *arphia frigida*, *trimerotropis vinculata*] (by S. H. Scudder), p. 23-28, pl. 17. r. App. 3: Report of John Marten [observations made in Iowa, Dakota, Minnesota and Nebraska, in 1879], p. 29-32. s. App. 4: Bibliography of some of the literature concerning destructive locusts [of Europe, Asia, and Africa (by B. P. Mann), with supplementary list (by Thomas)], p. 33-56. t. App. 5: Data concerning locusts in Texas [and in Indian Territory, in 1877] (furnished by A. J. Myer, from signal service records), p. 57-61. u. App. 6: On the flight of locusts [transl. by F. P. Sposford from G. de Lucretis] "Sulle locuste, dette volgarmente bruchi" (Atti del r. istit. incorrag. alle sci. nat. di Napoli, 1811, t. 1, p. 233-299); incursions and ravages of *pachytis migratorius*, and means against them]; Of the locusts which devastated various provinces of Spain from the year 1753 until 1757 [transl. by F. P. Sposford from F. Milizia's ital. transl. entitled "Introduzione alla storia naturale e alla geografia fisica di Spagna . . ." (Parma, 1783) of W. Bowles]; "Introduccion a la historia natural y a la geografia fisica de España" (Madrid, 1775), t. 2, p. 1-24; habits of *caloptenus italicus*], p. 63-68. v. App. 7: Notes of a journey made in Utah and Idaho in the summer of 1878, by A. S. Packard, jr. [miscellaneous observations on occurrence of *caloptenus spretus* and *anabrus simplex*], p. 69-71. w. App. 8: Yersin's researches on the functions of the nervous system of the articulate animals [transl. by Packard from H. de Saussure's "Notice sur la vie et les écrits de Alexandre Yersin" (1860)], p. 73-74. x. Index, p. 75-80. B: P. M. (3201)

ENTOMOLOGICAL ITEMS.

THE SEVENTH congress of Russian naturalists and physicians will be held this year at Odessa, from 30 Aug. to 9 Sept.

DR. HAGEN notes in the April numero of the *Entomologist's mo. magazine*, that *Simulium*, the "black-fly," sucks out the juices of chrysalids of *Pieris meufia*.

THE FIRST numero of *Zoologische Beiträge*, a new German journal, contains a paper by Prof. Anton Schneider on the development of *Sphaerularia bombi*, the curious heminth parasitic in *Bombus*.

WILLIAM ALEXANDER FORBES, a rising English naturalist who has devoted much time to entomology, died at Shonga, on the upper Niger, Africa, on 14 Jan. 1883. He was born at Cheltenham, England, 24 June 1855.

FROM SEVERAL parts of Sweden the appearance of an unknown caterpillar, which consumes the crops, is reported. Its length is from one inch to one and a half, and its color grey-brown with green stripes. In one place it put in an appearance immediately after a violent storm with rain. The Academy of agriculture has despatched an entomologist to visit the places from which it is reported.—*Nature*, 5 July 1883, v. 28, p. 234.

PROF. PHILLIP CHRISTOPH ZELLER, of Grünhof, near Stettin, Germany, died at that place 27 March 1883. He was born 9 April 1808, at Steinheim-on-the-Murr, in Württemberg. Prof. Zeller was a well-known authority on microlepidoptera, some of his papers dealing with those of North America. An interesting biography of Prof. Zeller, by H. T. Stainton, is given in the *Entomologist's monthly magazine*, June 1883, v. 20, p. 1-8.

MR. EDMUND BAYNES REED has compiled a very convenient "General index to the thirteen annual reports of the Entomological society of the province of Ontario, 1870-1882" which has been published by the society. In a few instances the compiler, probably inadvertently, has used lower-case ini-

tial letters for generic names, and often lower-case letters for specific names derived from names of persons, mythological characters and places. A consistent and general use of lower-case initial letters, at least for species, would have been still more acceptable to the writer. Some errors in orthography and typography occur, but do not lessen the general usefulness of Mr. Reed's index. G: D.

M. FREDERICQ, of Liège, says the *English mechanic*, lately put several aquatic coleoptera (including the great water beetle) in aqueous solution of curare and strychnine in poisonous quantity. A few drops of these liquors sufficed to poison a frog in a few minutes. The insects, however, lived in them, some more than a fortnight, others nearly a month (when the experiment was concluded). These coleoptera are certainly sensible to the action of curare and strychnine, and the absence of symptoms of poisoning in the present case must be (the author says) because the absorption by the surface of the body and the mouth was *nil*. M. Plateau has previously observed that aquatic coleoptera kept in sea water do not absorb its salts.—*Amer. nat.*, Aug. 1883, v. 17, p. 903-904

IN THE *Bulletin of the Buffalo naturalists, field club* for March of the present year (1883), Prof. D. S. Kellicott, of Buffalo, describes and figures a remarkable larva which he has this year found parasitic upon and destroying nearly all of the galls of *Cecidomyia salicis-batatus* that had formerly abounded upon some low willows occupying waste land near the city. The larva was found to be a species of *Platygaster* belonging to the group known as that of the "cyclops larvae," from the great resemblance its larvae bear to the crustaceans of the genus *Cyclops*. The peculiar manner in which the five-jointed abdomen is folded underneath the body, like that of a cray-fish protecting her eggs, makes it a very interesting form.

We hope that Prof. Kellicott may soon be able to determine the species, if it be one that has already been described. F. A. L.

IN A brief paper upon "Insects injurious to fruit," by Mrs. Mary Treat, read before the New Jersey state horticultural society, at its annual meeting in January last, among other items of interest, a statement was made of a remarkable collection of "cut-worms" by the writer, which may serve to show the value of the same method of dealing with these notorious pests, when employed upon a larger scale. Some phlox bordering a carriage-way through an orchard of dwarf pear trees was observed one morning to be partly denuded of its leaves and flower-buds. The cause being suspected, it was examined the following evening with a light, when "untold numbers of cut-worms were seen among the flower-buds." Numerous worms were at work on the branches of a plum tree beside them. A large number of worms were found eating into the just expanding buds of the pear-trees.

The soil around the phlox was examined, and the first collection resulted in over a pint of worms of various sizes. The best time for this search was found to be about dusk in the evening, for the worms were then just beneath the surface of the ground.

7. A. L.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, *Secretary.*

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884.
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, *Secretary.*

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, *Recorder.*

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, *Recording Secretary.*

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

G. J. BOWLES, *Secretary.*

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary.*

No. 109-110 were issued 12 July 1883.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 113-114.

SEPTEMBER-OCTOBER 1883.

CONTENTS:

ADVERTISEMENTS	82
THE INFLUENCE OF METEOROLOGICAL CONDITIONS ON INSECT LIFE— <i>Charles Golding Barrett</i> [Abstract by <i>Benjamin Pickman Mann</i>]	83-87
SALIVARY GLANDS IN BEES—[Abstract by <i>George Dimmock</i>]	87-89
CONTRIBUTION TO THE KNOWLEDGE OF PARASITIC LIFE IN GALLS—[Ab- stract by <i>Benjamin Pickman Mann</i>]	89-91
PROCEEDINGS OF SOCIETIES.—Linnean Society of London	92-93
LONDON LETTER— <i>W. L. Distant</i>	93-94
VACTOR TOUSEY CHAMBERS	94
BIBLIOGRAPHICAL RECORD, no. 3292-3337	95-98
ENTOMOLOGICAL ITEMS—Society Meetings	99-100

PUBLISHED BY THE
CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, . . . 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

EARLY STAGES OF BUTTERFLIES WANTED.

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,
Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

GALLS AND GALL INSECTS.

The undersigned desires, either by exchange or otherwise, Galls from all parts of the United States. He is especially interested in those made by *Lepidoptera*, *Colcoptera*, *Homoptera* and *Diptera*. Correspondence in reference to Gall growths, or other vegetable abnormalities, is invited.

CHARLES V. RILEY,
1700 Thirteenth St., N. W.,
Washington, D. C.

TORTRICIDAE WANTED.

I am desirous of obtaining as many North American TORTRICIDAE as possible, for the purpose of studying this family. I shall be glad to name and return any TORTRICIDAE forwarded to me for this purpose, save such as may prove new and desirable to retain for description.

Pack carefully, and direct to
PROF. C. H. FERNALD, Orono, Me.

LEPIDOPTERA.

Living cocoons, pupae and ova of American lepidoptera bought or exchanged for other species. by Monsieur ALFRED WAILLY, (Membre-Lauréat de la Société d'Acclimatation de France).

Tudor Villa, Tudor Road, Norbiton,
Kingston-on-Thames, England.

NORTH AMERICAN FERNS.

Check lists of the Ferns of North America north of Mexico, enumerating 31 genera, 132 species and 15 varieties, on one octavo page. Will be sent by mail on receipt of the price, 15 cents per dozen copies.

S. STEBBINS, Springfield, Mass.

PSYCHE.

THE INFLUENCE OF METEOROLOGICAL CONDITIONS ON INSECT LIFE.

BY CHARLES GOLDING BARRETT, PEMBROKE, WALES.

[Abstract, by B. Pickman Mann, Washington, D. C., from Entom. mo. mag., June 1882, v. 19, p. 1-8.]

“The means employed by nature to keep species within due bounds—checking their inordinate increase or unnecessary decrease—are so certain and reliable in their results, and yet so obscure and difficult to trace in their modes of action, that almost any observations, however slight, which seem to be reliable as data from which to ascertain these means, are interesting and worthy of being put on record.

“In every district and every climate there are evidently many species so peculiarly fitted to it that none of the periodical changes of weather and temperature materially affect their numbers, and from *these* little evidence can be obtained. It is from those species which only casually and rarely extend themselves from their natural homes into climates unsuitable for them, or from those which are always to be found in a given locality, but sometimes rarely and always varying in numbers, that the most satisfactory evidence must be expected.

“In the first class of cases an example occurred to me a few years ago which seems very much to the point.”

From eggs of *Deiopeia pulchella* received from the south of France some moths were, by great care and assiduity, reared to maturity in England, and from these were obtained fertile eggs, which duly hatched. Only about half

a dozen of the larvae seemed to possess sufficient vitality to feed. These were fed on potted plants, grown in a sunny window, where they, covered with gauze, “grew rapidly, feeding with especial eagerness when the sun was shining on them. The weather happened to be fine and the sun hot for two or three weeks just at that time, and one larva made such progress that in a fortnight it was full-fed, when it spun a very slight cocoon on the gauze and turned safely to pupa. By this time two more larvae were full-fed and left the food-plant for the gauze, the rest being fully half-grown, when a change of weather came, with wind, heavy rain, and a total absence of sunshine. The larvae were, of course, not exposed to the rain, but the effect of the change was that those full-fed made no attempt to spin up, and the rest ceased to feed, and in a few days they all fell off the gauze or the plants, dead. After a fortnight of wet weather it cleared up and the one pupa produced the moth—a male.

“This seems to supply a key to the whole history of the eccentric casual appearances” in England, “of this and many other inhabitants of warmer climates. In obedience to some singular instinct that impels insects when becoming too numerous in their natural homes to emigrate to ‘fresh fields and

pastures new,' they, contrary to their ordinary habits, cross land or sea, arriving, of course, very often, in some inhospitable clime, where—if not at once captured—they very likely soon fall victims to some pitiless storm of wind and rain. But supposing both these risks to be avoided, the moth—if an impregnated female—in due course lays its eggs, which most probably hatch. If the temperature happens to be lower or the weather wetter than the natural constitution of the species is able to endure, the young larvae die without even attempting to feed, but if matters are more favourable, the strongest of them struggle along, and if fairly favoured by the weather a few of them may reach the perfect state; if quite unusually favored by the weather a large proportion of them may do so, producing those remarkable instances of the sudden appearance in numbers of a species usually rare. Such good fortune rarely extends to a second season and the species becomes a rarity again or is even probably exterminated, to be renewed at some future time by the same instinct of migration. In cases such as these it appears to me that sunshine means life, and its absence destruction, to the larvae, and that by this simple and obvious influence the extension of species beyond their assigned limits is practically prohibited.

“It also happens sometimes that the immigrant, following instinctively its inherited habit, attempts to produce *an additional brood* in the year, over what the climate will allow.” For instance, pupae of the second brood of *Colias*

edusa, in England, showed in December the yellow color of the wings, “which only shows itself when the insect is nearly ready to emerge,” thus “following inherited habit so as to hibernate, as they are well known to do [on the continent of Europe] in the perfect state, but from insufficient warmth and sunshine were unable to muster sufficient strength,” and died.

Again, in the autumn of 1880, in which year there had been a wonderful immigration of *Vanessa cardui* into England, evidently a portion of the vast army that migrated across Europe, larvae were found tolerably common, feeding, at the beginning of October, on young thistle plants, close to the ground, making their nests among the radical leaves, all the tall thistles being dead. From some of these larvae two pupae were obtained, in doors, 17 and 20 October, and one imago, 20 November. “The rest died. This failure of instinct on the part of the immigrants surely explains, in some degree, the fact that last year [1881] the insect was more than usually scarce, hardly any appearing to have hibernated, and also why an insect with such power of increase in a suitable climate is so uncertain and variable in its appearances in one that is unfavorable.

“With reference to the second class of cases—those in which a species always present is periodically common or scarce—much has been written, excessive *rain* being usually assigned as the cause of diminution in numbers, sunshine as the cause of increase. Without doubt these causes act to a

very large extent, large numbers of larvae being actually *drowned* by continued heavy rain, and others rendered liable to disease, but a little evidence has come under my notice, pointing so distinctly to another influence of equal potency, that I think it well worth recording in detail."

For many years previous to 1878 there had been little or no intense cold in Pembrokeshire, owing to the predominance "through each winter of winds from the southeast, south and west, and especially the southwest, all coming off a sea kept constantly warm by the gulf stream. In many places fuchsias standing out of doors had never been cut down by frost within the memory of the inhabitants." Some of these plants had become trees five or six metres high, with trunks of the size of a man's leg. Plants usually grown in greenhouses here flourished in the open air. "During these years, very many insects of general distribution [in Great Britain] continued to be either very scarce, or confined to exceedingly restricted localities in this district." [Particulars given.] "*Noctuae* (except a few universally abundant species) appeared to be almost absent; such a dearth of ordinary night-flying species I never knew anywhere before.

"But in the winter of 1878, there was a great change. Persistent north or northeast winds, intensely cold, froze everything up hard, the warm sea air was completely expelled, or if a slight change of wind permitted a few clouds to come over, the rain from them was instantly converted into ice, with which

the high roads were coated to a thickness of three or four inches [7.6 to 10.2 cm.], for weeks.

"The winters of 1879 and 1880 were equally cold, indeed, the latter was said to be the coldest known here for fifty years, even the sea sands along the tide line were covered ankle deep with ice and frozen snow, a sight very rarely seen on this coast. The first of these three winters [1878-1879] killed all the shrubby veronicas and some of the sumachs, and the tree fuchsias and myrtles above the ground.

"And now I will give the results as regards insects."

Lepidoptera which before were exceedingly rare became more and more abundant in 1879, 1880, and 1881, until in the last year they actually abounded. Species previously restricted to a few favorite spots spread all along the coast or over the country. Many *Geometrae* turned up which had hardly been seen before.

"But in *Noctuae*, the improvement was the most remarkable, as in that group the scarcity had been most marked." [Mentions numerous species which became abundant.]

"Here we seem to have a direct example of cause and effect, but I am not prepared to say that the effect always arises in the same way. I think there can be no doubt that in the case of those insects, whose mode of life includes the capacity for hibernation, their constitution is greatly strengthened and their chance of arriving at maturity increased, if the cold of winter is sufficiently severe to induce *complete* tor-

pidity, undisturbed by warm and spring-like weather at unseasonable times, and this may account for the vast increase in numbers in species which hibernate in the egg state; it also probably has a strengthening effect on those which pass the winter as small social larvae under a silken tent on the ground, or which, like the *Noctuae*, hibernate in the larva state on the ground or among dead leaves, and are tempted out to feed by every warm and genial evening.

“On the other hand there can be no doubt that mild winters act directly to cause the destruction of both hibernating larvae and pupae, in two ways. One is by encouraging the growth of mould, which we know attacks them as soon as, from excess of rain or humidity, they become sickly; the other by permitting the continued activity of predaceous creatures. These are very numerous. Moles continue at work in mild winters, instead of burying themselves deep in the ground; and mice are constantly active. These small mammalia destroy great numbers of Lepidopterous pupae, and they abound in this district, as also do birds during the winter in an extraordinary degree. As soon as severe cold sets in to the north and east, the birds come down in swarms to the open fields and sheltered hillsides of this district, and it is hardly necessary to point them out as most industrious and persevering destroyers of larvae. Predaceous beetles and earwigs are generally on the alert all through very mild winters, and although they probably do not eat much

at that time, and, indeed, are not very plentiful in Pembrokeshire, they must destroy many larvae and pupae, having little else to subsist upon. But I believe that the mischief done by all these added together does not equal that done by the Onisci.

“During mild winters these crustaceous vermin increase and multiply, and feed, and grow without check, till in so mild a climate they become a perfect nuisance, pervading everything indoors and out. It was hardly possible to keep them even out of the breeding cages, where they would get introduced when very small and unnoticed—or perhaps in the egg state—hunt out and destroy every larva and pupa, and grow large and plump without ever showing themselves above the leaves and rubbish. Doubtless, their industry out of doors was in the same proportion, and my impression is that they approached very near to completely exterminating many species that would naturally be common here. Severe cold seems to destroy some of them, for they are not nearly so numerous now, and it certainly puts a complete stop to their destructive operations during a time when larvae are most especially helpless and liable to attack. To this, with other causes already mentioned, I am inclined to attribute the extraordinary increase in numbers of so many species during the last three seasons, divided by severe winters. The winter now past has been mild, and, therefore, a further progressive increase cannot reasonably be expected; but I hope that the mischief done in one mild winter may not be

serious. It is the progressive increase of destroyers with the decrease of victims through successive mild seasons that is really to be dreaded.

"As a slight corroboration of this view, I may mention, that while this district of country is comparatively poor in all the species of which the larvae feed and hibernate in any exposed situation, several species of Noctuae, of which the larvae live underground, are always abundant, and the country is actually

rather rich in those species of Tortricina which feed and hibernate entirely within the stalks or roots of plants.

"It is worthy of notice, that there are a very few species which have appeared unable to cope with severe cold. *Lobophora viretata* was tolerably common here during the first three or four years of which I have been writing, but after the first cold winter it became scarce, and has since almost disappeared."

SALIVARY GLANDS IN BEES.

[Abstract of a dissertation by Paulus Schiemenz.]

BY GEORGE DIMMOCK, CAMBRIDGE, MASS.

Paulus Schiemenz' dissertation "Über das herkommen des futtersaftes und die speicheldrüsen der biene" . . . [Rec., no. 3337] gives many interesting facts in the anatomy of the honey-bee and of other bees. The beginning of this paper is a historical consideration of the subject, with a description of the digestive tract of *Apis mellifica*, in which the author follows Plateau's view that the proventriculus serves to arrest the too rapid flow of the contents of the crop (or honey-stomach, as Schiemenz here terms it) into the ventricle. Following the views of Leuckart, in whose laboratory Schiemenz prepared this paper, the author considers that the ileum of the bees, as of insects in general, has no other function than that of furnishing a suitable connection between ventricle and rectum, and he decides that the nutrient fluid used by bees to feed their queen, larvae and drones surely does

not come from the ventricle, as has been often supposed. The salivary glands are next described, and their secretions and histological structure discussed, in the order introduced for them by Siebold, i. e., as "system I, II, III, IV and V."

The gland of system I (Meckel's supramaxillary gland) is provided with a reservoir and discharges its strongly acid secretion by openings, one on each side of the "Schlundblättchen" [hypopharynx of Savigny]. This gland is absent in queens and drones. In six species of *Bombus* this system is well developed, and the author describes various modifications in other bees.

The glands of system II (Meckel's glandula sublingualis) are in the head, just above its lower or posterior chitinous walls, and are easiest prepared by first removing system I, and then the brain. The different efferent ducts of the parts

of this system of glands unite on each side, and the ducts resulting from their union join the duct from system III at right angles, forming a cruciform figure. The secretion of system II is slightly alkaline and leaves a fatty spot upon the test-paper. Queen bees have system II similar to that of workers, but in drones its place is occupied by a mass of yellow fat-cells, which cannot secrete and which the author follows Pagenstecher in regarding as results of degeneration. In the male of *Bombus* this system occupies nearly the whole head, while in the females and workers it is less developed proportionally than in *Apis*. System II is present in *Psithyrus*, *Megachile* and *Coelioxys*, but absent in all other bees examined by the author, e. g., in *Hylaeus*, *Dichroa*, *Dasyroda*, *Andrena*, *Osmia*, *Anthidium*, *Colletes*, *Melecta* and *Anthophora*.

System III consists of a pair of glands in the anterior part of the thorax, each gland having a reservoir, and each opening by a duct which passes forward into the head, the two ducts there uniting to form the common duct of this system, with which (as mentioned before) the two ducts of system II unite at right angles to form a cross, the combined efferent duct of systems II and III forming the fourth, or anterior, branch of the cross. The secretion of the glands of system III is slightly alkaline or neutral. In queens and drones, particularly in the latter, this system of glands is of similar structure, but not so strongly developed as in workers. The reservoir is differently proportioned in queen, drone

and worker, but in the latter its capacity is greatest. System III is not as well developed, relatively, in other bees as it is in *Apis*. This system of glands is described and figured by Spaulding (*Amer. nat.*, Feb. 1881, v. 15, p. 113-119), whom Schiemenz incorrectly cites as Hyatt, but whose description he rightly says "gives only the crudest outlines and even these inaccurately."

System IV, described minutely by Wolff and noticed by Graber, consists of two glands, one on each side, opening by a short duct upon the inner side of the base of each mandible, and giving out a strongly odorous and very acid liquid. If a mandible is torn from a bee's head the gland usually hangs to the base of the mandible as a little sac. In queen bees system IV is very strongly developed, in workers well developed, but has suffered a degeneration in drones, in which the gland, altho still present, secretes nothing. System IV is present, more or less developed, in all bees.

System V, which is not present in *Apis mellifica*, but exists in *Bombus* and some other genera, consists of an unpaired gland which opens into the outlet of the common duct of systems II and III. This system was not very fully studied by the author, its function probably being only that of lubrication.

In studying the development of these glands, which he considers at length, Schiemenz shows that systems I and IV are entirely new formations from epidermal invagination, system III is partly developed from the silk-glands of the larva, and systems II and V are derived later from the duct of system III.

While pursuing the development of these glands opportunity was taken of proving that Engelmann's so-called "neuroid filaments" (Neuroidfasern) were not of a neural nature.

Under the heading "function" Schiemenz treats of some curious views that have been advanced by authors in regard to the different salivary glands of bees. Ramdohr at first mistook system II for an olfactory organ and system III for its continuation in open communication with the tracheae of the thorax. He later corrected this error. Fischer thought that system III was an "insect-lung." Wolf and Graber properly receive sharp criticism at the hands of Schiemenz because they

thought that system IV was a gland for moistening an olfactory organ beneath the labrum, the place where Wolf, in his wild search for analogies between vertebrates and insects, had located the olfactory organ of the bee. Schiemenz regards the glands of system IV as used in the preparation of food, and the glands of system I as producing, in part at least, the nutrient fluid used for the larvae. The functions of the other systems still remain doubtful.

As an appendix the author describes and figures the structures of the antennae of *Apis mellifica*, since it is now settled that the antennae are the seat of the olfactory sense.

CONTRIBUTION TO THE KNOWLEDGE OF PARASITIC LIFE IN GALLS.

[Translated, with some change, from G. Fr. Möllers "Bidrag till kännedomen om parasitlivet i galläpplen och dylika bildningar" (Entom. tidskr., 1882, årg. 3, p. 182-186).]

BY B. PICKMAN MANN, WASHINGTON, D. C.

In his work, *Die Ichneumonien der Forstinsecten*, bd. 2, p. 217 and 219, Ratzeburg gives a list of all the parasites which Tischbein, Nördlinger, Reising, and others had hatched from galls of species of *Cynips* and *Nematus*. Since however the list is very incomplete as regards our fauna I will here give a list of the parasites and inquilines which I have obtained from such gall-formations during several years' continuous investigations.

In the determination of the species I have followed exclusively Thomson's *Hymenoptera Scandinaviae* and *Opuscula entomologica*. Where the sex is

not mentioned it is to be understood that both males and females were obtained, and where the quantity of specimens is not mentioned that a moderate number were obtained: (a) indicates an abundance, (aa) a great abundance, and (r) a scarcity of specimens.

1. From galls of *Cynips folii*, collected in Scania, September 1868, were raised, in March 1869:—*Torymus viridissimus* (r), *T. cingulatus*, *T. flavipes* ♀ (unique); in April:—*Synergus vulgaris*; in May:—*Eurytoma appendigaster* ♀ (unique).

2. From galls of *Cynips longiventris*, collected in Scania, September

1875, were raised, in May 1876:—*Torymus nigricornis* ♀ (unique), *Syntomaspis cyanca*, *Synergus nervosus* (a), *Platytermus fasciculatus*, *Decatomä biguttata* ♀ (r).

3. From galls of *Cynips terminalis*, collected in Blekinge, July 1876, were raised, in July 1876:—*Torymus viridissimus* (a), *Synergus facialis*, *Decatomä biguttata* ♀, *Torymus euchlorus* (r), *T. cingulatus* ♀ (unique), *Platytermus simplex* (r), *Cecidostiba truncata* (r), *Megastigmus dorsalis* ♂ (unique); in February and March 1877:—*Olinx gallarum* (aa); in March:—*Syntomaspis saphirina* (a), *Megastigmus dorsalis* (r); in May:—*Eupelmus urozonus* (r), *Cecidostiba rugifrons*.

4. From galls of *Cynips terminalis* from Öland, collected in September 1876, were raised, in February to April 1877:—*Syntomaspis saphirina* (aa); in March:—*Pimpla inanis* ♂ (r); in April to July:—*Megastigmus dorsalis*; in April:—*Synergus nervosus* (a), *Tortrix* (? *Grapholitha puncticostana*) (r), *Cecidostiba rugifrons*, larvae of *Balaninus villosus* (a), *Eurytoma intermedia*; in May:—*Eupelmus urozonus* (a), *Cecidomyia longicornis* ♂ (rather rare), *Cecidostiba truncata* (r), *C. collaris*, *Eupelmus azureus* (rather rare); in June:—*Tetrastichus terminalis* ♀.

Remark. The small lepidoptera and diptera which occur here, as well as the coleopterous larvae, are inquilines. The little *Pimpla* has probably been raised as a parasite upon the *tortrici-*

dae, as also presumably the *Tetrastichus* from the *Cecidomyia*, analogously with its related genus *Oxymorpha*, which lives parasitically on *Cecidomyia fagi*. The *Eupelmus* have perhaps lived as parasites in the *Curculio*-larvae.

5. From galls of *Cynips gemmae*, from Scania, autumn of 1876, were raised, in March 1877:—*Synergus vulgaris* (a), *Olinx gallarum* (a), *Syntomaspis saphirina* (a).

6. From galls of *Cynips* (*Spathogaster*) *baccarum*, collected in Scania during April and May 1876-1879, were raised, in May 1876:—*Synergus apicalis* (r), *Figites anthomyiarum* ♀ (unique); in June 1877:—*Torymus viridissimus* (a), *Amblymerus crassicornis* ♀ (rather rare), *A. pedunculi* ♀ (rather rare); in March 1879:—*Olinx fulvicrus* ♀; in April:—*Synergus thaumacerus* ♂ (unique); in July:—*Torymus viridissimus* (a), *Eutelus heterotomus* ♂ (unique), *E. collaris*, *Synergus vulgaris* (a), *Platytermus fasciculatus* ♀ (r), *Ormyrus gastris* ♂ (common) ♀ (r).

7. From galls of *Cynips* (*Trigonaspis*) *crustalis*, collected in Scania, April 1878 and 1879, were raised, in June 1878:—*Synergus thaumacerus* (a); in April 1879:—*Syntomaspis fastuosa* (a); in July:—*Synergus thaumacerus*.

Remark. At the end of April 1878 quite numerous individuals of *Trigonaspis* of both sexes came forth, whenever *Synergus* exterminated *Syntomaspis*; in 1879 not a single *Trigonaspis* came forth whenever they were exterminated by *Syntomaspis*, whose para-

site *Synergus* was now present in small numbers.

8. From galls of *Cynips* (*Andricus*) *inflator*, from Scania, April 1877, were raised in the same month: — *Synergus* (*Sapholytus*) *connatus* ♀ (r).

9. From galls of *Cynips* (*Andricus*) *curvator*, collected in Scania, June 1879, were raised, in July 1879: — *Platytermus fasciculatus*.

10. From galls of *Cynips* (*Andricus*) *ramuli*, from Scania, June 1881, were raised, in July 1881: — *Olinx gallarum* (a), *Eutelus tibialis* ♀, *Decatoma incrassata* ♀ (unique).

11. From galls of *Cynips* (*Aulax*) *glechomae*, from Scania, were raised, in April 1882: — *Torymus glechomae* n. sp. ♀ (2 specimens).

12. From galls of *Cynips* (*Aulax*) *foveiger* on *Hieracium umbellatum*, were raised, in 1882: — *Decatoma submutica* (a).

13. From bedeguar galls [*Rhodites rosae*] on *Rosa canina*, collected in Scania during March 1881 and April 1882, were raised, in May to July 1881: — *Cynips* (*Rhodites*) *rosae* ♂ (r) ♀ (a), *Ortopelma luteolator* (a); in May and June: — *Habrocytus bedeguaris* (r); in June and July: — *Torymus bedeguaris* (r); in April to June 1882: — *Ortopelma luteolator* (a), *Torymus bedeguaris* (a); in May and June: — *Eurytoma pubicornis*, *Rhodites rosae* ♀ (r), *Aulax brandti* (aa).

14. From swelling on the branches of *Salix capraea*, collected near Stehag, in Scania, during March 1881 and April 1882, were raised, in May 1881: —

Nematus viduatus (r), *Pimpla inanis* ♂ (r), *P. vesicaria* ♂ (common) ♀ (unique), *P. brevicornis*, *P. mandibularis* (r); in May and June, *Nematus pentandrae* (a); in June: — *Limneria chrysosticta* (aa), *Sympiezus sericeicornis* ♂ (unique); in June and July: — *Habrocytus capreae* (aa), *Eurytoma salicis* (a); in April 1882: — *Nematus pendandrae* (a); in April and May: — *Limneria chrysosticta* (a); in May and June: — *Eurytoma salicis* (a), *Habrocytus capreae* (r).

A part of the species of the genus *Torymus* and of the genera *Syntomaspis* and *Megastigmus* are constant parasites in galls on oak, like *Ortopelma* and *Torymus bedeguaris* in rose-galls and *Limneria chrysosticta* in willow-galls. The genera *Synergus*, *Eurytoma* and *Decatoma* are all secondary parasites, that is to say, they attack in their turn the parasites on gall-formations and destroy them. The other *pteromalini* (*Eutelus*, *Platytermus*, *Habrocytus*, etc.) are probably also secondary parasites. In regard to *Aulax brandti*, on the other hand, which often occurs so numerously in bedeguars, it can hardly be considered as a parasite, since all its congeners form gall-like swellings on the branches of plants or live in swollen seed-capsules, but it may be considered to be an inquiline or the possible fellow-builder with *Rhodites rosae*. The *Pimpla* raised from willow galls of the year 1881 have probably all lived parasitically on the larger *Nematus viduatus*.

PSYCHE.

CAMBRIDGE, MASS., SEPT.—OCT., 1883.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

LINNEAN SOCIETY OF LONDON.

15 FEB. 1883.—Mr. J. Jenner Weir exhibited a perfect hermaphrodite butterfly (*Lycæna icarus*), and a blue male and a brown female of the same species for comparison. The hermaphrodite in question possesses two spotless blue wings on the left, and two spotless brown wings on the right, thus being intermediate in color between the two sexes.

A paper was read on the manna insect of South Australia, by J. G. Otto Tepper. This contains observations on the insect in question, and on the peculiar saccharine substance derived from and deposited on various species of *Eucalyptus* trees.

1 MARCH 1883.—Mr. Alfred W. Bennett read a paper "On the constancy of insects in their visits to flowers." He stated as a summary that the different classes of insects show very great difference in this respect. Butterflies show but little constancy except in a few instances; but they would appear to be guided to a certain extent by a preference for particular colors. The diptera exhibit greater constancy, though by no means absolute. A much greater degree of constancy is manifested by the *apidae*: and this becomes all

but absolute in the hive-bee. It is an interesting circumstance that this constancy appears to increase in proportion to the part performed by the insects in carrying pollen from flower to flower. A much larger number of observations is however needed in order to determine with certainty any general law; and especially a careful microscopic examination of the pollen attached to the proboscis, mandibles, legs, and under side of the abdomen and thorax. As respects preference for particular colors, the lepidoptera observed paid 70 visits to red or pink flowers, 5 to blue, 15 to yellow, 5 to white; the diptera 9 to red or pink, 8 to yellow, 20 to white; the hymenoptera 303 to red or pink, 126 to blue, 11 to yellow, 17 to white.

There followed a communication "On the methodic habits of insects when visiting flowers" by Mr. R. M. Christy. The author records in detail the movements of 76 insects while engaged in visiting 2,400 flowers. He tabulates the results and concludes that insects possess a decided preference for a number of successive visits to the same species of flower, although this is not invariably the case. Most of the observations were made on bees, which seem to perform the fertilization of at least one-half of all the flowers fertilized by insects in this country. Butterflies as a rule seem to wander purposelessly in their flight, nevertheless some species, including the fritillaries, are fairly methodic. The author believes that it is not by color alone that insects are guided from one flower to another of the same species, and the sense of smell is suggested. Bees, he avers, have poor sight for long distances but good sight for short distances. Of 55 humble-bees watched, 26 visited blue flowers; 12 of the bees were methodic in their visits and 5 not so; 13 visited white flowers; 5 were methodic and 8 not so; 11 visited yellow flowers; 5 were methodic and 6 not so; 28 visited red flowers; 7 were methodic, 9 nearly so, and 12 not so. Mr. Christy inclines to the opinion (though admitting paucity of data) that bees in a

flight from their nest confine their visits exclusively or principally to only one species of plant.

15 MARCH 1883.—Prof. T. S. Cobbold read a paper "On *Simondsia paradoxa* and on its probable affinity with *Sphaerularia bombi*."

19 APRIL 1883.—Rev. A. E. Eaton gave a digest of an extensive monograph of the *ephemeridae*, or mayflies, Part I. In this the subject is prefaced by the historical accounts, and his views of the group generally; the genera are defined, and a tabular conspectus of the present known species indicated.

7 JUNE 1883.—A short record of observations on the white ants (termites) of Rangoon, by Dr. Robert Romanis, was read by

the secretary. He details what he saw in what may be termed the swarming of a nest.—Selected from *Zool. anzeiger*.

LONDON LETTER.

EAST DULWICH, LONDON,
JULY 6th, 1883.

Perhaps the most interesting information to American entomologists is that relating to the progress of Godman and Salvin's great work—the "Biologia Centrali-Americana." This has now appeared with most commendable punctuality during the last three years, and the following is an abstract of its progress to date.

Subjects.	Authors.	Nr. of species enumerated.	New species described.	New genera described.	Nr. of Plates.	Nr. of species figured.	Number of figures.	Pages letter-press.
COLEOPTERA:								
Adephaga	H. W. Bates	812	240	7	7	175	175	216
	D. Sharp	417	282	27	4	66	66	192
Serricornia	C. O. Waterhouse	88	36	1	2	40	40	32
Malacodermata	H. S. Gorham	498	295	13	9	208	221	192
Longicornia	H. W. Bates	837	276	24	15	258	269	224
Phytophaga	M. Jacoby	736	243	2	15	350	374	264
LEPIDOPTERA:								
Rhopalocera	Godman & Salvin	405	29	7	26	222	404	264
Heterocera	H. Druce.	90	5	—	2	14	15	24
RHYNCHOTA:								
Heteroptera	W. L. Distant	574	134	9	21	464	513	232
Homoptera	W. L. Distant	56	20	—	3	42	42	24

To this may be added the first hymenopter contribution of Mr. P. Cameron, which has just appeared. This fauna includes the whole of Mexico and extends as far south as the Isthmus of Darien. Some idea as to the extent of the work remaining to be completed can be gathered from observing

the many families and some orders of insects which have not as yet been commenced. My own contribution devoted to the rhynchota has only just reached the *capsidae*, but it has already dealt with some matters of interest to Nearctic entomologists, such as the discovery of the "Chinch Bug," *Blissus leuco-*

pterus extending southward through Mexico, Guatemala and Panama.

Dr. Leitner, of Basle, has passed the last nine or ten months in this country, studying—both in the British Museum and at the different private collections—the polymorphism of lucanoid beetles comprised in the *odontolabidae*, with the view to an explanation of the evolution of the mandibles and of the strongly marked sexual dimorphism. Dr. Leitner considers the female to exhibit (in this case) the archaic type, and his memoir will probably be published by one of our London societies about the end of the year.

Perhaps at no previous period in the study of lepidoptera has so much complete faunistic work been in the course of publication as at the present time. Thus in your own country appears the excellent work of Edwards on the Butterflies of North America, whilst Godman and Salvin are publishing their monograph of the rhopalocera of Central America, and, farther south, Dr. Burmeister is doing a similar service for the lepidoptera of the Argentine Republic. In London Lang is publishing his "European Butterflies" whilst as regards the east, Moore's "Lepidoptera of Ceylon," Marshall and de Niceville's "Butterflies of India, Burmah and Ceylon," and my own "Rhopalocera Malayana" are regularly appearing and sufficiently attest the amount of publishing energy in this field.

Very few entomological collections have recently been received from the neotropical region. Mr. Champion has just returned from Central America bringing the remainder of the best collection—in view of the number of minute and carefully mounted specimens—ever made in the tropics. Dr. Angas has brought home from Dominica a small but interesting collection, and in all probability the next lot of entomological novelties from this region will be received in America from your countryman Herbert

Smith and the other members of his expedition.

W. L. Distant.

VACTOR TOUSEY CHAMBERS.

Born in Burlington, Boone County, Kentucky, 6 August 1830.

Died in Covington, Kenton County, Kentucky, 7 August 1883.

Mr. Chambers made his name familiar to the entomologists of North America, and widely abroad, by his writings upon the *tineina*, and may be reckoned next to Brackenridge Clemens as a pioneer in the study of these insects in this country. His first paper upon the subject seems to have been his "A new species of *Cemiostoma*." . . . [Rec., no. 3297], published in June 1871, but we find an earlier paper of his on a parasited larva of *Tropaea luna*, published in January 1870. His last paper appears to be his "The classification of the *tineidae*," on p. 71-74 of the present volume of PSYCHE. Such of his papers as have thus far been recorded in PSYCHE appeared in approximately the following chronological order, the numerals referring to the Bibliographical record: 88. 411, 441, 337, 339, 340, 341, 343, 449, 361, 491, 1065, 1072, 1075, 1090, 1102, 1113, 1129, 1142, 1150, 1156, 851, 852, 853, 1185, 1196, 1212, 1239, 1244, 1261, 1398, 1866, 1868, 1867, 1292, 1308, 1326, 1409, 1370, 1805, 2269, 2803. We have still on hand the titles of several articles by him, making in all at least sixty titles, and many of these are in fact series of separate articles, appearing under the same word-title throughout a volume. Mr. Chambers was singularly unfortunate in the treatment he received from his proof-readers, in some of the publications where most of his articles appeared, and rendered the citation of his articles especially difficult by the similarity which he gave to their titles. A brief biographical sketch of him appears in *Science*, 24 Aug. 1883, v. 2, p. 253-254. B: P. M.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, as note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Bieler, S. [Pièces buccales d'un gamase uropode.] (Bull. Soc. vaudoise des sci. nat., Dec. 1880, s. 2, v. 17; Procès-verbaux. p. 8.)

Brief note on the trophi of a gamasid mite.

G: D. (3292)

Boden, C. J. *Pulex* feeding on lepidopterous larvae. (Entomologist, March 1882, v. 15, p. 70.)

Pulex irritans observed sucking the juices of larvae of *ocophora pseudospitella* and *endrosis fenestrella*.

G: D. (3293)

Borgmann, Hugo. Vorschläge zur präparation. (Entom. nachrichten, 1 Jan. 1881, jahrg. 7, p. 13-14.)

Discussion of proper length of insect pins, and of the height at which insects should be placed on the pins.

G: D. (3294)

Borgmann, Hugo. Zur anziehungskraft des lampenlichts auf nachtschmetterlinge und andere insecten. (Entom. nachrichten, 15 March 1881, jahrg. 7, p. 88-90.)

Gives formula for, and requests observations on the influence of elevation above sea-level, of temperature, hygrosopic condition, direction of the wind, condition of the weather, etc., on the attraction of insects by lights.

G: D. (3295)

Bowles, G. J. Entomology for beginners. Migratory insects. (Can. entom., July 1880, v. 12, p. 130-137.)

Notes on migrations of insects, especially of *caloptenus spretus*, *danaus archippus* and *pyraus cardui*.

G: D. (3296)

Chambers, Vactor Tousey. A new species of *cemiotoma*. *Micro-lepidoptera, tineina*. (Can. entom., June 1871, v. 3, p. 23-25.)

Describes *cemiotoma albella*, a new species, of which the larva mines the leaves of *populus alba* and *p. dilatata*.

G: D. (3297)

Cooke, E. Naphthaline. (Entomologist, Nov. 1882, v. 15, p. 263-264.)

Recommends use of naphthaline (C₁₀H₈) to keep mites out of collections.

G: D. (3298)

Corbett, H. H. The bad season for lepidoptera. (Entomologist, Oct. 1882, v. 15, p. 236.)

Limited number of species, but great number of individuals of a few species, of lepidoptera in England during 1882.

G: D. (3299)

Dalla Torre, K: W. Addenda et corrigenda zu Hagens Biblioth. entomologica, bis 1862. (Entom. nachrichten, 15 Dec. 1878, jahrg. 4, p. 324-330.)

Additions to and corrections of H. A. Hagen's "Bibliotheca entomologica" [Rec., 3306]. For continuation, see author's "Addenda und corrigenda" . . . (*op. cit.*, 1880, jahrg. 6) [Rec., 3301], "Addenda und corrigenda" . . . (*op. cit.*, 1 Feb. 1881, jahrg. 7, p. 45-48) [Rec., 3302], and "Addenda et corrigenda" . . . (*op. cit.*, 1 June 1881, jahrg. 7, p. 163-170) [Rec., 3303].

G: D. (3300)

Dalla Torre, K: W. Addenda und corrigenda zu Hagen's: Bibliotheca entomologica II. (Entom. nachrichten, 1880, jahrg. 6: 15 June, p. 125-129; 1 July, p. 137-140; 1 Aug., p. 168-171; 1 Dec., p. 261-267.)

Additions to and corrections of H. A. Hagen's "Bibliotheca entomologica" . . . [Rec., 3306], continued from author's "Addenda et corrigenda" . . . (*op. cit.*, 15 Dec. 1878, jahrg. 4, p. 324-330) [Rec., 3300], *which see*.

G: D. (3301)

Dalla Torre, K: W. Addenda und corrigenda zu Hagens Bibliotheca entomologica. III. (Entom. nachrichten, 1 Feb. 1881, jahrg. 7, p. 45-48.)

Additions to and corrections of H. A. Hagen's "Bibliotheca entomologica" . . . [Rec., 3306]. Continued from author's "Addenda und corrigenda" . . . (*op. cit.*, 1880, jahrg. 6) [Rec., 3301]; see also author's "Addenda et corrigenda" . . . (*op. cit.*, 15 Dec. 1878, jahrg. 4, p. 324-330) [Rec., 3300].

G: D. (3302)

Dalla Torre, K. W. Addenda et corrigenda zu Hagen's Bibliotheca entomologica. iv. (Entom. nachrichten, 1 June 1881, jahrg. 7, p. 163-170.)

Additions to and corrections of H. A. Hagen's "Bibliotheca entomologica" . . . [Rec., 3300]. Continued from author's "Addenda und corrigenda" . . . (op. cit., 1 Feb. 1881, jahrg. 7, p. 45-48) [Rec., 3302]; see also author's "Addenda et corrigenda" . . . (op. cit., 15 Dec. 1878, jahrg. 4, p. 324-330) [Rec., 3300].

G. D. (3303)

Dobson, H. T., jr. The effect of heat upon *notodonta dictaea*. (Entomologist, March 1882, v. 15, p. 65-67.)

Alteration of the normal time of appearance of *notodonta dictaea* by the season being milder or colder.

G. D. (3304)

Dobson, H. T., jr. Prevention of mould. (Entomologist, Nov. 1882, v. 15, p. 264.)

Effect of the use of carbolic acid in preventing mold in collections, and effect of cyanizing on some lepidoptera.

G. D. (3305)

Hagen, Hermann August. Bibliotheca entomologica. Die litteratur über das ganze gebiet der entomologie bis zum jahre 1862. 2 v. Lpz., W. Engelmann, 1862-1863. Bd. I. A-M, 1862. t.-p., 12+566 p. Bd. 2. N-Z. Mit einem systematischen sachregister. t.-p. + 512 p., 24 X 15, t. 18.2 X 11.

Additions and corrections, by K. W. Dalla Torre, entitled "Addenda et corrigenda zu Hagens Biblioth. entomolog., bis 1862." (Entom. nachrichten, 15 Dec. 1878, jahrg. 4, p. 324-330.)

Additions and corrections, by K. W. Dalla Torre, entitled "Addenda und corrigenda zu Hagen's: Bibliotheca entomologica II." (Entom. nachrichten, 1880, jahrg. 6; 15 June, p. 125-129; 1 July, p. 137-140; 1 Aug., p. 168-171; 1 Dec., p. 261-267.)

Additions and corrections, by K. W. Dalla Torre, entitled "Addenda und corrigenda zu Hagens Bibliotheca entomologica. III." (Entom. nachrichten, 1 Feb. 1881, jahrg. 7, p. 45-48.)

Additions and corrections, by K. W. Dalla Torre, entitled "Addenda et corrigenda zu Hagen's Bibliotheca entomologica. IV." (Entom. nachrichten, 1 June 1881, jahrg. 7, p. 163-170.)

Bibliography of 18130 writings on entomology, besides extracts, reviews, and translations, by 4766 named and 851 anonymous authors, from the earliest times down to the year 1862, with designation, as a guarantee of accuracy, of the 14331 titles transcribed from the sources themselves by the author, and with a minutely arranged subject index; list of 19 entomological societies, and of the entomological publications of 11 societies; description of the author's methods, and discussion of the principles of construction of the bibliography. B: P. M. (3306)

Riley, C: Valentine. The boll-worm alias corn-worm. *Heliothis armigera* Hüb. (Rept. [U. S.] commiss. agric., for 1881 and 1882. 1882 [Jan. 1883], p. 145-149, pl. 1; pl. 12, fig. 1.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 145-149 [85-89], pl. 1; pl. 12, fig. 1.)

Advance reprint, from 4th report of U. S. entomological commission, of section on the food-plants of *heliothis armigera*, other than cotton; list of these food-plants, and of authorities upon which the respective statements are made; history of first proofs of the identity of this species on maize with the same on cotton; habits of the larvae in their several broods; figures of all stages of the insect. B: P. M. (3307)

Riley, C: Valentine. The catalpa sphinx. *Sphinx catalpa* Bois. (Rept. [U. S.] commiss. agric., for 1881 and 1882. 1882 [Jan. 1883], p. 189-193, pl. 13.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 189-193 [129-133], pl. 13.)

Relative excellence of *catalpa speciosa* and *c. bignonioides* as timber-trees, according to J. A. Warder; geographical distribution, habits, ravages and parasites of and means against *sphinx catalpa*; description and figures of all stages of this insect; description of supposed sound-producing organs in pupae of this and other species. B: P. M. (3308)

Riley, C: Valentine. The clover leaf-beetle. *Phytonomus punctatus* Fabr. (Rept. [U. S.] commiss. agric., for 1881 and 1882 [Jan. 1883], p. 171-179, pl. 10, fig. 1.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 171-179 [111-119], pl. 10, fig. 1.)

Food-plants and habits of the species of *phytonomus* in Europe and United States; civil and natural history, number of annual broods, ravages, enemies and geographical distribution of and means against *ph. punctatus*; description and figures of eggs, larva (four stages), and pupa of this species; figures of imago and of injured plant; report, by E. A. Schwarz, of observations on this insect in New York; *hylesinus trifolii* seems to feed only on *trifolium pratense*; coleoptera imported from Europe usually confined to the neighborhood of the Atlantic coast. B: P. M. (3309)

Riley, C: Valentine. The corn bill-bug. *Sphenophorus robustus* Horn. (Rept. [U. S.] commiss. agric., for 1881 and 1882. 1882 [Jan. 1883], p. 138-142, pl. 7, fig. 2; pl. 8, fig. 2.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 138-142 [78-82], pl. 7, fig. 2; pl. 8, fig. 2.)

History of earlier observations on the species of *sphenophorus* injurious to maize in the United States; report of observations on *s. robustus*, by L. O. Howard; habits and ravages of *s. robustus*; description and figure of larva, pupa and imago of this species and description of larvae of *rhodobaenus tredicinipunctatus* and *rhyrachophorus zimmermanni*, and figures of imago of the former; characters distinguishing *sphenophorus* and *s. robustus* and the four other species allied to it from other genera and species. B: P. M. (3310)

Riley, C: Valentine. *Crambus vulgivagellus*. (Amer. nat., Nov. 1881, v. 15, p. 914-915.)

Records the excessive abundance of this species in the eastern United States in 1881; description of the egg; method of oviposition. B: P. M. (3314)

[**Riley, C: Valentine.**] A disastrous sheep parasite. (Amer. nat., Dec. 1881, v. 15, p. 1011.)

A parasite, probably *trichodectes ovis*, doing great injury to sheep in Illinois. G: D. (3312)

[**Riley, C: Valentine.**] [*Dolerus unicolor*]. (Amer. nat., July 1881, v. 15, p. 574.)

Statement, by H. Keenan, that the imagos of *dolerus unicolor* injured the fruit buds of pear-trees at Quaker City, Ohio, by eating holes therein; as this habit in a tenthredinid imago seems not to have been observed before, the statement is questioned. B: P. M. (3313)

Riley, C: Valentine. Effect of drought on the hessian fly. (Amer. nat., Nov. 1881, v. 15, p. 916.)

Hot and dry weather dries up and kills *cecidomyia destructor* and its parasites. B: P. M. (3314)

[**Riley, C: Valentine.**] Entomologist for the Pacific coast. (Amer. nat., Oct. 1881, v. 15, p. 821-822.)

Notice of attempts made to have a state entomologist appointed in California. B: P. M. (3315)

Riley, C: Valentine. Entomology in Buffalo, N. Y. (Amer. nat., Nov. 1881, v. 15, p. 917.)

Notice of v. 4, no. 1, of the Bulletin of the Buffalo society of natural sciences; list of entomological papers therein. B: P. M. (3316)

[**Riley, C: Valentine.**] Exuviation in flight. (Amer. nat., May 1881, v. 15, p. 395.)

Criticises R. McLachlan's observation that *oligo-neura rhenana* casts its submarginal skin while on the wing; describes the process in *polymitarcys alba*; excessive abundance of the latter species on the Red River of the North [Minnesota], in August 1877. B: P. M. (3317)

Riley, C: Valentine. Insect collection for sale. (Amer. nat., Dec. 1881, v. 15, p. 1014.)

Notice of the collection of coleoptera left by C. Tra-brandt, of New Orleans, at his death. B: P. M. (3318)

Riley, C: Valentine. Insect enemies of the rice plant. (Amer. nat., Feb. 1881, v. 15, p. 148-149.)

Identifies *chalepus trachypygus* feeding on roots of the rice-plant, and conjectures that other mentioned enemies of rice may be *spalacopsis suffusa* and *centrinus concinnus*. Rice-plant in India injured by *cecidomyia oryzæ*. B: P. M. (3319)

[**Riley, C: Valentine.**] Insect locomotion. (Amer. nat., Apr. 1881, v. 15, p. 325.)

Results of G. Carlet's studies on the order in which the feet are moved in the walking of hexapods and arachnids. B: P. M. (3320)

Riley, C: Valentine. Larval habits of *sphenophori* that attack corn. (Amer. nat., Nov. 1881, v. 15, p. 915-916.)

Mentions several species of *sphenophorus* injurious to maize plants in different parts of the U. S.; habits and ravages of *s. robustus*. B: P. M. (3321)

Riley, C: Valentine. Migration of butterflies. (Amer. nat., July 1881, v. 15, p. 577.)

Report, by J. H. Mellichamp, of the eastward flight of thousands of *pteris monuste*, in small groups of two, three or more individuals, on 1 and 2 June 1881, over Bluffton, S. C.; description of larva and pupa; larva feeds on *cleome pentaphylla* and *polanisia trachysperma*. B: P. M. (3322)

[**Riley, C: Valentine.**] Migration of plant lice from one plant to another. (Amer. nat., Oct. 1881, v. 15, p. 819-820.)

Exposition of J. Lichtenstein's theory that most *aphididae*, especially gall-making *pemphigini*, live upon two different plants in passing through their cycle of development; cites instances in which the host-plants are of different families. B: P. M. (3323)

[**Riley, C: Valentine.**] Moths mistaken for *aletia*. (Amer. nat., June 1881, v. 15, p. 486-487.)

Plathyrena scabra and *phoberia atomaris* mistaken for *aletia argillacea*; hibernating habits of the first. B: P. M. (3324)

Riley, C: Valentine. The new imported clover enemy. (Amer. nat., Nov. 1881, v. 15, p. 912-914.)

Records occurrence and habits of *phytonomus punctatus*, injurious to *trifolium* in New York, describes the egg and larva of this species, and gives a list of food-plants of the European species of *phytonomus*. B: P. M. (3325)

[**Riley, C: Valentine.**] A new imported enemy to clover. (Amer. nat., Sept. 1881, v. 15, p. 750-751.)

Clover [*trifolium*] injured by *phytonomus punctatus* at Barrington, N. Y., in July 1881. B: P. M. (3326)

Riley, C: Valentine. A new rice stalk-borer: genus-grinding. (Amer. nat., Dec. 1882, v. 16, p. 1014-1015.)

Extract from author's "The rice stalk borer" . . . (Rept. U. S.) commiss. agric., for 1881 and 1882, 1882 [Jan. 1883] [Rec., 3332], p. 134-135, with additional remarks; *chilo oryzaeellus* = *diphryx prolatella*; the genus *diphryx* stated by Lord Walsingham [T: de Grey] to have been founded by A: R. Grote on a mutilated specimen (as suspected by the author), with mistake of maxillary for labial palpi. B: P. M. (3327)

Riley, C: Valentine. A new species of oak coccid mistaken for a gall. (Amer. nat., June 1881, v. 15, p. 482.)

Description of *kermes galliformis* n. sp., occurring on *quercus palustris* in the southern and central U. S.; the coccid often infested by *euclemensia bassettella*.

B: P. M. (3328)

Riley, C: Valentine. The osage orange sphinx. *Sphinx hageni* Grote. (Rept. [U. S.] commiss. agric., for 1881 and 1881, 1882 [Jan. 1883], p. 193-194, pl. 12, fig. 2.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 193-194 [133-134], pl. 12, fig. 2.)

List of insects injurious to *maclura aurantiaca*; geographical distribution and classificatory relations of *sphinx hageni*; references to other accounts of this insect; description and figures of larva and imago.

B: P. M. (3329)

Riley, C: Valentine. Other insects injurious to growing rice. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 138, pl. 7, fig. 4-5.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 138 [78], pl. 7, fig. 4-5.)

Habits and food-plants of *Iophygma frugiperda*; occurrence of certain other insects doing minor damage on rice plants.

B: P. M. (3330)

Riley, C: Valentine. The rice grub. *Chalepus trachypygus* Burm. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 128-129, pl. 6, fig. 5.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 128-129 [68-69], pl. 6, fig. 5.)

Report of L. O. Howard on the habits and ravages of and means against *chalepus trachypygus*; references to earlier observations; structural characters and geographical distribution of the genera *cyclocephala* and *chalepus*; description and figure of larva and imago of *ch. trachypygus*.

B: P. M. (3331)

Riley, C: Valentine. The rice stalk borer. *Chilo oryzaecllus*, n. sp. (Rept. [U. S.] commiss. agric., for 1881 and 1882 [Jan. 1883], p. 133-135, pl. 7, fig. 1) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 133-135 [73-75], p. 3 [167], pl. 7, fig. 1.)

Extract, with additions, by author, entitled "A new rice stalk-borer: genus grinding." (Amer. nat., Dec. 1882, v. 16, p. 1014-1015.)

Description and figures of larva, pupa and imago of *chilo oryzaecllus* n. sp. = *diphryx prolata*; report of L. O. Howard upon its habits, enemies and ravages, and means against it; structural characters of the genus *diphryx* stated by Lord Walsingham [T. de Grey] (as suspected by author) to have been founded by A. R. Grote on a mutilated specimen, with mistake of maxillary for labial palpi.

B: P. M. (3332)

Riley, C: Valentine. The urena anomis. *Anomis erosa* Hub. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 167-170, pl. 8, fig. 1.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 167-170 [107-110], pl. 8, fig. 1.)

Detailed comparison of eggs of *anomis erosa* and *aletia xyliana*; figures and description of all states of the former species; seasons, habits and food-plants of this insect.

B: P. M. (3333)

Riley, C: Valentine. The vagabond crambus. *Crambus vulgivagellus* Clem. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 179-183, p. 3, pl. 10, fig. 2.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 179-183 [119-123], p. [167], pl. 10, fig. 2.)

Civil and natural history of *crambus vulgivagellus*; habits, ravages and parasites of and means against this insect; description and figures of egg, larva and imago; figures of cocoons and injured grass; description of pupa; list of articles written concerning this insect; similarity of habits of *crambus warringtonellus* of England to habits of *c. vulgivagellus*.

B: P. M. (3334)

Riley, C: Valentine. The "water-weevil" of the rice plant. (Amer. nat., June 1881, v. 15, p. 482-483.)

Extract, in author's "The water-weevil. *Lissorhoptus simplex* Say." (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 130-133.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 130-133 [70-73].)

Remarks on the injury done to rice-plants by the larvae of *chalepus trachypygus*, and by other larvae formerly suspected to be those of *spalacopsis suffusa*, but now supposed, on the testimony of J. Screeven, to be larvae of *lissorhoptus simplex*; letter from J. Screeven, embodying the above testimony; seasons, habits and ravages of the last mentioned species.

B: P. M. (3335)

Riley, C: Valentine. White blast. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 136-137.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 136-137 [76-77].)

Letter from J. Screeven and report from L. O. Howard on the phenomena and supposed causes of "white blast" in rice plants; insects found on rice plants; probable production of white blast by insects.

B: P. M. (3336)

Schiemenz, Paulus. Ueber das herkommen des futtersaftes und die speicheldrüsen der biene nebst einem anhang über das riechorgan. (Zeitsch. f. wissensch. zool., Feb. 1883, bd. 38, p. 71-135, pl. 5-7.)

Abstract by G. Dimmock, entitled, "Salivary glands in bees." (Psyche, Sept.-Oct. 1883, v. 4, p. 87-89.)

History of the subject; description of the salivary glands of *apis mellifica*, *bombus* and other bees, and of the digestive tract and olfactory organs of *a. mellifica*; discussion of the development and functions of the different salivary glands; decides that Engelmann's "neuroid filaments" are not of neural nature.

G: D. (3337)

ENTOMOLOGICAL ITEMS.

DR. JAMES SPENCER BAILEY, of Albany, N. Y., a lepidopterist well known to many of our readers, died 1 July 1883. Dr. Bailey was born in Albany, N. Y., 25 Feb. 1830.

THE BRITISH association for the advancement of science met 19 Sept. and days following at Southport. The assembly of German naturalists and doctors took place 18-21 Sept. at Freiburg-in-Baden.

MR. TOWNEND GLOVER, for a long time entomologist of the United States government, died 8 September, at Baltimore, Md. He was of English parentage and education, but came to this country when a young man.

HOWARD AYRES won the first Walker prize for 1883, awarded by the Boston society of natural history, by the presentation of a paper on the development of *Occanthus* and its parasite *Teleas*. One of the second Walker prizes was awarded to William Patton for a paper entitled "Notes on the development of *phryganidae*." Mr. Ayres and Mr. Patton were students of Harvard university and their success reflects much credit upon Dr. E. L. Mark, the present instructor in embryology at Harvard, who encourages his students to carry on original researches.

AT THE meeting of the French entomological society, held July 11, Mr. E. Lefèvre showed a large solitary ant allied to *Ponera*, found about Hong Kong, remarkable for the extraordinary development of its mouth parts, and for its power of leaping; being able, when disturbed, to make bounds of twenty to twenty-five centimetres. The statement was confirmed by the experience of earlier observers. As the legs are in no way developed for springing, Mr. Lefèvre was inclined to think that it was accomplished in some way by its buccal organs.—*Science*, 14 Sept. 1883, v. 2, p. 386.

DURING THE last few years *Papilio cresphontes* has been taken in Connecticut, but I do not find any record of its capture as far to

the northeast as Cambridge, Mass. On 9 Aug. of this year I took a specimen of that species in Cambridge, and saw another 21 Aug. A few days later another was seen. On 21 Aug. I received a note from Mr. F. G. Sanborn announcing the capture on that day, by Mr. A. H. Newton, at Worcester, Mass., of a worn *P. cresphontes*. Another interesting capture which I made this year (25 July) in Cambridge was *Junonia coenia*.—*G. Dimmock*.

AMONG EXCHANGES lately received by PSYCHE special mention ought to be made of 33 books and pamphlets sent by the Colonial museum of New Zealand. Among these is a "Manual of the New Zealand coleoptera" by Captain Thomas Broun, containing 744 pages. Professor F. W. Hutton writes of it, before the publication of Part 2, in which the number of species reaches 1321, that it is "a most excellent work, containing 1050 species, a large part of which are described for the first time, and that no country outside Europe and the United States has produced such a catalogue." Another interesting paper is Professor Hutton's "Catalogues of the New Zealand diptera, orthoptera, hymenoptera; with descriptions of the species."

MR. F. H. SPRAGUE gives us the following notes upon rare diurnal lepidoptera which he has taken the past summer in Massachusetts. *Grapta faunus* (a pair), Leverett, 15 Aug. *Limnitis proserpina* (faded ♂), Holyoke, 8 Aug. *Argynnis atlantis* (several), Leverett, Mt. Tom, Mt. Holyoke, 7-17 Aug., appeared much earlier. *Euptoieta claudia*, Malden, a fine new ♂ each of the following dates: 17 and 27 July, 1 Aug., 7 Sept. *Junonia lavinia*, Malden, a fresh pair 21 July, one fresh specimen 21 Aug.; Jamaica Plain, a new ♂, 18 July; Boston, a new specimen, 18 Sept. *Limnitis arthemis*, Malden, a poor ♀, 1 Aug.; Amherst, 2 fair ♀, 7 Aug.; South Hadley, a new ♂, 7 Aug.; Deerfield, a new ♂, 17 Aug. *Fenisea tarquinus*, Leverett, 7 fair specimens, 10 Aug.; Deer-

field, 15 fair specimens, 17 Aug. *Vanessa milberti* has been abundant in some localities about Boston this season. Another rare capture was two partly grown larvae of *Citheronia regalis*, at Leverett. 15 Aug.

DR. HERMANN MÜLLER, of Lippstadt, Germany, who has made many interesting and valuable contributions to scientific literature upon the mutual relations of insects and plants, especially upon the fertilization of plants by insects, died at Prad, in Tyrol, 25 August. His name heads over fifty titles of the bibliographical record of volume three of PSYCHE, and the name of his brother, Dr. Fritz Müller, of Blumenau, Brazil, about twenty more. Dr. Hermann Müller has contributed largely to Just's *Botanischer jahresbericht*, to *Nature* and to *Kosmos*; and, among other separate works, may be noted his excellent treatise on the fertilization of flowers by insects and their mutual adaptation for that function. The above statements convey only an imperfect idea of the amount, and almost no idea of the value of the papers written by Dr. Müller, whose death will be mourned by his numerous correspondents and by naturalists in general as the loss of a true philosopher in his special field of research.

G. D.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass., at 7.45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884.
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

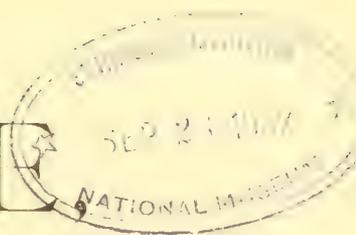
G. J. BOWLES, *Secretary*.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary*.

No. III-II2 were issued 14 Sept. 1883.

PSYCHE



A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lausing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 115-116.

NOVEMBER-DECEMBER 1883.

CONTENTS:

ADVERTISEMENTS	102
A NEW SEXUAL CHARACTER IN THE PUPÆ OF SOME LEPIDOPTERA— <i>Joseph Albert Lintner</i>	103-106
TRIBUTE TO THE MEMORY OF JOHN LAWRENCE LeCONTE— <i>Charles Valentine Riley</i>	107-110
GILLS OF INSECT-LARVÆ— <i>George Macloskie</i>	110-112
THE SCREW-WORM FLY, <i>COMPSOMYIA MACILLARIA</i> — <i>Samuel Wendell Williston</i>	112-114
INFLUENCE OF COLOR ON INSECTS	114
TOWNEND GLOVER	115-116
PROCEEDINGS OF SOCIETIES.—Cambridge Entomological Club	116
BIBLIOGRAPHICAL RECORD, no. 3338-3353	117-118
ENTOMOLOGICAL ITEMS—Society Meetings	119-120

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,
CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, . . . 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,

Carlstrasse 11, Berlin, N. W.

EARLY STAGES OF BUTTERFLIES WANTED.

The undersigned desires to obtain, by exchange or otherwise, from all parts of the world, eggs, caterpillars and chrysalids of Diurnal Lepidoptera. Dried specimens are preferred, especially of caterpillars, which should be prepared by inflation. Correspondence is invited with persons engaged in the study of the early stages of butterflies.

S. H. SCUDDER,

Cambridge, Mass.

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,

Department of Entomology,

The Cornell University,

Ithaca, N. Y.

R. FRIEDLÄNDER & SOHN, Berlin N. W., Carlstrasse 11.

Natural History and Natural Science Booksellers established since 1827.

Largest stock of the whole Literature of Natural History and the Exact Sciences.

Apply for classified catalogue in 25 parts (each one special department of science), price 10 c. each.—Just published. Part IX. *Entomology 1.* (General Entomology.—Coleoptera.) 46 p. about 2000 works.—X. *Entomology 2.* (Lepidoptera), comprising among others the library of the late Prof. P. C. Zeller, 30 p., about 1300 works.—XI. *Entomology 3.* (Hymenoptera, Neuroptera, Orthoptera, Diptera, Hemiptera, Parasita.) 34 p. about 1500 works.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper, \$3.30 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the SCIENTIFIC AMERICAN sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 261 Broadway, New York.

PSYCHE.

A NEW SEXUAL CHARACTER IN THE PUPAE OF SOME LEPIDOPTERA.

BY JOSEPH ALBERT LINTNER, ALBANY, N. Y.

[Read before the American association for the advancement of science at its
Montreal meeting, August 1882.]

The sexual characters of insects have always been an interesting study to the entomological student, the more so as they are the less apparent, and discoverable, if to be found at all, only as the result of close observation and comparison. In the larger proportion of insects, in the perfect stage, they are so marked as to leave no doubt of the sex when the male and female are compared. Thus, in the hymenoptera, we have the ovipositor in its varied forms, often quite conspicuous. In the lepidoptera, among the *heterocera*, there are usually the more fully developed antennae of the male, and the broader, conical and more capacious abdomen of the female—features attaining their maximum development in the family of *bombycidae*. In the diptera, there are the larger and more approximate eyes in the male, and conspicuous structural differences in the antennae and suctorial apparatus in some of the families. In the coleoptera, there are often, in the male, stouter legs, broader tarsi, greatly elongated mandibles and other horn-like capital and thoracic processes. In the hemiptera, the vocal organs in the *ficadidae*, the ovipositor in several of

the families, and the great sexual differences in size and in the presence or absence of wings are prominent features. In the orthoptera, there are the stridulating wing-nerves, the extended ovipositor, and a genital armature greatly varied in its adaptation to greatly differing habits. And in the neuroptera, distinctive male characters are found in clasping organs, in differences in color and in size, the long mandibles of *Corydalus*, the abnormal location of the intromittent organ in *libellulidae*, and in the elongated and forcipated genitalia of *Panorpa*.

In addition to such primary features as above noted, there are numerous secondary ones, which do not appear to be so dependent upon sex, and many of which seem almost to serve no higher purpose than that of ornamentation. Yet it is reasonable to believe that most of these differences have their use in the economy of nature, and that they aid in the continuance of the species.

Among such minor antigenetical features, may be mentioned, in the lepidoptera, the usually more angulated wings of the male; the simple frenulum of most of the male *heterocera* in con-

trast with the compound one in the female; the hairy anterior legs of *Grapta* and *Vanessa* in the *nymphalidae*; the long hairs between the costal and subcostal nervures, above the cell of the hind wings of *Argynnis*, appearing, when extended in the cabinet, like a long fringe to the inner margin of the front wings; the incassated, black scale-patch upon the middle of vein 2 (the 1st median nervule) of the secondaries of *Danaïs*; the ovoid discal spot on the front wings of many of the *theclinae*; in the *hesperidae*, the reflexed costal margin in most of the *Nisoniades*, *Eudamus*, and *Pyrgus*, and the tibial epiphysis¹ of the anterior legs in all but one of our genera; the transverse discoidal stigma on the primaries of the larger portion of our pamphilas, the beautiful and peculiar microscopic (often concealed) scales, or androconia, of many of the butterflies; the usually concealed pair of extensile anal appendages found by Fritz Müller and others in certain *glaucoptidae*, *bombycidae*, *noctuidae* and in a *Danaïs*;² each of these indicating the male sex. Features equally interesting, and alike serving no purpose so far as known, might be mentioned in each of the orders of insects.

In the earlier stages of insects (egg and larval), sexual features, as would naturally be expected, are less numer-

ous and less conspicuous. They rarely occur in the first stage—that of the egg, or more properly, they have not, in many instances, been recognized by us.³

It was for a long time believed that in the larva of one of our *sphingidae* not unfrequently met with—*Thyreus abbotii*—the sex was so clearly indicated by difference in color and pattern that it could be told at a glance. Of the two greatly differing forms, the one marked with a series of large yellow-green patches on the dorsum extending half-way down the sides, and with another row of smaller subtriangular similarly colored spots resting on the prolegs, was described by Clemens as the male; the female being reddish-brown throughout, with a dark brown subdorsal stripe and numerous short broken striae.⁴ This sexual determination of Clemens was accepted by me in my paper upon the larvae and pupae of this species in the 26th Report of the N. Y. state museum of natural history, p. 114-116, and has also been followed by other writers. That the two forms are indicative of sex, has since been denied,⁵ and it is to be presumed that the denials are based upon results obtained in rearing them to their perfect form. The green-spotted larva may therefore be accepted as a dimorphic form, comparatively

¹ Guenée: Hist. nat. ins., 1852—Lepid., v. — Noct., 1, p. xxxv. Speyer: in Canad. entomol., 1878, v. 10, p. 124. Edwards' Catal. lep. Amer., 1877, p. 64.

² Fritz Müller: Nature, 11 June 1874, v. 10, p. 102 (Psyche, Mch.-Apr. [9 July] 1877, v. 2, p. 24). Morrison: Psyche [9] Oct. 1874, v. 1, p. 21-22. Siewers: Canadian entomologist, Mch. 1870, v. 11, p. 47-48, fig. 12. Stretch: Papilio, Feb. 1883, v. 3, p. 41-42, fig.

³ In *Phylloxera*, the eggs which are to produce males and females may be known by their difference in size. See Riley's Annual reports of the state entomologist of Missouri: 6th, p. 41; 7th, p. 62, 68; 8th, p. 158.

⁴ Two colored figures of the larva: in my possession, made by Dr. Clemens, show the sexes the reverse of this—the green-spotted one, marked as ♀, being much the larger of the two.

⁵ Whitney: Canadian entomologist, April 1875, v. 8, p. 75-76. Grote: *id.*, May 1876, p. 100.

rare in my own collections and in the examples that have come under my observation.

The young collector of insects learns very early the simple method of determining the sexes of his *Luna*, *Polyphemus*, *Promethea*, and *Cecropia* pupae, and of many other bombycid pupae, by observation of the comparative breadth of their antennal cases.

A means by which the sex in the pupae of the *sphingidae* may be infallibly named, was pointed out by me in the Proceedings of the entomological society of Philadelphia, 1864, v. 3, p. 654. I have since found the same characters applicable to the *noctuidae* and to other *heterocera*.

Dr. C. V. Riley, in the Transactions of the academy of science of St. Louis, 1873, vol. 3, p. 128-129, and in the 6th annual report of the state entomologist of Missouri, for 1873, 1874, p. 131-132, has described and figured sexual differences in the pupae of *Pronuba yuccasella*, consisting, mainly, in the greater length of the "dorsal projections" on the several segments of the male, in the length of the last two segments as compared with those of the female (its shorter 11th and longer 12th), and in its less rounded apex. He says: "sexual distinctions are very rarely observable in chrysalids; but after I had learned to distinguish between them, I could readily separate the sexes in this case, and my judgment was confirmed upon the issuing of the moths."

A few years ago I discovered an interesting feature in the armature of the species of *Cossus*, by which the sex

may at once be determined. I have, hitherto, withheld its publication, until I had studied others of our spined pupae and could illustrate this feature by proper figures; but the opportunity for this has not been found, and I accordingly defer no longer calling attention to it, that the observations of others in possession of more abundant material may supplement the few that have been made by me.

It is known to lepidopterists that most of the pupae of the species of moths which in their larval stage live in the interior of stems of plants and trunks of trees (endophytes), are armed upon their abdominal segments with transverse rows of teeth or spines, by the aid of which, when they are in readiness for their final transformation, they gradually work their way through the outer packing of their gallery and the bark, project their anterior segments to at least one-third the entire pupal length through the opening, and hold themselves securely during the eclosion of the moth.

This useful armature in the *cossinae*, and in such of the *aegeriidae* as I have had the opportunity of examining, consists of two rows of spines upon most of the abdominal segments, dividing them, when seen in extension, in three nearly equal parts. In *Cossus robiniae*, the species of the *cossinae* with which we are probably the most familiar, these rows occur on the fifth (the first stigmatal segment posterior to the wing-cases) and the following segments.

In *Cossus querciperda* alone of the

species known to me, they commence in a single row of minute dentations on the fourth segment. The principal features of this armature are the following:—It is always the stronger in the male sex—conspicuously so in *C. robiniae*, but less so in *C. centerensis*: the teeth increase in size from the fifth to the tenth segment: the anterior row is always the stronger in each sex; upon the fifth and sixth segments, it does not, in its lateral extension, reach below the stigma,⁶ while upon the following segments it passes in front of the stigma and quite a distance beneath it: the posterior row is discontinued before reaching the line of the stigmata: the teeth show irregularity in form and size, particularly those of the posterior row.

The sexual distinction above referred to, presented in this armature, is this: in the male pupae two rows of teeth occur on segments five to ten inclusive; in the female, two rows on five to nine inclusive. In other words, *the male pupa shows two rows of teeth on segment ten, where the female shows but one*. In each sex, the eleventh and twelfth have but a single row. Disregarding, as I think we should in ordinary usage, the subdivision of what is usually known as the terminal segment, into demi-segments, or a segment and a subsegment, and that still farther refinement which would make of the extreme portion an additional segment with full numerical designation, then it will serve to prevent misapprehension of the parti-

cular section showing the sexual feature, if we indicate it as the *antepenultimate segment*. It would be the eleventh, if we commence enumeration, as some of our entomologists do, with the head, but the tenth, if, as seems to me more proper, we begin with the first thoracic ring.

Beside the *rossinae*, this same sexual feature occurs in the *aegeriidae*. I am not able to say if it extends throughout the entire family. At the time of this present writing, I have at my command only the pupae of *Aegeria exitiosa* and *A. tipuliformis*, and it exists in each. It probably occurs in the pupae of *Zeuzera* (one North American species described), in which the two rows of teeth are found on several of the segments, and perhaps also in *Hepialus*, the pupae of which (unknown to me) are characterized as very similar to those of *Cossus*.

Another interesting fact connected with the armature of *Cossus* is that the form, size, and position of the teeth vary to so great an extent in the different species, and show such distinctive characters, as to afford excellent specific features.⁷ I would not hesitate to pronounce upon specific identity, upon an examination and comparison of the pupal armature alone.

⁷ For comparison with other species of the *rossinae* it may be stated that an example of *C. centerensis* ♂ has thirty-eight teeth in the anterior row of the tenth segment, and twenty teeth in the posterior row—the latter, in their entire range, occupying a transverse space equal to that of nine teeth of the anterior row. The teeth are black, shining, irregular in size, and are slightly bent upward over their base; their length and the distance between their tips exceeds their basal width.

⁶ In *C. centerensis* it reaches below the stigma on the sixth.

TRIBUTE TO THE MEMORY OF JOHN LAWRENCE LECONTE.

BY CHARLES VALENTINE RILEY, WASHINGTON, D. C.

Dr. John Lawrence LeConte died at his residence in Philadelphia, 15 Nov. 1883. Nothing that we can say will render the memory of him more lasting or more dear, for he achieved pre-eminence in his chosen field of labor and won the love and respect of all who knew him.

LeConte was born in New York, 13 May 1825, and was graduated *M.D.* by the College of physicians and surgeons in 1846. He moved to Philadelphia some years later, and after his marriage abandoned the practice of medicine. He was lieutenant-colonel and medical inspector in the United States army during the civil war and, from 1878 till the time of his death, chief clerk in the United States mint at Philadelphia.

Luckily for American natural science his fortune was such that, with these two exceptions, he held no positions, but was able to devote his time to entomology. His chosen specialty was the coleoptera, and in order to fully appreciate the magnitude of the work which he accomplished and the difficulties with which he had to contend, it is necessary to consider the state of entomology in this country as compared with Europe at the time he began to write, now almost forty years ago. Great activity at that time prevailed in Europe in all branches of entomology. In descriptive coleopterology Aubé, Erichson, Germar, Klug, Lacordaire, Mannerheim, Mulsant, Schönherr, Ser-

ville, Solier, Stephens and others were active at that period. Others equally eminent had died shortly before and many came into prominence shortly afterward. Naturalists there were aided as well by the large number of skilled and enthusiastic amateurs who furnished an abundance of material and observations, as by the numerous large libraries, public museums and private collections to which they had access. Numerous entomological societies also brought the workers together, gave stimulus and encouragement and offered ready means of publishing.

How different the circumstances in America at that time! In the whole country there were no more persons scientifically interested in entomology than could be found in a single large city of Europe. The larger libraries were scant of entomological literature and there were neither standard nor public collections and but few private collections, of limited size. The most important of the older collections, viz., that made by Thomas Say, had been irretrievably lost through carelessness and indifference, while other valuable collections had shared no better fate. Contributions to the knowledge of our coleopterous fauna consisted chiefly of disconnected descriptions of single species scattered through all sorts of publications. "Can it be wondered at," LeConte wrote in one of his earliest papers, "that there is so much confusion

about the synonymy of our species, when they are published in every country of the globe, but in that in which they ought to be published?" The thankless task of identifying and correctly interpreting these descriptions, involving so much labor and patient study, was performed almost alone by LeConte, and so well that but few species of the older authors remain to-day unidentified. LeConte clearly saw from the beginning that American coleopterology could not be so much advanced by mere descriptions of new species and genera as by conscientious monographic work. The number of such monographic and synoptic papers published by him was great. Of special importance among his earliest papers are those on the *pselaphidae*; on the classification of the longicorn coleoptera, and of the *carabidae*; on the *elateridae* and on the *melolonthidae*. In 1861 his "Classification of the coleoptera of North America," prepared for the Smithsonian institution, began to appear. This work, though left incomplete until recently, was indispensable to every student of systematic coleopterology, and necessitated the publication of the "New species of North American coleoptera" and the "List of the coleoptera of North America," both issued by the Smithsonian institution.

His entomological writing was interrupted during the civil war, but was resumed again in 1865. From this time on he had the coöperation of Dr. George Henry Horn, who, from the beginning of his entomological career, was a faithful co-laborer with LeConte. Indeed the

friendship and coöperation that always existed between these two specialists is one of the most pleasing and instructive incidents in the history of American entomology. LeConte must have felt proud of the excellent work done by the younger naturalist, and the manner in which Horn's more advanced views and often more thorough labors—made possible by accumulated knowledge and material—were accepted, even where they undid much of his previous descriptive work, was one of the truest marks of greatness in LeConte. The most important papers of this later period are those on the classification of the rhynchophorous coleoptera, and more especially "The *rhynchophora* of America north of Mexico," by John L. LeConte, assisted by George H. Horn, published in 1876 as vol. 15 of the Proceedings of the American philosophical society: a work which involved years of patient research and the value of which has not yet been fully recognized abroad. The last important work is the second and completed "Classification of the coleoptera of North America," by LeConte and Horn.

The list of Dr. LeConte's entomological writings has been carefully compiled (up to 1878) by Mr. George Dimmock, in his Special bibliography, no. 1, and the actual amount of his descriptive work is well illustrated in Mr. Samuel Henshaw's "Index to the coleoptera described by J. L. LeConte, M. D." An additional paper by LeConte, to be published in the Transactions of the American entomological society, was about to be published at the time of his

death, so that he may virtually be said to have died in harness.

This brief reference to his published papers reflects but feebly the character and value of LeConte's life and work. Throughout his writings there is the evidence of a calm, dispassionate, well-balanced and philosophic mind, which, added to their accuracy, made him from an early day the leading authority on North American beetles the world over. Beginning when the idea of fixity of specific type was general, he easily followed the advance of evolutionary ideas, conforming his later work thereto, acquiescing and assisting in the "sinking" of his early species founded on too trifling variations.

His non-entomological writings evince culture, breadth of view and that rarest of qualities in specialists, common sense. He was not of the class who decry the practical application of knowledge as ignoble, but he felt rather that such application to man's wants is one of the aims of science. Thus he was always interested in the economic bearings of his favorite study and made several most valuable suggestions in his "Hints for the promotion of economic entomology in the United States" and his "Methods of subduing insects injurious to agriculture."

He was likewise for some years actively interested in endeavors to elevate the United States Department of agriculture, and was a candidate for the office of commissioner in 1877. As president of the American association for the advancement of science in 1874, and the first president of the Entomolo-

gical club of that association, he took an active part in the attempt to bring about uniformity of terminology and the adoption of some general rules of nomenclature. He prepared, in conjunction with the writer, a memorial which in 1875 was signed by many members of the association praying Congress for the creation of a special entomological commission on a plan that would have been in many respects preferable to that upon which the United States entomological commission was finally created in 1877.

LeConte's taste for natural science was evidently inherited, and the family name is honored by several eminent scientists still living in this country and all of them, we believe, not very remotely connected. His father was a distinguished naturalist, and we were astonished at the beauty and accuracy of many of his yet unpublished drawings and paintings of animals which the son once showed us.

Few contemporary naturalists were better or more favorably known abroad than Dr. LeConte, and he was the first American elected to honorary membership of the Entomological society of France.

At a time when there was no national museum, before Dr. Horn had earned the fame he so richly deserves, and when the American entomological society showed no promise of being able to appreciate or properly care for his valuable collection Dr. LeConte bequeathed it to the Museum of comparative zoology, at Cambridge, where in Dr. Hagen's care it will form the most

precious systematic part of the Entomological department. When will our National museum fully warrant its name by becoming the one legitimate and most satisfactory repository of all such collections in whatever branch of science?

In closing this brief notice of one whose personal relations and whose appreciative and instructive correspondence with the writer during the past fifteen years will ever remain a green and pleasant memory, we would emphasize the fact that his writings throughout breathe a calm and judicial spirit, void

of personality. The only instance that occurs to us where he gave expression to ruffled feeling is in the "Synopsis of the coleopterous insects of the group *cleridae* which inhabit the United States" (*Annals lyceum nat. hist. N.Y.*, April 1849, v. 5, p. 9-35). In the prelude to this paper he indulges in some severe reflections on the exclusive attitude of the Latin or South European countries toward the scientists of other countries, more particularly as exemplified by Spinola's work—reflections not altogether unwarranted even at the present time.

GILLS OF INSECT-LARVAE.

BY GEORGE MACLOSIE, PRINCETON, N. J.

The gills of aquatic larvae of insects consist of elastic sacs arising as out-growths of the epidermis and enclosing a system of fine branches from the air-tubes or tracheae, being thus pneumatic branchiae. They vary greatly in the number of the sacs, in the number and complexity of the enclosed air-tubes, and in their position. In the *elmidae* (of coleoptera) they are simple and are distributed ventrally on the abdomen; in *Ephemera* (of neuroptera) they are also simple, and extend from the sides of the abdomen; sometimes they are caudal appendages, and in the *libellulidae*, or dragon-flies, they become complex, having in some cases many sac-like lamellae, and many hundreds of branches in each, the whole structure implanted within the rectum, from the walls of which the lamellar sacs open like so many pockets.

These structures have been described by Réaumur, Léon Dufour, Audouin, Oustalet,¹ and many others. Our present purpose is to rectify an error in their anatomy, as usually represented, which has important bearings on other questions.

It is usual to describe the laminae of the pneumatic gills as containing systems of fine tracheal loops, somewhat after the pattern of a plurality of carbon-wicks in an Edison lamp. Oustalet says, for example, in the *Annales des sciences naturelles* (1869, s. 5, v. 11), that the branchial laminae "include a veritable *chevelu* of tracheae folded on themselves so as never to reach the extremity of the fingers of the glove;" and that they serve as a loose sheath

¹ *Ann. des sci. nat., Zool.*, 1852, s. 3, v. 17; 1862, s. 4, v. 17; 1869, s. 5, v. 11; 1872, s. 5, v. 16.

for a tracheal *arbuscle* (shrubbery) whose last ramifications are not only recurved but anastomosed so as to complete the circuit (*à plein canal*), thus forming veritable arches (*anses*). His figure agrees with his descriptive representation, showing the very numerous ultimate branches of the tracheae as completely arched, and his idea evidently was that there is a capillary circulation of air in the tracheal tubules like the capillary circulation of blood in the gills of fishes.

Chun² correctly shows that the rectal branchiae of *Libellula* are outgrowths of the [hind] intestine, having at their extremity no epithelial cells, but only the intima (or cuticle) enclosing the tracheal filaments. The epithelium gradually grows thinner from the base towards the extremity of the branchial laminae, and at length disappears, being afterwards represented only by the cuticle. The tracheae divide dichotomously, finally becoming capillary air-tubes, which this author also (being here inaccurate) supposes to reunite again into stronger stems. This part of his plate is so confused that one cannot make out whether the branches reunite again or not, and we presume that he did not try to follow them to their extremities.

In a specimen of these branchial laminae which we rolled under the cover-glass, we found that the multitude of tracheal ramifications ended

caecally; all were of about the same length, their extremities recurved within the containing sac, and their tips not at all swollen, but rounded off. Thus if they were stretched out they would form a brush like the hairs of a horse's tail. As they are elastic and the enclosing sac is distensible, we think it highly probable that with each water-inspiration the sacs enlarge and the tracheal spray (having air forced in by the forward compression of the large tracheae) spreads out so as to bring the full tide of air close to the tide of water. Léon Dufour seems to have had some process like this in view when he said that each lamella of the branchia of *Potamophilus* is "probably swollen during life by air transmitted by endosmosis." As we understand the case, the air is injected into the branchiae from the rest of the body by rhythmical contractions, and its gases then communicate endosmotically with those in the tidal water, so as to secure renovation.

The paper by N. and E. Joly on the larva of *Prosopistoma*³ confirms our observation. This larva was supposed by Latreille, Duméril and Milne-Edwards to be a branchiopod crustacean, and is so described in Milne-Edwards' *Histoire des crustacés* (v. 3, p. 558). But MM. Joly found out that it was the larva of a coleopterous insect,⁴ and they figure and describe its external

² CHUN, Carl. Ueber den bau, die entwicklung und physiologische bedeutung der rectaldrüsen bei den insekten. Inaugural-dissertation. . . . Frankfurt a. M., 1875.

³ Joly, N. and E. Etudes sur le prétendu crustacé au sujet duquel Latreille a créé le genre *prosopistoma*, et qui n'est autre chose qu'un véritable insecte hexapode. (Ann. des sci. nat., Zool., 1872, s. 5, t. 16, no. 7, p. 1-16, pl. 13.)

⁴ It is in fact one of the *ephemeridae*.

tracheal branchiæ, showing that the branches of the tracheæ end caecally. In this case the branches are so few that their terminations can be easily made out.

The importance of this anatomical item depends on its bearing on the functions of the whole tracheal system. The action of the tracheæ is tidal rather than by peripheral capillary circulation. Here also the endings of the ramifications are found to harmonize with their internal terminations along the nervous and digestive tracts, and in other parts of the tissues which they supply. We never find a double system of tracheæ with capillary rami-

fications interposed for the transmission of air from one system to the other. It is not easy, in the living insect, to determine the ebb and flow directly; as the movements occur suddenly, have their speed multiplied by the degree of microscopic amplification; and hence we are able only to see the rhythmical peristaltic action, and are left to guess at its cause. We find, however, the muscular contractions and expansions of other parts of the body synchronizing with the pulsations in the gills, and thus explaining how the flux and reflux, rather than a mere circulation of the air, is the cause of its renewal.

Princeton, N. J., 12 Dec. 1885.

THE SCREW-WORM FLY, *COMPSONIA MACELLARIA*.

BY SAMUEL WENDELL WILLISTON, NEW HAVEN, CONN.

IN connection with Professor Snow's article on this fly¹ it seems worth while to give a brief synopsis of papers published in the past few years by the able dipterologist of South America, Dr. E. L. Arribáizaga, of Buenos Aires. From his studies he has ascertained no less than twenty-six different specific names that this fly had received! It is possible that some of these names would apply to distinct species were their types examined, but it is a thankless task to endeavor to make order out of the chaos in which Walker, Macquart, and Robineau-Desvoidy have involved the subject, and the result of Arribáizaga's thorough studies can with propriety be adopted.

To these results, however, Mr. J. Bigot, of Paris, has recently taken exception, in a note² on Professor Snow's paper. This author's penchant for making synonyms himself may perhaps have something to do with his wishing to preserve species founded on inadequate grounds. His argument that "il me semble fort hasardeux d'avancer qu'un seule et même espèce se retrouve, en permanence, depuis les confins de la Patagonie jusqu'au delà des provinces centrales de l'Amérique du Nord, vivant indifféremment sous les zones torrides, tempérées et même froides?" is of little value, when the

¹ Psyche, Mar.-Apr. 1883, v. 4, p. 27-30.

² Bull. soc. entom. France, 12 Sept. 1883, no. 17, p. 154-155.

author himself should know that other American flies *do* have a similar range of habitat, to say nothing of the nearly allied *Musca domestica*.

The specimens which Professor Snow sent me for examination, although somewhat injured, certainly seem to me to be *Comptosmyia macellaria* (Fab.) E. Lch. A. The species may, with tolerable certainty, be recognized by its having a bright metallic green or coppery color on the abdomen and thorax, the latter above with three black stripes; the bristle of the antennae feathered to the tip, and the head, except the eyes, chiefly yellow. In size it varies from seven to ten millimetres.

However, these systematic details will be of less interest than the following, which I translate from the Spanish of Arribáizaga³:

“During the pleasant days of spring or the hotter ones of summer, these flies may be seen covering in great numbers, now umbelliferous flowers, now all sorts of filth; or, resting, there glistens in the sunlight the iridescent surface of their half-opened wings, and the blue, the green, the violet, the copper and the gold of their metallic colored bodies.”

“Our fly deposits its eggs, commonly called ‘*queresa*,’ in dead bodies, in manure, in fresh meat reserved for food, and soon there appear immense numbers of voracious larvae that rapidly consume the objects in which has begun their active life. Not content with these habits, common to all the species of

the group to which it pertains, it deposits the germs of its posterity in the wounds of men and of animals, at the entrance of openings of the human face, and, in its anxiety for propagation, will deposit them in the wool of sheep.”

“Azara was, I believe, the first observer who noted cases of human myiasis in South America. Coquerel, many years later, called the attention of physicians and naturalists to the frequent and fatal accidents which this evil produces among the exiles of Cayenne: according to this author, Dr. Chapuis, physician-in-chief of the French marine, attended one case in which the larvae of *C. macellaria* had penetrated to the frontal sinuses, causing the death of the patient; also one very unclean person attacked in the nasal fossae and the pharynx, who succumbed after he had ejected one hundred and twenty larvae. There were, as M. St. Pair observed, in the same country, six similar cases, of which three terminated in the death of the patients after cruel sufferings; in two the nose was destroyed, and in the last there was a deformation of the olfactory organ. In another case observed by M. St. Pair there were removed, by means of injections, more than three hundred larvae, but he was not able to obtain them all, and the remainder soon penetrated the ball of the eye, destroying the lower eyelid in consequence of gangrene, invaded the mouth, corroded the gums and laid bare the inferior maxillary; the victim died seventeen days after his entrance into the hospital.”

³ Anales de la soc. científica argentina, v. 10, p. 80-84.

After giving records of numerous other cases he further adds:

“To Dr. Lesbini, of Córdoba, are due the better observations upon cases of myiasis produced by *C. macellaria*. The first case presented itself in an old foreigner who had an ulcer in his leg filled with these larvae: the second case occurred in Córdoba, in a boy of seven years, attacked in the left ear; the third and last case was in a girl of sixteen years, also of Córdoba, affected in the nasal fossae by the presence of two hundred and fifty larvae: all these patients were saved.”

“It is probable that, attracted by the fetid odor of unclean individuals, these flies hover over the mouth or the nose,

and thus deposit their eggs; some affirm that they at times enter the passages for this purpose.”

“The area of distribution of *Comptosomyia macellaria* is very great, and will be, I believe, yet greater with time, since their habits facilitate their transportation by man from one region to another; hitherto they have been observed in the following countries: Islands of America (*Musca macellaria* F.), N. America (*Chrysomyia tibialis*, *C. thermicri*, *C. caerulea*, *C. decora* *C. placi* R.-Desv.), Mexico (*Lucilia hominivorax*), Cuba, Colombia, Venezuela, Cayenne, Brazil, Peru, Chili, Uruguay, Argentine Republic and New Holland.”

INFLUENCE OF COLOR ON INSECTS.—The following extract from the recently published second part of vol. 1 of “Timehri,” the Journal of the Royal agricultural and commercial society of British Guiana, so ably edited by Mr. E. F. im Thurn, may be of interest to our readers. It occurs in an account of a visit to Mount Russell in Guiana, by the editor (p. 223):—

“That afternoon the Indians of the place, seeing our interest in catching butterflies, exhibited various clever ways of entrapping these insects. To catch those of yellow hue, they picked and laid on the ground the flowers of a yellow *Bignonia* (*B. chicka*); and this proved a most successful plan. Equally successful were they when they laid decaying banana-skins on the

ground to attract the large blue *Morphos*; but an attempt to attract certain red species by displaying the ripe red fruit of the faroah plant (*Bixa orellana*) was not successful. Then, these methods of enticing the insects were completed by inverting a round quack (a wide-mouthed basket of very open wicker-work) over the bait, taking care to raise the quack so that its lower edge was some inches from the ground. The butterflies, attracted by the flowers, made their way under the raised edge of the quack, and when the Indians approached flew, not out under the edge of the quack, but upward into the top, where they were captured.”—E. C. R., in *Entomologist's mo. mag.*, June 1883, v. 20, p. 15-16.

PSYCHE.

CAMBRIDGE, MASS., NOV.—DEC., 1883.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

TOWNEND GLOVER.

Born Aug. 1812, in Rio de Janeiro, Brazil.
Died 7 Sept. 1883, in Baltimore, Maryland.

Among the recent deaths of naturalists we have now to chronicle that of Professor Townend Glover, which occurred in Baltimore, Maryland, 7 September 1883, at the residence of his adopted daughter, Mrs. Daniel Hopper.

Prof. Glover was born of English parents, at Rio de Janeiro, on the 11th (or 12th) of August 1812, and consequently at the time of his death was in his seventy-second year. He received his early education in England, completing his studies in Germany, after which his roving disposition brought him to North America, where, for a time, his horse, his rod or gun were almost constant companions. After marriage he settled at Fishkill-on-the-Hudson, devoting himself to amateur gardening and horticulture, and it was here that his tastes for entomology were developed. About 1853 he became connected with the Bureau of agriculture, then a division of the United States Patent office, spending several years in the south,—at one time visit-

ing Demerara for the purchase of sugar-cane for government experiment,—studying the habits of the cotton and orange insects, of which little had then been written, besides employing his time in other ways. The results of these investigations, as published in the reports of the Patent office from 1854 to 1858, are already well known to entomologists. Just prior to the war, Mr. Glover accepted a professorship in the Maryland agricultural college, where his great work on entomology was begun, he having previously learned engraving of Mr. Gavitt, of Albany, with this object in view. Upon the formation of the present United States Department of agriculture, he was appointed its first entomologist, which position he held until the spring of 1878, when ill-health compelled him to rest from his labors.

An observer contemporaneous with Harris, his first writings appeared in the *Cultivator* and similar journals of the time, though the great mass of his notes of investigation and observation were never given to the world, but remained locked in his work on American entomology, which he had hoped to complete and publish in his life-time. His "work" was his dream, and here for years he accumulated a mass of interesting facts, the publication of which, as discovered, would have made his name as an observer great indeed. Some of these facts have been given to the world in his published reports as United States entomologist, but the majority were withheld from publication,—awaiting the completion of his work—until, from time to time, many of his interesting discoveries were re-discovered and published by the army of careful observers who have come after him, and the credit has thereby been lost to him. Perhaps it was his over conscientiousness which kept him from "rushing into print," for he often underrated his own judgment in citing the histories of insects he had carefully reared and observed, rather preferring to give the experience of another with full credit, than to use his own material.

Susceptible to the world's praise, he shrank from its censure, which alone may be given as a reason for his never having named a species, or, to use his own words, helped to mix up the nomenclature.

Of his labors only those who were intimately associated with him will ever know how untiring and persistent—even methodically so—were his efforts. For years, all the available moments of daylight, “out of office hours,” were given to engraving the copper plates; the evenings were devoted to writing, while into that uncertain limit ‘twixt bedtime and the time for blowing out the candle, were crowded all his mental recreation, reviewing of new books, reading the magazines and the *Herald*, or, sometimes, even a popular novel.

Whether his work will ever be given to the world or not, in its entirety—despite the efforts of some to belittle it—it is simply a colossal encyclopaedia of American entomology, comprising names, derivations from the Latin or Greek, and synonyms of thousands of species of insects, with histories, food-plants, remedies, habitat, etc., a library in itself, complete in detail, and comprehensive in inception to a wonderful degree. It is now in the possession of the United States government, and its great size will doubtless be the chief obstacle in the way of its publication.

CHARLES RICHARDS DODGE.

The complete set of illustrations comprises 273 quarto plates with 6179 figures, engraved on copper, and covering the following subjects:—

	Plates.	Figures.
Lepidoptera	135	2631
Coleoptera	49	1627
Diptera	13	520
Hemiptera	16	461
Hymenoptera	10	346
Orthoptera	18	281
Neuroptera	7	92
Cotton and its insects	22	215

Only 15 complete copies (author's proofs) of the work are in existence, six of which are in Europe and nine in this country. In general not more than 50 copies of any work were printed, the text being lithographed from the author's manuscript.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

13 APRIL 1883.—The 92nd meeting of the Club was held at 19 Brattle Square, Cambridge, 13 April 1883. In the absence of the President, Mr. Hayward was chosen Chairman. Five members were present.

Mr. S. H. Scudder showed a collection of colored figures of North American coleoptera, hymenoptera and diptera, drawn by Maj. LeConte, and now belonging to Dr. J. L. LeConte.

Mr. G. Dimmock read a paper on “The cocoons of *Cionus scrophulariæ*.” The cocoons of this European species of *curculionidae* imitate the fruit of *Scrophularia nodosa*. A sprig of *Scrophularia*, with cocoons of *Cionus* upon it, was shown. [The paper will appear in *Psyche*, v. 3.]

Mr. S. H. Scudder called attention to B. N. Peach's paper, entitled, “On some fossil myriapods from the lower old red sandstone of Forfarshire” (*Proc. Roy. phys. soc.* [Edinb.], 1881-1882, p. 177-188, pl. 2) in which two fossil myriapods from the devonian of Scotland are described. These two myriapods (*Kampecaris forfarcensis* and *Archidesmus macnicoli*) are probably the oldest insects known.

WE HAVE received the first seven numbers of the *Practical naturalist*, a monthly which Ward and Riley have started at Bradford, England. It consists of twelve octavo pages monthly, neatly printed and in a tasty cover, at the remarkably low price of 1s. 6d. [37½c.] (postpaid) to the United States, or Canada. The publication is “devoted to the assistance and encouragement of lovers of nature,” and contains interesting original notes on entomological subjects. The editors ought, however, to exercise more care in proof-reading. The International news company, of New York, are American agents for the sale of this paper.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Packard, Alpheus Spring, jr. Descriptions of some new ichneumon parasites of North American butterflies. (Proc. Boston soc. nat. hist. [16] Aug. 1881, v. 21, p. 18-38.)

Crit. rev. by C: V. Riley, entitled "Notes on microgasters." (Amer. nat., Aug. 1882, v. 16, p. 679-680.)

Describes *ophion tityri* (from *eudamus tityrus*), *campoplex pieridicola* (from *peris rafa*), *ichneumon hunterae* (fr. m. *pyraevis hunterae*), 1. sp., *t. tharotis* (from *milata tharas*), *microgaster carinata* (from *pyraevis atalanta*), *m. pieridis* (from *peris rafa*), *m. atalantae* (from *pyraevis atalanta*), *m. carduicola* (from *p. cardui*), *m. lunatus* (from *papilio asterias*), *eucyrtus turni* (from *p. turus*), *eulophus theclae* (from pupa of *thecla calanus*), *e. saundersii* (from pupa of same?), *entodon antiopae* (from *vanessa antiopa*), *trichogramma minutissimum* (from *papilio turus*) *pompilus* sp. ("from *grapta interrogatoris*"), 16 new species; and re-describes *trogon* ["*tragon*"] *excorius* (from pupae of *papilio*), *apanteles limenitidis* (from *limenitis disippus*), *pleromatus puparum* (from *peris rafa*), *eucyrtus montinus* (from pupa of *chionobas senidea*), *eulophus semi-theclae* (from *ch. senidea*), *trichogramma minutum* (from *limenitis disippus*), and each genus, except the last, of these parasites; compares the described species and genera with others.

B: P. M. (3338)

Riley, C: Valentine. The false indigo gall-moth: *walshia amorphella*, Clemens. (2d ann. rept. state entom. Mo., [Mch.] 1870, p. 132-133, fig. 98.)

Description and figures of gall, larva and imago of *walshia amorphella*, found on *amorpha fruticosa*; hibernation of the larva. B: P. M. (3339)

[**Riley**, C: Valentine.] Gall on *pelargonium*. (Amer. entom., Mch. 1880, v. 3, n. s., v. 1, p. 78, 6 cm.)

Letter from M. T. [reat], with answer; a gall, "growing at the base of a healthy *pelargonium*," contained *podura*; the gall apparently made by a mite, and the *podura* undoubtedly feeding on the diseased gall-tissue. B: P. M. (3340)

Riley, C: Valentine. Gall-nuts. (Johnson's new univ. cyclop., 1876, v. 2, p. 417, 1 fig.)

Definition of "gall-nuts," formed by *cynips gallae-tinctorie* on twigs of *quercus infectoria*; local origin, chemical composition, use in the arts.

B: P. M. (3341)

Riley, C: Valentine. Galls. (Johnson's new universal cyclop., 1876, v. 2, p. 417-419, 2 fig.)

Definitions of "galls;" their variety of form, texture and location, their nature and source.

B: P. M. (3342)

Riley, C: Valentine. The misnamed gall-moth: *curyptychia saligneanae*, Clemens. (2d ann. rept. state entom. Mo., [Mch.] 1870, p. 134-135, fig. 99.)

Description and figure of gall and imago and brief description of larva of *curyptychia saligneanae*; characters of the genus; this moth may be an inquiline. General remarks on the formation of galls by lepidoptera.

B: P. M. (3343)

Riley, C: Valentine. Notes on microgasters. (Amer. nat., Aug. 1882, v. 16, p. 679-680.)

Crit. rev. of A. S. Packard, jr.'s "Descriptions of some new ichneumon parasites of North American butterflies" (Proc. Boston soc. nat. hist., [16] Aug. 1881, v. 21, p. 18-38) [Rec., 3338]; synonymical notes on *microgaster carinata* [= *m. gele*], *m. pieridis* [= *apanteles congregatus* var. *pieridivora* n. var.], *m. atalantae* [= *a. congregatus* var.], *m. [apanteles] carduicola* and *m. [a.] lunatus*.

B: P. M. (3344)

Riley, C: Valentine. Notes on North American microgasters, with descriptions of new species. (Trans. acad. sci. St. Louis, [May] 1882, v. 4, p. 296-315, 9 fig.)

Separate. [St. Louis, Mo.], Apr. 1881. ½-t.-p. cover + 20 p., 23 X 16. il.

Sketch of previous knowledge of the North American *braconidae* closely related to *microgaster*; characteristics and habits of the group; denomination of the genera *microplitis*, *microgaster* and *apanteles*; description of typical larva (of *apanteles aletiae*) and of cocoons and the manner of their construction; effect of the presence of parasites upon the longevity of the host; occurrence of secondary parasites in these parasites; description, with notes on the habits, of the following new species: *microplitis ceratomiae*, *m. gortynae*, *apanteles megalyni*, *a. cacociae*, *a. aletiae*, *a. politus*, *a. cassianus*, *a. theclae*, *a. smerinthi*, *a. acronyctae*, *a. paleacritae*, and of the following new varieties: *apanteles limenitidis* form *flavicochae*, *a. congregatus* var. *hemiteucae* and var. *ruficoxalis* and var. *scitulus*; synonymical list of North American species of these three genera heretofore described. B: P. M. (3345)

Riley, C: Valentine. The smaller corn stalk-borer. *Pempelia lignosella* Zeller. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 142-145, pl. 7, fig. 3.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 142-145 [82-85], pl. 7, fig. 3.)

Ravages, habits, seasons, natural history, geographical distribution and synonymy of, and means against *pempelia lignosella*; description and figures of larva, pupa and imago, of structural details of mouth-parts and antennae of male imago, of markings of larva, and of injury done to corn-stalks. *B: P. M.* (3346)

Riley, C: Valentine. The sorghum webworm. *Nola sorghiella*, new species. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 187-189, pl. 11, fig. 1.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 187-189 [127-129], pl. 11, fig. 1.)

Habits, ravages and classificatory relations of *nola sorghiella* n. sp.; figures and description of larva, pupa and imago; figures of head of sorghum injured by the larva. *B: P. M.* (3347)

Riley, C: Valentine. The water weevil. *Lissorhoptrus simplex* Say. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 130-133, pl. 6, fig. 4.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 130-133 [70-73], pl. 6, fig. 4.)

Seasons, habits, ravages, classification and synonymy of *Lissorhoptrus simplex*; description and figures of larva and imago; includes extract from J. Screven's letter in author's "The 'water-weevil' of the rice plant" (Amer. nat., June 1881, v. 15) [Rec., 3335], p. 483, and extract from a report by L. O. Howard; *spalacopsis suffusa* and *hippopsis lemniscata* boring in stems of *chenopodium anthelminticum*. *B: P. M.* (3348)

[Walsh, B: Dann and C: Valentine Riley.] Galls and their architects. (Amer. entom., Feb. 1869, v. 1, p. 101-110, 389 cm., fig. 78-99; p. 144, 3 cm.)

Definition and classification of galls; variety of their sizes, shapes, colors, tastes, consistency, situation, construction and parentage; accounts of some galls made by *Cynipidae*, *Cecidomyiidae*, and *Aphididae*, and of the gall-makers; figures, describes and treats especially of galls of *Cynips quercus-spongifica*, *C. q. inanis*, *C. q. prunus* n. sp., *Cecidomyia salicis-strobiloides*, *C. s. brassicoides*, *C. vitis-pomum* n. sp., *C. v. coryloides* n. sp., *Pemphigus vagabundus*, *P. rhois* and *Glyphina ulmicola*; describes imago of *Cynips q. prunus* n. sp., and of *Pemphigus ulmi-fusus* n. sp., and larvae of above new species of *Cecidomyia*; dimorphism of gall-makers; occurrence of inquilines and parasites in galls. [Continued in authors' "Galls and their architects: 2d article" (*op. cit.*, Nov. 1869, v. 2, p. 45-50) (*Rec.* 3350).] *B: P. M.* (3349)

[Walsh, B: Dann and C: Valentine Riley.] Galls and their architects: 2d article. (Amer. entom., Nov. 1869, v. 2, p. 45-50, 242 cm., fig. 30-32.)

[Cont. from authors' "Galls and their architects" (*op. cit.*, Feb. 1869, v. 1, p. 101-110) (*Rec.*, 3340).] Definition and classification of galls; descriptions and figures of galls and larvae and descriptions of imago of *Nematus salicis-pomum*, *cura s. ovum*, and *C. s. gemma*; habits and seasons of these insects and of *Anthonomus sycophanta*, *Batracheda salicis-pomonella* and *Nematus mendicis*, inquilines in the galls of *Nematus s. pomum* and in other galls; evidences distinguishing gall-makers from inquilines; balance of nature; dignity of entomology; reasons for preferring the name *cura s. gemma* to the prior name *C. orbitalis*. [Cont. in authors' article of same title (*op. cit.*, Dec. 1869-Jan. 1870, p. 70-71) (*Rec.*, 3351).] *B: P. M.* (3350)

[Walsh, B: Dann and C: Valentine Riley.] Galls and their architects: 2d article. (Amer. entom. Dec. 1869-Jan. 1870, v. 2, p. 70-74, 193 cm. fig. 45-47.)

[Cont. from authors' article of same title (*op. cit.*, Nov. 1869, p. 45-50) (*Rec.* 3350).] General remarks explanatory of the occurrence of distinct genera of gall-insects on plants of distinct genera; figures and descriptions of galls of *Cynips quercus-seminator* and *C. q. frondosa*; nature of these galls and of those of *C. q. operator*; seasons of the gall-makers; *Nematus quercicola* inquilinous in galls of *C. q. frondosa*; synoptical table of North American genera of *Cynipidae psenides*; description of *antistrophus* n. g. (*Cynipidae*), and of gall and imago of *A. lygodesmiae-pisum* n. sp. [Cont. in authors' article of same title (*op. cit.*, Feb. 1870, p. 103-106) (*Rec.*, 3352).] *B: P. M.* (3351)

[Walsh, B: Dann and C: Valentine Riley.] Galls and their architects: 2d article. (Amer. entom., Feb. 1870, v. 2, p. 103-106, 144 cm., fig. 68-71.)

[Concluded from authors' article of same title (*op. cit.*, Dec. 1869-Jan. 1870, p. 70-74 (*Rec.*, 3351).] Figure and description of the gall *Rubi podagra* n. sp., made by *Agrilus ruficollis*, of the gall *Vitis vulnus* n. sp., made by *Bardicola sesostris*, of the larva and imago of the former insect and of the imago of the latter; habits and food-plants of and means against these insect . . . history of the names of the latter and of its gall; brief description of gall and of imago of *Madarus anepelopsidis* n. sp.; habits of *Imprestidae*. *B: P. M.* (3352)

[Walsh, B: Dann and C: Valentine Riley.] The trumpet grape-gall. (Amer. entom., Sep.-Oct. 1869, v. 2, p. 28, 18 cm., fig. 27.)

Description and figure of galls of *Cecidomyia vitis-litius* n. sp. [= *C. vitis-viticola*], the gall-maker being unknown; enunciation of general law that when one gall-insect inhabits a plant, many more species of the same genus of insects generally inhabit the same genus of plants; occurrence of the same or similar galls on several varieties of grape-vines and of related galls on leaves of *Carya* and *Celtis*. *B: P. M.* (3353)

ENTOMOLOGICAL ITEMS.

MR. C. J. A. PORTER published, in the *American naturalist* for December 1883, a most thoroughly unscientific report on some experiments to test the function of the antennae of insects.

THE *Bulletin d'insectologie agricole* for July-September contains an interesting account of the exhibition of insects held last July in the palace of industry, at Paris, together with a list of the prizes and medals awarded to exhibitors.

THE NOVEMBER numero of that enterprising magazine, the *Kansas City review*, contains, besides other interesting articles, not pertaining to entomology, an agreeable paper by T. Berry Smith on "Natural science in the 17th century," and an abstract, by Dr. C. V. Riley, on "Emulsions of petroleum and their value as insecticides."

CIRCULAR NO. 1 of the Department of entomology of the New York state museum of natural history, issued by Mr. J. A. Lintner in October, contains notes upon the chinch-bug, *Blissus leucopterus*, and its attack upon the crops of portions of St. Lawrence county, New York. An enlarged figure of the insect and directions for checking its depredations are given. Whether these insects have done any serious damage to crops in Massachusetts this year, or not, I do not know, but on 28 March the low land between Belmont and Cambridge was swarming with them. *G. D.*

AGAIN WE have the unpleasant duty of recording the death of one of our leading American entomologists. Dr. John L. LeConte, whose numerous publications on North American coleoptera have rendered the systematic study of these insects so easy, died at his home in Philadelphia, 15 Nov. 1883. The December numero of the *Bulletin of the Brooklyn entomological society* contains a portrait of Dr. LeConte, and an obituary notice by Mr. F. G. Schaupp. The notice which appears in this numero of PSYCHE was originally written, at the request of Dr. A. S. Packard, jr., for the entomological de-

partment of the *American naturalist*, which department Dr. Riley has been editing. The exclusion of the article by Prof. E. D. Cope, one of the editors of the *American naturalist*, against the protest of Dr. Riley, has caused the latter's withdrawal from that magazine. The notice having been offered to PSYCHE with this explanation, we are pleased to publish it as a token of the high esteem in which we held the late coleopterist, and of our appreciation of the competency of the distinguished author to write such a notice as shall command respect from any journal in the land. We had intended to write a notice, which we will now omit.

AT A recent meeting of the French entomological society, Dr. Laboulbène instanced a case in which dipterous larvae had been vomited by a woman thirty-nine years old, under the care of Dr. E. Pichat of La Rochelle. Specimens of the pupa, and of the fly hatched from them (*Cartoneura stabulans* Fall.), were exhibited to the society. The woman had been troubled for some days with bronchitis and very fetid breath, and finally, after a severe attack of coughing, vomited twice. Dr. Pichat afterward found in the basin used a hundred to a hundred and fifty of these larvae; and the circumstances as related by him leave no serious doubt of their source, though he was not present during the vomiting, but only called immediately after it.

This larva, according to Laboulbène, is well known, and is ordinarily found in decomposing animal and vegetable matter, in mushrooms, etc., and has also been reared from caterpillars and hymenopterous larvae.

The possibility of the existence of such flies (*muscaria*) in the human body was formerly generally accepted, but has lately been denied by Davaine. Experiments have proved, says Dr. Laboulbène, that such larvae, introduced into the stomach of animals by a fistula, have been discharged alive in the excrement, one, two, or even three days later. — *Science*, 23 Nov. 1883, v. 2, p. 697.

THE FOLLOWING notes upon the medicinal use of preparations of *Blatta orientalis* are

extracted from an abstract given in the *Deutsch-amerikanische apotheker-zeitung*, 1 Apr. 1883, Jahrg. 4, p. 49, of a paper by T. Bogomolow, published in the *St. Petersburg med. wochenschrift*:

Bogomolow first introduced this medicine into practice in 1876. In the course of the last six years it has been used successfully for dropsy by several physicians, while others have had negative results. Favorable action resulted in 47 per cent. of cases published heretofore. Bogomolow mentions 70 additional cases, in 29 of which the medicine was administered in powdered form, and in 41 as tincture. In 19 cases the author brought about profuse perspiration, in 61 cases clear increase of urination, and in 13 cases increase of intestinal evacuation (by stronger transudation through the intestinal walls). He had in no case seen symptoms of irritation or other inconvenient accessory action. The tincture was prepared by soaking well-dried and pulverized cockroaches in six times their weight of 95 per cent. alcohol for two or three days in a warm place. Of this tincture the author prescribes for adults a tablespoonful thrice daily, for children twenty drops thrice daily. The powder is to be used only in case of emergency, and spoils easily by exposure.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7-45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass. at 7-45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884.
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

G. J. BOWLES, *Secretary*.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary*.

No. 113-114 were issued 16 Nov. 1883.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 117-118.

JANUARY-FEBRUARY 1884.

CONTENTS:

ADVERTISEMENTS	122
ON THE LIFE-HISTORIES AND IMMATURE STAGES OF THREE EUMOLPINI— <i>Stephen Alfred Forbes</i>	123-130
COLLECTION AND PRESERVATION OF DIPTERA— <i>Samuel Wendell Williston</i>	130-132
MUSEUM PESTS OF SERVICE TO THE ENTOMOLOGIST— <i>L. O. Howard</i>	132
PROCEEDINGS OF SOCIETIES—Cambridge Entomological Club—Biological Society of Washington	133-134
BIBLIOGRAPHICAL RECORD, no. 3354-3405	135-138
ENTOMOLOGICAL ITEMS—Society Meetings	139-140

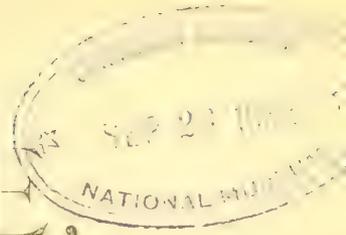
PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB.

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, . . . 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N.W.

BULLETTINO DEL NATURALISTA COLLECTORE.

PUBLISHED MONTHLY AT SIENA, ITALY.

At least eight large octavo pages per numero, principally in Latin, Italian, and French.

Subscription:

Countries in the postal union 2.50 Francs.
Countries outside the postal union 5.00 "

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

R. FRIEDLÄNDER & SOHN,

Berlin N.W., Carlstrasse 11.

Natural History and Natural Science Booksellers established since 1827.

Largest stock of the whole Literature of Natural History and the Exact Sciences.

Apply for classified catalogue in 25 parts (each one special department of science), price 10 c. each.—Just published. Part IX. *Entomology 1.* (General Entomology.—Coleoptera.) 46 p. about 2000 works.—X. *Entomology 2.* (Lepidoptera), comprising among others the library of the late Prof. P. C. Zeller, 30 p., about 1300 works.—XI. *Entomology 3.* (Hymenoptera, Neuroptera, Orthoptera, Diptera, Hemiptera, Parasita.) 34 p. about 1500 works.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper. \$3.00 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the SCIENTIFIC AMERICAN sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 231 Broadway, New York.

PSYCHE.

ON THE LIFE-HISTORIES AND IMMATURE STAGES OF THREE *EUMOLPINI*.

BY STEPHEN ALFRED FORBES, NORMAL, ILLINOIS.

[*With Plate 1.*]

The three species to which this paper is devoted (*Colaspis brunnea* Fab., *Paria aterrima* Oliv., and *Scelodonta pubescens* Mels.), live underground in the larval stage, and feed upon the roots of the strawberry (*Fragaria vesca* L.). The larvae of all three often occur in the same localities and situations; they are extremely similar in general appearance, two of them (*Paria* and *Scelodonta*) being, indeed, almost indistinguishable; and their food-plants and food-habits are identical. They have consequently not been discriminated heretofore, even where they have been collected in considerable numbers and studied with some care; and their life-histories, as far as made out, have very naturally fallen into some confusion.

The following account is based upon almost continuous observation of one of the species, upon breeding experiments with all three, and upon numerous collections of all, made from August 1882 to December 1883, mostly in southern Illinois, where all are abundant in strawberry fields.

COLASPIS BRUNNEA Fab.

Literature.

The first undoubted reference to an immature stage of this beetle, which I have found, is in the 3rd report of the state entomologist of Missouri (C. V.

Riley), for 1871, p. 81-84, in which the larva is described and figured, and record is made of the fact that it feeds upon the roots of the strawberry. A brief outline of its life-history is also given, but in terms to show that it was not at that time distinguished from the larva of *Scelodonta*.

In his report as state entomologist for the following year, p. 34, Mr. Riley again described this larva from numerous specimens, and figured the dorsal and ventral aspects of the head, a separate mandible, and one of the ventral segments. The description given of the mandible and of the anal segments, and the figure of the former, do not apply exactly to the larva of *Colaspis*, and it is possible that the specimens upon which this second description was based belonged to one of the other species.

In the American entomologist for 1880, v. 3, p. 243, Mr. Riley repeats his original figures of the *Colaspis* larva; and this form has since been mentioned frequently in various economic publications, but without any further additions to our knowledge, either of its characters or of its history. The pupa has remained hitherto unknown.

Description.

Larva. (Pl. 1, figs. 7-8.) This species is 3 to 4 mm. long by one-half that width, white throughout, except the

head and the first segment, which are a pale, yellowish brown. The first segment is leathery and smooth above, and as long as the two following together; but each of the remaining eleven segments is marked on the back by about three transverse dorsal folds, which terminate on the sides in large, low elevations, pointed-ovate in form (the pointed ends being upwards), one to each segment of the body except the first and the last.

The first spiracle is larger than the remaining eight, and placed between the first and second thoracic segments. The others are situated at the lower ends of the ovate elevations mentioned above, and just within a tortuous longitudinal groove, which separates these elevations from a series of prominent tubercles which extend along the sides, one tubercle to each segment. Still beneath the first mentioned row of tubercles is another longitudinal groove, and a second series of tubercles; and these again are separated from the transverse ventral ridges by still another irregular longitudinal groove. Finally, the ends of these ventral ridges are cut off obliquely by a series of grooves, each extending from before backwards and inwards, thus forming a fourth series of elevations, on a line with the legs.

In *Colaspis*, the elevations of this last series have the form of thick, fleshy tubercles which project downward beyond the general ventral surface, each bearing about ten hairs of varying lengths, the three or four longest of which are longer and stouter than any

others on the larva. The hairs on the ventral ridges between these tubercles form an unbroken row. They are about nine in number, alternately longer and shorter, with very many short ones intermingled; the longest being about as long as the corresponding segments. The twelfth ventral segment (fig. 7E) is deeply and widely emarginate posteriorly, divided, in fact, into two triangular plates, between which the unusually developed thirteenth segment appears. These lateral plates are fringed with spines on the posterior two-thirds of their inner margin. The thirteenth or anal segment is likewise longitudinally divided beneath.

These two segments taken together are about one and a half times the length of the preceding one; and their dorsal arches are likewise relatively elongate, being scarcely, if at all, shorter than the next segment in advance.

The legs are about as long as the thoracic segments to which they are attached, and are white, with the exception of the claws, which are dark brown at the tips. They are provided with a few slender white hairs, which become shorter and more spine-like toward the end of the leg.

The head is smooth, somewhat flattened in front, with a few slender, scattered hairs. The clypeus is trapezoidal, and the anterior edge of the labrum (fig. 7D) is convex. The antennae (fig. 7A) are situated just outside the bases of the mandibles. They are minute, white, four-jointed, the two basal joints short and quadrate, the second

and third together as long as the first. The outer distal angle of the third joint is continued as a cylindrical process, which reaches to the end of the joint following.

The mandibles (fig. 7C) are rather narrow (the width being about two-thirds the length), strongly curved, comparatively broad, and obtuse at tip, where they are emarginate, or sometimes trifid. Each bears two long, slender hairs at its outer base.

The cardinal and basal pieces of the maxilla (fig. 7Bc) are not clearly distinct; the maxillary lobe is stout, rounded at the tip, and convex internally, with about ten spines, of varying strength, along the inner margin, the two basal ones being very strong, and about half the length of the lobe. This last extends only a little beyond the second joint of the palpus. The palpi (fig. 7Bd) are prominent and four-jointed, the third joint longest, about equal to the first and second together, and the fourth slender and cylindrical.

The labium (fig. 7Bb) is thick and quadrate, without distinct palpigerous tubercle, and bears on its under surface two slender, cylindrical, unarticulate palpi (fig. 7Ba), which are about as long as the third joint of the maxilla, and taper slightly distally.

Pupa. The pupa is 3.5 mm. long by 2.5 mm. wide; white, except the eyes and the mandibles, which show through the outer envelop red or black.

The front of the head is set with a few long, stout hairs, articulated upon slender, conical tubercles; and three similar rows of hairs appear upon the

thorax, one near the anterior border, another near the posterior, and a third intermediate. Six other hairs occur upon the scutellum, and a row of about six or eight borders each one of the abdominal segments above.

The anterior inferior angle of the tibio-femoral articulation of each leg bears a stout, curved hook, that on the first pair of legs being very small. Each of these articulations is likewise armed with two long hairs borne upon slender, conical tubercles. The sheaths of the antennae are tuberculate externally.

The posterior segments of the abdomen are peculiarly armed. The last (fig. 7F) terminates in two simple, incurved hooks, and bears in front of these a pair of stout lateral spines, projecting directly outwards; while a similar but smaller pair of backward-projecting spines is borne by the penultimate.

Life-History.

The imago is said by Dr. Fitch to appear in the latter part of June, continuing through the month of July. Mr. Riley, in his third Missouri report, says that pupation commences in June, the beetles appearing in that month and continuing to issue from the ground until fall.

Larvae of this species were first seen by me in southern Illinois on 19 May, at which time they were about half-grown. On 28 June, full-grown larvae and imagos were found in the earth, in strawberry fields, the imagos having, of course, just transformed. Adults again occurred in the earth on 9 July, but by 18 July all had emerged. As early as

4 July they appeared in stubble fields, and were found from the beginning in sweeping the leaves of the strawberry, where they continued common until 1 August. They were also taken in vineyards, feeding upon the leaves of grapes, on 11 July.

Careful and repeated search in all situations suited to their development failed to discover either larvae or pupae again during the year; and I have no doubt that the species is single-brooded, and think that it completes its transformations, under ordinary circumstances, by 1 August.

Numerous collections made in October, November and December, throughout the region where these beetles appeared abundantly earlier in the year, failed to discover a single specimen among the thousands of hibernating insects encountered; and I am of the opinion that this species hibernates rarely, if ever, as an imago, but believe that it deposits its eggs in late summer or autumn, probably in the earth about strawberry roots.

PARIA ATERRIMA Oliv. (Pl. 1, fig. 1, 4.)

Literature.

The larva of this chrysomelid was first noticed in 1880, in an article by Prof. A. J. Cook, of Michigan, printed originally in several western agricultural journals, and later in the report of the Michigan state horticultural society for that year, p. 293. This newspaper description was republished in the American entomologist for October 1880, v. 3, p. 242 243, and a few remarks were added by Mr. Riley, com-

paring the characters of the larva, as described by Prof. Cook, with those supposed to distinguish *Colaspis*.

Prof. Cook's article, in a revised form, was also published by the State agricultural society of Michigan, in its report for the year ending August 31st, 1880, p. 273. Another account of the larva, with some additional notes upon its habits, was given by the present writer in the Transactions of the State horticultural society of Illinois, for 1882, p. 199, and again, in the following year, in a paper on Insects affecting the strawberry, published in the Transactions of the Mississippi valley horticultural society for 1883, p. 77 and also issued as a separate pamphlet. This description was somewhat fuller than any preceding, and was illustrated by a figure of the larva made from a camera-lucida drawing, but still insufficient to distinguish it clearly from the larva of *Colaspis*, and applying equally well either to *Paria* or to *Scelodonta*.

Description.

Larva. Agreeing closely in size, form, and general appearance with the larva of *Colaspis*, this species may be distinguished by the following details: The brown hairs of the ventral ridges are few and short, all shorter, in fact, than the corresponding segments. The ends of these segments are cut off by oblique grooves, and have the form of triangular tubercles, with their apices inwards; but these are not raised at all above the general ventral surface. Each of them bears from five to seven hairs, of which about three are longer than

the others. The hairs of the median portion of the ridge are separated into two groups by a narrow, median, naked strip. The vent is surrounded by a circle of ten short hairs. All the hairs of the last four segments are longer and stouter than those preceding; and those of the dorsal surfaces of these segments are likewise more numerous. The dorsal arches of the last two abdominal rings are broken into four prominent tubercles, which are sometimes slightly blackened, and bear especially strong spinous hairs.

The eyes are represented by a small cluster of a varying number of pigment specks, situated at less than the length of the antenna above its base.

The antennae are three-jointed, very short, not twice as long as wide, the length of the basal joint being just about its width. The cylindrical process of the penultimate joint is segmented off, forming an apparent accessory article beside the terminal one. The clypeus is about as long as the labrum; and upon the middle of the upper surface of the latter are four long hairs, arranged transversely; and at the inferior edge of the posterior surface are eight strong hooks or spines, projecting inwards and backwards. The maxillary palpi are strong and thick, the two basal joints being broader than long, the third about as long as wide, and the fourth ovate. The tip of the third joint extends scarcely beyond the end of the blade of the maxilla. The latter is not longer than broad, and is armed with about ten stout, blunt spines at its inner margin.

The general form of the mandibles (fig. 6B), seen from above, is triangular, the length being scarcely greater than the width at their base. The tip, seen from beneath, is obtuse and more or less conspicuously emarginate, often decidedly lobed, in which case the lobes are equal. It is never trifold, and never acute. Occasionally this bilobate character of the mandibles is indicated by a longitudinal groove, which scarcely renders the tip emarginate.

The anal segment of this larva is used as a proleg, the grub looping along on a smooth surface after the manner of a phalaenid larva.

Pupa. The pupa may be distinguished by differences in the armature of the posterior segments of the abdomen, especially the last (fig. 6A). This terminates in a pair of brown, chitinous hooks, which curve dorsally, instead of inwards as in *Colaspis*, each being furnished with a strong, erect tooth or spine arising from the upper side of the base. From the middle of the concave margin of each hook springs a long slender hair. The spines in front of these anal hooks project directly backwards. This pupa is further distinguished from that of *Colaspis* by the absence of spines upon the anterior inferior angle of the tibio-femoral articulation of the first and second pairs of legs.

Life-History.

Last April the adult beetles were found not uncommonly in strawberry fields in southern Illinois, having evidently lately emerged from their winter

quarters; but the most careful search of fields infested by root-worms yielded no *Paria* larvae. On 18 May, the adults were again obtained in considerable numbers, by sweeping the foliage of strawberries; and on 15 June a few were seen in the ground about the roots of the plants. On 20 July, larvae and pupae of this species were found among the strawberry roots, adults also occurring on the foliage; and on 26 July all stages were sent me from Lansing, Michigan.

From 1 to 10 August, larvae, pupae and imago were collected in southern Illinois. On 11 August, the larvae and pupae were noticeably less common than before, but the imago were now more abundant on the leaves, and several were taken from cavities in the earth. Some larvae and pupae taken from the ground on 1 August, were kept in earth (after careful study of the living specimens for subsequent identification) until they transformed, one beetle emerging on 11 August.

On 24 August, the earth was examined and three more adults were found. These were the last immature examples seen, only scattering adults occurring in our collections during September, October, and November. On 8 December they were taken in abundance under leaves and rubbish on the ground, hibernating in the strawberry fields.

Evidently, here we get no glimpse of a second brood, either early or late, but find the beetles wintering as mature insects, probably laying their eggs in the ground in June, the adults appearing again late in July and in August.

SCELODONTA PUBESCENS Mels.

(Pl. 1, fig. 2.)

The larva and pupa of this species have hitherto remained unknown.

Description.

Larva. The description of the larva of *Paria aterrima*, given above, will answer for this species also, point by point, with the exception of characters drawn from the mandibles (fig. 5C). The tips of these are usually entire, and rather obtuse, although rarely irregularly lobed, or trifid, the central lobe being then much the most prominent. The inner edge of the mandible is excavated on the distal third, like that of *Paria*.

Pupa. (Pl. 1, fig. 3.) The pupa of this species is indistinguishable from that of *Paria*, except by the fact that the terminal hooks of the abdomen (fig. 5A) are smaller, more slender, destitute of the basal spine and of the hair springing from the convex margin.

Life-History.

My first specimens of the larva of this species were obtained in August 1882, two half-grown individuals and one adult beetle occurring in a small collection of insects made at that time in southern Illinois. On 11 September, large and small larvae were found devouring strawberry roots, and a single adult was obtained by sweeping in the field. On 9 November, full-grown larvae were abundant, all having gone into winter quarters in oval cavities in the earth. They occurred at various depths, from 2.5 to 10 cm., and often at con-

siderable distances from the plants on which they had been feeding.

Many hundreds of these larvae were unearthed in November, but not a pupa was found, nor a single adult. Two of the latter were obtained, however, in strawberry fields, in December, showing that a sprinkling of them hibernates as imagos. That it is only a sprinkling was clear, not only from the great numbers of mature larvae of this species in the ground at the time, but likewise from the fact that adults of *Paria aterrima* were then collected by the hundred, although the strawberry roots had been much less seriously attacked by that species than by *Scelodonta*. Early in the following April the larvae were still secure in their subterranean retreats, no pupae yet appearing. On 16 April, two adults were taken, but these were the only ones captured during several days of careful and active field work.

A number of hibernating larvae were placed in boxes of earth at this time, for the purpose of determining the period of their transformations. On 9 May they were found still in their winter condition, but on 20 May pupation was well under way; and about half those in the field were also now in the pupa stage. A thorough search yielded no adults, and no young larvae.

On 7 June, a single adult emerged from those under observation, and the next day three more appeared. The day following, the earth was examined carefully, and fifteen adults were found, all but two still in their cells. With these were three larvae (one of which was dead) and a single pupa. On 15

June, many adults were found in the ground, in the fields, with larvae and pupae, but no adults could be got by sweeping the strawberry vines, and careful search of previously infested fields, made late in July and early in August, yielded but a single imago of this species.

Adults emerging in the breeding cages were observed to feed freely upon the leaves of the strawberry, making small, round holes through the leaf, of about the diameter of their own bodies.

The above data enable us to say definitely that this insect is single-brooded, like its congeners; that it hibernates as a full-grown larva, in oval cells in the earth, a few beetles of the preceding brood likewise sometimes surviving the winter; that the change to pupa occurs in May; and that the adults appear above ground in June. In July, doubtless, the eggs are laid, probably in the ground, the young larvae attacking the roots of the strawberry in that month and in August.

Comparison of Life-Histories.

It will now be interesting and profitable to bring together, side by side, the life-histories of these three companion species.

We have, in these root-worms, three related species, attacking the same part of the same plant in precisely the same way, at the same stage in their development; and strictly dependent upon this plant (as far as is known) for their continued existence. They are, moreover, all native to the region in which they now occur, and have probably fed upon

the wild strawberry from time immemorial.

One would say that here were all the conditions of a most determined struggle for existence, in which one or more of these species must succumb. It is indeed interesting to see how the issue is evaded, and an adjustment reached by which competition is reduced to a minimum. The *Colaspis* larva makes the earliest attack upon the plant, beginning its work upon the root certainly as early as the first of May (half-grown individuals having been taken on the 15th), and finishing in June, all being of full size and preparing to pupate by the end of that month. Next comes *Paria*, in July and August, neither extreme of its period being exactly defined by our observations; and finally comes *Scelodonta*, adults of which were copulating on 1 July, young larvae occurring 7 August. As far as now known, the *Scelodonta* larva is left in undisturbed possession during the remainder of the year; although there is a break in our observations for October. Certainly by November it has completed its work, and retired, full-grown, and ready to transform into its subterranean cell.

It seems clear, furthermore, that this curious succession of periods is related

to a difference of habit with respect to hibernation. Undoubtedly *Scelodonta* winters as a larva, and *Paria* as an adult. As *Colaspis* larvae were only half-grown on 15 May, they very probably hatched from the egg that spring; and as the adult *Colaspis* emerged about two months before the new brood of *Paria*, it seems hardly possible that both could have developed from eggs laid that spring; but it is much more likely that *Colaspis* hibernates in the egg. On this hypothesis, we shall have the eggs of *Colaspis* deposited in autumn, those of *Paria* in spring, and those of *Scelodonta* in midsummer, the first species hibernating in the egg, the second as an adult, and the third as full-grown larva, with the necessary result that their attacks upon their common food plant are delivered successively.

The immense advantage derived from this arrangement is evident, when we reflect that by this means as many of each of the species are fed upon the surplus structures and supernumerary individuals of the strawberry (that plant being a continuous grower), as it would be possible to maintain of *all three* if they came into simultaneous competition.

COLLECTION AND PRESERVATION OF DIPTERA.

BY SAMUEL WENDELL WILLISTON, NEW HAVEN, CONN.

From dearly purchased experience I have learned the necessity of care in the collection and preservation of entomological specimens, and it may be

that a few hints will be of service to the collectors of diptera and similar insects.

For collecting I use a cyanide-bottle.

which, although objected to by European dipterologists, I have found the best and most convenient. But I do not mean an *ordinary* cyanide-bottle, for specimens collected in such are worthless for scientific or other purposes. I select several two ounce [60 c. c.], wide-mouthed bottles of the same form, and carefully line the bottom and sides with a good quality of blotting-paper. Good, firm corks are selected, which are interchangeable in the different bottles: in one of these corks a small hole is made, in which it is better to fit a small metallic ferule; a strip of blotting-paper is then coiled within this cavity, and it is over this that a few drops of a solution of cyanide of potash is poured. It is useless to collect flies in a bare bottle; the insects soon exhale moisture sufficient to ruin them. The blotting-paper prevents this, and the cork can readily be removed from one bottle and put into another when a sufficient quantity of flies is collected. *Moisture of any kind injures flies.* Some flies, such as the hairy *bombyliidae*, should always be pinned when caught. For this purpose a small, tight, pith-lined box may be carried in the pocket, together with a vial of benzine to kill the flies.

In the earlier part of the season many rare specimens of diptera may be obtained by beating. For this purpose a I employ rather heavier net-wire, to which a pointed net of cheese-cloth is attached. On such occasions it is necessary to carry with one a larger bottle with a little cotton-wool in the bottom.

and a vial of chloroform in the pocket. By thrusting the end of the net, with its contents, for a few seconds into the chloroform bottle, one can then remove the specimens undisturbed. Very minute flies it is expedient to preserve alive in small bottles filled with paper clippings and through the cork of which a small glass tube is thrust nearly to the bottom. For a collecting net, after many experiments and failures, I have found most serviceable a simple, rather light, brass wire, soldered together to form a ring about 28 cm. in diameter and firmly attached to a light handle about one metre long. The net is made of very coarse bobbinet lace, the most serviceable and, in the end, cheapest material. The net should be readily handled with one hand.

For the collection of diptera a few hints here will suffice. The best season in New England is June, yet specimens may be collected every month in the year. In May and the early part of June, beating will give excellent results. A little later, patches of blackberry (*Rubus*), wild cherry (*Prunus*), dogwood (*Cornus*), Canada thistle (*Cirsium*), or other melliferous blossoms, will afford desirable specimens. It is better to let specimens come to the collector than to go hastily about looking for them. I have spent six hours about a patch of *Cornus paniculata* not ten metres in diameter, and been amply repaid. But few specimens are found in shady woods; those few are to be sought for there. The favorite place for *tabanidae*, as indeed for most

flies, is on the border of woods, open glades, meadow lands, etc.

Specimens should not be allowed to remain over night unpinned. The large specimens may be pinned through the thorax, preferably with japanned iron pins. They should be placed on the pin only low enough so that the head may be grasped with the thumb and forefinger without danger to the specimen. *The wings should never be spread.* Spreading not only renders the specimens more difficult to study, but it spoils the natural appearance of the insects, and is a positive injury to them for the cabinet. All that is necessary is to push aside the wings so that they will not conceal the abdomen. Minute specimens should be pinned with fine iron wire from the underside, and then pinned upon small strips of thin cork, the upper surface of which

has been covered with white paper, and through the other end of which a pin is thrust. Small specimens should never be glued to bits of card-board, as is commonly done with coleoptera. Only one specimen should be placed on the piece of cork.

The greatest enemy to dipterological collections is dust: insects can be guarded against, but it is difficult to exclude dust, unless tight cases are used. Dampness and mildew do often much mischief.

A good dipterological specimen must be unrubbed, unmoistened, not dusty nor greasy, and with the wings unspread. It is quite as easy to collect good specimens as poor ones and much more satisfactory.

[For other articles on the collection and preservation of diptera, see Rec. 157, 2335, 3396, 3404 and 3405.]

MUSEUM PESTS OF SERVICE TO THE ENTOMOLOGIST.—*Trogoderma tarsale* has heretofore been viewed with un-mixed hatred by entomologists, but for the last few days I have been showering blessings on the heads of a particular colony which had established itself in a pill-box containing some hundreds of specimens of a pteromalid reared from the cocoons of *Apanteles aletiae* Riley. It is true that nothing but fragments of the pteromalid remained after the *Trogoderma* had been at work for a year or more, but among these fragments

I have found a number which illustrate points in the external anatomy better than the most careful dissections. Certain points concerning the form and structure of the metanotum—always hard to study in the complete insect, and very difficult to dissect out, owing to a disagreeable tendency to break through the middle as readily as at a suture—are admirably exhibited by these accidental anatomical preparations. Truly it is an ill wind that blows no good.

L. O. Howard.

Washington, D. C., 25 Jan. 1884.

PSYCHE.

CAMBRIDGE, MASS., JAN.—FEB., 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(Continued from p. 110.)

11 MAY 1883.—The 93rd meeting of the Club was held at 19 Brattle Square, Cambridge, 11 May 1883. In the absence of the President, Mr. S. H. Scudder was chosen Chairman. Three members were present.

The minutes of the last meeting were read and approved. The additions to the library of the Club were announced by the Secretary.

Mr. R. Hayward exhibited a specimen of *Chlaenius tomentosus* taken at Milton, Mass., which varied strikingly from the common form of this insect.

Mr. S. H. Scudder showed a collection of colored figures of insects drawn by Major J. E. LeConte. These figures were a continuation of the collection which was exhibited at the last meeting.

Mr. S. H. Scudder described the habits of *Myrmecophila* and gave a history of specimens previously mentioned as from America. Living specimens of young *M. fergandi*, taken among ants under bark, at Washington, D. C., were shown.

Mr. S. H. Scudder called attention to the eleventh part of W. H. Edwards' "Butterflies

of North America" and showed specimens of eggs and larvae of *Lemonias nais*.

Mr. G. Dimmock described a mode of mounting eggs of insects, or other small objects, for the collection, in such a way that they may be examined easily with the microscope. The eggs or other objects are mounted in rings of cork between two thin cover-glasses such as are used for microscope slides. Thus mounted, and sealed with black lac or other means, the specimens can be pinned in the collection with safety and neatness. Specimens can be mounted in Canada balsam in these cork rings, in the way described by Cameron (Proc. nat. hist. soc. Glasgow, 1881-1882, v. 5, pt. 1, p. 4-7), who used, however, paper in place of cork. Cork is lighter than paper, is more convenient for pinning, and can be cut easily into rings of different sizes with a cork-borer such as is used in chemical laboratories. If circular cover-glasses are used the cells can be sealed neatly on a turntable for preparing microscope slides. Specimens illustrating several styles of mounting were shown.

Mr. A. F. Foerste communicated (through the Secretary) a note upon the fluid thrown out by *Attacus luna* just after it emerges from the chrysalis.

BIOLOGICAL SOCIETY OF WASHINGTON.

14 DEC. 1883. — . . . A paper by Dr. C. V. Riley on "The use of naphthaline [sic] in medicine and as an insecticide," was read for Dr. Riley, in his absence, by Dr. W. S. Barnard. It was in the main abstracted from Dr. Ernst Fischer's "Das naphthalin in der heilkunde und in der landwirthschaft . . . 1883." Naphthalin [C₁₀H₈] was first made in 1808. Nothing was said by Dr. Riley of its use in medicine. Its use as a substitute for camphor, for killing museum pests, was suggested in 1840. Placed in insect boxes, it kills acari and psoci, but not other museum pests. Experiments were made with it against *Phylloxera vitifoliac* in 1872. Fischer began ex-

perimenting with it in 1881. It is a better insecticide and cheaper in its crude form than when pure, but is more injurious to plants in that form. It has been applied to grape vines by pouring a kilogram of it in a trench from 15 to 20 cm. deep near the stock of the vine, and then filling the trench with earth.

Dr. T: Taylor said that he had recommended the use of naphthalin for killing phylloxera about ten years ago, and promised to read a paper on the subject at the next meeting of the society. He had not placed the substance in the ground.

Dr. W: S. Barnard said that naphthalin might prove valuable as an insecticide, if made cheap enough and so applied as not to injure the plants. He had devised a method and apparatus by which those insecticides which are dangerous to plants, such as kerosene, cyanide of potassium [KCN], and bisulphide of carbon [CS₂], might be used so as to be safe for the plants and destructive to insects in the ground. These substances have usually been applied on the surface of the ground or buried shallowly, either among the roots or above them, but when brought in contact with the roots, in strength, they kill them. When applied in volatile form they are not so injurious. Naphthalin and kerosene especially should be placed deep below the roots. The apparatus, which Dr. Barnard names a "nether-insertor," consists of a tube which is made to fit closely around a central solid shaft somewhat longer than the tube and pointed at its lower end. The tube may have an internal diameter of 15 mm. and the shaft a diameter of 12 mm. The upper end of the tube expands like a bowl. The upper portion of the shaft is weighted with a heavy ball so disposed that the shaft can be grasped above the ball. By withdrawing this shaft partially from the tube and then returning it with force, as the lower end of the tube rests on the ground, both tube and shaft can be driven into the ground to any required depth. The shaft is then wholly withdrawn

and the insecticide poured into the tube, by which means it is placed beneath the roots without coming in contact with them. The tube is then withdrawn, and the hole made by it filled with earth. The insecticide, being volatile, rises through the ground and becomes diffused. With this method of application kerosene is probably superior to naphthalin.

28 DEC. 1883. . . —DR. T: Taylor read a paper "On naphthaline [sic], its effects on seeds, plants, insects and other animals," describing the results of experiments made by him in 1872 and since. He found that its vapor produced asphyxia in various degrees in different animals. Winged *Phylloxera vitifoliae* were killed almost instantly. Aphides succumbed readily when confined with the vapor. Coleoptera resisted its effects several days. Imagos of *Doryphora decemlineata* died in ten days, but recovered if sooner brought into fresh air. Females of *Calliphora vomitoria* aborted their eggs and then recovered. Flies, bees and wasps were anaesthetized, but recovered if soon brought into fresh air. Ants and termites were killed by the vapor, or were driven away if free to depart. Crickets, roaches, locusts and other insects were driven away. Rats and mice were driven away, and frogs were rendered torpid. Earth worms were driven out of the ground and killed by placing naphthalin in the bottom of a flower-pot where the worms occurred. Insects infesting seeds were killed by enclosing the seeds in jars with naphthalin. Seeds enclosed with naphthalin for two years afterwards germinated, though the odor of the naphthalin was as strong at the end of that time as at the beginning. Three tender plants were kept in an atmosphere of naphthalin vapor for thirty-six hours causing a single leaf on two plants to wilt, and not affecting the third plant. One hour was sufficient to kill the insects on the plants. Naphthalin acts more powerfully when moistened.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Bassett, Homer Franklin. To American naturalists. Waterbury, Conn., [Author], 1 Mch. 1877. 2 p., 26 X 21.

Request for contributions of specimens of galls, directions for collecting and transporting galls, information about galls. B: P. M. (3354)

Bassett, Homer Franklin. Descriptions of several new species of *cynips*, and a new species of *diastrophus*. (Proc. entom. soc. Philad., Dec. 1864, v. 3, p. 679-691.)

Describes galls and imagos of *cynips quercus-formosa*, *c. q.-ventricosa*, *c. q.-ilicifoliae*, *c. q.-majalis*, *c. q.-scitula*, *c. q.-similis*, *c. q.-hirta*, and *diastrophus potentillae*, all new species, and galls of *c. q.-frondosa* and *c. q.-decidua*, both new species, of which the imagos are unknown; describes imagos of *c. q.-batatas* and *c. q.-tuber*, and includes description by C. R. Osten Sacken of imago of *c. q.-strobilana*; gives biological notes on most of these species; *c. q.-singularis* = *c. q.-nubilipennis*. B: P. M. (3355)

[**Bassett, Homer Franklin.**] List of North American *cynipidae*. (Amer. nat., Mch. [24 Feb.] 1882, v. 16, p. 246.) (RILEY, C: V. Entomology . . . [Mch. 1882], p. 246.)

Rev., by H. F. Bassett, entitled "Arrangement of N. A. *cynipidae* by Dr. Mayr." (*op. cit.*, Apr. [22 Mch.] 1882, p. 329-330.)

List of North American *cynipidae* as generically arranged by Dr. G. L. Mayr, of Vienna; comprises 13 genera (including 1 subgenus) and 52 species.

B: P. M. (3356)

Bassett, Homer Franklin. New species of *cynipidae*. (Can. entom., Mch. 1881, v. 13, p. 51-57.)

Rev., [by C: V. Riley], entitled "Galls and gall-insects." (Amer. nat., May [16 Apr.] 1881, v. 15, p. 402-403.) (RILEY, C: V. Entomology . . . [May 1881], p. 402-403.)

Descriptions of galls and imagos of *cynips quercus-californica*, *c. q.-agrifoliae*, *c. q.-suttonii* and *c. q.-nubila*, all new species. B: P. M. (3357)

Brandt, Eduard K. Recherches anatomiques et morphologiques sur le système nerveux des insectes hyménoptères. *hymenoptera*. Comptes rendus de l'acad. des sci. de France. 18 Sep. 1876, v. 83, p. 613-616.)

Separate. [Paris, 1876.] 4 p., 28.5 X 23, t 10 X 12.7.

Eng. transl., entitled, "Anatomical and morphological researches on the nervous system of hymenopterous insects." (Annals and mag. nat. hist., Dec. 1876, s. 4, v. 18, p. 504-506.) [PSYCHE, Rec., no. 874.]

Study relating to 75 species in the adult stage and 22 larvae. The metamorphoses have been followed in 15 species. Describes the characters of the nervous system in the adult and the larvae and proves that the metamorphosis is accompanied by a coalescence of ganglia.

H. A. R. (3358)

See also the analysis in PSYCHE, Rec., no. 874.

C[laypole] E[:] W[aller]. The Colorado beetle. (Can. entom., May 1881, v. 13, p. 115.)

Extract from *Bristol* [Eng.] *mercury*, noting a fine of £5 imposed, in England, for having a living Colorado beetle [*doryphora decemlineata*]. G: D. (3359)

Collier, P. Report of the chemist. (Ann. rept. [U. S.] commiss. agric., for 1878, [22 Nov?] 1879, p. 95-156.)

Contains statements (p. 96, 97) that analyses had been made of the white covering of the eggs of *corydalus cornutus*, of so-called bomic acid, and of London purple as a substitute for Paris green as an insecticide; (p. 134, 144) statements of results of these analyses.

B: P. M. (3360)

Extraordinary cure. (Amer. museum . . . M. Carey, Aug. 1787, v. 2, no. 2, p. 178-179.)

Issue of 42 worms from the ulcerated wounds of a boy who had been impaled on a hay fork.

B: P. M. (3361)

Farn, A. B. On the diseases of lepidopterous larvae. (Entomologist, April 1882, v. 15, p. 73-75.)

Notes from Pasteur, about the diseases called "pébrine" and "flacherie." G: D. (3362)

- Fauvel, Albert.** Sub judice! Lettre à M. J. B. Géhin. (FAUVEL, A. Annuaire entomologique, 1880, p. 75-85.)
Extract. entitled, "Zum kapitel der varietätenfabrikation." (Entom. nachrichten, 1 July 1880, jahrg. 6, p. 145-146.) [Rec., 2022.]
Criticizes the general naming of varieties of insects.
G: D. (3363)
- Fitch, E: A.** External parasites of spiders. (Entomologist, Aug. 1882, v. 15, p. 169-175, 1 fig.)
Figures and describes *polysphincta tuberosa* in several stages; compilation from other authors on the subject.
G: D. (3364)
- Fitch, E: A.** Fixity of tenure by a moth. (Entomologist, April 1882, v. 15, p. 91.)
Notes a *taenioampa gothica* that occupied the same position on a window-frame for three days.
G: D. (3365)
- Fowler, W. W.** Water-beetles guided to water by sight, and not by other senses. (Entomologist, Dec. 1883, v. 16, p. 286.)
Water-beetles mistake glass for water. G: D. (3366)
- French, G: Hazen.** A new variety of *catocala*. (Papilio, Dec. 1881, v. 1, p. 218-219.)
Describes as new *catocala robinsonii* var. *curvata*.
H: E. (3367)
- Frey, Heinrich.** Jacob Boll, ein schweizer'scher naturforscher. (Mitth. d. schweiz. entom. gesells., 1880, bd. 6, p. 47-51.)
Obituary notice of Jacob Boll, b. 29 May 1828, in canton Aargau, Switzerland; d. 29 Sep. 1880, in Willbarger co., Texas.
S: H. (3368)
- Frost, J.** Water-beetles and light reflected by glass. (Entomologist, Dec. 1883, v. 16, p. 286.)
Water-beetles mistake glass for water. Water-beetles possibly carry fish-spawn from one pond to another, thus stocking new ponds.
G: D. (3369)
- Gardner, J. Starkie.** Moths attracted by falling water. (Nature, 9 March 1882, v. 25, p. 436, col. 1, 6 cm.) (Entomologist, Apr. 1882, v. 15, p. 96.)
Notice, [by C: V. Riley], with same title. (Amer. nat., Oct. [28 Sep.] 1882, v. 16, p. 826.) (RILEY, C: V. Entomology . . . [Oct. 1882], p. 826.)
Moths seen flying into the great horse-shoe falls near Ljósavatn, in Iceland, attracted by the gleaming of the water as by an artificial light.
G: D. (3370)
- Gibbs, T., jr.** Hermaphrodite *Iycaena alexis*. (Entomologist, April 1882, v. 15, p. 89.)
Record of capture of a hermaphrodite specimen of *Iycaena alexis*.
G: D. (3371)
- Giraud, Joseph Etienne and Alexandre Laboulbène.** Liste d'éclosions d'insectes observées par le Dr. Joseph-Etienne Giraud, member honoraire. Recueillie et annotée par M. le Dr. Alexandre Laboulbène. (Annal. soc. entom. France, 1877, 10 April 1878, s. 5, v. 7, p. 397-436.)
List of 788 hymenoptera and 1 coleopteron observed by Giraud to be parasites upon insects, with statement of the names of the respective insects from which each was obtained.
B: P. M. (3372)
- Gray, Asa.** How flowers are fertilized. (Amer. agriculturist, 1876, v. 35: Jan., p. 22; Feb., p. 62; Apr., p. 142-143; May, p. 182; June, p. 222; July, p. 262; Aug., p. 303; Nov., p. 382-383; 1877, v. 36: Jan., p. 22-23; Feb., p. 62-63; Mar., p. 102; May, p. 182.)
A series of popular articles on cross and self fertilization in flowering plants, including the part played by insects in effecting the former.
W: T. (3373)
- [**Gray, Asa.**] Insectivorous plants, 1. (Nation [N. Y.], 2 Apr. 1874, v. 18, p. 216-217.)
Correction. (op. cit., 6 Jan. 1876, v. 22, p. 12, note.)
A historical notice of the insectivorous habits of *dionaea*.
H: T. (3374)
- [**Gray, Asa.**] Insectivorous plants, 2. Nation [N. Y.], 9 Apr. 1874, v. 18, p. 232-234.)
A historical notice of the insectivorous habits of *drosera* and *sarracenia*.
W: T. (3375)
- Gray, Asa.** Insects and plant fertilization. (Amer. agriculturist, 1866, v. 25: May, p. 186-187; July, p. 257-258; Aug., p. 290-292; Sept., p. 324-325; Oct., p. 362; Nov., p. 400; Dec., p. 437.)
Discusses the pollination of a number of flowering plants, and the part played in it by insects.
H: T. (3376)
- Haase, Erich.** Das respirationssystem der symphylen und chilopoden. (Zool. anzeiger, 8 Jan. 1883, jahrg. 6, p. 15-17.)
Anatomical investigations into the respiratory system of *symphyta* and *chilopoda*.
G: D. (3377)
- Hagen, Hermann August.** A mystery in reference to *pronuba yuccasella*. (Can. entom., July 1880, v. 12, p. 128-129.)
Crit. rev., by C: V. Riley, entitled "Dr. Hagen's mystery." (Can. entom., Dec. 1880, v. 12, p. 263-264.)
Crit. rev., [by C: V. Riley], entitled "A mystery in reference to *pronuba yuccasella*." (Amer. entom., Dec. 1880, v. 3, n. s., v. 1, p. 293, 16 cm.)
Imago of supposed *tegeticula yuccasella* obtained from larvae not agreeing with Riley's descriptions, and living in stems of *yucca filamentosa*; these imagos have maxillary palpi like those of *I. yuccasella*. [Later acknowledged to be imagos of *prodovus decipiens*, and not to have such maxillary palpi.]
B: P. M. (3378)

Harding, Martin J. Abnormalities in butterflies. (Entomologist, Nov. 1883, v. 16, p. 257-258.)

Effect of the attacks of ichneumonids and of deficiency of food of larvae in producing deformed butterflies. *G: D.* (3379)

Harding, Martin J. White admiral butterfly; curious abnormality. (Pract. nat., May 1883, v. 1, p. 58, 5 cm.)

A bred specimen of *limenitis sibilla* destitute of the right hind wing. *G: D.* (3380)

Hayward, Roland. A note on *acmaeodera culta*. (Quart. Journ. Bost. zool. soc., Oct. 1883, v. 2, p. 56.)

Acmaeodera culta common on flowers of *hyfoxys erecta*. *G: D.* (3381)

Hayward, Roland. Rare lepidoptera around Boston during the past summer. (Quart. Journ. Bost. zool. soc., Oct. 1883, v. 2, p. 56.)

Notes on *euptoieta claudia* and *papilio cresphontes* from eastern Massachusetts. *G: D.* (3382)

Hellins, J. On the colouring matter, &c., of cocoons of some of the silk-spinning lepidoptera. (Entom. mo. mag., April 1882, v. 18, p. 260-261.)

Discusses the nature of certain substances discharged by silk-producing caterpillars from their anus when spinning their cocoon and used by them to line the cocoon. *G: D.* (3383)

Hellins, J. *Ichneumonidae* infesting larvae of *gyrinus natator*. (Entom. mo. mag., Sept. 1881, v. 18, p. 88-89.)

Two species of *hemiteles*, a *pezomachus* and a *pteronalus* reared from pupae of *gyrinus natator*. *G: D.* (3384)

Hellins, J. On the variable number of moults in larvae from the same batch of eggs. (Entom. mo. mag., Sept. 1881, v. 18, p. 86.)

Records larvae of *orgyia antiqua* that molted three, four, and five times. *G: D.* (3385)

Hoffmeister, August W. [Notes on lepidoptera.] (Can. entom., Sept. 1881, v. 13, p. 196.)

Occurrence and food-plants of *melitaea phaeton* and notes on a few other lepidoptera, observed at Fort Madison, Lee Co., Iowa, in 1881. *A. K. D.* (3386)

Horn, G: H. [Remarks on the species of *cicindela* of the United States.] (Trans. Amer. entom. soc., 1867, v. 1; Record of the meetings, p. 2-3.)

Variations in color and structure of species of *cicindela*; criteria of specific characters in this genus; large series needed for the study of the species. *B: P. M.* (3387)

Jaworowski, Anton. Vorläufige resultate entwickelungsgeschichtlicher und anatomischer untersuchungen über den eierstock bei *chironomus* und einigen anderen insekten. (Zool. anzeiger, 11 Dec. 1882, jahrg. 5, p. 653-657.)

Development of the ovaries of *chironomus* and conclusions based thereon. *G: D.* (3388)

Jenkyns, M. S. Lepidopterous larvae and yellow flowers. (Entomologist, Jan. 1883, v. 16, p. 23.)

Partiality of larva of *heliolithis armigera* and of two other lepidoptera for yellow flowers; cannibalism of larva of *h. armigera*. *G: D.* (3389)

Jenkyns, M. S. *Vanessa urticae*. Entomologist, Jan. 1883, v. 16, p. 13-14.)

Records variation in the colors of the pupae of *vanessa urticae* and asks its causes. *G: D.* (3390)

Jones, E. H. Abnormal larva of *melanippe montanata*. (Entomologist, June 1883, v. 16, p. 121, fig.)

Notice, in [C: V. Riley's] "Rare monstrosities" (Amer. nat., Nov. [19 Oct.] 1883, v. 17, p. 1175.)

Figures and describes a larva of *melanippe montanata* with developed antennae of the imago. *G: D.* (3391)

Jones, E. H. Hermaphrodite *orgyia pudibunda*. (Entomologist, June 1883, v. 16, p. 135.)

A hermaphrodite *orgyia pudibunda*, with antennae and wings of the male, and body of the female, deposited infertile eggs. *G: D.* (3392)

Jousset de Bellesme.— Experimental researches on the phosphorescence of the glowworm. (Annals and mag. nat. hist., April 1880, s. 5, v. 5, p. 345-347.)

Eng. tr. of—Jousset de Bellesme's "Recherches expérimentales sur la phosphorescence du lampyre" (Comptes rendus acad. sci. France, 16 Feb. 1880, v. 90, p. 318-321) [Rec., 3394]. *G: D.* (3393)

Jousset de Bellesme.— Recherches expérimentales sur la phosphorescence du lampyre. (Comptes rendus acad. sci. France, 16 Feb. 1880, v. 90, p. 318-321.)

Abstract. (Rev. scientifique, 28 Feb. 1880, an. 9, p. 835, 13 cm.)

Eng. tr., entitled "Experimental researches on the phosphorescence of the glowworm." (Annals and mag. nat. hist., Apr. 1880, s. 5, v. 5, p. 345-347.)

The presence of oxygen is indispensable to the action of the luminous apparatus of *lampyrus*. Every agent which kills the cells immediately arrests the phosphorescence. This appears to be due to the production by the protoplasm under the influence of the will of a phosphorescent substance, probably hydrogen phosphate. *H. A. R.* (3394)

Jousset de Bellesme.— Sur une fonction de direction dans le vol des insectes. (Comptes rendus acad. sci. France, 8 Dec. 1879, v. 89, p. 980-983.)

Review? ("Guide du natural., an. 2, p. 12-13.")

Extract. (Rev. scientifique, 20 Dec. 1879, an. 9, p. 597-598, 12 cm.)

Description of the mode in which the different orders of insects direct their flight; comparison with the mode of directing flight in birds. It is not the wings, but other parts of the body, which displace the centre of gravity. *G: D.* (3395)

Mik, Josef. Ueber das präpariren der dipteren [Rec., 2335].

Reprint. (Entom. nachrichten, July 1881, jahrg. 7, p. 189-206.)

Notice, [by C: V. Riley], entitled "Preparation of diptera." (Amer. nat., [3] Dec. 1881, v. 15, p. 1008.) (RILEY, C: V. Entomology . . . [Dec. 1881], p. 1008.)

Dutch tr. with additions, by F. M. van der Wulp, entitled "Over het prepareren van diptera. Naar het hoogduitsch van Josef Mik. (Tijdschr. voor entom., jahrg. 1881-1882, deel 25, p. xci-cix, il.)

B: P. M. (3399)

Möller, G. Fr. Bidrag till kännedomen om parasitlivet i galläpplen och dylika bildningar. (Entom. tidskr., 1882, årg. 3, p. 182-186.)

Engl. tr., by B: P. Mann, entitled "Contribution to the knowledge of parasitic life in galls." (Psyche, Sept.-Oct. [16 Nov.] 1883, v. 4, p. 89-91.)

Lists of insects other than the gall-makers raised from galls of several species of *Cynipidae*, in Sweden.

B: P. M. (3367)

Osten Sacken, C: Robert. Biological notes on diptera. Article 2nd. (Trans. amer. entom. soc., Mch. 1870, v. 3, p. 51-54.)

Additions and correction in author's "Biological notes on diptera, article 3d" (*op. cit.*, Dec. 1871), p. 347.

Describes gall and imago of *asphondylia rudbeckiae-conspicua* n. sp., comparing them with related species, and describes galls and larvae of the new species *cecidiomyia sambuci-umbellicola*, *c. caryae-nucicola*, *c. tiliac-citrina* and *c. quercus-majalis; collinome advena?* parasitic on the *asphondylia*. *B: P. M.* (3308)

Osten Sacken, C: Robert. Biological notes on diptera, article 3d. (Trans. amer. entom. soc., Dec. 1871, v. 3, p. 345-347.)

Describes imago, abode and transformations of *diploasis resinicola* n. sp., and gall of *cecidiomyia cerasi-serotina* n. sp.; seasons of *asphondylia monacha*; further note on *cecidiomyia sambuci-umbellicola*. *B: P. M.* (3300)

Osten Sacken, C: Robert. Biological notes on diptera. Galls on *solidago*. (Trans. amer. entom. soc., Mch. 1869, v. 2, p. 299-303.)

Enumeration and synopsis of North American dipterous galls on *solidago*; description of galls and imagos of *asphondylia monacha* and *cecidiomyia anthophila*, both new species, and of gall of *trypteta folita*, all on *solidago*, with biological notes; generic characters of *asphondylia*. *B: P. M.* (3100)

Osten Sacken, C: Robert. *Lasioptera* reared from a gall on the golden-rod. (Proc. entom. soc. Philad., Feb. 1863, v. 1, p. 368-370.)

Supplementary note, by author, entitled [*Lasioptera solidaginis* and *trypteta solidaginis*]. (*op. cit.*, July 1863, v. 2, p. 77.)

Description of galls of *trypteta solidaginis* and *curyptychia salicencana*, and of evidences of the presence of other insects in these galls; "does *lasioptera* produce a gall for itself?"; description of imagos of *lasioptera solidaginis* [reared from galls of the *curyptychia*]. *B: P. M.* (3101)

Riley, C: Valentine. Chinch bug notes. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 87-89.)

(RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 87-89 [27-29].)

Verification of Cyrus Thomas' predictions in relation to the ravages of *blissus leucopterus* in 1881 and 1882; extracts from correspondence reporting the abundance of this insect early in 1882; letter from J. G. Barlow on the weather and the ravages of the *blissus* in Washington county, Missouri, in 1882; irrigation, cremation and other means against these insects. *B: P. M.* (3102)

Riley, C: Valentine. Gall-insects. (Johnson's new universal cyclop., 1876, v. 2 v. p. 412-416, [16] fig.)

Definition of term "gall-insects;" classification and habits of these insects, mentioning by name and giving figures of typical species and the galls made by them. Dimorphism and metagenesis of *Cynips*. *B: P. M.* (3103)

[Riley, C: Valentine.] Preparation of diptera. (Amer. nat., [3] Dec. 1881, v. 15, p. 1008.) (RILEY, C: V. Entomology . . . [Dec. 1881], p. 1008.)

Notice of J. Mik's "Ueber das präpariren der dipteren" (Verh. k. k. zool.-bot. ges. Wien, jahrg. 1880, bd. 30, p. 359-378) (Entom. nachr., July 1881, jahrg. 7, p. 189-200) [Rec., 2335 and 3397]. *B: P. M.* (3104)

VAN DER Wulp, F. M. Over het prepareren van diptera. Naar het hoogduitsch van Josef Mik. (Tijdschr. voor entom., jahrg. 1881-1882, deel 25, p. xci-cix, il.)

Transl., with additions, of Mik's "Ueber das präpariren der dipteren" (Verh. k. k. zool.-bot. ges. Wien, jahrg. 1880, bd. 30, p. 359-378) (Entom. nachrichten, July 1881, jahrg. 7, p. 189-200) [Rec., 2335 and 3397]. *S: H: H.* (3105)

ENTOMOLOGICAL ITEMS.

BULLETIN NO. 3 of the Entomological division of the U. S. Department of agriculture was issued 8 Dec. 1883, and may be obtained on application to the U. S. Commissioner of agriculture at Washington.

THE SECRETARY of the Cambridge entomological club has just published, at his own expense, the minutes of the club's meetings held during 1883. A copy has been sent to every active member of the club.

M. THÉODORE GOOSSENS has announced a memoir to appear in the annals of the French entomological society on the eggs of lepidoptera. With M. Goossens' long experience in rearing lepidopterous larvae this paper will be probably a valuable and interesting contribution to entomology.

MR. W. HAGUE HARRINGTON has presented a list of 926 species of coleoptera taken about Ottawa, Canada, during the past six years, to the Ottawa field-naturalists' club. The list, when published, will contain about 1050 species, there being some yet awaiting determination.

DR. H. A. HAGEN, of Cambridge, Mass., is writing a monograph of the *Odonata* and is desirous of obtaining larvae and pupae of these insects, and especially reared specimens with notes upon their earlier stages.

MR. HENRY EDWARDS, who started and has since edited and published *Papilio*, has transferred that paper to Mr. Eugene M. Aaron, who requests that all communications and business pertaining to *Papilio* be addressed to him, Lock Box 2500, Philadelphia, Pa.

PROF. BERG describes in a late numero of *Kosmos*, how a spider, *Diapontia kochii*, found in Uruguay, uses funnel-formed webs to catch tadpoles for food. In the *American naturalist* for November 1876, T. M. Peters relates the mode by which a species of spider found in Alabama springs upon and captures minnows.

MR. WILLIAM JONES notes, in *Science* for 4 Jan. 1884, that he kept a spider alive in a box without food or drink for 204 days.

LE NATURALISTE CANADIEN, begun Dec. 1868, has just ceased publication, the final numero containing an explanation that the withdrawal of an allowance of \$400 heretofore granted it by the government rendered its continued publication impossible.

THE WORLD'S industrial and cotton centennial exposition, which will open early in December 1884, in New Orleans, La., includes in its scope exhibits of useful and noxious insects, and should not be forgotten by entomologists. Further particulars can be obtained by addressing the director general of the exhibition, Mr. E. A. Burke, at New Orleans.

ANY PERSON who considers himself competent to transcribe and to translate into English with accuracy descriptions of insects in dutch, english, french, german, italian, and latin, and has access to extensive entomological libraries, is invited to communicate with Mr. B. P. Mann, at the U. S. Department of agriculture, Washington, D.C., stating the price at which he would be willing to do such work.

THE MINISTRY of the interior of the government of the Argentine Republic, by resolution of 8 September 1883, refused to allow Don Julio Lacroze to import into the country a quantity of grape-vines lying in the custom house at Buenos Aires. This resolution was founded on a previous decree prohibiting the introduction of grape-vines, so as to prevent the development of *Phylloxera vitifoliae*.—*El nacional* [Buenos Aires], 8 Sep. 1883, p. 1, col. 8.

THE FRIENDS of the late Dr. Hermann Müller, of Lippstadt, Germany, have undertaken to establish a fund to honor the memory of Dr. Müller and to aid his family. The fund will be termed the Müller-fund; its revenues will be given to Dr. Müller's widow during her life-time, and after her

death, to some descendant of Dr. Müller who may desire to study natural science, or to some other needy and worthy student of natural science from the school at Lippstadt. Contributions may be sent to the treasurer of the committee on the Müller-fund, Wilhelm Thurmann, City-treasurer of Lippstadt. The undersigned will forward with pleasure, to their destination, any sums he may receive for the fund, together with the names of the givers.

G: Dimmock.

MR. J. B. SMITH prepares his duplicate coleoptera in the following manner:—They are soaked for a week or more in a fluid composed of 100 grams of alum, 25 of salt, 12 of saltpeter, 60 of potash and 10 of white arsenic dissolved in 3000 grams of boiling water. The solution is filtered and when cold add to every ten parts four of glycerin and one of methyl alcohol. Insects prepared in this manner remain soft and flexible and can be sent in boxes without being pinned and without danger of breaking. The same method could be applied to hemiptera and orthoptera, but probably it would not be successful with diptera, hymenoptera, lepidoptera, or neuroptera.—*Science record*, Nov. 1883, v. 2, p. 15-16.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass. at 7.45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884.
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

G. J. BOWLES, *Secretary*.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary*.

No. 115-116 were issued 11 Feb. 1884.

EXPLANATION OF PLATE I.

- Fig. 1. *Paria aterrima* Oliv.
Fig. 2. *Scelodonta pubescens* Mels.
Fig. 3. Pupa of *Scelodonta pubescens*.
Fig. 4. Head of *Paria aterrima*, front view.
Fig. 5. Larval and pupal structures of *Scelodonta*.
A, tip of abdomen of pupa, lateral view; with figure of anal hook, more enlarged. B, last abdominal segments of larva, viewed from beneath. C, mandible of larva.
Fig. 6. Larval and pupal characters of *Paria*.
A, tip of abdomen of pupa, lateral view. B, mandible of larva.
Fig. 7. Larval and pupal characters of *Colaspis*.
A, antenna of larva. B, labium and maxillae. C, mandible.
D, labrum. E, last abdominal segments of larva, viewed from beneath. F, tip of abdomen of pupa, ventral view.
Fig. 8. Larva of *Colaspis brunnea* Fab.

FIG. 1.

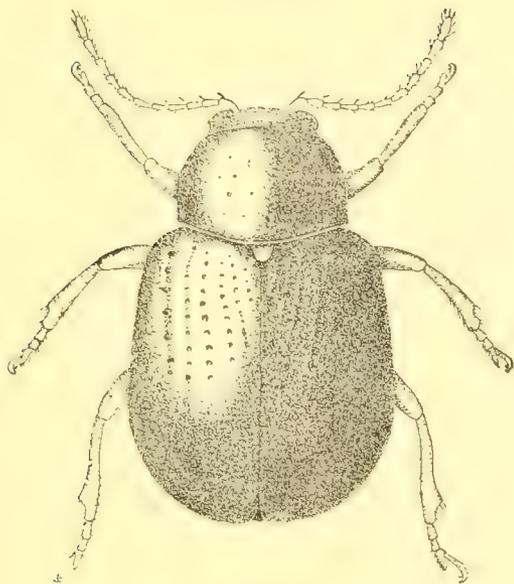


FIG. 2.

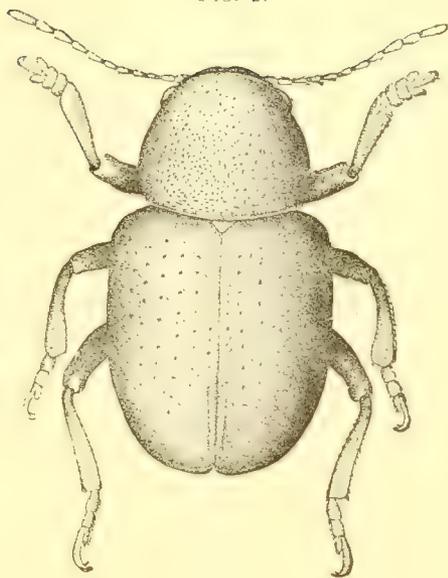


FIG. 3.

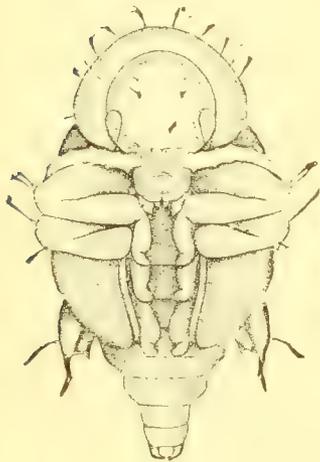


FIG. 4.

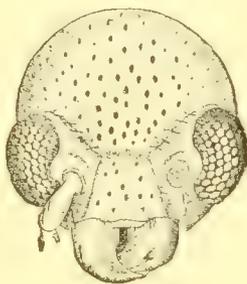


FIG. 5.

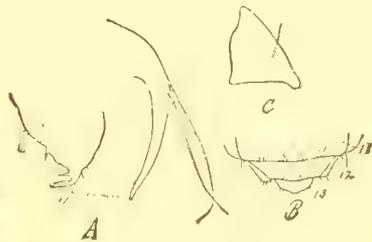


FIG. 6.



FIG. 7.

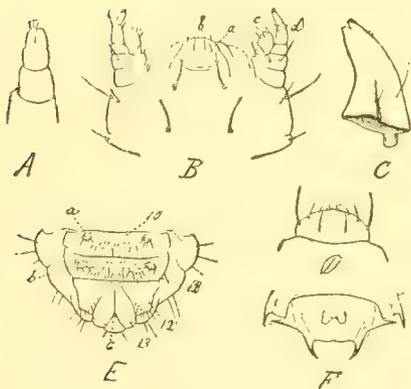
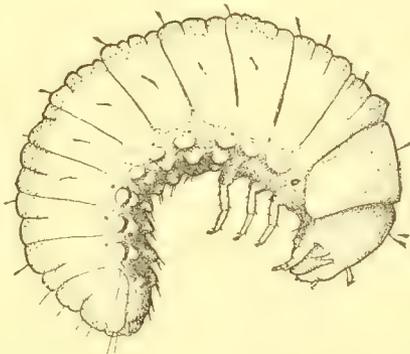


FIG. 8.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 119.

MARCH 1884.

CONTENTS.

ADVERTISEMENTS	142
TREATMENT PROCESSES AGAINST PHYLLOXERA VITIFOLIAE— <i>William Stebbins Barnard</i>	143-144
THE FIRST NUMERO OF THOMAS SAY'S AMERICAN ENTOMOLOGY AND TWO LETTERS ON THE HESSIAN FLY HITHERTO NOT MENTIONED AMONG HIS PUBLISHED PAPERS— <i>Hermann August Hagen</i>	145-146
SOUND-PRODUCING ORGANS IN ANOMALA, ANTHONOMUS, AND OTHER COLEO- PTERA— <i>W. H. Patton</i>	146
PROCEEDINGS OF SOCIETIES—Cambridge Entomological Club	147
LONDON LETTER— <i>W. L. Distant</i>	147-148
BIBLIOGRAPHICAL RECORD, no. 3406-3433	149-150
ENTOMOLOGICAL ITEMS—Society Meetings	151-152

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, . . . 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

BULLETTINO DEL NATURALISTA COLLECTORE.

PUBLISHED MONTHLY AT SIENA, ITALY.

At least eight large octavo pages per numero, principally in Latin, Italian, and French.

Subscription:

Countries in the postal union 2.50 Francs.
Countries outside the postal union 3.00

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

R. FRIEDLÄNDER & SOHN,

Berlin N. W., Carlstrasse 11.

Natural History and Natural Science Booksellers established since 1827.

Largest stock of the whole Literature of Natural History and the Exact Sciences.

Apply for classified catalogue in 25 parts (each one special department of science), price 10 c. each.—Just published. Part IX. *Entomology 1.* (General Entomology.—Coleoptera.) 46 p. about 2000 works.—X. *Entomology 2.* (Lepidoptera), comprising among others the library of the late Prof. P. C. Zeller, 30 p., about 1300 works.—XI. *Entomology 3.* (Hymenoptera, Neuroptera, Orthoptera, Diptera, Hemiptera, Parasita.) 34 p. about 1500 works.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper, \$3.20 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the *Scientific American* sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 201 Broadway, New York.

PSYCHE.

TREATMENT PROCESSES AGAINST PHYLLOXERA VITIFOLIAE.

BY WILLIAM STEBBINS BARNARD, WASHINGTON, D. C.

The control or destruction of this notorious pest is one of the most prominent scientific problems of our day. It has baffled many experimenters even under the stimulus of a standing prize of 300,000 francs offered by the French government. The Phylloxera commission has not yet found a device worthy of the award. In its reports (1) bisulphide of carbon, (2) sulphocyanide of potassium and (3) submersion by water, are recommended as the best remedies it has found. The control of the phylloxera is becoming a serious question with the Viticultural association of California and the pest occurs more or less through the eastern and middle parts of our country. On these accounts every new treatment against it is received with interest here and abroad.

A treatment devised against the phylloxera by the writer was reported upon last year [14 Dec. 1883] before the Biological society of Washington and a published notice of the discussion on remedies for the phylloxera at that meeting appeared in *PSYCHE* for Jan.-Feb. 1884, v. 4, p. 133-134, in which kerosene, applied by the nether-insertion process, was recommended as superior to naphthalin.

Those remarks were in response to communications by Prof. C. V. Riley and Prof. T. Taylor setting forth the

value of naphthalin as a remedy for the phylloxera. A partial description was there given of a nether inserter [without its handles and accessories] which I had previously constructed for inserting kerosene, but which was equally adapted for applying naphthalin. Omitting some important details and applications of this instrument, it may be added that in practice the device has operated with perfect satisfaction, as used by me in treating infested vines near Washington.

By the process of nether insertion and upward or volatile diffusion of that most infallible of all insecticides, petroleum, by its distillation and upward capillary dispersion in the ground, we have a treatment not only against the active insect but likewise against its summer eggs, which are also on the roots. The insecticides used against the active insect have not killed the eggs in sufficient number, and the survivors have hatched to restock the plants; hence to destroy both by one and the same application makes the treatment simple and more complete.

But the phylloxera also presents itself in a third phase for treatment, viz., in its winter eggs, which are different from the summer eggs and are deposited above ground. This brings me to another method of diffusing petroleum which I devised and reduced to practice

some years since, and which has proved of great value for freeing the orange groves of the scale insects. I allude to its emulsification with milk and water, whereby petroleum can be diluted to any suitable strength for insecticide purposes. The emulsion applied by a brush upon the parts where winter eggs are deposited will destroy them. When diluted, a spray of it over the entire plant in the winter season will do no harm. The winter eggs should be treated not later than February. The milk-kerosene process permits petroleum to be applied by the ordinary methods for insecticides. Emulsification with milk is also a recourse to slow and milden the intense action of the petroleum naphthas when placed in the ground.

Petroleum should be sprayed over the ground to destroy scattered eggs, and to reach the superficial larvae in the soil, but not, when undiluted, so as to flow undiffused upon the roots. When gradually dispersed above as spray and when inserted beneath the roots, the ground itself practically dilutes and diffuses the petroleum before it can reach the roots. The nether-upward kerosene diffusion process is the only economically practical way, of course, in which the deep application of the undiluted forms of petroleum can be attempted with safety to the plant. By it the cheap, crude article and its lighter form, the naphthas, become available as most valuable agents against the pests.

The nether-kerosene process applies likewise as a treatment against all other root insects or subterranean pests, as for

example, the American blight aphid [*Schizoneura lanigera*] the hop root gortyna [*Gortyna immanis*], root maggots of the cabbage, &c., the strawberry root beetles, cicadas, cut-worms, white grubs, wire worms, nests of ants, &c. Thus it is seen to have a general application to a wide range of cases heretofore not satisfactorily treated.

Besides the combined application of petroleum and the nether-insertion process, the latter and the inserters apply in combination with many other insecticides which have more or less efficiency in the cases cited, of which the following examples may be specially mentioned, viz. : rhigolene, gasolene, naphtha, benzine, kerosene, crude petroleum, oil of tar, tar water, naphthalin, pyroligneous acid, soot, creosote, carbolic acid, cresylic acid, sulphurous acid, sulphocyanide of potassium, bisulphide of carbon, cyanide of potassium, pyrethrum preparations, lye solutions, tobacco decoction, chips and snuff, water, gas water, liquid fertilizers, vapors, gases or fumes. The relative merits or advantages or disadvantages of these would involve lengthy discussion which may now be postponed, each has its special adaptation.

The nether inserters apply any upward acting insecticide against any underground enemies. Also I have provided certain accessories with which they in the same manner apply water or liquid manure to saturate the ground against *Phylloxera* or the other pests, and to fertilize the ground, to stimulate and diet up the plant; but these topics will be fully noticed at a later date.

THE FIRST NUMERO OF THOMAS SAY'S AMERICAN ENTOMOLOGY AND TWO LETTERS ON THE HESSIAN FLY HITHERTO NOT MENTIONED AMONG HIS PUBLISHED PAPERS.

BY DR. HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

I bought, in 1850, out of the library of the late W. Von Winthem, in Hamburg, the first numero of Say's American entomology, 1817; the first volume of his American entomology, 1824; and the glossary, 1825. All three are in the original binding and the two latter with the inscription on the title: "To Mr. Wm. W. von Winthem from his friend the author." All belong now to the library of the Museum of comparative zoology.

The first numero of volume 1 of the Amer. entomology, 1817, is extremely rare; indeed I have never seen another copy than mine in Europe or in America, and was also assured by the best authority, Mr. S. H. Scudder, that he had never seen a copy. Dr. J. L. LeConte, in his edition of Say's works, 1859, v. 2, p. 1, note, says: "These references are to the suppressed first edition of the American entomology, which I have never seen." Later, in 1872, when I showed my copy to the late Doctor, he answered that he possessed a similar copy. Perhaps my memory is wrong; at least in the printed catalogue of his library it is not mentioned.

I suppose some details about this rare book may not be out of place. Say, in the preface of vol. 1, 1824, p. vii, says: "Six plates of the present volume, together with their accompa-

nying text, were printed off in the year 1817, but as they were never properly published, it has been thought advisable to include them in the present work."

The little volume is printed on the same paper and same size as vol. 1, 1824; the cover has the same nice vignette (two Cupids catching insects), but marked vol. 1, no. 1, and Kneass, Young and Co. etc., which is also repeated on the title plate. The title is American | Entomology | or | Descriptions | of the | Insects of North America | illustrated by | Coloured Figures | from | Drawings executed from nature | by Thomas Say | Member of the Academy of Natural Sciences of Philadelphia etc. | (the verses from Stillingfleet as in 1824) Philadelphia | published by Mitchell and Ames | W. Brown, Printer, Prune Street. | 1817.—

Then follows, p. iii to x, a preface entirely different from that in 1824.

The six plates have no numero nor the name of the engraver, exactly as in volume 1, 1824, where the same six plates are alone not numbered.

1. *Papilio Philenor*, with three pages of text, marked Plate I (the same numero in 1824).

2. *Geotrupes Tityus*, with 4 pages of text, marked Pl. II (*Scarabaeus Tityus*, pl. 4. in 1824).

3. *Nemognatha immaculata*, with 2 pages of text, marked Pl. III (pl. 7 in 1824).

4. *Notoxus monodon*, the lower fig., and *N. bicolor*, with 4 pages of text, marked Pl. IV (*Anthicus bicolor* and *A. monodon*, pl. 10, in 1824).

5. *Berytus spinosus*, with 3 pages of text, marked Pl. V (pl. 14, in 1824).

6. *Cicindela formosa*, and *C. decemnotata*, with 4 pages of text, marked Pl. VI, and followed by an index of the 8 species figured (pl. 18 in 1824).

The text in 1824 is throughout different from the text in 1817, mostly shortened, but scarcely different for the descriptive part of the species. The coloration of the plates is more careful than in 1824 and better than in LeConte's edition.

The Memoirs of the Philadelphia society for promoting agriculture, vol. 4, Philadelphia, 1818, 8°, contain two letters of Thomas Say, which are not mentioned in Doubleday's List of Thomas Say's works, nor in LeConte's edition, nor quoted by Th. W. Harris. Dr. Asa Fitch states that he has never seen this rare book. The volumes were presented to the Library of Harvard college in 1849, after Harris had done his work. He knew it, but as it contains nothing of importance it is not quoted by Harris, though in one volume a letter to him is found on the cover.

1. A letter, Sept. 28, 1817, to Hon. R. Peters, by Thomas Say, p. 224-226, containing remarks on the Hessian fly, on the locust and on corn grubs.

2. A letter, p. 236-237, to the same, by Thomas Say, containing remarks on

the Hessian fly, on *Tinea granella*, and on cut worms.

[The references to these two articles, which were written out several years since, are added in the Bibliographical record, nos. 3430 and 3431.—*B. P. M.*]

SOUND-PRODUCING ORGANS IN ANOMALA, ANTHONOMUS, AND OTHER COLEOPTERA.—There is a stridulating organ in *Anomala*, situated on the metathorax and elytra, in the same position as described by me in *Polyphylla* (PSYCHE, v. 2, p. 278). Its location is the same as that of the elytral organ described by Dr. LeConte (Class. col. N. A.) in *Trox* and *Ligyryus*, but Dr. LeConte failed to notice that the metathorax in those genera has on its ascending portion (beneath a ridge in *Trox*) a corresponding pearly space, just as it has in *Polyphylla*; this is in addition to the organ on the first ventral, corresponding to the third dorsal, segment, in *Trox*, described by Dr. LeConte. My finding these organs in *melolonthini* and *rutelini* is merely accidental: why does not some coleopterist study them microscopically in all our genera of *scarabacidae*? The same organs are present in *Limonium* and other *clateridae*, and there is, besides, a surface on the ascending portion of the first ventral segment, as in *Trox*, which, as in *Trox*, corresponds to a second surface on the elytra. I find stridulating organs also in *Anthonomus*, of the *curculionidae*, situated as in *Anomala*.

W. H. Patton.

Waterbury, Conn., 13 Nov. 1883.

[Stridulating organs of coleoptera are described in PSYCHE, Rec., no. 1409, 1414.]

PSYCHE.

CAMBRIDGE, MASS., MARCH 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(Continued from p. 133.)

8 JUNE 1883.—The 94th meeting of the Club was held at 19 Brattle Square, Cambridge, 8 June 1883. In the absence of the President, Mr. R. Hayward was chosen Chairman. Five persons were present.

Mr. S. H. Scudder reviewed P. H. Gosse's "On the clasping organs ancillary to generation in certain groups of the lepidoptera" (Trans. Linn. soc. Lond., April 1883, Zool. : s. 2, v. 2, pt. 6, p. 265-345, pl. 26-33) and described the general structure of the genitalia of lepidoptera, giving the nomenclature of these parts according to Gosse and according to other authors. [For further notice of this review see *Science*, 6 July 1883, v. 2, p. 22 & 3.]

Mr. G. Dimmock exhibited a living specimen of *Buthus occitanus*, and described some of the habits of that species of scorpion. The specimen shown was taken near the Arago Laboratory, at Banyuls-sur-mer, Pyrénées-Orientales, France, in May 1882.

Mr. R. Hayward showed a male specimen of *Rhyssa atrata*, and some discussion followed on the comparative rarity of the males and females of certain hymenoptera.

Mr. G. Dimmock said that after repeated attempts he had succeeded in making the male of *Culex* drink. The structure of the mouth-parts of the male had led the speaker to believe that the male mosquito could drink altho it could not bite us and thus get at our blood, and by keeping a male without drink for several days he had had the satisfaction of seeing the insect drink water freely from a moist cloth.

THE LARGE number of references to galls and gall-insects in the Bibliographical record, recently, are brought together in answer to inquiries from correspondents. We have many more on hand, not yet complete enough to print in the record, but sufficient for immediate use. Having brought together, in the course of years, by diligent labor, an immense stock of references, partially indexed, we are prepared to supply such to correspondents, in manuscript. We deem it no more than just to require such correspondents to pay for the assistance thus rendered them, either in kind or in money which may be applied to defraying the expenses of PSYCHE.

B: P. M.

LONDON LETTER.

EAST DULWICH, LONDON.

JANUARY 5th, 1884.

One of the most important and extensive contributions to a knowledge of the Japanese entomological fauna has recently been received in this country from the hands of Mr. Geo. Lewis. This gentleman, having made a no inconsiderable collection during a previous sojourn in Japan, returned to that country for the express purpose of supplementing and increasing the same, and being an experienced British collector was thus enabled to bring home a magnificent series of coleoptera, neuroptera and rhynchota. The coleoptera in several families have already been treated by Messrs. Bates, Gorham and Lewis; the neuroptera have been handled by Baron de Selys-

Longchamps, and I have given a first report on the rhynchota, an order of which some Japanese members have previously received the efficient attention of your own countryman, Mr. P. R. Uhler. We have no state aid to entomology in this country, and our success in the study of the science has always been largely indebted to the voluntary efforts of those votaries who possess the love of entomology combined with the necessary leisure and competence to undertake or promote such expeditions.

Herr Georg Semper, of Altona, who has recently paid us a visit, has informed me of his intention to publish a work on the rhopalocera of the Philippine Islands, for which he possesses good material in the collection made by his brother Prof. Carl Semper during his memorable journey to those islands. Another work of this nature is in the press, viz., a new edition, with much new matter, of Mr. Trimen's "*Rhopalocera Africae australis*."

We are still having a very mild winter, resembling in this respect its immediate predecessors. It is probable, therefore, that the ensuing summer may also follow its recent precursors in exhibiting a considerable dearth in insect life, as the complaints of lepidopterists and other collectors in our entomological magazines during the last few years abundantly testify. The mild, damp winters are well known to be destructive to pupating insect life, but these do not explain the more difficult and interesting problem as to the sudden and plentiful appearance in one season of a generally scarce and almost unobserved species. This is not confined to temperate climates, as I have lately received a very forcible illustration of the same phenomenon in the tropics. *Ragadia crisis* Hübn., a well known and handsome member of the *satyrinae*, is not a scarce insect in the Indo-Malayan region, though it has hitherto been unrecorded from the Malay peninsula. I did

not meet with it, when residing and collecting there myself, some fifteen years ago, nor have I received it since, in numerous collections derived from that locality. Last year, however, the species seems to have been common from Penang to Singapore. I first received two specimens captured on Penang Hill, and sent me as a new species; others shortly followed from Province Wellesley, with the remark of an experienced collector that the species was quite new to the locality; and almost simultaneously the Indian mail brought me more examples from Sungie, Ujong, Malacca and Singapore.

For some years past, owing to the demands of foreign institutions, entomological literature has reached a pecuniary value that has rendered its acquisition by many students a matter of some inconvenience and difficulty. At recent sales, held in London, of the books of deceased naturalists, these high prices have failed to obtain, and we may hope that prices may soon be less prohibitory to those working entomologists to whom a library of reference is a real necessity.

Mr. Edward Whympere, who paid a visit to Ecuador in 1879-1880, where he made a considerable collection in natural history, especially in regard to entomology, is now writing the account of his journey, which will shortly be published. A feature of this work will be a scientific appendix giving the details and identifications of his collection, contributed by a body of specialists who have undertaken this work. The entomological collection is not very large, but its interest and biological importance is due to the fact that many of the specimens were collected in very high altitudes, and thus contrast with those found in the hot, tropical valleys.

In my previous letter (v. 4, p. 94) the name "Dr. Leitner" should be spelled "Dr. Leuthner."

W. L. Distant.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Gerber, Armand. Conservation des collections entomologiques. (Feuille des jeunes naturalistes, 1 Dec. 1880, an. 11, p. 30-31.)

Discusses the merits of the essence of bitter almonds (C⁶H⁶, COH) and the essence of mirbane, or nitrobenzole (C⁶H⁵, NO²) for keeping collections of insects free of pests. G: D. (3406)

Illinois state laboratory of natural history, Normal, Illinois—Director. 1881-1882 (Stephen Alfred Forbes). Report of the director of the state laboratory of natural history, for the two years, ending June 30, 1881, and June 30, 1882. [Normal, Ill., Mch. 1883.] t.-p. cover, n. t.-p., 12 p., 23 × 15, t 18 × 11.

Report of progress made in the different kinds of work of the Illinois state laboratory of natural history. Considerable space is devoted to the work in branches of economic entomology. G: D. (3407)

Osten Sacken, C: Robert. [*Lasioptera solidaginis* and *trypeta solidaginis*.] (Proc. entom. soc. Philad., July 1863, v. 2, p. 77.)

Note supplementary to author's "*Lasioptera* reared from a gall on the golden-rod" (*op. cit.*, Feb. 1863, v. 1, p. 368-370) [Rec., 3401]; *Lasioptera solidaginis* bred from galls [of *Eurytychia saligneana*] on *Solidago* and similar galls on *vernonia*; *trypeta asteris*|| Harris = *L. solidaginis* Fitch; it is not certain that this fly makes galls on *aster*. B: P. M. (3408)

Riley, C: Valentine. Conical galls on leaves of wild grape-vine. (Moore's rural new-yorker. 28 Aug. 1869, v. 20, p. 555, col. 3-4, 12 cm.)

Brief description of galls [of *Cecidomyia vitis-viticola*]; characters of larvae of *Cecidomyia*. B: P. M. (3409)

[**Riley, C: Valentine.**] Covering of egg-puncture mistaken for *dorthesia*. (Amer. nat., July 1881, v. 15, p. 574.)

In the collection of Asa Fitch the white and ribbed waxy material covering the egg-punctures of *Euclophyl-lum binotatum* are labelled as *dorthesia viburni* and *d. celastri*. It is doubtful whether any such species were described by Fitch. B: P. M. (3410)

[**Riley, C: Valentine.**] Cypress-gall. (Amer. entom. and bot., June 1870, v. 2, p. 244, 19 cm., fig. 153.)

Description and figures of gall and description of larva and imago of *Cecidomyia cypressi-auranassa* on *Cypripedium "thyoides"* [*disticho*]; figure of breast-bone of larva. B: P. M. (3411)

Riley, C: Valentine. Dr. Hagen's mystery. (Can. entom., Dec. 1880, v. 12, p. 263-264.)

Crit. rev. of H. A. Hagen's "A mystery in reference to *Protonuba yuccasella*" (*op. cit.*, July, p. 128-129) [Rec., 3378]; the remarks in that article are admitted by Dr. Hagen to have been founded upon the confusion of *Prodoxus decipiens* with *tegeticala yuccasella*. B: P. M. (3412)

Riley, C: Valentine. On a gall-making genus of *apioninae*. (Bull. Brooklyn entom. soc., Oct. 1883, v. 6, p. 61-62.)

Separate. [Brooklyn, N. Y., 1883.] 2 p., 23 × 15.

List of gall-making coleoptera hitherto found in North America; description of the new genus *Podopion* and of the gall and imago of *P. gallicola* n. sp., found on twigs of *Pinus inops*; probable life-habits, inclinations and parasite of this insect. B: P. M. (3413)

[**Riley, C: Valentine.**] Gall on *Solidago* leaves. (Amer. entom., Nov. 1880, v. 3, n. 8., v. 1, p. 278, 4 cm.)

Letter from H. Barnes, with answer; occurrence of galls of *Cecidomyia carbonifera* on leaves of *Solidago nemoralis*? at Mulberry Corners, Ohio. B: P. M. (3414)

[**Riley, C: Valentine.**] Galls. (Amer. entom. and bot., Dec. 1870, v. 2, p. 372, 3 cm.)

Notice of author's studies on North American gall-insects, and request for specimens and notes upon that subject. B: P. M. (3415)

[**Riley, C: Valentine.**] Galls and gall-insects. (Amer. nat., May [16 Apr.] 1881, v. 15, p. 402-403.) (RILEY, C: V. Entomology... [May 1881], p. 402-403.)

Review of H. F. Basset's "New species of *Cynipidae*" (Can. entom., Mch. 1881, v. 13, p. 51-57) [Rec., 3387, with additional notes on the gall of *Cynips quercus-coccifera*]; this gall found on *Quercus douglasii*, and infested by *Ozognathus cornutus* even after it has been dried for years; the *Cynips* produced from it all females; reference to earlier accounts of the gall and of the habits of the *Ozognathus*. B: P. M. (3416)

Riley, C: Valentine. [On galls growing on wild sage.] (Trans. acad. sci. St. Louis. [July ? 1873], v. 3; Journ. of proc., p. 84.)

[Verbal communication, 3 June 1872.] Occurrence of three distinct, undescribed galls on *artemisia tridentata* in Utah. *B: P. M.* (3417)

Riley, C: Valentine. Galls made by moths. (2d ann. rept. state entom. Mo., [Mch.] 1870, p. 132-135, fig. 98-99.)

Contains, by C: V. RILEY:—The false indigo gall-moth: *walshii amorphella*, Clemens [Rec., 3339]. The misnamed gall-moth: *euryptychia, saligneana*, Clemens [Rec., 3343]. *B: P. M.* (3418)

[**Riley, C: Valentine.**] Galls on *eucalyptus*. (Amer. nat., May [16 Apr.] 1881, v. 15, p. 402.) (Riley, C: V. Entomology... [May 1881], p. 402.)

Probable character of two galls occurring on *eucalyptus gracilis* in Australia, and described by R: McLachlan. *B: P. M.* (3419)

[**Riley, C: Valentine.**] Large *asilus* fly. (Amer. entom. and bot., Oct. 1870, v. 2, p. 340, 4 cm.)

Food-habits of *promachus vertebratus*, *p. bastardi* and *asilus missouriensis*; occurrence of undetermined galls under trees of *quercus alba*. *B: P. M.* (3420)

[**Riley, C: Valentine.**] Mite gall on sugar maple. (Amer. entom. and bot., Oct. 1870, v. 2, p. 339, 4 cm.)

Brief description of gall of *acarus aceris-crumena* n. sp., on leaves of *acer saccharinum*; occurrence of similar galls of *acarina* on plum and cherry. *B: P. M.* (3421)

[**Riley, C: Valentine.**] Mossy rose gall. (Amer. entom. and bot., May 1870, v. 2, p. 213, 12 cm., fig. 130.)

Description of gall, larva and imago of *rhodites rosae* and of larva of a parasite on it; figure of the gall. *B: P. M.* (3422)

[**Riley, C: Valentine.**] Moths attracted by falling water. (Amer. nat. Oct. [28 Sep.] 1882, v. 16, p. 826.) (RILEY, C: V. Entomology... [Oct. 1882], p. 826.)

Notice of J. S. Gardner's "Moths attracted by falling water" (Nature, 9 Mch. 1882, v. 25, p. 436) [Rec., 3370]; gleaming water-falls in Iceland as attractive to moths as artificial light would be. *B: P. M.* (3423)

[**Riley, C: Valentine.**] "A mystery in reference to *pronuba yuccasella*." (Amer. entom., Dec. 1880, v. 3, n. s., v. 1, p. 293, 16 cm.)

Crit. rev. of H. A. Hagen's "A mystery in reference to *pronuba yuccasella*" (Can. entom., July 1880, v. 12, p. 128-129) [Rec., 3378]; Hagen confounded *prodovus decipiens* with *tegeticula yuccasella* in his article, and published no correction of the error after he found it out. *B: P. M.* (3424)

Riley, C: Valentine. Oak apple. (Americyclop... Appleton, 1875, v. 12, p. 558-559, 3 fig.)

Describes galls of *cynips terminalis*, *c. quercus-spongifica* and *c. quercus-inanis*, and manner in which they are formed; figures the latter two galls and a parent fly, nature of galls; problems involved in the study of gall-insects. *B: P. M.* (3425)

[**Riley, C: Valentine.**] Oak gall: *cynips q.-decidua* Bass. (Amer. entom., Nov. 1880, v. 3, n. s., v. 1, p. 278, 4 cm.)

Letter from J. Schneck, with answer; galls supposed to be those of *cynips q.-decidua* found on leaves of *quercus muhlenbergii* at Mt. Carmel, Ill. *B: P. M.* (3426)

[**Riley, C: Valentine.**] Pithy blackberry gall. (Amer. entom., Mch. 1870, v. 2, p. 159-160, 24 cm., fig. 103.)

Description and figures of larva and gall of *diastrophus nebulosus* on *rubus*; figure of pupa; seasons, guest-fly (*aulax sylvestris*) and parasite (*eurytoma diastrophii*) of the *diastrophus*; the genus *diastrophus* confined to *rosaceae*, *cynips* to *capuliferæ* and *antistrophus* to *compositæ*. *B: P. M.* (3427)

[**Riley, C: Valentine.**] The pod-like willow gall. (Amer. entom. and bot., May 1870, v. 2, p. 214, 14 cm., fig. 133.)

Description and figures of gall of *cecidomyia salicis siliqua*, figure of larva; food-plants, synonymy and description of pupa of this genus. *B: P. M.* (3428)

[**Riley, C: Valentine.**] Prickly rose gall. (Amer. entom. and bot., June 1870, v. 2, p. 246, 3 cm.)

Brief description of gall of *rhodites bicolor* on wild rose. *B: P. M.* (3429)

Say, T: Hessian fly; grain moth; cut worm. (Memoirs Phil. soc. promot. agric., 1818, v. 4, p. 236-237.)

Cecidomyia destructor oviposits in stubble of old wheat; the "grain-moth" may be *linea granella* of Europe; the parents of cut-worms probably oviposit a the roots of grass. *B: P. M.* (3430)

Say, T: Season of 1816. (Memoirs Phil. soc. promot. agric., 1818, v. 4, p. 224-226.)

Cecidomyia destructor unknown in Europe; *cicada septendecim* not a locust; "corn-grubs" are larvae of various species of *noctua*. *B: P. M.* (3431)

[**Tepper, F: and E: L: Graef.**] Synoptic table of lepidoptera. (Bull. Brooklyn entom. soc., May 1879, v. 2, p. 5-6, 1 fig.)

Synoptic table of species of the genus *colias*. Cont. from *op. cit.*, Mar. 1879, v. 1, p. 89-90. *F. G: S.* (3432)

Worthington, C: Ellis. Two new hesperians. (Papilio, Sept. 1881, p. 132-133.)

Describes as new *andamus aberon* and *erycides okeechabee*, both from Marco Island, Fla. *H: E.* (3433)

ENTOMOLOGICAL ITEMS.

WORCESTER, MASS. has a new scientific society, the Zoological club of Worcester, of which Mr. F. G. Sanborn is president.

MR. D. W. COQUILLET, of Anaheim, California, has in view the preparation of a monograph of the dipterous family *bibionidae*.

MR. WILLIAM BUCKLER, who has described the early stages of a large number of British lepidoptera, died 9 Jan. 1884, at Lumley House, Emsworth, Hants, in his seventieth year.

IT MAY interest entomologists to learn that the newly organized American ornithologists' union have a committee to consider whether the English sparrow (*Passer domesticus*) is on the whole beneficial or injurious to agriculture. The committee has issued a circular asking answers to questions on the subject.

AT A meeting to which the entomologists of Washington and Baltimore were invited, held at the house of Dr. C. V. Riley, in Washington, D. C., on the evening of 29 February 1884, and presided over by Rev. Dr. John G. Morris, of Baltimore, a resolution was adopted unanimously to establish an entomological society in Washington and vicinity, and a committee was appointed to draw up the necessary regulations and to call a future meeting for organization.

B: PICKMAN MANN, *Secretary*.

THE CORNELL UNIVERSITY offers to its students "final honors" in entomology, as in several other subjects, and under the following conditions, which we extract from "The Cornell university register 1883-84," p. 111:—

Entomology.—The candidate must have passed, with an honorable average, the regular examinations in the subjects of zoölogy (vertebrate and invertebrate), microscopic technology, botany (the elementary course, including field-work), and entomology (the general course, as laid down in the sophomore and junior years in the course in agri-

culture); and must also pass, with distinguished excellence, a special examination upon the results of an investigation of one or more special subjects to which he has devoted an amount of work equivalent to two hours a term for two years.

The subject for 1884 is to be selected from the following list:

(a) The internal anatomy of the larva of the *Corydalus cornutus* Linn.

(b) The insects injurious to woolen goods in the United States.

(c) The insects infesting apple trees at Ithaca.

(d) The insects injurious to wheat in the north-eastern part of the United States.

NEW SCIENTIFIC journals are springing up with about the same prolificacy, and with almost the same prospect of long life, as is the case with French political newspapers. We have before us the third numero of "Random notes on natural history" published by Southwick and Jencks, of Providence, R. I., from which we discover the existence of a Rhode Island entomological society. From the first (March) numero of "Problems of nature," to be published semi-monthly at New York, under the editorship of H. P. Philbrook, we learn still less. We learn that Mr. Winfrid A. Stearns, of Amherst, Mass., proposes to start a monthly journal, to be devoted to the interests of Massachusetts natural history, and to be called the "Bulletin of the natural history of the state of Massachusetts." We can decide better upon the merits of this bulletin with a long name, after we see a copy of it. Its price is one dollar a year, and it is approved and aided by the officers of the State agricultural college at Amherst.

Many enthusiasts wish practically to promote the natural sciences by publications, they can do better by increasing the effectiveness of established journals than by wasting their energies in overcoming the friction of numerous new machines. for each separate journal requires as much unproductive labor in its merely mechanical working as all combined would need, while the same energy concentrated on one working machine would all be utilized.

THE JANUARY numero of the *Deutscher biennfreund* contains an interesting article on Professor R. Leuckart of Leipzig university, with special reference to his contributions to our knowledge of bees. The article, which is accompanied by a full-page portrait of Prof. Leuckart, was written by Dr. Oskar Krancher, lately a student in Leuckart's laboratory. As Leuckart, who is now sixty years old, has done much excellent work for entomology in the midst of his extensive zoological investigations, and has been the teacher of many young zoologists who have studied the anatomy of insects, I may be pardoned for translating a part of what Dr. Krancher truly says of the secret of his ability as an educator. "One needs only to be present at a single lecture to discover the reason for this extraordinarily large attendance. Animated diction, eminent gift of eloquence, pleasant, flexible tenor voice, knack at experimenting, finally the gift of teaching and explaining in the clearest manner, these faculties combine to make Leuckart one of the best instructors of Leipzig university." "In his laboratory he proves himself the true 'friend' of the students, now and then taking active hold in the tasks of the several workers."

G. D.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass. at 7.45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

G. J. BOWLES, *Secretary*.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary*.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 120.

APRIL 1884.

CONTENTS:

ADVERTISEMENTS	154
THE BIBLIOGRAPHY OF ENTOMOLOGY. Annual Address of the Retiring President of the Cambridge Entomological Club, 11 January, 1884— <i>Benjamin Pickman Mann.</i>	155-159
SEXUAL ATTRACTION IN PRIONUS— <i>Anna Katherina Dimmock</i>	159
PROCEEDINGS OF SOCIETIES—Cambridge Entomological Club	160
BIBLIOGRAPHICAL RECORD, no. 3434-3454	161-162
ENTOMOLOGICAL ITEMS—Society Meetings	163-164

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

BULLETTINO DEL NATURALISTA COLLECTORE.

PUBLISHED MONTHLY AT SIENA, ITALY.

At least eight large octavo pages per numero, principally in Latin, Italian, and French.

Subscription:

Countries in the postal union 2.50 Francs.
Countries outside the postal union 5.00 "

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

R. FRIEDLÄNDER & SOHN,
Berlin N. W., Carlstrasse 11.

Natural History and Natural Science Booksellers established since 1827.

Largest stock of the whole Literature of Natural History and the Exact Sciences.

Apply for classified catalogue in 25 parts (each one special department of science), price 10 c. each.—Just published, Part IX. *Entomology 1.* (General Entomology.—Coleoptera.) 46 p. about 2000 works.—X. *Entomology 2.* (Lepidoptera), comprising among others the library of the late Prof. P. C. Zeller, 30 p., about 1300 works.—XI. *Entomology 3.* (Hymenoptera, Neuroptera, Orthoptera, Diptera, Hemiptera, Parasita.) 34 p. about 1500 works.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper. \$3.20 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the Scientific American sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 251 Broadway, New York.

PSYCHE.

THE BIBLIOGRAPHY OF ENTOMOLOGY.

ANNUAL ADDRESS OF THE RETIRING PRESIDENT OF THE CAMBRIDGE ENTOMOLOGICAL CLUB, 11 JANUARY 1884.

Fellow Members of the Cambridge Entomological Club:—

I thank you for the honor you were pleased to confer upon me a year ago, in electing me to be your president, an office which to my regret I could fill only in name. I look upon this action of yours as a recognition of my interest in your work and of my earnest endeavors to promote it. My absence from your meetings has not weakened my devotion to the cause which under your auspices I have sought, during the last ten years, to advance.

Ten years of the life of the club have expired, in which the membership of the club has enlarged and grown in influence. A bright future is before us if we only strive in unison to carry out the purposes for which our club was formed, in the most liberal spirit, giving, and trusting for the returns.

I need not dwell upon retrospect nor prophecy. You know the past, and you have the future in your own control.

I welcome this opportunity, dictated by custom and by your laws, to express

my thoughts upon that part of our work as a club with which I have been most concerned. It will not seem to you unnatural for me to speak of the Bibliography of entomology, its purposes and its methods. I will not go into its history, for I prefer rather to consider its future.

We are fortunate in having in our midst and reckoning as one of our number the prince by excellence of the bibliographers of entomology. We count also amongst our members others who have rendered efficient service in this useful and laborious art. One can hardly think of the Cambridge entomological club without thinking of PSYCHE or of PSYCHE without thinking of its Bibliographical record. We are therefore prepared in an especial manner to appreciate the importance of bibliographical work as applied to the promotion of science.

The need of such work is evidently felt in these days more than ever before. Since we entered upon our work we have seen bibliographical departments established as an important feature in

many periodical publications, and some such publications established, as PSYCHIE was, mainly for the sake of their bibliographical departments.

Bibliography is not a science and yet without it the sciences would fare hardly in these times. By it the hidden treasures of acquired knowledge are brought to light. Without it the advance of knowledge would be slow. The ever increasing mass of literature is a wilderness, which no one can traverse throughout, into which few can penetrate deeply, in whose recesses are scattered, with little order, the gathered riches of innumerable workers. He who would not spend his life in doing anew what has been done before him, and often well done, must have access to these acquired stores. Without guides he would become lost, he would find little of that for which he seeks and in the search would lose his time and his way. The index is to the traveler in this wilderness more than the compass to the mariner. It is the guiding hand which leads him from store to store, and places at his disposal all that he wants, or points out to him the empty coffers yet to be filled. Thus are his labors spared and his strength saved for the work that is yet to be done.

I presume that you all are bibliographers, in varied degrees. You have your several studies, and you make your several indices in relation thereto. You are interested to promote the formation of indices of which you may make use, or by which you may render service to others. I have labored long, as you know, to construct a bibliogra-

phy, not so much of any specialty in entomology, as of the subject as a whole.

We have many bibliographical publications at our service now, for the record of current literature. Such works of frequent issue as the *Zoologischer anzeiger* and the *Naturae novitates* serve an excellent purpose for temporary use. By them little of value escapes mention. Their form and style are not suited, however, to the characteristics of a permanent and comprehensive bibliography. In their bibliographical department they are little more than lists of writings, without those references to reviews, extracts and reprints, which serve for the history of literature, and which have a more than bibliographical value. They are not adapted for ready reference by means of indices, and indeed hardly pretend to be more than temporary guides to current literature, for the especial benefit of those workers who are ever tumbling over each other in their haste to get at the latest development of science, and to move forward.

The annual records, such as the Zoological record and the *Zoologischer jahresbericht*, are more than bibliographies in their essential features, but less in others. They too give lists of titles, but without the bibliographical descriptions. The bibliography, such as it is, is almost buried in the mass of the reviews. These works are not so much guides to literature as contributions to it, themselves requiring guides. They treat of the substance of the literature more than of its form, and this so copiously that in the course of years

they become like forests themselves, the trees indeed planted in rows, but those of one kind so far apart and interspersed with others, that they can only be found by a tedious search.

I do not wish to seem to find fault with these works. I recognize their value for the purposes of their being. I only say of them that they have not certain characteristics which they do not pretend to have. We have yet to find the bibliography that we need, permanent, complete, limited to bibliographical simplicity and convenient of reference.

For the early literature there is no need to attempt to improve upon Hagen's *Bibliotheca entomologica*.¹ My remarks apply to literature subsequent to that there recorded, including such omissions from and corrections of that work as occasion may present. The time may come in which a supplement to that work will be published, in some similar form, supplanting all lesser bibliographies, as that has supplanted all earlier ones. Until that time the best that we can do is to form a current bibliography, upon a simple and uniform plan, adapted to serve all the varied purposes which are to be sought in such a work. It may seem superfluous for me to attempt to describe the principles upon which I think such a work should be constructed.

You have granted me so great liberty in the editorial management of *PSYCHE* that I have been enabled, as improvements in the form of the bibliographical

record have been suggested, to put them into practice. I am largely indebted to my principal colaborer in the editorship for many of these improvements. Many changes have been made and probably many others will be made, but the essential features have so far remained the same throughout. Hagen's *Bibliotheca* served as a model in the beginning, and except in detail little change has been made since.

It is useless in a current bibliography to preserve any classification of matter. In the early volumes of *PSYCHE* the attempt was made to bring together the whole contents of volumes in a continuous record, but the disadvantages of the plan were found to overbalance its advantages. In such a plan the whole contents of a volume must be held back until the volume is finished, and other works which are connected with the former by cross-references must be postponed to them. This plan has few advantages, moreover, as reference is rarely made to the contents of works by volumes. In later volumes of *PSYCHE* little or no attempt has been made at the classification of matter.

The whole problem of classification is solved by the publication of the record in form suitable for the construction of card catalogs. The only feature of the work which is marred by the card catalog arrangement is the sequence of the current numeros used for the purposes of the index.

Some persons will choose to arrange their card catalogs by subjects, and others in chronological order, but I have

¹*Psyche, Rec.*, no. 3306.

found the most convenient arrangement to be that by authors, alphabetically and with titles arranged alphabetically under the names of the authors, the index being relied on for reference by subjects or in any other manner desirable. This requires, so long as the index is made by the use of the current numeros, the preservation of a copy of the record in its original form.

During the past three years I have been engaged, amidst other duties, in writing that bibliography of economic entomology which was projected by the United States entomological commission in 1881,¹ and was turned over to the United States Department of agriculture upon the extinction of the commission. This I have prepared strictly in accord with the methods adopted in *PSYCHÉ*, and I have hopes that it may appear so, when published. It has been necessary to index this in large part in advance of its publication, and while yet it was in process of formation, so that the current numeros were not yet attached to it. Under these circumstances the reference has been made in every case by the citation of the name of the author and of the title of the article. This method of reference, though less compact than the mere citation of a numero, has the advantage of being universally applicable, wherever the title may be found under the author's name.

The convenience of reference by a single series of numeros to the whole of the bibliography, however extensive it may become, seems to me one of the

most desirable features to be embodied in such a work.

One of the greatest objections to the annual records of literature, or to any other partial bibliography, from a bibliographical standpoint, is in the necessity, there present, of consulting many indices to find all the references to a single subject. No other form of reference is so compact, so definite and by so easily understood a symbol, as a simple numerical reference. With such means of reference available, new indices, complete to date, can be published from time to time, more readily than under any other circumstances,

I have now sketched briefly to you a few thoughts upon the desirable features of a permanent, complete, simple bibliography, convenient of reference. I have assumed that the characteristics of such a bibliography, are to be found in *PSYCHÉ*. It is true that the Bibliographical record of *PSYCHÉ* is not complete, but that is not the fault of its plan; only the misfortune of its circumstances. However unreasonable it may be to hope that these circumstances will yet so change, that the record in *PSYCHÉ* may be made complete, I still hope it may see better days. If I am not astray in my appreciation of it, it will at least serve as a model.

I hope yet to see an index to the literature of entomology, which will embody the features I have set forth, or better ones. Such a work could well be undertaken in connection with the work of some scientific station where entomology is a special feature, and which is provided with the necessary means

¹ Circular 12 of U. S. entomological commission, January 1st, 1884.

for its accomplishment. And if so undertaken and carried out, it should be a work which could be pointed at with pride. I would fain see this club the author of it.

I would gladly have contributed to your meeting a more worthy address,

but beg you to remember that if not felicitous of speech I am constant of heart, and shall ever wish you prosperity and good fellowship in your future.

Respectfully,

B: *Pickman Mann.*

SEXUAL ATTRACTION IN *PRIONUS*.

BY ANNA KATHERINA DIMMOCK, CAMBRIDGE, MASS.

Late in the summer of 1883 my attention was drawn to the sudden appearance of a large number of holes in the garden, which, upon closer observation, proved to be the exits of numerous beetles of the genus *Prionus*. Having heard that the attraction of the male by the female was not common among coleoptera, and finding no notice of such attraction in the above-mentioned coleoptera, I captured a large female which was found in the grass with ovipositor distended and greatly protruded. Scarcely had the female been secured before a male *Prionus* appeared; he ran and flew, by alternation, meanwhile rapidly palpitating his antennae, about and around the tent, inside of which the female had been confined; finally, discovering the entrance to the tent, he flew in and lit directly on the screen under which the female had been put. After the appearance of the first male another was seen to approach the tent. He went through a similar performance to that of the first one, finally alighting on the cage. In this manner a great many male specimens of *Prionus* were taken in the course of an afternoon. On account of the presence of so many males

a number of females made their appearance, showing an attraction of the female to the male like that above-noted of males attracted by females. Instances similar to those just described, that is, of male insects attracted by females of the same species, have been frequently recorded in lepidoptera, especially among the *bombycidae*; but among the coleoptera such cases are, I think, more rarely met with, the only instance to my knowledge being the one originally mentioned by Prof. F. H. Snow,¹ and quoted by Mr. J. A. Lintner.² Prof. Snow found males of *Polyphylla variolosa* vigorously scratching the ground above places where females were about to emerge, presumably guided to these places, as Mr. Lintner suggests, by the sense of smell, rather than, as Prof. Snow supposed, by that of hearing.

The most remarkable part of the sexual attraction manifested by *Prionus* is that of the females being attracted by the males, a kind of attraction concerning which I have found no notice whatever.

2 Mar. 1884.

¹ Trans. Kans. acad. sci., 1874, p. 27-28.

² Lintner, 1st ann. rept. insects N. Y., 1882 [1883], p. 71.

PSYCHE.

CAMBRIDGE, MASS., APRIL. 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(Continued from p. 147.)

12 OCT. 1883.—The 95th meeting of the Club was held at 19 Brattle Street, Cambridge, 12 Oct. 1883. In the absence of the President, Mr. S. H. Scudder was chosen Chairman. Four persons were present.

The Secretary announced the reception of a box containing a brood of young larvæ of *Papilio philenor*, in fine condition. The Secretary received no clue as to the name of the sender, the box having written on it only, "*Papilio philenor*, Staten Island, June 18th 1883."

Messrs. Hayward, Sprague, and Dimmock announced captures of rarer diurnal lepidoptera in Massachusetts. [See *Psyche*, Sept.—Oct. 1883, v. 4, p. 99-100.]

Mr. S. H. Scudder made some remarks upon fossil species of *Raphidia* and *Inocellia* from the Florissant Basin, in Colorado. The one species of *Raphidia* and four species of *Inocellia* differ structurally from living forms. One species of *Inocellia*, not differing structurally from those found living, has been found in amber.

The Secretary read a letter from Miss Eleanor C. Scott, of Flushing, N. Y., who inquired in regard to a very small luminous

insect. None of the members present could give information about the insect without a fuller description than the one sent.

Mr. S. H. Scudder announced the death of Prof. Oswald Heer, of Zurich, Switzerland, well known as an author upon fossil insects and plants. Mr. Scudder showed a photograph of Prof. Heer and made some remarks upon his works.

9 Nov. 1883.—The 96th meeting of the Club was held at 19 Brattle Street, Cambridge, 9 Nov. 1883. In the absence of the President, Mr. R. Hayward was chosen Chairman. Three members were present.

Mr. G. Dimmock read a paper "On some glands which open externally on insects," illustrating the paper with a few specimens of insects having such glands. [The paper is published in *Psyche*, v. 3, p. 387-401.]

Mr. R. Hayward exhibited specimens of *Bolitotherus bifurcus*, and called attention to the pubescence on the posterior femora and on the horns, and to the length of the carina of the head, all secondary sexual characters of the male of this species.

Mr. S. H. Scudder made some remarks on G. B. Buckton's "Monograph of British aphides," of which the fourth volume has just appeared.

14 DEC. 1883.—The 97th meeting of the Club was held at the Secretary's house, 54 Sacramento Street, Cambridge, 14 Dec. 1883. In the absence of the President, Mr. R. Hayward was chosen Chairman. Five persons were present.

The Secretary announced the withdrawal from the Club of Mr. T. J. Mathews, of Grayville, Ill., who had written that on account of increase in his business he had no time now to devote to entomology; also the withdrawal of Mr. A. P. Chadbourne, of Cambridge, Mass.

Mrs. A. K. Dimmock showed a collection representing stages of 38 species of insects which are found upon *Betula alba*, the white birch. [An account of this collection will be given in *Psyche*.]

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Lubbock, J: On flowers and insects. (LUBBOCK, J: Scientific lectures, Lond. and N. Y., *Macmillan*, 1879, p. 1-30, fig. 1-30.)

Treats of the cross-fertilization of plants and the modes by which it is accomplished; rapidity of visits of wasps and bees in collecting honey; color sense in bees. G: D. (3434)

Lubbock, J: On the habits of ants. (LUBBOCK, J: Scientific lectures, Lond. and N. Y., *Macmillan*, 1879, p. 68-96, fig. 45.)

Treats of the metamorphoses, food, domesticated aphids and other insects in the nest, enemies and modes of warfare, industry, longevity, association with one another, slavery, division of labor, intelligence, engineering, recollection of associates, smell, hearing, sight, and communities of ants. G: D. (3435)

Lubbock, J: On the habits of ants: continued. (LUBBOCK, J: Scientific lectures, Lond. and N. Y., *Macmillan*, 1879, p. 97-137, fig. 46-51.)

Treats of the absence of affection for one another, recognition of associates, hatred of strangers, agricultural skill (exemplified by *Pogonomyrmex barbatus*), cooperation, power of communication (compared with that of bees and wasps), power and mode of finding their way (compared with that of bees and wasps), ability or absence of ability to produce and hear sounds, and power of discriminating colors, of ants, ending with a comparison of the advancement among different kinds of ants to "the three great phases: the hunting, pastoral and agricultural stages, in the history of human development." G: D. (3436)

Lubbock, J: On plants and insects. (LUBBOCK, J: Scientific lectures, Lond. and N. Y., *Macmillan*, 1879, p. 31-67, fig. 31-44.)

Treats of the use of honey by plants as an attraction for flying insects, in order to secure cross-fertilization, and as an attraction for ants, to act as protectors for the plant; structures to keep ants out of flowers; modifications of insects to imitate plants, and thus escape enemies; forms and colors of larvae do not depend upon those of the mature insect, but upon larval habits; richness of adaptive modifications illustrated by a brief description of the transformations of *Sitaris*; protective coloration of lepidopterous larvae, especially of *Sphinxidae*. [Most of the facts in regard to the larvae of *Sphinxidae* are, according to author (p. 52), from Weismann's "Studien zur descendenz-theorie." 11. G: D. (3437)

Lubbock, J: Scientific lectures. Lond. and N. Y., *Macmillan & co.*, 1879. 12+188 [+adv.] p., il.; 1, pl., 23X14.5, t 17X9.8. cl., \$2.50.

Notice. (*Nation*, 16 Oct. 1879, v. 29, p. 262.)

Rev. (*Westminster rev.* [Amer. ed.], Oct. 1879, p. 287-288, 48 cm.)

Rev. (*Amer. journ. sci. and arts*, Nov. 1879, s. 3, v. 18, p. 418.)

Rev. by A. R. W[allace], entitled "Lubbock's Scientific lectures." (*Nature*, 7 Aug. 1879, v. 20, p. 335-336, 38 cm.)

Contains six lectures, by author, with following titles, *which see*:—1. On flowers and insects [Rec., 3434], p. 1-30.—2. On plants and insects [Rec. 3437] p. 31-67.—3. On the habits of ants [Rec., 3435], p. 68-96.—4. On the habits of ants: continued [Rec., 3436], p. 97-137.—5 and 6 [not entomological]. G: D. (3438)

Müller, Hermann. Die bedeutung der honigbiene für unsere blumen. [No. 1-9.] (*Eichstädter bienenzeitung*, 1875, v. 31: 15 Apr., p. 81-82; 15 May, p. 102-104; 31 May, p. 109-111; 15 June, p. 122-125; 15 July, p. 138-141; 31 July, p. 165: 1876, v. 32: 31 Jan., p. 20-22; 1 June, p. 119-123; 15 July, p. 176-184.)

Abstract of nos. 8-9, by H. Müller, under full title. (*Bot. jahresbericht* . . . Just, 1876, v. 4, p. 946, 7 cm.)

A series of nine articles, as follows: 1. The Sprengel-Darwinian theory of flowers. 2. The adaptation of *tanium album* to *bombus*. 3. The mutual adaptations of *bombus* and flowers which it visits. 4. The gradual development of the pollen-baskets of *apis*. 5. Gradual correlated increase in the care for their young, and in the pollen-bearing efficiency of *lethredinidae*, *cyrtopidae*, *ichneumonidae* and *sphingidae*. 6. The care of certain *sphingidae* (*pompilus*) for their young. 7. What bees have inherited from lower hymenoptera, and what they have acquired for themselves. 8. Statistical comparison of the floral activity of lower hymenoptera. 9. Statistical comparison of the floral activity of the lower and higher bees. H. M. (3439)

Müller, Hermann. Die stellung der honigbiene in der blumenwelt. 1. (*Bienenzeitung*, 15 Jan. 1882, jahrg. 38, p. 22-24.)

Records the visits of *apis mellifica* to anemophilous flowers. W: T. (3440)

Ormerod, Eleanor A. Effects of warmth and surrounding atmospheric conditions on silk-worm larvae. (Entomologist, June 1882, v. 15, p. 127-129.)

Experiments upon the effects of temperature and moisture in rearing *bombyx mori*. G: D. (3441)

P[ackard], A[lpheus] S[pring, jr.]. The insects of May. (Amer. nat., May 1867, v. 1, p. 162-164, 3 fig.)

Figures *carpocapsa pomonella*, *phyllobrotica vittata*, and *conotrachelus nenuphar*, and gives brief notes on many other insects. G: D. (3442)

Osten Sacken, C: Robert. Dimorphism of female *blepharoceridae*. (Entom. mo. mag., Feb. 1881, v. 17, p. 206.)

Notice of private letter from F. Müller, proving "three facts, new to the student of *blepharoceridae*: 1, that male and female do not always have the head and the front of the same structure; 2, that some species may have two forms of females; 3, that one of these forms has the organs of the mouth built upon a plan different from the type hitherto described as peculiar to the female." B: P. M. (3443)

Patton, W: Hampton. Description of the species of *macropis*. (Entom. mo. mag., July 1880, v. 17, p. 31-35.)

Describes *macropis ciliata* n. sp., and *m. patellata* n. sp., and varieties of the former; remarks upon the criteria of species in this genus, and upon the distinctness of the forms hitherto described as separate species in Europe. B: P. M. (3444)

Reuter, Odo Moraunal. Diagnoses quatuor novarum pentatomidarum. (Entom. mo. mag., Mch. 1881, v. 17, p. 233-234.)

Describes 2 new species of *carbula* from the Amur and China, *edessa fuscidorsata* n. sp. from Mexico and Bogota, and *aspongopus nigroaeneus* n. sp. from Siam. B: P. M. (3445)

[Riley, C: Valentine.] Galls on supposed dock. (Amer. entom. and bot., May 1870, v. 2, p. 212, 4 cm.)

Gelechia gallae-solidaginis forms galls on stems of *solidago*; *gastrophysa cyanea* breeds on *rumex*. B: P. M. (3446)

[Riley, C: Valentine.] Raspberry gouty gall. (Amer. entom., Feb. 1870, v. 2, p. 128, 11 cm., fig. 90.)

Ravages of and means against *agrilus ruficollis*; description and figure of larva. B: P. M. (3447)

[Riley, C: Valentine.] Raspberry root-gall. (Amer. entom. and bot., Apr. 1870, v. 2, p. 181, 13 cm., fig. 110.)

Description and figure of gall of *rhodites radicum*, occurring on roots of *rosaceae* and especially of *rosa*; genera of parasites raised from it; interest of the question of the manner and extent of parasitization of this gall. B: P. M. (3448)

[Riley, C: Valentine.] Rose-gall and pupa of archippus butterfly. (Amer. entom. and bot., Sep. 1870, v. 2, p. 307, 7 cm., fig. 189.)

Figure of pupa of *donnis archippus*; brief descriptions of three undetermined species of galls on rose-leaf, doubtless all formed by *rhodites*. B: P. M. (3449)

Riley, C: Valentine. The solidago gall moth: *gelechia gallae-solidaginis*, n. sp. (1st ann. rept. state entom. Mo., [Mch.] 1869, p. 173-178, fig. 96-97; pl. 2, fig. 1-2, 5-9.)

Occurrence of galls of *trypeta (acinia) solidaginis* on stems of *solidago nemoralis*; description and figures of gall, larva and imago of *gelechia gallae-solidaginis* and of imagos of *pirene?* n. sp., *eurytoma bolteri* n. sp., and *hemiteles? cressonii* n. sp.; description of imago of *microgaster gelechiae* n. sp., and mention of *pimpla* n. sp. and *ephalites* n. sp., all these being parasites on the *gelechia*; seasons, habits, food-plants [*solidago* spp.] and geographical distribution of the *gelechia*, and habits of the *pirene?*, *hemiteles?* and *microgaster* and of an intruding larva perhaps of *oberea* sp.; comparison of the *gelechia* and its gall with *cochylis hilarana* and its gall on *artemisia campestris* in France. B: P. M. (3450)

[Riley, C: Valentine.] The trumpet grape-gall. *Vitis viticola*, O. S. (Amer. entom., Feb. 1870, v. 2, p. 113-114, 19 cm., fig. 76.)

Reprint of figure of gall figured in [B: D. Walsh and C: V. Riley's] "The trumpet grape-gall" (*op. cit.*, Sep.-Oct. 1869, p. 28) [Rec., 3353], fig. 27, under the name of *vitis-lituis*; this gall previously described as that of *cecidiomyia viticola*; occurrence of similar gall in England, on *tilia* probably caused by mites. B: P. M. (3451)

[Walsh, B: Dann and C: Valentine Riley.] An apple growing on a grape vine. (Amer. entom., Oct. 1868, v. 1, p. 28, 12 cm.)

Extract from *Richmond* [Va.] *whig*, with criticism; a gall of *cecidiomyia vitis-pomum* mistaken for an apple growing on a grape-vine. [Further accounts of the same given in (authors') "The apple growing on a grape vine" (*op. cit.*, Nov. 1868, p. 54) (Rec., 3453), and in (authors') "Galls and their architects" (*op. cit.*, Feb. 1869) (Rec., 3349), p. 106.] B: P. M. (3452)

[Walsh, B: Dann and C: Valentine Riley.] The apple growing on a grape vine. (Amer. entom., Nov. 1868, v. 1, p. 54, 7 cm.)

The "vegetable phenomenon" described in [authors'] "An apple growing on a grape vine" (*op. cit.*, Oct. 1868, p. 28) [Rec., 3452] proved to be a gall [described and figured as that of *cecidiomyia vitis-pomum* n. sp., in (authors') "Galls and their architects" (*op. cit.*, Feb. 1869) (Rec., 3349), p. 100]. B: P. M. (3453)

[Walsh, B: Dann and C: Valentine Riley.] Oak-leaf gall. (Amer. entom., Sep.-Oct. 1869, v. 2, p. 29, 22 cm.)

Description of galls of *cecidiomyia quercus-fulvulae* and *c. q.-[P-symmetrica]*; occurrence of *cygnipidae* as guests in galls of *cecidiomyiidae*; difference between larvae of *cygnipidae* and *cecidiomyiidae*; transformations of *cecidiomyia q.-fulvulae* and of the *cygnis* inquisitious in its gall; distinction of the annual and biennial groups of *quercus* and of the galls occurring on trees of the one or the other group. B: P. M. (3454)

ENTOMOLOGICAL ITEMS.

THE NATURAL history society at Springfield, Mass., proposes to begin an insect collection.

M. ADRIEN DOLLFUS, the editor of the *Feuille des jeunes naturalistes*, at 35, rue Pierre-Charron, Paris, France, desires to exchange European *oniscoda* for American species.

THE JANUARY numero of the *American college directory*, published at St. Louis, Mo., contains a portrait of Dr. C. V. Riley, of Washington, D. C., with a brief notice of his life.

THE DOLLFUS prize of the French entomological society is awarded, for the year 1883, to M. Ernest André, for his work entitled "Spécies des formicides d'Europe et des pays limitrophes."

DR. GRASSI has found that flies fed with materials which contain eggs of worms leave these eggs in their excrement, and that consequently meat which was exposed to the visits of the flies could help in distributing parasites.

IN THE November session of the zoological section of the Westfälischer provincial-verein für wissenschaft und kunst, Mr. Pütt showed the crop of a pheasant which was full of larvae, about 15 millimetres long, belonging to some species of diptera. There were 411 larvae in the crop.

IT IS announced that the Russian grand-duke Nikolai Michailowitsh, eldest son of grand-duke Michail, intends to issue in parts a fine work under the title "Mémoires lépidoptérologiques," the basis for which will be his own large collection of lepidoptera, rich in species which he collected in the Caucasus.

WE LEARN from the *Entomologist's monthly magazine* that the Ray society has acquired the late Mr. William Buckler's drawings of the larvæ of British macrolepidoptera, together with the voluminous manuscript which accompanies them, and they will probably form the subject for three or four volumes of the society's publications.

DR. H. A. HAGEN, in a letter to *Science* for 11 April 1884, shows that the Hessian fly was known by that name in the United States before the Revolution. Quotations are given from the minutes of the American philosophical society of Philadelphia, as early as 18 May 1768, where the committee on husbandry was "to consider whether any method can be fallen upon for preventing the damage done to wheat by the Hessian fly."

IN A brief summary of the European species of lepidoptera with apterous or subapterous females, by Dr. R. C. R. Jordan, in the *Entomologist's monthly magazine* for March 1884, it is shown that wingless lepidoptera exist in the following families: *heterogynidae*, *arctiidae*, *hepialidae*, *psychidae* (all species), *liparidae*, *noctuidae* (one species, *Ulochaena hirta*), *geometridae*, *pyralidae* (part of the females of *Acentropus niveus*, which oviposits under water), *tortricidae*, *tineidae*, and *talacporidae*.

DR. LAYET, of Bordeaux, has studied an eruptive disease to which workers in a large vanilla warehouse in that place are subject, and found that the disease is caused by a little insect (*Acarus*) which is found upon the outer end of the vanilla capsules. The insect does not bore into the skin, but causes the irritation by contact, aided perhaps by the mechanical action of acicular crystals which are upon the outside of the capsules.

THE POISONOUS properties of carbon disulphide [CS_2] have been investigated by a number of doctors in California. The results show that continued breathing of carbon disulphide produces derangement. As is well known, carbon disulphide has been extensively used in the wine-producing districts of California against phylloxera, and a number of workmen, who were engaged in the wine districts, have become insane.—*Deutsch-amer. apoth.-zeitung*, 15 Feb. 1884, p. 736.

THE NUMERO of the *Entomologist* for March 1884 contains a note entitled "Description of a *Pieris* new to science.—*Pieris spilleri*, mihli. By A. J. Spiller," in which Mr. Spiller

writes "As the insect is not in the Cape or British museum collections, and is unknown to collectors of exotic insects who have examined it, and as Dr. Staudinger has pronounced it to be a new and interesting species, I beg therefore to name it after myself." Mr. Spiller may be congratulated on the delicacy of the compliment he has received in having the species thus named after him.—*G. D.*

MR. J. J. WALKER, writing, in the *Entomologist's monthly magazine* for March 1884, of Pitcairn Island, that curious little inhabited island in the Pacific near Tahiti, which, although only two and a quarter miles long by less than one mile wide, rises to a height of 1000 feet above the sea, says: "No butterfly is apparently found on the island, and I saw only a few common Tahitian moths; but I found, for the first time, the large yellow-striped green larva of *Choerocampa erolus* on the 'Nono' plant, and a good many living pupæ of *Sphinx convolvuli* (equal in size to English specimens) were brought to me, having been found in the patches of sweet potatoes, of which a supply was then being dug up for the ship. Four species of coleoptera (a *Tomiscus*?, two cossonid weevils, and a rhizophagoid?) occurred rarely."

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, Secretary.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, Secretary.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass. at 7.45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884.
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, Secretary.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, Recorder.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, Recording Secretary.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

G. J. BOWLES, Secretary.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, Secretary.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. No. 121.

MAY 1884.

CONTENTS:

ADVERTISEMENTS	166
ON THE LIFE-HISTORIES AND IMMATURE STAGES OF THREE EUMOLPINI. Cor- rective Note— <i>Stephen Alfred Forbes</i>	167-168
PROTECTIVE SECRETIONS OF SPECIES OF ELEODES— <i>Samuel Wendell Williston</i> .	168-169
A CURIOUS HABIT OF CALLOSAMIA PROMETHEA— <i>John George Jack</i>	169
PROCEEDINGS OF SOCIETIES—Cambridge Entomological Club	170
BIBLIOGRAPHICAL RECORD, no. 3455-3504	171-174
ENTOMOLOGICAL ITEMS—Society Meetings	175-176

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

⌘ Subscriptions not discontinued are considered renewed.

⌘ Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, . . . Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, . . . 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

⌘ Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

⌘ Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

BULLETTINO DEL NATURALISTA COLLECTORE.

PUBLISHED MONTHLY AT SIENA, ITALY.

At least eight large octavo pages per numero, principally in Latin, Italian, and French.

Subscription:

Countries in the postal union 2.50 Francs.
Countries outside the postal union 5.00 "

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

R. FRIEDLÄNDER & SOHN,

Berlin N. W., Carlstrasse 11.

Natural History and Natural Science Booksellers established since 1827.

Largest stock of the whole Literature of Natural History and the Exact Sciences.

Apply for classified catalogue in 25 parts (each one special department of science), price 10 c. each.—Just published. Part IX. *Entomology 1.* (General Entomology.—Coleoptera.) 46 p. about 2000 works.—X. *Entomology 2.* (Lepidoptera), comprising among others the library of the late Prof. P. C. Zeller, 30 p., about 1300 works.—XI. *Entomology 3.* (Hymenoptera, Neuroptera, Orthoptera, Diptera, Hemiptera, Parasita.) 34 p. about 1300 works.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper. \$3.20 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the Scientific American sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 251 Broadway, New York.

PSYCHE.

ON THE LIFE-HISTORIES AND IMMATURE STAGES OF THREE *EUMLOPINI*. CORRECTIVE NOTE.

BY STEPHEN ALFRED FORBES, NORMAL, ILLINOIS.

I regret to have to report a mistaken identification of the species of *Scelodonta* mentioned in my paper "On the life-histories and immature stages of three *eumolpini* (PSYCHE, Jan.-Feb. 1884, v, 4, p. 123-130, pl. 1).

When the imagos appeared in our breeding cages last June (see PSYCHE, v. 4, p. 129), I sent a pair of them to Dr. J. L. Leconte, with a request that he would take the trouble to determine them for me; and mentioned at the same time the economic relations of the species.

In his reply, dated June 24, 1883, from Alexandria Bay, N. Y., he says:

"I have examined carefully the specimens of *Graphops* [*Scelodonta*], which were safely received just after my arrival here. I find that they are without doubt *G. pubescens*; that species differs from allied ones *G. curtippennis* and *G. marcassita*, by the more elongate form and by the punctuation being rugose only at the sides."

With this decision I, of course, rest-

ed content, until this month, when the reception of specimens of *Scelodonta* collected from evening primrose (*Oenothera biennis*), in southern Illinois, in the vicinity of strawberry fields, led to a review of this determination. It was soon evident that these primrose specimens were of a different species from those breeding in strawberries, and had also a different life-history, since they were taken *in copula*, in April, at which time the strawberry species was abundant in the earth, in the larval condition, not to appear as adult until June.

As the primrose specimens agreed closely with all accessible descriptions of *S. pubescens*, I enclosed to Dr. G. H. Horn a specimen of this lot, together with one from the lot bred from strawberry root-worms last June, with a statement of Dr. Leconte's previous identification of the latter as *S. pubescens*.

In his reply, received this morning, Dr. Horn determines the primrose specimen as *S. pubescens*, and that from the

strawberry as *S. nebulosus*, saying further :

"The names I now give you are absolutely typical as far as Leconte's collection goes. Last summer his health was so poor and his eyesight so deceptive that I do not wonder that some of his comparisons were erroneous."

When we further notice that he was separated from his collection when he

wrote me, it need not surprise us that for once Jove nodded.

So far as the paper in *PSYCHE* is concerned, the errors will be eliminated if *pubescens* is changed to *nebulosus* wherever it occurs, as a reëxamination of all the collections referred to shows that they consist of *nebulosus* only.

Illinois State Laboratory of Natural History,
17 April 1884.

PROTECTIVE SECRETIONS OF SPECIES OF ELEODES.

BY SAMUEL WENDELL WILLISTON, NEW HAVEN, CONN.

In connection with Dr. G. Dimmock's interesting article¹ on the glands opening externally in certain insects, it may be of interest to give some results of several years' observations of certain *tenebrionidae* on the Kansas plains. The following species, belonging to the genus *Eleodes*, viz., *E. acuta*, *E. suturalis*, *E. tricosata*, *E. obsoleta*, *E. extricata*, *E. longicollis*, and *E. hispilabris*, are abundant in the regions east of the Rocky Mountains, some of them very abundant, and with one or two exceptions, they all, when disturbed, eject a pungent, vile-smelling liquid. Perhaps the most disagreeable of these, in this respect, is *E. longicollis*, a beetle about two and a half centimetres long, which will eject a stream of fluid from the anal glands, sometimes to the distance of ten centimetres or more. This liquid has a strong, persistent odor, and leaves a brown stain upon the skin. Whether acid or alkaline in its reaction I cannot

say, but its effect upon the skin is very much like the first solution of carbolic acid, though less strong. Several times I have had small quantities reach my eyes, with disagreeable effects. Both sexes are equally provided with the secretion, and, in individuals which have not been exhausted, it is directed backward with considerable force, as I once learned to my entire satisfaction. I had seized a fine, large pair of *E. longicollis* by the thorax and held them up, at what I deemed a safe distance, for them to eject their vile secretion before placing them in my collecting bottle. Unfortunately they were provided with an unusually large quantity, and, both ejecting it simultaneously, I received it on my face and hands. A very noteworthy habit, moreover, in the species of this genus at least, and a constant one is that, when approached, they stand almost vertically with the abdomen directed upwards ready the moment they are touched, to eject their mephitic secretion. Among the species given in the forego-

¹*Psyche*, Sept.-Oct. 1882 [1 March 1884], v. 3, p. 37-40.

ing list, one (*E. tricostata*, if my memory serves aright) seems to be entirely devoid of this secretion, but yet has the same habit of standing erect. These beetles are the veritable skunks of their order, and doubtless, like their ill-scented superiors, find protection in their comparatively as formidable weapon. They are apterous, and slow in their move-

ments, coming out from their hiding places when the sun is declining, and feed upon dead matter or excrements. On the bare plains they are readily seen, and I doubt not that they find protection from birds, and perhaps from skunks also, by means of their secretion.

[For further information on this subject, see Rec., 1430.]

A CURIOUS HABIT OF *CALLOSAMIA PROMETHEA*.

BY JOHN GEORGE JACK, CHATEAUGUAY BASIN, P. Q., CANADA.

FOR several years I have been very much puzzled, in summer, to account for numbers of green leaves, some being partly eaten, found on the ground beneath trees having long petioled leaves, such as maples and poplars, the petioles of which apparently had been eaten through by some insect. Last summer, while in New Jersey, I noticed similar occurrences beneath a sweet gum tree, *Liquidambar styraciflua*, and upon looking for the cause I found that it was the work of nearly full grown larvae of *Callosamia promethea*, which were feeding on the foliage. The petioles of *Liquidambar* leaves are usually very long (from 5 to 10 cm.) and quite slender.

To get at the leaves the caterpillar was either obliged to abandon the branch of the tree and crawl out on the leafstalk to the leaf, where it would be in a very dangerous position, with slight foothold, and where it was very probable that, owing to the weight of its body, it would break off the leaf at the node and fall to the ground; or, the

caterpillar must contrive to bring the leaf to itself in some way, while still keeping a sure foothold on the branch. To do this last required a little skill and I found that the caterpillar was equal to the task. Grasping the twig firmly with the anal and sometimes one or two pairs of the abdominal legs, it would extend the remaining portion of its body along the leafstalk, which it commenced eating. As soon as the leafstalk was about half eaten through, the caterpillar would recede a little and eat another place half through or more, and sometimes a third place. By this time the leafstalk had become so weakened that the leaf began to droop, and the caterpillar, reaching forward again as far as possible and grasping the stalk beyond the first incision, was able to bend it, and, drawing the leaf up to itself, eat it without losing its sure foothold on the tree.

Sometimes the leafstalk was eaten through a little too far, or broke off in bending, which accounted for the green leaves found on the ground.

PSYCHE.

CAMBRIDGE, MASS., MAY 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(Continued from p. 160.)

Mr. G. Dimmock showed the two halves of a split wing of *Attacus cecropia*, in which the two layers of the wing had been separated by the following mode. The wing from a specimen that had never been dried is put first into seventy per cent. alcohol, then into absolute alcohol, and from the latter, after a few days' immersion, into turpentine. After remaining a day or two in turpentine, the specimen is plunged suddenly into hot water, when the conversion of the turpentine into vapor between the two layers of the wings so far separates these layers that they can be easily parted and mounted in the usual way as microscopical preparations on a slide. This is an easy way of demonstrating the sac-like nature of the wings of insects.

Dr. H. A. Hagen showed preparations to illustrate organs, of undetermined function, found on the larvae of *gomphidae*, *libellulidae*, *arschnidae*, but not as yet found on *agrionidae*, which he believes to be traces of segmental organs. The organs in question are little cavities or invaginations of the epidermis between the segments, one on each side of the median ventral line, on one, two, or three

abdominal segments according to the family to which the larva belongs. Dr. Hagen gave a brief notice of these organs in the *Zoologischer anzeiger*, 5 April 1880, Jahrg. 3, p. 161.

Mr. G. Dimmock showed a number of microscopical preparations to illustrate different points of insect anatomy.

11 JAN. 1884.—The 98th meeting, the tenth annual meeting, and the seventh since the incorporation of the Club, was held at the Secretary's house, 54 Sacramento St., Cambridge, 11 Jan. 1884. This meeting terminated the first decennial of the Club's existence, the first meeting having been held 9 Jan. 1874. In the absence of the President, Mr. C. C. Eaton was chosen Chairman. Six persons were present.

The Secretary announced the withdrawal from the Club of Mr. Edward Burgess, of Boston, Mass.

The following persons were elected to active membership: Charles C. Beale, of Faulkner, Mass.; Willard Loomis Devereaux, of Clyde, N. Y.; Thaddeus William Harris (grandson of the well-known entomological author who bore the same name), of Cambridge, Mass.; and John George Jack, of Chateaugay Basin, P. Q., Canada.

The following officers were elected for the ensuing year: President, Samuel Hubbard Seudder; Secretary, George Dimmock; Treasurer, Benjamin Pickman Mann; Librarian, Clifford Chase Eaton; members at large of the Executive Committee, Roland Hayward and Thaddeus William Harris. B. P. Mann was elected managing editor and G. Dimmock associate editor of *PSYCHE* for the ensuing year.

The annual reports of the Secretary, of the Treasurer, and of the Librarian were read and approved. [See further on.]

The address of the Retiring President, Mr. B. P. Mann, upon "The bibliography of entomology" was read by the Secretary. [This address is printed in full in *PSYCHE*, April 1884, v. 4, p. 155-159.]

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederick; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Erauer, Friedrich. On the metamorphoses of *blepharoceridae*. (Entom. mo. mag., Jan. 1881, v. 17, p. 186.)

Note calling attention to author's "Eine unbewusste Entdeckung Fritz Müller's" (Zool. anzeiger, 22 Mch. 1880, Jahrg. 3, p. 131-135) [Rec., 1855]; both sexes of *blepharocera fasciata*, of Europe, have the eyes close to each other. B: P. M. (3455)

Buckler, W. Is the number of moults of lepidopterous larvae constant in the same species? (Entom. mo. mag., July 1880, v. 17, p. 42-43.)

Remarks on the variety of the number of molts undergone by larvae of different species of lepidoptera, with solicitation of observations to prove whether the number varies in the same species. B: P. M. (3456)

Cameron, P. On parthenogenesis in the *tenthredinidae*. (Entom. mo. mag., May 1881, v. 17, p. 271-272.)

Nematusavidus and *texonus glabratus* added to the list of parthenogenetic *tenthredinidae*, and complete parthurogenesis proved to occur in *poecilosoma pulveratum* and *eriodocampa ovata*, all Scotch species. B: P. M. (3457)

Champion, G: C. Notes from Guatemala. (Entom. mo. mag., Feb. 1881, v. 17, p. 212-213.)

Mention of localities visited and of genera of insects encountered by the author in Guatemala. B: P. M. (3458)

Eaton, Alfred Edwin. An announcement of new genera of the *ephemeridae*. (Entom. mo. mag., 1881, v. 17: Jan., p. 191-192; Feb., p. 193-197.)

Describes as new genera of *ephemeridae*: *classoneuria*, *spaniophlebia*, *homoconeuria*, *jolia*, *rhocnanthus*, *blasturus*, *atalophlebia*, *adenophlebia*, *choroterpes*, *thraulus*, *habrophlebia* and *callibaetis*, and restricts the genera *leptophlebia* and *bactis*; *asthenopus* = *camisurus*; mentions the type species of each genus and describes 5 new species, of which *homoconeuria salviniac* is from Central America. B: P. M. (3459)

Fletcher, J. E. On parthenogenesis in *tenthredinidae*. (Entom. mo. mag., Jan. 1881, v. 17, p. 180.)

Statement of results of parthenogenetic reproduction observed in *phyllostoma vagans*, *eriodocampa ovata*, *hemichroa rufa* and *nematus curtispina* and in two other species, not yet determined, of *tenthredinidae*. B: P. M. (3460)

Forbes, Stephen Alfred, see ILLINOIS STATE LABORATORY OF NATURAL HISTORY—Director, 1881-1882.

Goossens, Théodore. Des chenilles urticantes et quelques considérations sur l'utilité des œufs pour la classification. (Ann. soc. entom. France, 1881, s. 6, t. 1, p. 231-236.)

Abstr., entitled, "Jeukende rupsen." (Natura, March 1883, jahrg. 1, p. 83-85.)

Considers that the spines of *liparis* and *cnethocampa* are poisonous because of a powder produced by the drying of the secretion given out by the evaginable glands found upon the dorsum of these larvae; experiments made with this poisonous powder; discusses the position of *cnethocampa* among the lepidoptera; remarks on the use of the characters of their eggs in the classification of lepidoptera. G: D. (3461)

Hagen, Hermann August. Ueber ein eigenthümliches organ in der Begattungstasche zweier teneiden und dessen bedeutung für die befruchtung. (Zool. anzeiger, 9 Jan. 1882, jahrg 5, p. 18-21.)

Anatomy of the genitalia, and especially of the vesicula seminalis, in *prodaxus* and *pronuba*. G: D. (3462)

Horn, G: H. Synopsis of the *colydiidae* of the United States. (Proc. Amer. philos. soc., 19 April 1878, v. 17, p. 555-592.)

Includes the genera and species of *murmidiidae*. S: H.

Describes 15 new species belonging to the genera *cicones*, *ditoma*, *endophloeus*, *phloconemus*, *coxelus*, *lascionotus*, *autonium*, *oxylaemus*, *sosylus*, *pycnomerus*, *bothrideres* and *philothermus*. H: W. T. (3463)

Kane, W. F. de Vismes. Causes of abundance or otherwise of lepidoptera. (Entomologist, Nov. 1882, v. 15, p. 245-246.)

Effects of weather on the abundance of lepidoptera: observations made in England. *G: D.* (3464)

Kellicott, D: Simons. An example of protective mimicry. (N. A. entomologist, Oct. 1879, v. 1, p. 30-31.)

Notes the habit of the imago of *rhodophora florida* of lying concealed in the withering flowers of *oenothera biennis*, which it closely resembles in coloration. The larvae, which feed on the flowers and fruit of the same plant, are also protectively colored. *W: T.* (3465)

de Kerchove de Denterghem, Oswald. L'ennemi de la pomme de terre. Notice sur le *doryphora decemlineata*. Bruxelles, 1875. t.-p. cover, 21 p., 1 col. pl. v. 25×16.5, t. 18.5×10.8. pam., 2 fr.

Statistical notes upon *doryphora decemlineata*; means taken by various European governments to prevent its introduction, and a discussion of the necessity of precautions; other notes; colored figures of different stages of *d. decemlineata*, and figure of imago of *d. juncta*. *G: D* (3466)

Kraepelin, K. Ueber die mundwerkzeuge der saugenden insecten. Vorläufige mittheilung. (Zool. anzeiger, 6 Nov. 1882, jahrg. 5, p. 574-579.)

Discusses anatomy of sucking mouth-parts of insects; describes and figures the mouth-parts of *bombus terrestris*, *notonecta glauca* and a species of *tabanus*. *G: D.* (3467)

Kracher, L., ed., see DEUTSCHER BIENENFREUND . . . [Rec., 2816].

Krukenberg, C. Fr. W. Vergleichend-physiologische studien. 5c abth. Heidelberg, 1881 100 p., 3 pl.

Rev., by P. Mayer, (Zool. jahresber. für 1881, 1882, p. 3.)

Discussion of the chemical composition of and action of reagents on the blood and organs of insects.—P. Mayer. [Not seen.] *B: P. M.* (3468)

La Munyon, Ira W. New hymenoptera. (Proc. Nebraska assoc. advanc. sci, 8 March 1877.)

Separate. [North Platte, Nebr.] [2] p., t 14.2×8.5.

Describes *davisonia* n. g., *d. anghei* n. sp., *trypoxylon sulcus* n. sp. [Separate only seen.] *B: P. M.* (3469)

La Munyon, Ira W. New orthoptera. (Proc. Nebraska assoc. advanc. sci., 8 Mar. 1877.)

Separate. [North Platte, Nebr.] [1] p., t 14.2×8.5.

Describes *exotix* [sic] *flavoannulatus* n. sp., *coloptenus sanguinocephalus* n. sp. [Separate only seen.] *B: P. M.* (3470)

Lankester, E. Ray. *Limulus* an arachnid. (Quart. journ. micros. sci., 1881, v. 21: July, p. 504-548; Oct., p. 609-649; pl. 28-29.)

Abstract, by P. Mayer. (Zool. jahresber. für 1881, 1882, p. 5-6.)

Gives a genealogical tree of arthropoda (copied by Mayer), and discusses the homologies of their segments, appendages, tracheae and sinews, defines the arachnida. [not seen.]—P. Mayer. *B: P. M.* (3471)

Lichtenstein, Jules. Another apterous male in the *coccidae*, *acanthococcus aceris*. Signoret. (Entom. mo. mag., April 1882, v. 18. p. 250-251.)

Brief account of the life history of *acanthococcus aceris*, of which the male is wingless. *G: D.* (3472)

Lintner, Joseph Albert. On *ccidomyia leguminicola*, n. sp. (Can. entom., July 1879, v. 11, p. 121-124.)

References to accounts of *ccidomyia* injuring leaves of *trifolium* in Europe; substitution of name *c. leguminicola* n. sp. for the preoccupied name *c. trifolii* given in author's "The clover-seed fly" . . . (*op. cit.*, Mch. 1879, p. 44-45) [Rec., 3474]; seasons, history and geographical distribution of *c. leguminicola*; description of imago. *B: P. M.* (3473)

Lintner, Joseph Albert. The clover-seed fly: a new insect pest. (Can. entom., Mch. 1879, v. 11, p. 44-45.)

Review, in author's "On *ccidomyia leguminicola*, n. sp." (*op. cit.*, July 1879, p. 121-124.)

Habits and ravages and description of larva of *ccidomyia trifolii* n. sp. [The name *c. leguminicola* afterward substituted (p. 121), as the name *c. trifolii* was preoccupied.] *B: P. M.* (3474)

Llewellyn, J. T. D. Results of experiments in rearing *tephrosia crepuscularia* and *biundularia*, with regard to variation. (Entom. mo. mag., May 1882, v. 18. p. 274.)

Results of interbreeding varieties of *tephrosia crepuscularia* and *t. biundularia* in order to obtain specimens of varieties. *G: D.* (3475)

Ludwig, Fritz. Ueber die bestäubungsvorrichtung und die fliegenfalle des hundskohles, *apocynum androsacmifolium* L. (Kosmos, Dec. 1880, bd. 8, p. 182-185.)

Abstract, by H. Müller, under same title. (Bot. zeitung, 1 Apr. 1881, bd. 39, c. 213-214.)

Abstract, by H. Müller, entitled "Die bestäubungseinrichtung von *apocynum androsacmifolium* L." (Bot. jahresbericht . . . Just, 1879, v. 7, p. 140, 8 cm.)

Describes the structure of the flowers of *apocynum androsacmifolium*, and their cross-fertilization by *apis* and large *syrphidae*. Small *syrphidae* and *muscidae* are unable to remove the pollen masses, and are held prisoners in the flowers. *W: T.* (3476)

McCook, H. Christopher. On the architecture and habits of the cutting ant of Texas, *atta fervens*. (Annals and mag. nat. hist., June 1879, s. 5, v. 3, p. 442.)

"The cutter [*atta fervens*] grasps the leaf with outspread feet and makes an incision at the edge by a scissor-like motion of her sickle-shaped toothed mandibles. She gradually revolves, stealthily cutting as she does so, her mandibles thus describing a circle or the greater portion thereof." *R. H.* (3477)

McDonald, G. L. Peculiar mistake of *dytiscus marginalis*. (Entomologist, Nov. 1883, v. 16, p. 263-264)

Dytiscus marginalis probably mistakes the glassy surface of a greenhouse for water. *G. D.* (3478)

McLachlan, Robert. Discovery of the winged form of *prosopistoma punctifrons*. (Entom. mo. mag., July 1880, v. 17, p. 46.)

Prosopistoma punctifrons bred to the sub-imago state by A. Vayssière, and proved to be one of the *ephemeridæ*. *B. P. M.* (3479)

McLachlan, Robert. A monographic revision and synopsis of the trichoptera of the European fauna. Lond., 7: *Van Voorst*, 1874-1880. [9 parts, each with t.-p. cover.] t.-p., 4+523+[Suppl., appendix and indices] 103 p., 59 pl.+t.-p., 26×16, t 20×11.5 £3, 8s.

Rev. (Berkaui's Bericht . . . der entomologie, 1873-1874, p. 180-181; 1875-1876, p. 278-280; 1877-1878, p. 382-385; 1879, p. 158-163.)

Rev., by H. A. Hagen. (Zool. jahresbericht, 1879, p. 580-581; 1880, abtheil. 2, p. 228-230.)

Rev., by M. Rostock. (Entom. nachrichten, 15 Oct. 1880, jahrg. 6; Lit. rev., p. 72.)

General structure of trichoptera; generic and specific characters, and notes on mode of preservation in collections; descriptions, classification, synonymy, habits and habitats of the European species; supplement, containing additional notes made while the work was in progress; appendix consisting of a systematic catalog of the trichoptera of Europe and a discussion of their geographical distribution; index of genera and of species. *G. D.* (3480)

McLachlan, Robert. A North American species of *dilar*. (Entom. mo. mag., Aug. 1881, v. 18, p. 55.)

Describes *dilar americanus*, a new species from Kentucky. *G. D.* (3481)

McLachlan, Robert. *Prosopistoma punctifrons*. (Entom. mo. mag., Oct. 1880, v. 17, p. 117.)

Denial of "the former possession of an opinion that the insects [*prosopistoma punctifrons*] might be an ephemerid suited for a continuous aquatic life." *B. P. M.* (3482)

McLachlan, Robert. On two new *panorpidæ* from western North America. (Entom. mo. mag., July 1881, v. 18, p. 36-38, 2 fig.)

Describes *bittacus chlorostigma* (from Cal.) and *panorpidæ orregonensis* (from Oreg.), 2 new species, and figures their abdominal appendages. *G. D.* (3483)

McRae, W. Prolonged existence of ichneumon in pupa. (Entomologist, Aug. 1883, v. 16, p. 188-189.)

An ichneumonid remained in the pupal state two years beyond the normal time. *G. D.* (3484)

McRae, W. Retarded development of *saturnia carpinii*. (Entomologist, June 1882, v. 15, p. 131-132.)

A female of *saturnia carpinii* emerged in April 1882, from a cocoon made in 1879; this female seemed to be entirely unattractive to males of the same species. *G. D.* (3485)

McRae, W. Retarded emergence of *sphinx ligustri*. (Entomologist, Aug. 1883, v. 16, p. 187.)

A specimen of *sphinx ligustri* remained in the pupal state, in a fern-case kept indoors, from Sept. 1881 to April 1883. *G. D.* (3486)

Mann, B. Pickman. Bibliography of some of the literature concerning destructive locusts. (2d rept. U. S. entom. commission, for 1878 and 1879, 1880: Appendix 4, p. 33-50.)

Separate, author's ed., including [C. Thomas'] "Supplementary list" (*op. cit.*, p. 50-55) and [C. Thomas'] "Additions to bibliography on the locusts of America" (*op. cit.*, p. 55-56), with above title. [Wash.], 1880 [18 Mch. 1881]. ½-t.-p. cover + ½-t.-p. + p. 33-56, 24×16. [Rec., 3291 s.]

List of writings on destructive *acridioidæ* of Europe, Asia and Africa, with partial analyses of contents. *B. P. M.* (3487)

Martini, W. Spannadeln. (Entom. nachrichten, 1 May 1881, jahrg. 7, p. 144.)

Description of a form of needle suitable for use in spreading lepidoptera. *G. D.* (3488)

Meinert, Fr. Fluernes munddele. Trophi dipterorum. Paa Carlsberg-fondets bekostning. Kjøbenhavn, *H. Hagerup*, 1881. t.-p. cover, t.-p., 91 p., 6 pl., 27×21, t 19×14.2.

Historical and general remarks on the trophi of diptera; more detailed description, with figures, of those parts in *culex*, *simulium*, *miastor*, *oligarces*, *tijula*, *limnobia*, *dilophus*, *tabanidæ*, *subula*, *thereva*, *leptis*, *empis*, *asilus*, *myopa*, *stratiomys*, *dolichopus*, *scarva*, *rhingia*, *cristalis*, *stomoxys*, *musca*, *mesembryna*, *ephydra*, *gastrus*, *melophagus*, and *nycteribia*. The summary of general conclusions and explanation of the plates are in latin. *G. D.* (3489)

- Melchert, G.** Einige vorschläge zur präparation. (Entom. nachrichten, 1 June 1880, jahrg. 6, p. 116-117.)
Discusses pinning insects and packing them for transportation. *G: D.* (3100)
- Melville, J. Cosmo.** Cannibalism in *Pieris crataegi*. (Entomologist, Jan. 1883, v. 16, p. 15-16.)
A number of individuals of *Pieris crataegi* seen sucking out the juices of a fallen comrade. *G: D.* (3191)
- Members, O. W. U.** [*pseud.*]. Insects on the Halifax. (Florida agriculturist, 13 July 1881, v. 4, p. 65, col. 3-4, 16 cm.)
Statement concerning the domestic insect fauna at Ormond, Fla. *B: P. M.* (3492)
- [Metallic casts of beetles.] (Amer. nat., Nov. [28 Oct.] 1881, v. 15, p. 933-934.)
Description of process for taking metallic casts of insects. *G: D.* (3493)
- Möschler, Heinrich B.** Beiträge zur schmetterlings-fauna von Surinam. [I.] (Verhandl. k.-k. zool.-bot. gesells. zu Wien, 1876, bd. 26; Abh., p. 293-352, pl. 3-4.)
Notes on lepidoptera from Surinam, South America, some of the species being also found in North America. Describes new species but no new genera. *G: D.* (3494)
- Möschler, Heinrich B.** Beiträge zur schmetterlings-fauna von Surinam. II. (Verhandl. k.-k. zool.-bot. gesells. zu Wien, 1877, bd. 27; Abh., p. 629-700, pl. 8-10.)
Notes on lepidoptera from Surinam, South America, some of the species being also found in North America. Describes the following new genera: *amphytona*, *eudolice*, *calvinacodes*, *eulophopteryx*, *euxoga*, *lepastia*, *phedrosia*, *pseudapistosia*, *pseuditeuceron*, *pseudodoryas*, *senia*, *sychestia* and *tricypha*. *G: D.* (3495)
- Möschler, Heinrich B.** Beiträge zur schmetterlings-fauna von Surinam. III. (Verhandl. k.-k. zool.-bot. gesells. zu Wien, 1880, bd. 30; Abh., p. 379-486, pl. 8-9.)
Notes on lepidoptera from Surinam, South America, some of the species being also found in North America. Describes the following new genera: *adyrona*, *ama-belu*, *amphodia*, *arbinia*, *arctinia*, *borilia*, *lufphana*, *cladonia*, *clapra*, *daedalina*, *erioscele*, *gabyna*, *gonaris*, *mindora*, *placonia*, *smyra*, *synalissa* and *thelidora*. *G: D.* (3496)
- Möschler, Heinrich B.** Beiträge zur schmetterlings-fauna von Surinam. IV. (Verhandl. k.-k. zool.-bot. gesells. zu Wien, 1881, bd. 31; Abh., p. 393-442, pl. 17-18.)
Notes on lepidoptera from Surinam, South America, some of the species being also found in North America. Describes the following new genera: *blechroma*, *diastema*, *ligonia*, *linosta*, *liopasia*, *neophrida*, *pilenta*, *singamia* and *tanyodes*. *G: D.* (3497)
- Möschler, Heinrich B.** Beiträge zur schmetterlings-fauna von Surinam. v. Supplement. (Verhandl. k.-k. zool.-bot. gesells. zu Wien, 1882, bd. 32; Abh., p. 303-362, pl. 17-18.)
Notes on lepidoptera from Surinam, South America, some of the species being also found in North America. Describes the following new genera: *alimera*, *antiora*, *asyloca*, *charmodia*, *goniffa*, *lysano*, *phiditia*, *pyrateria*, *strophocerus*, *talmenia*, *thogona* and *ulamia*. *G: D.* (3498)
- Murtfeldt, Mary Esther.** Rose-feeding *tortricidae*. The rose leaf-tyer. *Penthina cyanana*, n. sp. (Amer. entom., Jan. 1880, v. 3, n. s., v. 1, p. 14-15.)
List of *q. tortricidae* injurious to *rosa*; description of larva, pupa and imago and habits of and means against *Penthina cyanana* n. sp. *B: P. M.* (3499)
- Nusbaum, Joseph.** Zur entwickelungs-geschichte der ausführungsgänge der sexual-drüsen bei den insecten. (Zool. anzeiger, 27 Nov. 1882, jahrg. 5, p. 637-643.)
On the development of the excretory ducts of the sexual glands of insects, based especially on a study of *Lipeurus bacillus*, *Goniocotes hologaster* and *Blatta orientalis*. *G: D.* (3500)
- [Riley, C: Valentine.] Galls and gall-insects. (Amer. nat., May [16 Apr.] 1881, v. 15, p. 402-403.) (RILEY, C: V. Entomology . . . [May 1882], p. 402-403.)
Notice of H. F. Bassett's "New species of *Cynipidae*" (Can. entom., Mich. 1881, v. 13, p. 51-57) [Rec., 3357]: *Cynips q. californica* occurs on *Quercus douglasii*; its gall nourishes the coleopteron *Ozognathus cornutus*; habits of the latter; synonymy of both species. *B: P. M.* (3501)
- Saunders, E:** Notes on the hairs of hymenoptera. (Entom. mo. mag., Feb. 1881, v. 17, p. 201-202. fig. 1-3.)
Descriptions and figures of hairs from the eyes of *Cochlyxys* and the tibiae of *Andrena* and *Bombus*; *Hymenoptera mellifera* seem to differ from other Hymenoptera in having branched or plumose hairs; approximation of hairs to scales. *B: P. M.* (3502)
- Wilkinson, Clennell.** *Vanessa cardui* double brooded. (Entom. mo. mag., July 1880, v. 17, p. 43-44.)
Record of occurrence of a second brood of *Vanessa cardui* in November, in South Wales, the first brood having occurred in August; remark, by C: G. Barrett, on this phenomenon as "an instinctive attempt at following up the habit of the species in a hotter climate." *B: P. M.* (3503)
- Witlaczil, Emanuel.** Zur Anatomie der Aphiden. Vorläufige Mittheilung. (Zool. Anzeiger, 15 May 1882, jahrg. 5, p. 239-241.)
Outline of the general anatomy of *Aphidae*. *G: D.* (3504)

ENTOMOLOGICAL ITEMS.

MONSIEUR A. DÉLUGIN, pharmacien, à Blois, France, wishes to exchange the French species of *Donacia* for those of North America.

MR. HOWARD L. CLARK publishes, in *Random notes on natural history*, for May 1884, an account of a swarm of *Callidryas cubule* seen in Rhode Island, in 1869 or 1870.

JUST AS this numero goes to press we learn of the sudden death of Francis Gregory Sanborn, of Worcester, Mass., well-known as an entomologist. He died 5 June 1884, at Providence, R. I.

MR. ANSON ALLEN, lepidopterist, died in Orono, Me., 8 Feb. 1884, in the 55th year of his age. Prof. C. H. Fernald publishes an obituary notice of Mr. Allen in the *Canadian entomologist* for March, 1884, v. 16, p. 43-44.

MR. S. SCHOFIELD, at a late session of the Rhode Island entomological society, read a paper on experiments made with the eggs and larvae of *Ceratocampa imperialis*. The mode of fighting among these larvae was graphically described.

M. EDMOND ANDRÉ, à Beaune, Côte-d'Or, France, who has lately established an agency for the sale of entomological publications and apparatus, has just issued his fourth catalog of books for sale, including a large number of French separates.

DR. JACOBS notes two recent cases in which the larvae of *Dermatobia noxialis*, a dipteran have been found beneath the skin of persons who have returned to France from America. These cases have been announced in the *Annals of the Société de biologie de France*, and in the *Comptes rendus of the Société entomologique de Belgique*.

WE REGRET to learn that Sir Sidney Smith Saunders, C. M. G., for many years British consul in various Mediterranean ports, and a distinguished entomologist, died suddenly on Tuesday evening (15th) at an ad-

vanced age. He was one, of the original members of the Entomological society of London, and was a vice-president of the society at the time of his death. He devoted special attention to the singular bee-parasites known as *stylopidae*.—*Nature*, 17 Apr. 1884, v. 29, p. 581.

THE NEWLY organized Entomological society of Washington has elected the following officers: President, C. V. Riley; vice-presidents, J. G. Morris and Geo. Marx; recording secretary, E. A. Schwarz; corresponding secretary, L. O. Howard; treasurer, B. P. Mann; executive committee, the officers and W. S. Barnard, P. R. Uhler and A. J. Shafhirt. Meetings are held the first Thursday of each month.

M. ADRIEN DOLLFUS, the enterprising editor of the *Feuille des jeunes naturalistes*, offers to the subscribers of his paper a prize for competitive work in dissection and insect anatomy. A sample of the kind of work required is given in the *Feuille* for May, in a paper, by Dr. H. Viallanes, entitled "Anatomie et dissection de la larve de libellule," with a plate. The subject proposed by M. Dollfus is the anatomy of the larva of some diurnal lepidopteron, and the paper is to be accompanied by drawings of the parts. The first prize is a scientific work, of the value of 50 francs, to be chosen by the successful competitor; a second prize of 25 francs value may be given. We wish the best of success to M. Dollfus, who works with patriotic zeal to instil a love of scientific study of nature into the readers of his interesting paper.

G: D.

DR. J. A. OSBORNE writes, in the *Entomologist's monthly magazine* for Dec. 1883, among some observations on *Zaraea fasciata*.

"Last year I was not able to say positively in which end of the egg the head of the embryo develops. As the result of numerous observations I am now in a position to state, that the head of the embryo is found in the

upper and lower pole of the egg with about equal frequency. Often we meet with two eggs lying together, evidently laid by the same fly with the same orientation, in which the heads of the embryos lie in opposite directions. This is in direct contradiction to the dictum of Leuckart: 'Der obere Pol des Eies beherbergt in allen Fällen das Kopfende des Thieres' (Ueber die Micropile. &c., *Müller's archiv*, 1855, p. 102). Rare exceptions to the rule occur also, as I have already shown, in the eggs of *Gastrophysa raphani*." The abnormal position of the dorsum and venter of the embryo in these eggs is then discussed.

A NEW species of trap-door spider, a species of *Cteniza*, has been discovered at San José, Cal. The common though little known species of southern California is known as *C. californica*; and its trap-door nest is usually placed in museums beside the tarantula (*Mygale hentzii*), and erroneously labelled as the tarantula's nest. This popular error, by which dealers in curiosities generally profit, is stranger, since the tarantula is usually too large to enter the nest of *Cteniza*, and itself makes no nest, occupying crevices in the ground or under stones, spinning a small web.—*Science*, 11 April 1884, v. 3, p. 469.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass. at 7.45 p. m., on the days following:—

24 Oct. 1883.	27 Feb. 1884.
28 Nov. "	26 Mar. "
26 Dec. "	23 Apr. "
23 Jan. 1884.	28 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

12 Oct. 1883.	14 Mar. 1884.
9 Nov. "	11 Apr. "
14 Dec. "	9 May "
11 Jan. 1884.	13 June "
8 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

10 Dec. 1883.	9 June 1884.
---------------	--------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

2 Oct. 1883.	5 Feb. 1884.
6 Nov. "	4 Mar. "
4 Dec. "	1 Apr. "
8 Jan. 1884.	6 May "

G. J. BOWLES, *Secretary*.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary*.

PSYCHE



A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. Nos. 122-123.

JUNE-JULY 1884.

CONTENTS:

ADVERTISEMENTS	178
ON THE NERVOUS SYSTEM OF THE HEAD OF THE LARVA OF CORYDALUS COR- NUTUS LINN.— <i>William Christopher Krauss</i>	179-184
SEXUAL CHARACTERS IN THE CHRYSALIDS OF GRAPTA INTERROGATIONIS— <i>Mary Esther Murtfeldt</i>	184
REVIEW	185
PROCEEDINGS OF SOCIETIES—Cambridge Entomological Club	186
BIBLIOGRAPHICAL RECORD, no. 3505-3550	187-190
ENTOMOLOGICAL ITEMS—Society Meetings	191-192

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB.

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

BULLETTINO DEL NATURALISTA COLLECTORE.

PUBLISHED MONTHLY AT SIENA, ITALY.

At least eight large octavo pages per numero, principally in Latin, Italian, and French.

Subscription:

Countries in the postal union 2.50 Francs.
Countries outside the postal union 5.00 "

CALOSOMAS AND CICINDELIDAE WANTED.

The undersigned desires to obtain species of *Calosoma* (except *C. calidum* and *C. inquisitor*) from all parts of the world; also as many species of *Cicindelidae* as possible, especially foreign ones. Native coleoptera sent in exchange.

C. H. F. TOWNSEND,
Constantine, St. Jo. co., Mich.

R. FRIEDLÄNDER & SOHN,

Berlin N. W., Carlstrasse 11.

Natural History and Natural Science Booksellers established since 1827.

Largest stock of the whole Literature of Natural History and the Exact Sciences.

Apply for classified catalogue in 25 parts (each one special department of science), price 10 c. each.—Just published, Part IX. *Entomology 1.* (General Entomology.—Coleoptera.) 46 p. about 2000 works.—X. *Entomology 2.* (Lepidoptera), comprising among others the library of the late Prof. P. C. Zeller, 30 p., about 1300 works.—XI. *Entomology 3.* (Hymenoptera, Neuroptera, Orthoptera, Diptera, Hemiptera, Parasita.) 34 p. about 1500 works.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper, \$3.00 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the Scientific American sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 251 Broadway, New York.

PSYCHE.

ON THE NERVOUS SYSTEM OF THE HEAD OF THE LARVA OF *CORYDALUS CORNUTUS* LINN.

BY WILLIAM CHRISTOPHER KRAUSS, ATTICA, N.Y.

[With Plate 2.]

[Extract from a thesis in entomology, presented to the Faculty of the Cornell university for the Baccalaureate in science.]

The nervous system of the head of the larva of *Corydalus cornutus* Linn., consists of—

1. The supra-oesophageal ganglia or cerebrum, and nerves.
2. The crura cerebri.
3. The sub-oesophageal ganglion or cerebellum, and nerves.
4. The commissures.
5. The vagus nerve.

I. THE SUPRA-OESOPHAGEAL GANGLIA, OR CEREBRUM. — The supra-oesophageal ganglia (fig. 1. 1) are situated in the dorso-cephalad part of the head, midway between the tips of the labrum and the base of the head. They lie dorsad of the oesophagus, and immediately entad of the dorsal body wall, being separated from it only by thin, delicate layers of adipose tissue.

The supra-oesophageal ganglia, the probable homologs of the vertebrate

cerebrum, differ greatly from the other ganglia or nerve centres of the body. They are a compound organ composed of two distinct ganglia or hemispheres connected together by a short, thick commissure on the meson, but are sometimes described as a single ganglion. These hemispheres are similar in outline, having an ovoid appearance. The lateral ends of the hemispheres taper into the cerebral nerves. In the two-year-old larva, the cephalo-caudal diameter of the hemispheres is three-fourths of a millimetre, and the two together attain the length of two millimetres.

The ventro-latero-cephalad borders of the cerebrum are developed ventrad, forming the crura cerebri, which connect it with the sub-oesophageal ganglion.

The cephalad extremity of the aorta is attached to the neurilemma, at the cau-

dad border of the supra-oesophageal ganglia on the meson. The opening of the aorta appears as is shown in the plate, fig. 1. 7, the dorsal wall having a forked opening near the attachment of the aorta to the neurilemma.

The supra-oesophageal ganglia are supplied by two large tracheae lying parallel to the oesophagus (fig. IV, 4). Each trachea sends three branches to the ventral side of each hemisphere. These branches divide and sub-divide, ramifying to all parts of the hemispheres (fig. IV). The supra-oesophageal ganglia are covered with a thin, delicate curtain-membrane, the neurilemma.

The cerebral nerves.—The cerebral nerves consist of two trunks of nerves, which originate from two tracts at the lateral apices of the supra-oesophageal ganglia. The cephalad tract gives rise to the antennal nerve, and also a small integumentary nerve, and may therefore be called the antennal tract. The caudad tract gives rise to the optic nerves, and may therefore be called the optic tract.

The antennal nerve.—The antennal nerve (fig. 1. 4) arises from the antennal tract. It extends laterad a distance of one and one-half millimetres, and divides into a cephalad and a caudad branch.

The cephalad branch (fig. 1. 4. *a*) continues its course laterad, then cephalad, and enters the antenna, supplying it with nerves. It is therefore, probably, the tactile or sensor nerve of the antenna.

The caudad branch (fig. 1. 4. *b*) con-

tinues laterad, and enters the muscles of the antenna in the head (fig. 1. 9). At the point of entering the muscles it divides into several small branches. This nerve is probably the motor nerve of the antenna. Another small nerve (fig. 1. 4. *c*) arises from the antennal tract, and extends laterad a distance of two millimetres; it then divides into two branches. These branches pass dorsad of the antennal muscles, and enter the integument near the retinas of the eyes.

The optic nerves.—The optic trunk of nerves (fig. 1. 5) arises from the optic tract. This trunk extends laterad a short distance and divides into seven distinct branches, the optic nerves. These branches continue their course laterad, and are distributed one to each of the seven retinas. It is an interesting fact, that although there are seven retinas, the external parts of only six ocelli are developed. The presence of the seventh retina and optic nerve cannot be doubted, as it was observed in many specimens of the one- and two-year-old larvae. Fig. VI shows the separation of the optic trunk into the seven optic nerves. The optic and antennal nerves are protected by a covering, the extension of the neurilemma or theca (fig. VI. 3) which covers the sub- and supra-oesophageal ganglia and nerves.

2. *The crura cerebri.*—The crura cerebri or the cerebro-cerebellar commissures (fig. IV. 3 and fig. VII. 2) are two cords of nerve matter connecting the sub- and supra-oesophageal ganglia, and with them encircle the oesophagus.

They arise from the ventro-latero-cephalad portions of the supra-oesophageal ganglia, and extend ventrad, joining the sub-oesophageal ganglion at its dorso-latero-cephalad borders. They are similar in outline and appearance to the commissures of the body. They present a convexity laterad and a concavity mesad, corresponding to the cylindrical outline of the oesophagus.

The crural nerves.—At the points of departure of the crura cerebri from the supra-oesophageal ganglia, each crus gives off two nerves, the vagus and the clypeo-labral (fig. 1. 2, 3 and fig. iv. 8, 9). The vagus nerve will be described later as a special part of the nervous system of the head.

The clypeo-labral nerves.—The clypeo-labral nerves, two in number, arise one from each crus near its origin (fig. 1. 3). They extend cephalad and a little mesad. Each gives off three small branches in the clypeus, and a fourth, long branch which extends cephalad to the base of the labrum and penetrates the integument. After giving off these branches, the main trunk extends cephalad into the labrum and may be termed the labral nerve. This labral nerve divides into several small branches near the tip of the labrum. The largest of these branches enters a labral palpus (?), or probably a seta.

The crura cerebri are joined together by a cord of nerve matter (fig. vii. 3) one-half millimetre from their attachments to the sub-oesophageal ganglion. This cord or cross-nerve of the commissures is dorsad of the cephalad part of

the sub-oesophageal ganglion, and is entirely concealed by it. The cross-nerve arises from the commissures and like the commissures follows the outline of the oesophagus, presenting a convexity ventrad, and a concavity dorsad.

3. THE SUB-OESOPHAGEAL GANGLION, OR CEREBELLUM.—The sub-oesophageal ganglion (fig. II. 1) is situated in the ventro-cephalad part of the head, midway between the tips of the labium and the base of the head. It lies ventrad of the oesophagus, and is separated from the ventral body-wall by a layer of muscles and by adipose tissue. The sub-oesophageal ganglion, the probable homolog of the vertebrate cerebellum, differs somewhat from the other ganglia. It is nearly cordate in outline, with two apices pointing caudad and terminating in the commissures. Its cephalo-caudal diameter is one and one-half millimetres, and its greatest width is one millimetre, in the two-year-old larva. It is connected to the supra-oesophageal ganglia by the crura cerebri, and to the other ganglia of the body by the commissures. It is covered with a thin, delicate curtain-membrane, the neurilemma.

Tracheae also penetrate the body of the ganglion, ramifying to all parts.

The cerebellar nerves.—The cerebellar nerves consist of a pair each of labial, gustatory, maxillary, and mandibular nerves, and three other, unnamed pairs of nerves.

The labial nerves.—The labial nerves (fig. II. 3) originate from the ventro-latero-cephalad borders of the sub-

oesophageal ganglion, and continue their course cephalad into the labium. At a point one millimetre from the ganglion two branches are given off laterad, one from each nerve, which divide into several small branches piercing the integument.

At a point two millimetres from the ganglion two branches are given off, one from each nerve, going cephalo-laterad to the integument.

At a point three millimetres from the ganglion the labial nerve separates into two large branches, one extending to the palpus, and one to the distal end of the ligula. The nerve of the labial palpus enters that organ, and near its extremity separates into several small branches. The ligular nerve continues cephalad into the ligula, and near its extremity divides into two or three small branches. The nerve of the labial palpus gives off a very small nerve at the point of entering the palpus.

The gustatory nerves.—The gustatory nerves (fig. II. 2), if they may be so called, arise from the cephalad border of the sub-oesophageal ganglion, and continue their course cephalad into the ligula, being in close relation to the floor of the mouth. At a point three millimetres from the ganglion, at the caudad part of the ligula, the nerves meet on the meson, forming an arch. The dextral nerve sends a small nerve laterad about one and one-half millimetres from the ganglion, while the sinistral nerve sends a branch laterad one millimetre from the ganglion. The two nerves, at the point of changing their course from

cephalad to mesad, give off two branches, one from each nerve. These branches continue cephalo-laterad, piercing the floor of the mouth. These branches also divide into several smaller branches. The arch of the gustatory nerves gives off two small nerves, going cephalad, which unite at a point one millimetre from the arch. This united nerve divides into three small nerves, one going cephalad, and two going cephalo-laterad. The gustatory nerves and branches are very fine and delicate, and are closely related to the integument which forms the walls of the labium and ligula.

The maxillary nerves.—The maxillary nerves (fig. II. 5 and fig. III) arise from the ventro-latero-cephalad borders of the sub-oesophageal ganglion as a single trunk, which immediately divides into four branches. These may be indicated by the letters a, b, c, d, fig. II. 5, and A, B, C, fig. III.

Nerve A (fig. III), which is the largest of the branches, forks at a point about two millimetres from the ganglion. Both branches enter the maxilla, going to its extremity, and one of them enters the maxillary palpus.

Nerve B.—This branch divides into two branches, three millimetres from the ganglion, one branch forking immediately and going cephalad. The other branch continues laterad, dividing into several branches which pierce the integument.

Nerve C.—This branch forks two millimetres from the ganglion, one branch going cephalad to the maxilla, the other

branch going caudad, giving branches to the maxillary muscles in the head. The cephalad branch divides into two branches four and one-half millimetres from the ganglion, both continuing their course cephalad.

The fourth nerve (fig. II. 5. *d*) is a very small nerve which divides into two branches entering the maxillary muscles.

The mandibular nerve.—The mandibular nerve (fig. II. 4 and fig. V) arises from the dorso-latero-cephalad borders of the sub-oesophageal ganglion, and continues laterad to the mandibles. Before entering the mandibles three branches are given off (fig. V. 2, 3, 4).

The first branch (fig. V. 2) gives off two nerves which go caudad, entering the mandibular muscles.

The second branch (fig. V. 3) goes laterad a short distance, then forks. The caudad fork, dividing into two branches, enters the mandibular muscles. The cephalad branch is united to a long nerve going cephalad. This nerve forks one and one-half millimetres from the base of the mandibles. This nerve extends caudad of its attachment to nerve 3 (fig. V), and enters a muscle. Just caudad of its attachment to nerve 3 it gives off a very fine and delicate nerve which goes cephalad into the mandibles. Nerve 4 (fig. V) goes laterad two millimetres, then forks, one branch going caudad to supply the mandibular muscles in the head, the other branch going cephalad into the mandibles. The mandibular nerve gives off a branch at the point of entering the mandibles, two branches one and one-fourth millimetres from the

base of the mandibles, and then forks at a point two and one-fourth millimetres from the base into two branches, which continue their course cephalad. The more minute branches of the mandibular nerve are shown in fig. V.

Other nerves.—A small nerve (fig. II. 6) arises immediately caudad of the attachment of the labial nerve on the ganglion, and divides into several branches going to the adjacent muscles.

From the lateral borders of the sub-oesophageal ganglion two nerves are given off, one on each side, going caudad parallel to the commissures (fig. II. 8). These nerves enter the perivisceral cavity.

At the caudad part of the ligula, three millimetres from the sub-oesophageal ganglion on the meson, are attached two long nerves going caudad (fig. II. 7). These nerves are joined to the labial nerves by neurilemma and by two very fine nerves, one on each side. At the ganglion each nerve gives off two small, delicate nerves which are joined to nerve 6 (fig. II). The main branch continues caudad, but no caudal attachment was found. The cephalad attachment of these nerves is not shown in fig. II, having been dissected away to show the cephalad extremity of the gustatory nerves.

4. THE COMMISSURES.—The caudad end of the sub-oesophageal ganglion terminates in two large white cords, the commissures (fig. II. 9, fig. VII. 4). These commissures are similar to the commissures of the body, and join the sub-oesophageal ganglion to the first

thoracic. Each commissure gives off a nerve three and one-half millimetres from the ganglion, going caudad. The distance of these nerves from the ganglion varies however (fig. II. 0).

5. THE VAGUS NERVE.—The vagus nerve of *Corydalus cornutus* arises as two nerves from the crura cerebri, dorsad of the labial nerves (fig. IV. 9). These nerves pass cephalo-mesad, forming two arches, and unite in a ganglion on the median line dorsad of the palate. This ganglion (fig. I. 2, fig. IV. 2) is sometimes called the frontal ganglion, and is immediately cephalad of the supra-oesophageal ganglion. The vagus nerve departs from the caudad part of the ganglion, passes caudad between

the aorta and the oesophagus, and continues on the median line until it reaches a point two millimetres caudad of the frontal ganglion (fig. IV. 9). Here it enters another ganglion smaller than the frontal ganglion. This ganglion is also situated on the median line between the aorta and the oesophagus. Two nerves depart from this ganglion, going latero-caudad to the sides of the oesophagus (fig. I. 8, fig. IV. 0). They continue their course caudad until they reach the pro-ventriculus, where they divide into many branches.

The vagus nerve gives branches to the aorta in the head, and numerous nerves are continually given off to the oesophagus.

SEXUAL CHARACTERS IN THE CHRYSALIDS OF *GRAPTA INTERROGATIONIS*.

BY MARY ESTHER MURTFELDT, KIRKWOOD, MO.

The publication in *PSYCHE* for November-December 1883, v. 4, p. 103-106, of the full text of Mr. Lintner's interesting paper on "A new sexual character in the pupae of some lepidoptera," reminds me of an observation which I made last summer on the chrysalids of *Grapta interrogationis*.

Desirous of obtaining fresh specimens of this species, I placed about a dozen elm-feeding larvae in a rearing cage, from which, in due time, I obtained eleven chrysalids. These were, in respect to color and ornamentation, of two distinct sorts. The larger proportion were of a dull, pale fuscous with darker

brown lateral stripes, dots and markings, without a trace of metallic ornamentation, while four were much paler in general color, inclining to golden brown, each ornamented with the eight brilliant, pale-golden, papillose dorsal spots by which this chrysalis is usually characterized. From each of the pale and gilded chrysalids emerged a female, while the seven dark and unornamented ones gave forth males exclusively. This observation may be a mere corroboration of a well known fact concerning the sexual characters of the species, but if so I have not met with it, or it has entirely escaped my memory.

EXPLANATION OF PLATE 2.

- Fig. i. Dorsal view of the head, showing the supra-oesophageal ganglia and nerves. $\times 6$.
1, Supra-oesophageal ganglia. 2, Frontal ganglion. 3, Clypeo-labral nerve. 4, Antennal nerve. *a*, Sensor branch. *b*, Motor branch. *c*, Integumentary branch. 5, Optic nerves. 6, Oesophagus. 7, Aorta. 8, Vagus nerve. 9, Antennal muscles.
- Fig. ii. Ventral view of the head, showing the sub-oesophageal ganglion and nerves. $\times 6$.
1, Sub-oesophageal ganglion. 2, Gustatory nerve. 3, Labial nerve. 4, Mandibular nerve. 5, Maxillary nerve. 6, 7, 8, Unnamed nerves. 9, Commissure. *o*, Commissural nerve.
- Fig. iii. The maxilla with its three large nerves. Nerve *d*, fig. ii, not shown. $\times 7$.
- Fig. iv. Ventral aspect of the supra-oesophageal ganglia, the crura cerebri turned cephalad. $\times 15$.
1, Supra-oesophageal ganglia. 2, Frontal ganglion. 3, Crura cerebri. 4, Tracheae. 5, Aorta. 6, Optic nerves. 7, Antennal nerve. 8, Clypeo-labral nerve. 9, Vagus nerve. *o*, Vagus nerve.
- Fig. v. The mandible with its nerves. $\times 7$.
- Fig. vi. The separation and dissection of the seven optic nerves. $\times 10$.
1, Optic trunk of nerves. 2, Optic nerve. 3, Neurilemma.
- Fig. vii. Showing principally the cross-nerve of the crura cerebri, the cephalad extremity of the sub-oesophageal ganglion having been dissected away. $\times 12$.
1, The sub-oesophageal ganglion. 2, Crura cerebri. 3, Cross nerve. 4, Commissure.

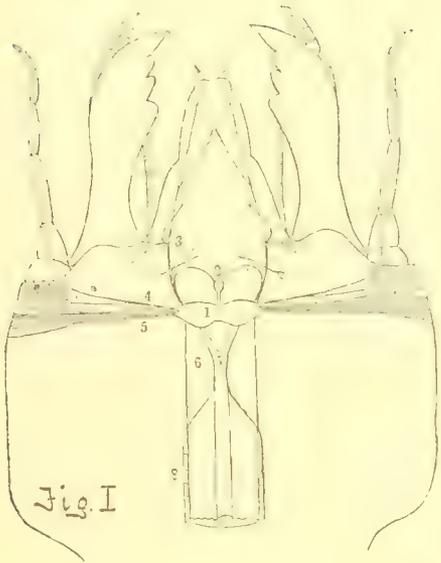


Fig. I

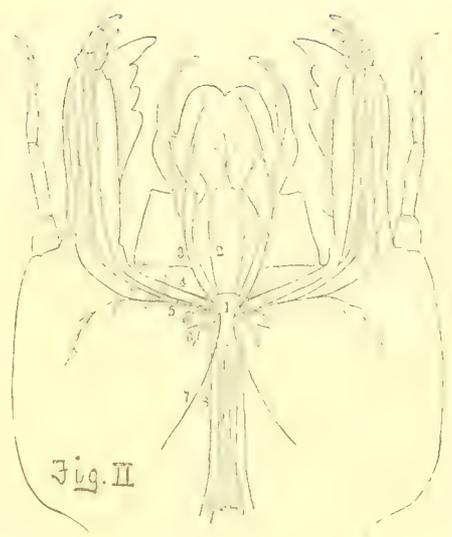


Fig. II

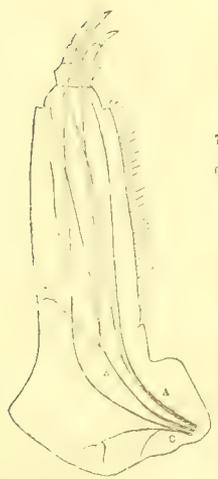


Fig. III

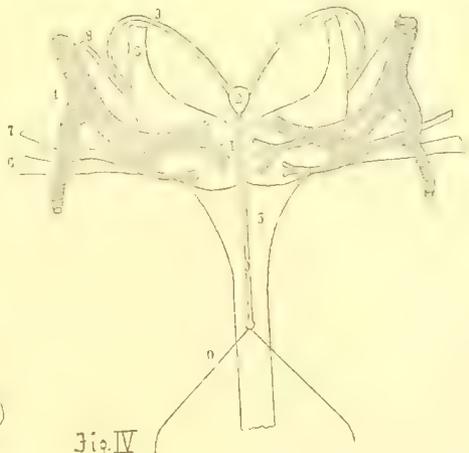
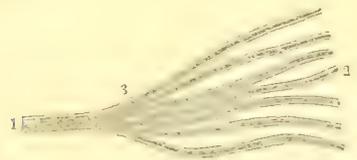


Fig. IV



Fig. V



W^{ch} C. Krauss. Del. Fig. VI

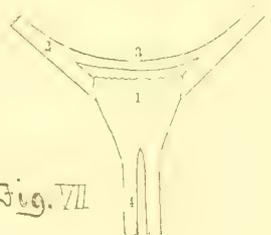


Fig. VII

PSYCHE.

CAMBRIDGE, MASS., JUNE—JULY 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

REVIEW.

More than two years ago we received, by the courtesy of Professor J: H: Comstock, a copy of his "(A fragment of a) Guide to practical work in elementary entomology" [Rec., 3508]. We were then disposed to write a critical review of the pamphlet, as regards its orismology, but did not publish it. We are now favored with a contribution from one of Mr. Comstock's pupils, in which this orismology is used. We notice, however, two deviations, in this article, from the terms recommended by Mr. Comstock, and thereby the most serious objections to the nomenclature are obviated. These deviations are in the use of the adverbial forms cephalad and caudad with also an adjectival significance. It seemed to us too absurd for toleration to be required by this orismology to "speak of the caudal part of the head or of the cephalic portion of the tail." If however, we speak of the caudad part of the head and the cephalad portion of the tail, we only introduce new words into the language, which is always permissible and cannot cause confusion. Otherwise the introduction of the proposed terms cannot cause harm, and may do good; indeed, if it is found that in any way terms may be introduced which are more "brief, simple, exact, significant," and more

widely applicable than former terms, good is certainly accomplished. It is proper to say that these terms are adopted by Mr. Comstock from a more comprehensive series proposed by Professors Wilder and Gage, and are not original with him. We have looked through the article by Mr. Krauss, to which we have referred, with the idea of determining the necessity for the new nomenclature. We do not find any passage where terms formerly in use, such as above, below, before, behind, would not be as intelligible as the new terms; but, on the other hand, they would not be more intelligible except that they are more familiar, a difference which disappears with use. We do not imagine that any entomologist would lay an insect on its back or stand it on its head to describe it, using corresponding terms descriptive of position, and Mr. Comstock admits that with any system of nomenclature we must first agree what to consider the normal position of the parts of an insect: that being admitted, the choice is mainly a verbal one. The use of the term meson, however, and its derivatives, we find to be a valuable addition to entomological orismology.

The second chapter of the work is taken up with a description of *Caloptenus femurrubrum*, unfortunately called a "grasshopper," and described as having a "caudal leg" and "cephalic wings." The idea of using a locust for this illustrative chapter is borrowed from Dr. W. K. Brooks. The description is excellent; we commend it to teachers and students, but think older forms of expression could be substituted with advantage in a sentence like the following, whose peculiar terms are based upon the very natural assumption that the locust is standing on his legs and holding his head in the only position it can then assume without being pulled off:—

"Upon each side joining the pseudo-ventral [lower] end of the suture just described and the pseudo-ventral [lower] end of the one which extends pseudo-ventral [downwards] from the compound eye is a well marked suture, which forms the pseudo-ventral [lower] border of the lateral part of the epicranium."—p. 20.

R: P M

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(Continued from p. 170.)

Dr. G : Dimmock showed abnormally colored specimens of *Thyreus abbotii*, and made some remarks upon the causes which produced their abnormal coloration.

The annual report of the Secretary for the year 1883 reports the number of active members, 1 Jan. 1884, as 32, the number of associate members, 50. Four associate members, Messrs. Belfrage, Chambers, Glover, and LeConte, who were included in the list of members published last year, are dead. During the year 1883 the Club held 9 meetings; the average attendance was 5.2.

The annual report of the Treasurer states the deficit on volume 1 of *PSYCHE*, for which Mr. B. P. Mann advanced the cash, \$29.49. On volume 2 the deficiency, made up by an advance of cash by Dr. G. Dimmock, is \$252.66. The Club's account for the years 1880-1882, during which time *PSYCHE* (v. 3) was published by Dr. Dimmock, shows a surplus of \$32.59, which the Treasurer recommends to be added to the Permanent publication fund. On the account of volume 4 of *PSYCHE* there is a deficit, 1 Jan. 1884, of \$29.90, which is made up by advances by Mr. Mann. The principal of the Permanent publication fund is \$224.39, deposited in the Cambridge Savings Bank and drawing an annual interest of four per centum.

The Librarian reports almost exactly one thousand titles in the library, and an increased list of exchanges for *PSYCHE*.

8 Feb. 1884.—The 99th meeting of the Club was held at 19 Brattle St., Cambridge, 8 Feb. 1884. The meeting was called to order by the President, Mr. S. H. Scudder, at 7.50 P.M. Three members were present.

The Secretary announced the withdrawal from the Club of Mr. William Barnes, of Cambridge, and the letters from Messrs C. C. Beale, W. L. Devereaux, and J. G. Jack ac-

cepting membership. The Secretary called attention to the fund which it is proposed to raise in honor of the late Dr. Hermann Müller, of Lippstadt, Germany.

Dr. G. Dimmock called attention to some curious habits of *Forficula auricularia*, a specimen of which he had kept in confinement several months. These insects are omnivorous, but apparently prefer insects as food, eating their own species greedily. Altho to all appearances blind, except to the presence or absence of light, the specimen above mentioned captured fleas (*Pulex irritans*) with ease in a circular enclosure about 5 cm. in diameter. No notice was taken of a flea put in the enclosure until the flea actually touched the forficula, when the latter would rush after the flea, palpitating rapidly with the antennae, and thus keeping on his track. If the flea escaped from beneath the antennae of the forficula the latter would find him again in a moment, and the amusing chase would be renewed, to end in the sure seizure of the flea in the mouth-parts of the forficula. The forficula was a glutton and would often eat a large number of fleas or other insects in succession, at the end of his repast his abdomen being much distended.

Mr. S. H. Scudder exhibited a specimen and drawings of an arachnid from the coal-measures of Arkansas. Two years ago Karsch figured a similar form from the coal of Prussian Silesia, under the generic name *Anthracomartus*, and Kusta has just described another from carboniferous beds in Bohemia. This adds another to the many instances in which a new generic type of carboniferous arthropods had no sooner been announced as found on one continent than it was discovered on the other. The Arkansas species was obtained by Prof. T. S. Harvey of Fayetteville, and had not been in Mr. Scudder's hands a month before a second American species was found by Mr. R. D. Lacoe in the well-known bed of Mazon creek, Ill.

Dr. G. Dimmock showed an alcoholic specimen of the larva and pupa of *Lucanus dama*.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Axon, W: E. A. Dipterous larvae in the human subject. (Entomologist, July 1882, v. 15, p. 164-165.)

Abstract from *British medical journal*, 1 Oct. 1881, in regard to the occurrence of a larva of an unknown dipteran beneath the skin of a girl. *G: D.* (3505)

Barnard, W: Stebbins. Eggs of *corydalus cornutus*. (Amer. entom., July 1880, v. 3, n. s., v. 1, p. 178 6 cm.)

Corroboration of conclusions as to the eggs and early development of *corydalus cornutus* set forth in C: V. Riley's "On the larval characteristics of *corydalus* and *chauliodes*" . . . (Kansas City review of science and industry, Sep. 1878, v. 2, p. 354) [Rec., 3535]; the egg-masses of *c. cornutus* deposited on the vertical, sun-exposed faces of rocks over water, at Ithaca, N. Y.; eggs hatch at Ithaca during the last half of August. *B: P. M.* (3506)

Collier, P: Report of the chemist. (Ann. rept. [U. S.] commissioner agric., for 1878, [22 Nov.] 1879, p. 95-156.)

Contains statements (p. 96, 97) that analyses had been made of the white covering of the eggs of *corydalus cornutus*, of so called bomic acid, and of London purple as a substitute for Paris green as an insecticide; (p. 134, 144) statements of results of these analyses. *B: P. M.* (3507)

Comstock, J: H: A fragment of a Guide to practical work in elementary entomology, an outline for the use of students in the entomological laboratory of Cornell university. Ithaca, N. Y., 1882. t.-p. cover+t.-p., 35 p., 22 X 15.

Notice. (Entomologist, June 1882, v. 15, p. 144.) Rev., by B: P. Mann, entitled "Review." (Psyche, June-July 1884, v. 4, p. 185.)

Consists of chapter 1, "Terms denoting position and direction of parts," and chapter 2, "The external anatomy of a grasshopper," of part 1, "Anatomical nomenclature," of author's proposed "Guide to practical work" etc.; need of and suggestions for the improvement of anatomical nomenclature; descriptive of the external anatomy of *caloptenus femur-rubrum*. *B: P. M.* (3508)

Douglas, J: W: Measurements in descriptive entomology. (Entom. mo. mag., Mich. 1882, v. 18, p. 236-237.)

Crit. rev., by R. McLachlan, with same title. (*op. cit.*, p. 237-238.)

Crit. rev. of R. McLachlan's "Measurements in descriptive entomology; a suggestion" (*op. cit.*, Feb. 1882, p. 205-207); considers the Paris line [2.25 mm.] a standard of measurement for insects, and opposes the use of the millimetre as a unit. *G: D.* (3509)

Frenzel, Johann. Der Verdauungstractus der Larve des *tenebrio molitor*. Vorläufige Mittheilung. (Zool. Anzeiger, 1 May 1882, jahrg. 5, p. 215-217.)

Anatomical and physiological notes on the digestive tract of the larva of *tenebrio molitor*. *G: D.* (3510)

Haldeman, S: Stehman. History and transformations of *corydalus cornutus*. (Mem. Amer. acad. arts and sci., 1849 [Jan. 1850], p. 162-168, pl. 1-3.)

Habits and external anatomy (with especial reference to the mouth-parts and genitalia) of *corydalus cornutus*. *G: D.* (3511)

LeConte, J: Lawrence. Lists of coleoptera collected in 1881 by Dr. Bell and others, in the Lake Superior district and in the north-west territories, east of the 112th meridian and south of the 60th parallel. (Rept. of progress of Geol. and nat. hist. surv. Canada, 1880-1882, Montreal, 1883, 29c-39c.)

Gives lists of coleoptera from 11 places about Lake Superior. *G: D.* (3512)

Leidy, Joseph. Internal anatomy of *corydalus cornutus* in its three stages of existence. (Mem. Amer. acad. arts and sci., 1849 [Jan. 1850], p. 162-168, pl. 1-3.)

Describes the digestive apparatus of the larva, pupa, and imago of *corydalus cornutus*, and the generative apparatus and nervous system of the imago of the same insect. *G: D.* (3513)

McLachlan, Robert. Measurements in descriptive entomology. (Entom. mo. mag., March 1882, v. 18, p. 237-238.)

Reply to J. W. Douglas' "Measurements in descriptive entomology" (*op. cit.*, p. 230-237); the extent to which the metric system is now used precludes the probability that Paris or English lines will ever become general standards of measurement; the use of Paris lines by British writers is especially objectionable.

G: D. (3514)

McLachlan, Robert. Measurements in descriptive entomology; a suggestion. Entom. mo. mag., Feb. 1882, v. 18, p. 205-207.)

Crit. rev., by J. W. Douglas, entitled "Measurements in descriptive entomology." (*op. cit.*, Mch. 1882, p. 236-237.)

Urges British entomologists to use millimetres as units in measurement of insects. G: D. (3515)

Meade, R. H. Note on parasitic diptera. (Entomologist, June 1882, v. 15, p. 140-141.)

Cyrtoneura stabulans, which is said to live generally on fungi, is, according to C. V. Riley, parasitic on the cotton worm, *alecia argillacea*. G: D. (3516)

Observations on the sagacity of the spider (Amer. museum . . . Carey . . . Oct. 1791, v. 10, no. 4, p. 203-204, 31 cm.)

Treats of the habits and web-building of spiders. B: P. M. (3517)

Osborne, J. A. Further notes on parthenogenesis in coleoptera. (Entom. mo. mag., Nov. 1881, v. 18, p. 128-129.)

Statistics of parthenogenetic reproduction as observed in *gastrophysa raphani* and compared with reproduction from impregnated females. G: D. (3518)

Osten Sacken, C: Robert. Dr. F. Müller's discovery of a case of female dimorphism among diptera. (Entom. mo. mag., Nov. 1880, v. 17, p. 130-132.)

Crit. rev. of F. Müller's "Paltoetoma torrentium. Eine mücke mit zweigestaltigen weibchen" (Kosmos, Oct. 1880, Jahrg. 4, bd. 8, p. 37-42); *paltoetoma torrentium* perhaps not a *paltoetoma*; geographical distribution of this genus and of the family *blepharoceridae* which differs from most other families of diptera in having the eyes contiguous in some genera and separate in others, but alike, so far as known, in both sexes, in this regard; references to literature on *blepharoceridae*. B: P. M. (3519)

Osten Sacken, C: Robert. Habits of *bombylius*. (Entom. mo. mag., Feb. 1881, v. 17, p. 206-207.)

Rev. of C. V. Riley's "On the natural history of certain bee-flies, *bombyliidae*." (Amer. entom., Dec. 1880, v. 3, n. s., v. 1, p. 279-283) [Rec. 3536]; food-animals of *systoechus*, *triodites* and *bombylius*; summary statement of the mode of oviposition of *bombylius*, *tomatia* and *anthrax*, with references to the literature.

I: W. (3520)

[Packard, Alpheus Spring.] The horned corydalus. (Amer. nat., Oct. 1867, v. 1, p. 436-437, fig. 1-2.)

Figure and general description of larva and imago of *corydalus cornutus*; low grade of its structure; habits of larva; eggs unknown; form and position of eggs of *stallis*; probably greater abundance of *stallidae* at the carboniferous period than at present. B: P. M. (3521)

Parfitt, E: *Halictus cylindricus* carnivorous. (Entom. mo. mag., Dec. 1882, v. 19, p. 162-163.)

A male of *halictus cylindricus* captured with other insects in his mouth. G: D. (3522)

Parthenogenesis bei käfern. (Entom. nachrichten, 15 Jan. 1881, jahrg. 7, p. 31-32.)

Abstract of J. A. Osborne's "Parthenogenesis in the coleoptera" (Nature, 30 Sept. 1880, v. 22, p. 509-510). In the abstract the species is given as "*gastrophysa raphani*." G: D. (3523)

Peach, B. N. On some fossil myriapods from the lower old red sandstone of Forfarshire. (Proc. roy. phys. soc. [Edinb.], 1881-1882, p. 177-188, pl. 2.)

Figures and describes *kampecaris forfarensis* and *archidesmus* [nov. gen.] *macnicoli* [n. spec.], apparently the oldest myriapods known. G: D. (3524)

Pierce, F. N. Three-winged insects. (Pract. nat., June 1883, v. 1, p. 65, 15 cm.)

Mentions several specimens of lepidoptera which lack one posterior wing. G: D. (3525)

Pike, J. W. Preservation of fossil insects and plants on Mazon Creek. ("Vinland [N. J.] weekly independent" . . .) (Science advocate [Atco, N. J.], Oct. 1881, v. 2, p. 57-59, 83 cm.)

General notes on Mazon Creek, Ill., as a source of fossil insects and plants. G: D. (3526)

Plowright, C: B. On mimicry in fungi. (Grevillea, Sept. 1881, v. 10, p. 1-14.)

Includes remarks on fungivorous insects and on the dissemination of fungi by insect aid. W: T. (3527)

Poisson, J. Sur deux nouvelles plantes-pièges. (Bull. soc. bot. de France, 12 Jan. 1877, v. 24, p. 26-31.)

Abst., by H. Müller, entitled "Ueber zwei neue fallenpflanzen." (Bot. jahresbericht. . . Just, 1877, v. 5, p. 750, 10 cm.)

Abst., by Asa Gray, entitled "The beheading of flies by *mentzelia ornata*." (Bot. gazette, Oct. 1879, v. 4, p. 213-214.)

Describes, as one of the vegetable traps, the barbed hairs and interspersed glandular hairs on the flower-stalk of *mentzelia*. Flies, attracted by the secretion of the first, insert their tongues between the barbed hairs, and are unable to remove them. In their efforts to escape they often twist their bodies from their heads.

W: T. (3528)

Potato bugs. (New remedies, Sept. 1881, v. 10, p. 284, 3 cm.)

Use of "potato bugs" [*? doryphora decemlineata*] in homoeopathic medicine. *G: D.* (3529)

Ribeaucourt, C. Manuel d'apiculture rationnelle d'après les méthodes modernes. 3e édition revue et augmentée. Paris, 1880. t.-p. cover, 126 p., 15 X 11, t II X 6.7. General work on apiculture. *G: D.* (3530)

Riley, C: Valentine. On the curious egg mass of *corydalus cornutus*, Linn., and on the eggs that have hitherto been referred to that species. (Proc. Amer. assoc. advanc. sci., for 1876, 1877, v. 25, p. 275-279, 1 fig.)

Reprint, by author, entitled "The hellgrammite. *Corydalus cornutus*, Linn. (9th ann. rept. state entom. Mo., 1877, p. 125-129, fig. 30-33.)

Structure and habits, description of egg-masses and eggs and of newly-hatched larvae of *corydalus cornutus*; eggs formerly attributed to this species are probably those of *belostoma grande*; figure of these eggs and of the imago of *b. grande*. *B: P. M.* (3531)

Riley, C: Valentine. The hellgrammite. (Sci. amer., 23 June 1877, v. 36, p. 392-393, 120 cm. 3 fig.)

Structure and habits of *corydalus cornutus*, description and figures of egg-masses, eggs, larvae, pupa and imago of this species; adaptations of sexual structure to varying conditions; figure and description of eggs of *belostoma grande*, formerly supposed to be those of *c. cornutus*. *B: P. M.* (3532)

Riley, C: Valentine. The hellgrammite. *Corydalus cornutus*, Linn. (9th ann. rept. state entom. Mo., 1877, p. 125-129, fig. 30-33.)

Reprint of author's "On the curious egg mass of *corydalus cornutus*" . . . (Proc. Amer. assoc. advanc. sci., for 1876, 1877, v. 25, p. 275-279), with addition of figures of imago, pupa and full-grown larva of *corydalus cornutus* and of imago and eggs of *belostoma grande*; structure and habits, description of egg-masses and eggs and of newly-hatched larvae of *corydalus cornutus*; eggs formerly attributed to this species are probably those of *belostoma grande*. *B: P. M.* (3533)

Riley, C: Valentine. The hellgrammite fly: *corydalus cornutus*, Linn. (5th ann. rept. state entom. Mo., 1873, p. 142-145, fig. 69-71.)

Description and figures of larva, pupa and imago of *corydalus cornutus*, and of eggs of *belostoma grande* mistaken for those of the *corydalus*; description of the external respiratory organs of the larva; habits and transformations; adaptation of the jaws of the male imago of this species and of *Lucanus elaphus* for embracing the female. *B: P. M.* (3534)

Riley, C: Valentine. On the larval characteristics of *corydalus* and *chauliodes* and on the development of *corydalus cornutus*. (Kansas City review of science and industry, Sep. 1878, v. 2, p. 354.)

Reprint. (Can. entom., May 1879, v. 11, p. 96-98.)

Reprint. (Proc. Amer. assoc. advanc. sci., for 1878, [14 July?] 1879, v. 27, p. 285-287.) (RILEY, C: V. Entomological papers. . . [From the Proceedings (etc.), St. Louis, Mo., August, 1878.] [Salem, Mass., Feb. 1879.] p. 19-21.)

Abstract of paper read by the author at meeting of American association for the advancement of science, Aug. 1878; characters and economic value of larva of *corydalus cornutus*, with brief indication of characters of imago; characters of larva of *chauliodes*; description of eggs of both genera; peculiar situation of egg-masses of the *corydalus* and physical character of their covering; describes particularly the respiratory apparatus and method of respiration of the *corydalus* larvae. [The reprints include a few verbal corrections.] *B: P. M.* (3535)

Riley, C: Valentine. On the natural history of certain bee-flies, *bombyliidae*. (Amer. entom., Dec. 1880, v. 3, n. s., v. 1, p. 279-283, fig. 147-151.)

Rev. by C: R. Osten Sacken, entitled "Habits of *bombylius*." (Entom. mo. mag., Feb. 1881, v. 17, p. 206-207.)

Advance reprint and abstract of p. 262-263 of 2d report of U. S. entomological commission, chap. 13 [Rec., 3291], with approximate copies of figs. 1, 1b-1g, 2a, 3, 5a and 7 of pl. 16; larval habits and figures of several stages of *triodites mus* and *systocchus orca*, with history of their discovery; description and figures of mouth-parts of the larvae; review of previous knowledge of habits of larvae of *bombyliidae*, with references to the literature; distinctive characters of cells and cocoons of *pelepoceus* and *trypoxylon*; habits of *trypoxylon albitarse*; retardation of development in parasitic insects. *B: P. M.* (3536)

Roth, Albrecht Wilhelm. Von der reizbarkeit der blätter des sogenannten sonnenthaues, *drosera rotundifolia*, *longifolia*. (Beyträge zur botanik, Bremen, 1782, theil 1, p. 60-76.)

Describes the capture of insects by the leaves of *dionaea muscipula*, as well as by *drosera rotundifolia* and *d. longifolia*, recording several experiments on the latter genus. *W: T.* (3537)

Rüst, — Eine einfache käferfalle. (Entom. nachrichten, 15 April 1880, jahrg. 6, p. 84-85.)

Mode of constructing a trap, baited with dead animals, for collecting carnivorous and carrion-eating coleoptera. *G: D.* (3538)

Sang, J. *Platyptilia dichrodactyla* and [*p.*] *bertrami*. (Entom. mo. mag., Nov. 1881, v. 18, p. 143-144.)

Discusses the synonymy of *Platyptilia dichrodactyla* and *p. bertrami*, and gives notes on the early stages of *p. dichrodactyla*. G. D. (3539)

Saunders, W. Entomology for beginners. The promethea emperor-moth. *Callosamia promethea*, Drury. (Can. entom., Dec. 1883 [Feb. 1884], p. 231-233, fig. 10-13.)

Figures male and female imago, and larva and cocoon of *Callosamia promethea* and gives notes upon them. G. D. (3540)

Scudder, S. Hubbard. The carboniferous hexapod insects of Great Britain. (Mem. Bost. soc. nat. hist., 1883, v. 3, p. 213-224, pl. 17.)

Separate. Boston, June [Oct.] 1883. t.-p. cover, p. 213-224, pl. 17, 30X23, t 22 X16.

Describes *brodia priscolincta* and *archacoptilus ingens* (2 new genera and species) and *lithostialis bronngiarti*, fossil neuroptera; list of carboniferous hexapods (1 neuroptera, 2 orthoptera and 1 coleopteron) from Great Britain. G. D. (3541)

Scudder, S. Hubbard. The fossil white ants of Colorado. (Proc. Amer. acad. arts and sciences, 1883, v. 19, p. 133-145.)

General notes on fossil *termitina* and their distribution; describes 1 new genus and 6 new species, viz.: *parotermes* (n. g.), *p. insignis*, *p. hagenii*, *p. fodinae*, *hodotermes? coloradensis*, *cutermes fossarium*, and *e. meadii*, all from tertiary beds of Florissant, Colorado. G. D. (3542)

Siewers, C. Godfrey. Some notes on coleoptera for beginners. (Can. entom., July 1880, v. 12, p. 138-139.)

Modes of collecting and preparing coleoptera.

G. D. (3543)

Stanley, H. M. Through the dark continent, or the sources of the Nile, around the great lakes of equatorial Africa and down the Livingstone river to the Atlantic ocean. 2 v. N. Y., Harper & Brothers, 1878. v. 1, 14+522 p.; v. 2, 10+566 p.; 23X15, t 17X9.7. "With 10 maps and 150 woodcuts" and 2 por. of Stanley. Cloth, \$10; sheep, \$12; half-morocco or half-calf, \$15. Sold by subscription only.

Entomological notes, brief and of a popular nature, are found in v. 1, as follows: p. 72, piccautions against white ants [*termes*], p. 157 and 462, mosquitoes [*culex*]; p. 220-221, general remarks on insects of Musira island, in Victoria Nyanza lake. Vol. 2 contains the following: p. 59-60, 202, 297, 310, 317, and 361, mosquitoes [*culex*]; p. 60, name of lake Nyanza Muta Nzige means "Lake of dead locusts"; p. 106, 235, 310 and 361, ants and their attacks; p. 121, honey, white-ants and grasshoppers sold in the market at Nyangwé; p. 138, myriapoda, beetles and ants; general notes on the insects at the junction of the Lowwa with the upper Livingstone river; p. 202, and 310, tssetsé and other flies; p. 361, the "jirra" [*sarcophylla penetrans*]; p. 360, ulcerous diseases conveyed by flies; p. 387 bees and their wax at Mowa on the lower Livingstone river. G. D. (3544)

Smyth, J. Boswell. On the fertilization of grasses. (Journ. roy. hort. soc., 17 Apr. 1872, [1873], n. s., v. 4, p. 7-9.)

Remarks on the maturation of the flowers of several genera of *gramineae*, and on the insects which visit these flowers. *Dactylis glomerata*, *psamma arenaria* and *glycyria fluitans* are very attractive to *lepidoptera*, as is evinced by a long list of species taken on their flowers. W. T. (3545)

Walsh, B. Dann. Fire-blight. Two new foci of the apple and pear. (Prairie farmer. 6 Sep. 1862, [v. 26], n. s., v. 10, p. 147-149. 189 cm., 7 fig.)

Definition of fire-blight; this disease not caused by attacks of *scalytus pyri*, but suspected to be caused by attacks of *chloroneura malefica* and *ch. maligna*; figures of these insects and of the neurulation of the upper and lower wings of their allies; distinctive characters, habits and ravages of these insects; synoptical table to distinguish the genera *typhlocyba*, *emposca* n. g., *emposca*, *chloroneura* n. g. and *erythroneura*; description of *typhlocyba urea*, *t. pallidula*, *t. binotata*, *emposca viridescens*, *e. consobrina*, *e. obtusa*, *emposca albicans*, *chloroneura abnormis*, *ch. malefica*, *ch. maligna*, *erythroneura australis*, *e. ciczac* and *e. octonotata*, all new species; *hemerodromia superstitiosa* found killing an *erythroneura*. B. P. M. (3546)

[Walsh, B: Dann and Riley, C: Valentine.] The apple-root plant-louse. *Eriosoma pemphigis* pyri. Fitch. (Amer. entom., Jan. 1869, v. 1, p. 81-84, fig. 70-72.)

Habits and ravages, description and figures, enemies and parasites of and means against *schizoneura lanigera*; evidences of the presence of this insect in orchards; doubts whether *eriosoma [schizoneura] pyri* is the same as *e. [s.] lanigera*; generic differences between *pemphigus* and *eriosoma*; confinement of *aphididae* to the food-plants peculiar to each; description and figure of larva, puparium and imago of *pipiza radicum* n. sp. B. P. M. (3547)

[Walsh, B: Dann and Riley, C: Valentine.] The asparagus beetle: *crioceris asparagi*, Linn. (Amer. entom., Feb. 1869, v. 1, p. 114-115, 77 cm., fig. 94; p. 144, 1 cm.)

Introduction into United States, natural history, ravages and parasites of and means against *crioceris asparagi*; figure of eggs, larvae and imago of this insect; importance of asparagus culture. B. P. M. (3548)

[Walsh, B: Dann and Riley, C: Valentine.] The boll-worm. *Heliothis armigera*, Hubner. (Amer. entom., July 1869, v. 1, p. 212-214, 92 cm., fig. 150-151.)

Seasons, ravages and food-plants of and means against *heliothis armigera*; description and figures of all stages of this insect. B. P. M. (3549)

[Walsh, B: Dann and Riley, C: Valentine.] The hellgrammite fly. *Corydalis cornutus*, Linn. (Amer. entom., Dec. 1868, v. 1, p. 61-62, 71 cm., fig. 56-57.)

Description of habits and figures of larva, pupa and imago of *corydalis cornutus*; description and figure of eggs of *belostoma grande*, mistaken for those of this insect. B. P. M. (3550)

ENTOMOLOGICAL ITEMS.

ON account of inability to arrange satisfactorily the material on hand for publication this double numero contains four pages less than is usual. This deficiency will be made up in the succeeding numero.

ABOUT THE middle of June thick clouds of dragon-flies, *Libellula quadrimaculata* and *L. rufa*, were seen flying east over Moscow, Russia. They were at first mistaken for locusts.

WE INCLUDE in the Bibliographical record several references to *corydalis cornutus*, to accompany the article by Mr. Krauss, on that insect. For earlier references see the Bibliographical record, no. 468, 865 q, 971 i, 1037 b, 1115, 1348, 1401.

IN THE *Bulletin d'insectologie agricole* for May 1884 appears the first portion of a notice of Dr. C. V. Riley and his work as an economic entomologist, written in anticipation of his third visit to France this year. The notice is entitled "Riley et l'entomologie agraire aux États-Unis."

DR. H. C. McCook has recently described the cocoon of a species of spider which he calls, provisionally, *Micaria limnicunae*. The peculiarity of the cocoon consists in its being covered with mud, and being suspended by a thread beneath fallen boards. The cocoons were found in Illinois.

ENTOMOLOGY HAS just suffered a loss in the death, at Copenhagen, early in June, of Prof. J. C. Schiödte, a well known entomological author. Among other entomologists, notices of whose deaths we have seen lately, are Mr. Edwin Birchall, lepidopterist, who died in Douglass, Isle of Man, on 2 May 1884, and Mr. William Prest, lepidopterist, born 7 May 1824, in York, England, and died 7 April 1884 in the same town.

MR. W. C. KRAUSS, whose description of the nervous system of the head of the larva of *Corydalis cornutus* we publish at this time, attained *special final honors* in the subject of insect anatomy at his graduation from the

Cornell university on 19 June of this year, when he was made a Bachelor of science in the departments of science and letters, and received a licentiate certificate in the medical preparatory course. We hail with pleasure the advent to the ranks of the entomologists in this country of every member who is not content with pinning and exchanging specimens, describing new species and discussing their names, but seeks to advance the knowledge of their essential structure, relations to the rest of the world, and manner of life.

B. P. M.

DR. FRITZ MÜLLER, under title of "Butterflies as botanists" notes in *Nature* for 10 July 1884 that "The caterpillars of *Mechanitis*, *Dircenna*, *Ceratinia* and *Ithomia* feed on different species of *solanaceae* (*Solanum*, *Cyphomandra*, *Bassovia*, *Cestrum*), those of the allied genus *Thyridia* on *Brunfelsia*. Now this latter genus of plants had been placed unanimously among the *scrophularinaceae*, till quite recently it was transferred by Bentham and Hooker to the *solanaceae*. Thus it appears that butterflies had recognized the true affinity of *Brunfelsia* long before botanists did so." Dr. Müller likewise shows that the close affinity of *Dalechampia* and *Tragia*, two genera of *cuphorbiaceae*, "had been duly appreciated by butterflies," altho only lately recognized by botanists.

PROF. XAVER LANDERER, of Athens, Greece, writes to the *Deutsch-amerikanische apotheker-zeitung* (15 May 1882, jahrg. 3, no. 5, p. 134):—

"As far as I can determine the manna of the Israelites, with which they are said to have nourished themselves for forty years in the wilderness, comes from *Myrica mannifera*. The manna is known to be secreted from openings which are made in the leaves of the tree by a gall-insect, *Cynips manniparax*. The manna trickles slowly down and hardens. The monks collect this manna at the present time and eat it as hallowed food. Sometimes strangers are honored with a small quantity as a present.

"This manna should not be confused with the *Mana-mana*, in Arabic *Abel Atse*; these are earth-nuts (*Cyperus esculentus*), which are nearly indispensable as food for the poor Arab people."

GUSTAV WEYMER describes and figures in the *Jahresbericht des naturwissenschaftlichen Vereins in Elberfeld*, Heft 6, two hermaphroditic lepidoptera. One of them, an *Apatura iris*, while really a female has various coloration characteristics of a male. The other specimen, a *Nemcophila russula*, has the right half female, the left male; this specimen is the more striking because the male and female of this species vary strikingly in coloration, size, and form. The same author (*l. c.*) describes and figures varieties of *Papilio machaon*, *Apatura iris*, *Limnitis sibylla*, *Vanessa polychloros*, *Melitaea athalia*, *Argynnis selene*, *Arctia caja*, *Acronycta menyanthidis*, *Hybernia leucophaearia*, and *Biston stratarius*. In the same heft Carl Cornelius gives a list of 2304 species of coleoptera from Elberfeld and its vicinity, adding notes concerning habits and food of numerous species and general remarks on the coleopterous fauna of the region.

SOCIETY MEETINGS.

THE REGULAR meetings of the Cambridge Entomological Club will be held at 7.45 p. m., on the days following:—

10 Oct. 1884.	13 Mar. 1885.
7 Nov. "	10 Apr. "
12 Dec. "	8 May "
9 Jan. 1885.	12 June "
13 Feb. "	

G. DIMMOCK, *Secretary*.

THE NEW YORK Entomological Club meets twice monthly, except in June, July and August, but no special date is fixed for each meeting.

HENRY EDWARDS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Boston Society of

Natural History will be held at N. W. corner of Berkeley and Boylston Sts., Boston, Mass. at 7.45 p. m., on the days following:—

22 Oct. 1884.	25 Feb. 1885.
26 Nov. "	25 Mar. "
24 Dec. "	22 Apr. "
28 Jan. 1885.	27 May "

EDWARD BURGESS, *Secretary*.

THE REGULAR meetings of the Entomological Section of the Academy of Natural Sciences, of Philadelphia, Pa., will be held at S. W. corner of 19th and Race Sts., on the days following:—

10 Oct. 1884.	13 Mar. 1885.
7 Nov. "	10 Apr. "
12 Dec. "	8 May "
9 Jan. 1885.	12 June "
13 Feb. "	

JAMES H. RIDINGS, *Recorder*.

THE SEMI-ANNUAL meetings of the American Entomological Society will be held at S. W. corner of 19th and Race Sts., Philadelphia, Pa., on the days following:—

8 Dec. 1884.	8 June 1885.
--------------	--------------

JAMES H. RIDINGS, *Recording Secretary*.

THE REGULAR monthly meetings of the Montreal Branch of the Entomological Society of Ontario, will be held at Montreal, Que., Canada, on the days following:—

7 Oct. 1884.	3 Feb. 1885.
4 Nov. "	3 Mar. "
2 Dec. "	7 Apr. "
6 Jan. 1885.	5 May "

G. J. BOWLES, *Secretary*.

THE MONTHLY meetings of the Brooklyn Entomological Society will be held in the rooms of Wright's Business College, Broadway, corner of Fourth Street, Brooklyn, E. D., the last Saturday of each month except July and August.

F. G. SCHAUPP, *Secretary*.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. Nos. 124-125.

AUGUST-SEPTEMBER 1884.

CONTENTS:

ADVERTISEMENTS	194
NOTES ON THE RELATIONS OF TWO CECIDOMYIANS TO FUNGI— <i>William Trelease</i>	195-200
WANT OF SYMMETRY AMONG INSECTS— <i>Oskar Paul Krancher</i>	200-203
FOOD-PLANTS OF BEETLES BRED IN MARYLAND— <i>Otto Lugger</i>	203-204
EFFECT OF CYANIDE UPON COLOUR	204
FRANCIS GREGORY SANBORN	205
NOTICE OF AN OMISSION FROM LECONTE'S EDITION OF THOMAS SAY'S WRIT- INGS— <i>L. O. Howard</i>	206
A BUTTERFLY ATTRACTED BY LAMPLIGHT— <i>Mary Esther Murtfeldt</i>	206
PROCEEDINGS OF SOCIETIES— <i>Linnean Society of London</i>	206
BIBLIOGRAPHICAL RECORD, no. 3551-3590	207-210
ENTOMOLOGICAL ITEMS—Acknowledgment of Contributions	211-212

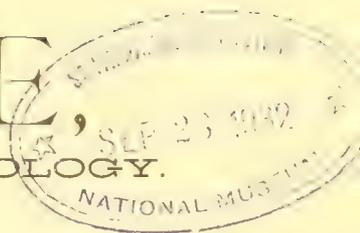
PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]



Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, *not for cash*, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

BULLETTINO DEL NATURALISTA COLLECTORE.

PUBLISHED MONTHLY AT SIENA, ITALY.

At least eight large octavo pages per numero, principally in Latin, Italian, and French.

Subscription:

Countries in the postal union 2.50 Francs.
Countries outside the postal union 5.00 "

CALOSOMAS AND CICINDELIDAE WANTED.

The undersigned desires to obtain species of *Calosoma* (except *C. calidum* and *C. inquisitor*) from all parts of the world; also as many species of *Cicindelidae* as possible, especially foreign ones. Native coleoptera sent in exchange.

C. H. T. TOWNSEND,
Constantine, St. Jo. co., Mich.

AMERICAN AGRICULTURIST

100 Columns and 100 Engravings in each Issue.

43rd YEAR. \$1.50 A Year.

Send three 2c. stamps for Sample Copy (English or German) of the **Oldest and Best Agricultural Journal in the World.**

ORANGE JUDD CO., DAVID W. JUDD, Pres.

751 Broadway, New York.

PATENTS

MUNN & CO., of the SCIENTIFIC AMERICAN, continue to act as Solicitors for Patents, Caveats, Trade Marks, Copyrights, for the United States, Canada, England, France, Germany, etc. Hand Book about Patents sent free. Thirty-seven years' experience. Patents obtained through MUNN & CO. are noticed in the SCIENTIFIC AMERICAN, the largest, best, and most widely circulated scientific paper. \$3.00 a year. Weekly. Splendid engravings and interesting information. Specimen copy of the Scientific American sent free. Address MUNN & CO., SCIENTIFIC AMERICAN Office, 261 Broadway, New York.

PSYCHE.

NOTES ON THE RELATIONS OF TWO CECIDOMYIANS TO FUNGI.

BY WILLIAM TRELEASE. MADISON, WISC.

For some years, while collecting the commoner *uredineae* or rust fungi, my attention has been attracted by certain small orange-red insects, that are very frequent in and about some of the sori. They are most often noticed in the aecidia or cluster-cups and in those sori which contain uredo-spores. At times they are so abundant that it is almost impossible to collect a specimen of the commoner uredo or aecidial forms without finding numbers of them in nearly every sorus.

A first glance at them suggests that the insects may be some species of *Thrips*, but the resemblance vanishes on closer examination. Their motions, as a general thing, are less rapid than those of *Thrips*, and a hand-lens at once shows them to be some sort of dipterous larvae. With a higher power the breast-bone, characteristic of cecidomyid larvae, is distinctly seen. Various attempts have been made to bring them to maturity, but so far without success, so that it is as yet impossible to say anything definite about the species to which they belong.

The constant presence of these insects on the fruit of the fungi led me to watch their movements from time to time, and the reason for their presence was soon seen in the altered appearance of the sori where they were most numerous. Their relish for the spores is entirely disproportionate to the size of their minute bodies. The fact that they feed on the spores affords a simple explanation of their presence on the aecidial and uredo fruits, rather than in the teleutosporic sori of the rusts, since the spores of the latter are more frequently thick-walled and hard.

The fungi on which I have most often observed the larvae in question are *Aecidium caladii*, the cluster cup of *Arisaema* and other aroids, *Coleosporium sonchi-arvensis*, the common rust of *Aster* and *Solidago*, and *Caeoma nitens*, the destructive red-rust everywhere abundant in spring on leaves of the blackberry and raspberry (*Rubus*).

Mr. C. V. Riley informs me that he has also found the same larvae on a fungus (*Exobasidium vaccini?*) growing on *Azalea*, and that they have been

seen absolutely swarming on some flesh-colored fungus covering a squash, *Cucurbita*. The same, or very similar insects occur also in Europe, for M. Patouillard, speaking of *Cacomra euonymi* and *Accidium convallariæ* in the vicinity of Paris, says that their spores are frequently devoured by a small larva of an orange color.¹

These larvae differ in their fungivorous habits from the greater number of cecidomyiids, which feed on the juices of phaenogams, causing atrophy, as in the case of wheat attacked by *Cecidomyia destructor*, the hessian fly, or the development of galls such as most of the *cecidomyiidae* produce. Some species, notably *Cecidomyia tritici*, the wheat fly, feed upon pollen, at least in the early part of their lives, in this respect approaching the species which eat spores. Aside from these, there are a few anomalous feeders in the genus. Westwood² states, on the authority of Vallot, whose work I have been unable to consult, that the larvae of one species are found on the under side of leaves of *Chelidonium*, sucking the acari found there; and *Cecidomyia bicolor* Meig. is said by Macquart to frequent the underside of the leaves of *Leonurus*, possibly for a similar purpose.

While the fungus-eating species are not sufficiently restricted in their choice of food to be classed as entirely injurious or entirely beneficial, they would

naturally fall among the useful species. Even the golden-rods and asters are of some importance to bee-keepers, and the onslaughts of the insects on the spores of the raspberry rust and other parasites of cultivated plants must tend to check the spread of these fungi, so that in a measure they protect the flowering plants on which they live, as does the species referred to by Vallot.

Entomologists are familiar with certain black spots, several millimetres in diameter, in the leaves of golden rods and asters. *Solidago lanceolata* and *S. tenuifolia* are more frequently marked in this manner than other species. These objects are found in the cabinets of economic entomologists as the galls of a gnat, *Cecidomyia carbonifera* O. S. They also occur in the herbaria of mycologists as fungi, under the names *Rhytisma solidaginis* and *R. asteris* given them a half century ago by Schweinitz.

On narrow-leaved species of *Solidago*, e. g., *S. lanceolata*, the spots, visible on both surfaces of the leaf, are sometimes almost circular, varying in diameter from 1 to 4 mm.; but more commonly they are elongated parallel to the axis of the leaf, so as to be elliptical or oblong. They are usually symmetrical, unless the centre is situated at one side of the midrib of the narrow leaf, in which case the corresponding side is necessarily truncated on reaching the margin. The leaf is always slightly swollen in the discolored spot, but

¹ Bull. soc. bot. France, 28 May 1880, v. 27, p. 162.

² Introd. to mod. class. insects, v. 2, p. 510.

the enlargement occurs so uniformly in all parts that neither the midrib nor lateral nerves are obliterated. Now and then spots of the same nature are seen on the stem, where they are more irregular than on the leaf, and commonly occupy somewhat swollen portions of the internodes. The surface of the spot is of a dead coal-black, occasionally slightly glossy on the nerves. Sometimes the black passes into a deep purple at the edge of the spot, due to the presence of a soluble pigment in the diseased epidermal cells, this color changing gradually into the green of the surrounding leaf. In other cases it is bordered by a narrow white ring, forming a sharp line of demarcation between the black on the one hand and the green on the other, or more rarely separating the black from a purple zone, which gradually passes into the green.

On broader leaved species, like *Solidago ulmifolia* and *S. caesia*, the spots are more frequently round or slightly irregular, extending without interruption over the smaller veins or even the midrib. Though often glistening, they usually lack the coal-black appearance noticeable on *S. lanceolata*, and the reason for this is in some instances detected in a very delicate, whitish membrane, clearly continuous with the white or yellow border, which covers and modifies to a greater or less degree the black of the underlying parts. While some of the spots are no thicker than the unaffected portions of the leaf, others are strongly convex on one or both sides.

It has been said that Schweinitz called these fungi, and two species were made

of them, characterized by their external features as follows:—

2034. *Rhytisma solidaginis*, L. v. S., vulgatissimum in foliis vigentibus *Solidaginis lanceolatae* nec alibi. . . *R. innatum*, aeternum, absque ullo velo aut nitore, orbiculatum aut ovatum, margine luteo in folio; in pagina superiori convexum, in inferiori concavum; diametro 1-6 linearum. Saepe plura confluent—sed apertum non vidi.

2035. *R. bifrons*, L. v. S., rarum in folio *Solidaginis sempervirentis*. . . *R. innatum*, amphigenum, orbiculatum, gregarium aut subconfluens, convexum in ambabus paginis et satis crassum, margine in folio exalbescente. Sursum indutum cortice aut velo crassiore fusco-grisea exteriori, demum frustulis soluto, cortice interiori atra, intus carbonaceum. Diametro trilineari. Interdum perforatum invenitur, an casu?—ceterum inapertum.—*Schweinitz*, Synopsis fung. Amer. bor. (Trans. Amer. philos. soc., 1831, n. s., v. 4, p. 241.)

The spots on *Aster* leaves resemble those on the broad leaved species of *Solidago* in their general appearance, and vary even on the same plant from plane to strongly plano- or bi-convex. They are either entirely marginless or with a white or yellow border from 0.2-2 mm. in width. Occasionally the border is more or less tinged with red; this is especially the case where it is very broad. As with some specimens of the preceding species, the degree of convexity increases with age, the central portion of some spots being nearly hemispherical. Schweinitz at first referred this to the fungus genus *Xyloma*, but afterward transferred it to *Rhytisma*, and characterized it as follows:—

271. *Xyloma asteris* Sz. X. minus oblongum tenuius subellegatum rugosum nigrum opacum, ambitu suo folium decolorans. In foliis vigentibus *Asteris* tradescanti et aliorum rarissime. Initio et ipsum velo tenuissimo cinereo subtectum, rugosum, absque splendore.—*Schweinitz*, Syn. fung. Carol. Super., (1822), p. 83.

2033. *Rhytisma asteris* L. v. S., Syn. Car. 271, passim in foliis variorum *Asterum*. Species quam distincta. *R. innatum* exacte orbiculatum, margine latiusculo exalbescente, ambitu lobato, amphigenum, atrum sed exspenitoris, tenuissimum, punctulatum: diametro bilineari, primum velo tenuissimo cinereo tectum demum evanes-

cente. Dehiscens non mihi obvium. In planta ubi occurrit plerumque frequenter infestat folia. Schweinitz, Syn. fung. Amer. bor. (*op. cit.*, p. 211.)

It has been seen that the single or double convexity of these galls is not available as a distinctive character, although Schweinitz makes use of it. One of the most obvious superficial characters is the presence or absence of a white, gray or yellow membrane over the carbonized portion of the leaf. This, the *velum* of Schweinitz, is however by no means constantly absent or present in the same species, if we except that on *Solidago lanceolata*, where I have never seen it. On the same plant of *S. ulmifolia* some spots are black, while others are invested on both surfaces by the yellowish-white indusium; and one of the Osten Sacken types of the gall of *Cecidomyia carbonifera*, on a broad leaved *Solidago*, for an examination of which I am indebted to the courtesy of Dr. H. A. Hagen, is black above, with a narrow white border, while below it is completely covered by a white indusium, broken here and there as if by accident. With age this membrane frequently breaks away, but in the specimens to which the preceding statements refer the leaves were intact, and its absence was clearly not due to removal.

In their microscopic characters, all of these forms show a general agreement. The parenchyma of the leaf is invaded by a colorless mycelium of thick-walled hyphae, which lives between the cells and to a certain extent deforms them. It excites little if any hypertrophy, but by crowding the cells apart in its own

growth causes the slight convexity of the part of the leaf in which it occurs. Near the surface the mycelial threads become brown, apparently as the result of some chemical action due to the fungus, which also affects the surrounding cells of the leaf, some of which are so completely carbonized that their walls are coal-black. In *R. solidaginis* and the other exindusiate forms, the epidermis is especially influenced by this change, which, however sometimes does not extend so far laterally as in the underlying tissue,—a fact which at once explains the pale border sometimes noticed; the dead but colorless epidermal cells at the margin of the spot, filled with air, appearing white, and contrasting strongly with the carbonized cells on the one hand and with the living ones on the other. The indusium of the other forms is of a similar nature to this border, consisting merely of the dead epidermis, filled with air; but why the epidermis should be blackened in some cases and remain colorless in others it is hard to say.

From what precedes it will be seen that only two of the three so-called species of *Rhytisma* are certainly distinguishable in the specimens that I have examined, viz: *R. solidaginis*, on *Solidago lanceolata* and *S. tenuifolia*, and *R. asteris* (including *R. bifrons*) on *Aster* and the broader leaved species of *Solidago*.³ Curtis, whose herbarium, containing many Schweinitzian specimens, I have examined, through

³ The latter are referred by Berkeley to *R. solidaginis* (Grevillea, v. 4, p. 8).

the kindness of Professor W. G. Farlow, was evidently of the same opinion, for his specimens bear only these two names, though some of the last named species occur on *Solidago*, and one, on *Aster gracilis*, agrees very well with the description of *R. bifrons*. Schweinitz, also, says of the three so-called species "Tres species antecedentes memorabiles inter se affines sunt."⁴ The fruit of all is unknown. Like that of other species of *Rhytisma*, it does not develop on the living leaf, and I have been unable to look for it on the fallen leaves late in autumn or on the approach of the following spring. Possibly, when found, it may offer a means of distinguishing the so-called species more satisfactorily than can be done at present. Both species are widely distributed over the eastern third of the continent, from the Gulf states to New Brunswick.

The discussion of these objects from a botanical standpoint may appear to some readers unnecessary in an entomological journal, but no account of them would be complete without it. Turning, now, to the entomological side of their history, it remains to be said that several entomologists have bred from them one of the gall gnats — *Cecidomyia carbonifera* Osten Sacken. I, myself, have obtained the adult insects from what I have called *R. asteris*, and they are to be seen in some of the specimens in the Curtis herbarium, which have been broken. The Osten Sacken types, in the Museum of comparative zoology, would also undoubtedly be referred

to this species by a mycologist. With the form on *Solidago lanceolata* I have been less successful, having never obtained the imago from it; but in the summer of 1881, while at Woods Holl, Mass., where this form was exceedingly common, I examined several hundred specimens on this plant, by breaking them open, and in every instance a living larva, evidently a cecidomyid, and apparently *Cecidomyia carbonifera*, was found in the substance of the gall, where it lay in a minute cavity. So far as I know, therefore, both insect and fungus are always present in these galls, to whichever species they are referred. While the slight convexity of the young gall is explained by the growth of the fungus, the hemispherical enlargement in many cases, especially on asters, seems to be caused by the insect, and these very thick spots, so far as I have examined them, always contain fully grown insects.

The first published intimation that these spots on *Aster* and *Solidago* are not simply insect galls or simply fungi, that I have noticed, is by Mr. W. R. Gerard,⁵ who, doubting their fungoid nature, sent specimens to Mr. C. V. Riley, and was told that (at least so far as the forms on *Solidago* are concerned) they are the galls of *C. carbonifera*. Professor C. H. Peck also makes a similar statement in one of his later reports on New York fungi.⁶ Interested in the subject by these notes, I have examined

⁵ Bulletin Torrey bot. club, Oct. 1876, v. 6, p. 114 [PSYCHE, Rec., no. 2404].

⁶ 20 Rept. N. Y. Cab. nat. hist., p. 81.

⁴ Syn. fung. Am. bor., l. c., p. 241.

a large number of specimens from different parts of the country, and without exception have demonstrated their composite nature.

This compound character of the galls implies a close interdependence between the fungus and insect. That *Rhytisma solidaginis* or *R. asteris* cannot occur without the presence of *Cecidomyia carbonifera*, or *vice versa*, cannot be said; yet I have never seen one without the other. Only a study of the development of the galls can show whether the insect paves the way for the fungus or lives only in leaves previously attacked by the latter; but the great powers of multiplication and dissemination possessed by most fungi incline me to the belief that the former is the case, the mycelium being unable to penetrate the uninjured plant, as Hartig has shown to

be the case with parasitic species of *Nectria*, etc. From the carbonization of all the species of *Rhytisma*, it is probable that the color of the galls in the present instance is due to the fungus.

The form of fruit of the *Rhytisma*, and the early development of the galls, could be easily made out by any collecting entomologist or botanist living in the eastern states, where they occur; and as I no longer have access to good material these notes are published in their present incomplete form to draw attention to a very interesting subject for further study.⁷

⁷ Sections of an undetermined cecidomyid gall on *Impatiens fulva*, from Medford, Mass., prepared in my laboratory by Miss L. N. Martin, show a mycelium somewhat similar to that noticed in *Aster* and *Solidago* leaves, and there is also a certain amount of carbonization. It will be interesting to observe whether the mycelium is always present in this gall which is not uncommon.

WANT OF SYMMETRY AMONG INSECTS.

BY OSKAR PAUL KRANCHER, LEIPZIG, GERMANY.

The extraordinary symmetry which occurs among insects is usually brought prominently forward in most of the books which treat of entomology. Nothing is pictured more symmetrically than, for instance, the structures of bees and ants, or the color of butterflies, which latter is prominently reputed to have a perfectly symmetrical bilateral equality. Although there is much truth at the bottom of all this, although nature in many cases works with great symmetry, yet it must not be overlooked that even this symmetry is often converted into its

strict opposite. Surely no observing lepidopterologist has failed to notice that the coloration of the wings of his favorites is to be recognized as strictly symmetrical only in the smallest number of cases, that, indeed, that of one side, which certainly resembles that of the other in its superficial aspect, still shows many differences in its details, and there is little foundation for asserting that they are symmetrical. I might cite innumerable examples of this, but the reader can better see them for himself. This is most plainly shown in the

species of *Vanessa*, *Argynnis*, *Melitaea*, *Arctia*, etc. I have found this also very striking in *Papilio machaon*, a specimen of which, now in my collection, has a distinct black spot in the first yellow area at the tip of the left front wing, while, as usual, there is no such spot on the right wing.

In how diverse a manner nature works, moreover, in the different animals of one and the same species, in animals which are sought for as so-called varieties, a striking proof is given by collections which contain often ten or twelve or even more specimens of one and the same animal. How long one has to hunt among duplicates in order to find two butterflies which are perfectly alike! This field of inquiry has interested me to an unusual degree for a long time and I have had the good fortune to obtain many interesting results in it. Here again *Papilio machaon*, *Arctia caja*, different noctuids and geometrids (for instance, *Abraxas grossulariata*), have excited my special delight by their peculiarly diverse clothing.

But the so-called gynandromorphs, especially those of the lepidoptera, are yet far more remarkable. As is well known, these are animals which show the coloration and structure of one sex on the right wings, and those of the other sex on the left wings. Of course these can only be observed in such animals as show some kind of difference between the coloration and shape of the wings, or the form and structure of the antennae, in the two sexes. A few years ago a gynandromorph of *Endromis versicolora* was found here in the

neighboring village of Leina. This, after various wanderings, is now deposited in the Natural history museum at Altenburg. Gynandromorphs of *Ocnecia dispar*, *Smerinthus populi*, etc., are not very rare. I had an opportunity this spring of adding a partial gynandromorph to my own collection. I obtained from a pupa of *Aglia tau*, the "Nagelfleck," a specimen which had one antenna male, the other female, that is to say, one filiform, the other pectinate. In its other characters, especially in the coloration of the wings, the specimen appears throughout to be a female.

Finally some attention may be bestowed upon crippling among insects. My few observations again concern the butterflies. Mutilations often occur in these on one side only, and on account of this unfortunate circumstance the specimen which had been so carefully nursed as larva and pupa is entirely useless for the collection, and is ill-humoredly thrown aside by the raiser unless it is kept in spirits to furnish occasion for subsequent observations. The collector is still more displeased with those specimens which have the wings of both sides crippled. Even if such specimens are not well suited for breeding purposes, and so deny various uses to the one who has raised them, yet for other reasons I should not want to condemn such a specimen without further consideration. In spite of all apparent irregularity, nature often works quite regularly, as is well shown by the annexed figure. This specimen was going to be thrown away together with several other cripples, when Mr. Reich-

ert, of Leipzig, who had raised it, recognized its wonderfully regular crippling, and of course spread the specimen and so made clearly manifest that perfectly symmetrical incision in the fore and hind wings. The undulate nerves

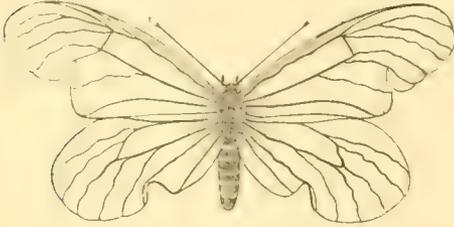


Fig. 12. Deformed *Aporia crataegi*.¹

of the wings of this specimen appear remarkable at the same time, as the figure represents. *Aporia crataegi*, which is the butterfly mentioned, is a well known species, so that I need not say much about it. The caterpillar, which is found moderately common in this vicinity, lives especially on *Crataegus oxyacantha*, *Prunus spinosa* and *P. domestica*, species of *Pyrus*, etc. At the end of five or six weeks from the time of hatching of the eggs, the caterpillar pupates by fastening its anal extremity and then maintaining itself in a horizontal position by means of a thin thread around the thorax. After fourteen days more the butterfly emerges.

It seemed that it would be interesting to ascertain the cause of these regular notchings, and so we found in the pupa-case from which this butterfly came, that the thoracic girdle had been drawn exceedingly tense, and so firmly, besides, that a sort of depression was to be found

in the pupa. From this observation it is easy to conclude that this was the cause of the mutilation that has been mentioned, and since the continuous pressure was here a perfectly uniform one, the irregular development could not but be perfect and uniform. Whether such a mutilation can also be produced artificially with this regularity might be learned from our investigations which are to be instituted for the purpose.

A single glance at a bee-hive will convince one that there are many irregularities also in the colonies of bees. The most regular structures made by bees are the cells, which, as is well known, are so arranged with mathematical exactitude as to accomplish the most with the least material. Worker-cells and drone-cells, both of which serve at the same time as honey-cells, are made in this way, but besides these we find three other different kinds of cells in the commonwealth of bees, of which we may give the name of holding-cells to those which serve to fasten the comb all around to the wall of the hives or to the frames. They are usually only two-thirds formed, the sixth or both the fifth and sixth sides of the hexagon of the cell being wanting. The so-called transition-cells, which constitute the intermediary between the large drone-cells and the smaller worker-cells in one and the same comb show still greater irregularities. They are in shape from four- to nine-angled, for the most part entirely out of place and warped. Undoubtedly the last two named kinds of cells, in spite of their irregularity, demand our fullest admira-

¹ We are indebted to Mr. Otto Heidemann, xylographer in the U. S. Department of agriculture, for his generosity in transferring this illustration to wood, and engraving it. [Eds.]

tion, since they give proof that the bees know how to help themselves under all circumstances, that they understand how to overcome any obstacle. The most irregular cell in the bee-hive is the queen-bee cell, in which, as is well known, the queen has to pass her youthful stages. This queen-bee cell is shaped like an acorn, and does not stand horizontally like all the other bee cells, but

hangs vertically, with the opening downward.

These few quite imperfect remarks may serve to call attention to some of the so numerous irregularities among insects. I hope they may incite others to further new and more interesting observations.

Leipzig, 15 June 1884.

FOOD-PLANTS OF BEETLES BRED IN MARYLAND.

BY OTTO LUGGER, BALTIMORE, MD.

[The numeros (inserted by the editor) are, for the coleoptera, those of G. R. Crotch's "Check list of the coleoptera of America, north of Mexico" (PSYCHE, Rec., no. 43), and, for the food plants, those of Horace Mann's "Catalogue of the phaenogamous plants of the United States" . . . Where the species of the food-plant is not stated, the numero expresses a conjecture.]

BUPRESTIDÆ.

3691.	<i>Dicerca pugionata</i>	2574.	<i>Quercus alba.</i>
3726.	<i>Buprestis apricans</i>	2658.	<i>Pinus mitis.</i>
3767.	<i>Chrysobothris azurea</i>	2579.	<i>Quercus coccinea var. tinctoria.</i>
3799.	<i>Ptosima gibbicollis</i>	705.	<i>Cercis canadensis.</i>
3801.	<i>Mastogenius subcyanens</i>	2603.	<i>Ostrya virginica.</i>
3814.	<i>Agrilus lecontei</i>	1053?	<i>Cornus [florida?].</i>
3825.	" <i>politus</i>	575.	<i>Robinia pseudacacia (spines).</i>

ELATERIDÆ.

3863.	<i>Tharops obliquus</i>	2600.	<i>Fagus ferruginea.</i>
4260.	<i>Corymbites vernalis</i>	2660?	<i>Pinus? [strobis?].</i>
4310.	" <i>hamatus</i>	447.	<i>Rhus toxicodendron.</i>

RHIPICERIDÆ.

4374.	<i>Sandalus petrophya</i>	2574.	<i>Quercus alba.</i>
-------	---------------------------	-------	----------------------

CERAMBYCIDÆ.

4925.	<i>Sphenostethus taslei</i>	2574.	<i>Quercus alba.</i>
4941.	<i>Smodicum cucujiforme</i>	2621?	<i>Salix [alba?]</i>
4943.	<i>Dularius brevilineus</i>	2538?	<i>Ulmus [americana?].</i>

4970.	<i>Oeme rigida</i>	2658.	<i>Pinus mitis</i> .
4977.	<i>Gracilia minuta</i>	2610.	<i>Betula lenta</i> (band around gin-barrel).
5015.	<i>Elaphidion unicolor</i>	2595.	<i>Quercus rubra</i> .
5025.	<i>Tylonotus bimaculatus</i>	2563.	<i>Juglans nigra</i> .
5047.	<i>Molorchus bimaculatus</i>	1053?	<i>Cornus</i> [florida?]; 818. <i>Amelanchier canadensis</i> .
5070.	<i>Purpuricenus humeralis</i>	498?	<i>Acer</i> [dasycarpum?].
5070a.	“ var. <i>axillaris</i>	2579.	<i>Quercus coccinea</i> var. <i>tinctoria</i> .
5111.	<i>Calloides nobilis</i>	2316?	<i>Fraxinus</i> [americana?].
5113.	<i>Arhopalus fulminans</i>	—.	<i>Quercus</i> .
5144.	<i>Cyrtophorus gibbulus</i>	2574.	<i>Quercus alba</i> .
5145.	“ <i>verrucosus</i>	2574.	“ “
5146.	<i>Tillomorpha geminata</i>	2574.	“ “
5155.	<i>Distenia undata</i>	—.	<i>Pyrus malus</i> .
5166.	<i>Centrodera decolorata</i>	—.	<i>Carya</i> .
5225.	<i>Leptura emarginata</i>	2536.	<i>Ulmus fulva</i> .
5253.	“ <i>zebra</i>	2593.	<i>Quercus prinus</i> .
5256.	“ <i>cordifera</i>	2598.	<i>Castanea vesca</i> .
5331.	<i>Hetoemis cinerea</i>	—.	<i>Maclura aurantiaca</i> . —. <i>Morus</i> .
5343.	<i>Acanthoderes morrisii</i>	1061.	<i>Nyssa multiflora</i> .
5381.	<i>Dectes spinosus</i>	—.	<i>Ambrosia</i> .
5405.	<i>Hippopsis lemniscata</i>	—.	<i>Ambrosia</i> .
5457.	<i>Dysphaga tenuipes</i>	2574.	<i>Quercus alba</i> .

SPERMOPHYGIDÆ.

5464.	<i>Bruchus mimus</i>	705.	<i>Cercis canadensis</i> (seed).
-------	----------------------	------	----------------------------------

EFFECT OF CYANIDE UPON COLOUR.
— A very curious case of artificial colouring in a butterfly has been sent me by a friend. He says that the specimen, a male *Gonopteryx* [*sic*] *rhamni*, was placed in a spare cyanide bottle, and left undisturbed for two years; but that, at some intermediate time, the stopper was tampered with and not properly replaced, so that air was introduced. The result is, that the butterfly is richly

coloured with crimson along the costal area, and partially round the other margins of the fore-wings, and has large blotches of the same on the hind-wings. Indeed, the only portion of the wings which is left entirely of the usual brimstone colour is that portion which, in *G. cleopatra*, is clouded with crimson. — Chas. G. Barrett, Pembroke: 9th April, 1884. [From *Entom. mo. mag.*, June 1884, v. 21, p. 23.]

PSYCHE.

CAMBRIDGE, MASS., AUG.—SEPT. 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

FRANCIS GREGORY SANBORN.

Born 18 Jan. 1838, at Andover, Mass.

Died 4 June 1884, at Providence, R. I.

Francis Gregory Sanborn was the son of Eastman and Mary C. L. (Gregory) Sanborn. His father died in 1859; his mother, to whom he was dutiful and affectionate, in 1883. Mr. Sanborn was a devoted and affable friend to his associates, a genius and a close observer. He used his talents often for the good of others, but little for his own worldly advancement. His interest in natural history was of early development, giving occasion for remark and record in his mother's journal when he was but little more than three years old. It was constant and absorbing, leading him to abandon opportunities for private gain, such as that of succeeding to his father's practice as a dentist, for which he had fitted himself and by which he might have prospered pecuniarily.

Mr. Sanborn was widely known to the entomologists of the eastern United States, and almost constantly engaged in the care or preparation of collections of insects or other objects of natural history belonging to public

institutions or private possessors. He was graduated at Phillips academy, in Andover, Mass., in 1858, after a six years' course of study interrupted at times on account of ill health. In October 1858 he found employment in the Massachusetts State cabinet of natural history at the state house in Boston, the collection in which, according to Governor N. P. Banks, he built up. Here he remained, with occasional vacations, until the summer of 1865, being also clerk to C. L. Flint, the secretary of the Massachusetts State board of agriculture. He was engaged in miscellaneous work in the museum of the Boston society of natural history in 1865 and 1866 and as regular assistant from 1867 to 1873, having particular care of the insects, also performing general duties, lecturing, and at times acting as secretary. In 1872 he was a justice of the peace and a member of the school committee in West Roxbury, Mass. At this time also he was instructor in entomology at the Bussey institution, in Jamaica Plain, and lecturer at the Museum of comparative zoology in Cambridge, but was soon afterwards affected with mental trouble which caused his seclusion, at private expense, for about seven months, at the state hospital in Worcester. Here he entered into relations with the Worcester society of natural history, of which he afterwards became curator, an office he held at the time of his death. In 1874 he was an assistant in the Kentucky state geological survey, under Professor N. S. Shaler. In 1876 he was engaged to prepare the entomological exhibit of the United States Department of agriculture for the Centennial exposition at Philadelphia.

He was a member of the American association for the advancement of science, Boston society of natural history, Cambridge entomological club, Essex institute, corresponding member of the American entomological society, Entomological society of Ontario, and New York entomological society, and member of other learned societies.

B: P. M.

CORRESPONDENCE.

NOTICE OF AN OMISSION FROM LECONTE'S EDITION OF THOMAS SAY'S WRITINGS.—In the Journal of the Academy of natural science of Philadelphia, July 1817, v. 1, p. 45-48, Thomas Say, in an article entitled, "Some account of the insect known by the name of Hessian fly, and of a parasitic insect that feeds on it," describes *Cecidomyia destructor* and its parasite *Ceraphron destructor*, and gives a short account of the habits of each species. This article is reprinted correctly in Leconte's edition of Say's writings, v. 2, p. 6-7. On p. 63 of the Journal, for August 1817, however, just before the explanation to the plate, Say inserted a note which Leconte overlooked and which is here republished, both as showing a curious mistake made by Say, and to correct the omission from the "Complete writings." Say says:—

"I forgot to mention in its proper place that the parasitic insect, *Ceraphron destructor*, which is so commonly mistaken for the *Cecidomyia*, after the business of propagation is performed, throws off its wings as a useless incumbrance, in this respect resembling some species of the genera *Formica*, *Termes*, &c., to which it also bears some resemblance in point of form and appearance; this has led many to suppose that the Hessian-fly is in reality no other than a species of pissmire in its apterous state. T. Say."

Of course Say is mistaken in his statement that the wings were shed after copulation. It not uncommonly occurs among the *pteromalinae* that certain individuals (both male and female) have only rudimentary wings—mere pads which never become developed into wings. This is the case with the species under consideration, the relative proportion of the winged to the wingless individuals varying with the climate and the season.

L. O. Howard.

A BUTTERFLY ATTRACTED BY LAMPLIGHT. I do not remember any published account of the attraction of diurnal lepidop-

tera by lamplight, except the note by Mr. S. H. Scudder in *PSYCHE*, v. 1, p. 28 [Rec., 659], but in two instances I have taken specimens of the eyed emperor (*Apatura lycaon*, Fabr.) in this way. After ten o'clock of the evening of 20 August 1882, a perfect, but not entirely fresh, specimen came in at the open window of my sitting-room and was captured with a butterfly net. The other example referred to was taken earlier in the evening, but after the lamps were lighted. The close proximity of a hackberry tree (*Celtis*), on which the larvae feed, accounts for the presence of these insects in the neighborhood, but does not give us the key to their unusual nocturnal activity. *Mary Esther Martfeldt*.

PROCEEDINGS OF SOCIETIES.

LINNEAN SOCIETY OF LONDON.

20 Dec. 1883.—... Mr. J. Maule Campbell showed the web of a spider (*Tegenaria guyonii*) which had been spun in the centre of a pasteboard cylinder; the peculiarity being the manner in which the solid part of the web was medially swung; whereas in this species of spiders it is more usually on the sides of objects.

17 Jan. 1884.—A paper was read by Mr. A. D. Michael on the "Hypopus" question or life history of certain Acarina. From a careful series of experiments and observations he concludes that—true "Hypopi" are not adult animals but only a stage or heteromorphous nymphs of *Tyroglyphus* and allied genera. Nor do all individuals become "Hypopi," which latter stage takes place during the second nymphal ecdysis. It seems a provision of nature for the distribution of the species irrespective of adverse conditions. "Hypopi" are not truly parasitic nor confine themselves to any particular insect. A new adult form described is called by the author *Disparipes bombi*, and he believes there are other species of the genus *Dormadicus* bee-parasites admitted to be adults, though it is uncertain if they are identical with Dufour's *Trychodactylus*.—From J. Murie in *Zool. anzeiger*.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Foerste, Aug. F. *Pastinaca sativa* proterandrous. (Bot. gazette. Feb. 1882, v. 7, p. 24, 4 cm.)

Crit. rev., by W: Trelease, entitled "Proterandry of *pastinaca*. (op. cit., Mch., p. 26-27, 9 cm.)

The flowers of *pastinaca sativa* are said to be crossed by means of "small coleoptera and other insects." Other *umbelliferae* are said to be protogynous.

W: T. (3551)

Müller, Hermann. Ueber die Befruchtung von *symplocarpus foetidus*. (Bot. jahresbericht . . . Just, 1879, v. 7, p. 137, 5 cm.)

Abstract of W: Trelease's "On the fertilization of *symplocarpus foetidus*" (Amer. nat., Sep. [22 Aug.], 1879, v. 13, p. 580-581) [Rec., 1794].

W: T. (3552)

Shimer, H: On a new genus in homoptera, section *monomera*. (Proc. Acad. nat. sci. Philad., Jan. 1867, [v. 19], p. 2-11, fig.)

Crit. rev. in B: D. Walsh's "The grape-leaf gall-house. *Dactylosphaera vitifoliae*, Fitch" (1st ann. rept. acting state entom. Ill., 1868) (Trans. Ill. state hortic. soc. for 1867, 1868, n. s., v. 1; Appendix), p. 21-24.

Characterises the "supposed new family" *dactylosphaeridae*, and the new genera *dactylosphaera* [type: *d. globosum* n. sp.] and *viteus* [type: *pemphigus vitifoliae* Fitch]; describes *d. globosum* n. sp. and *d?* (*viteus*) *vitifoliae*; describes the method used in observing these insects.

[*D. globosum* = *Phyllovera caryocemen*; *d?* (*viteus*) *vitifoliae* = *Ph. vitifoliae*.] B: P. M. (3553)

Shimer, H: The wavy-striped flea-beetle. (Amer. nat., Dec. 1868, v. 1, p. 514-517, fig. 1.)

Extract, [by B: D. Walsh and C: V. Riley], entitled "The wavy-striped flea-beetle. *Haltica (phyllostreta) striolata*, Illiger." (Amer. entom., Apr. 1869, v. 1, p. 158-159, 62 cm., fig. 119.)

Habits and ravages, food-plants and description and figure of larva and imago of *phyllostreta striolata*.

B: P. M. (3554)

Stillman, J: M. On the origin of the lac [Rec., 2792].

Extract, in Germ. tr., by C. F. Gissler, entitled "Ueber den Ursprung des Schild-lack's." (Deutsch-amer. apotheker-zeitung, 1 Dec. 1880, Jahrg., 1, no. 18, p. 2, 40 cm.) B: P. M. (3555)

Tasker, J. C. W. Naphthaline versus camphor. (Entomologist, Oct. 1882, v. 15, p. 240.)

Use of naphthalin (C₁₀H₈) recommended as a pestifuge in collections of insects. G: D. (3556)

Tilghman, E.: 3d. [Hessian fly.] (Amer. farmer . . . Skinner, 20 Oct. 1820, v. 2, ed. 3, p. 235, 18 cm.)

Process of oviposition of *ecidomyia destructor* on wheat, described from nature. B: P. M. (3557)

Todd, James E. On the flowers of *solanum rostratum* and *cassia chamaecrista*. (Amer. nat., Apr. [22 Mch.] 1882, v. 16, p. 281-287, 3 fig.)

Includes remarks on the cross-fertilization of *solanum rostratum* and *cassia chamaecrista* by *bombus*, which visits them for pollen. W: T. (3558)

Townsend, C: H: Tyler. On the variation of the elytral markings in *cicindela sexguttata*. (Can. entom., Nov. 1883, v. 15, p. 205-208, 1 fig.)

Describes the variations in number and arrangement of the elytral spots in *cicindela sexguttata*, making eight varieties of them; table to show the relative number of individuals of each variety out of forty-nine specimens taken during 1883. G: D. (3559)

[?Treat, Mary.] A chapter on mites. (Harper's new mo. mag., Apr. 1861, v. 42, p. 607-614, fig. 1-11.)

Figures *acarus domesticus*, *a. lacteus*, *a. roseae*, *a. canna-mellifera*, *a. megarhina*, *a. muscida*, *a. contagiosus*, *hydrachna geographica*, *h. globum*, *h. puteus*, and anatomical details of some of these species; figures imago, larva, ovipositor and mandibles of *pioiphila casei*; with some account of these several insects. B: P. M. (3560)

[Treat, Mary.] More about spiders. (Harper's new mo. mag., Feb. 1861, v. 42, p. 323-335, fig. 1-21.)

Gi.
 of *ctenus tungenicus*, nest, eye,
 of *clubiona ogaricus*, *drassus perfida*, *Lycosa violaceus* and *tegenaria textura* and their nests, mandibles and eyes; of *epieira fasciata*, *theridion migratum*, *phalangium* sp. and *Lycosa noctes*, their mandibles and eyes; and of male palpi of two *theridion*, a *segestria*, two *clotho* and an *epieira*; gives some account of these species and of *epieira diadema*, and of the habits, food and fights of some of them. B: P. M. (3561)

Trelease, W: On the fertilization of *symplocarpus foetidus* [Rec., 1794].

Reprint, under head, "*Symplocarpus foetidus*." (GOODALE, G: L. and SPRAGUE, I: Wild flowers of North America. 1880. pt. 14, p. 120-121.)

Abstract in F. Delpino's "Impollinazione e fecondazione nel cotone e in altre specie" (Rivista botanica. 1880. p. 45).

Abstract, by H. Müller, entitled "Ueber die befruchtung von *symplocarpus foetidus*." (Bot. jahresbericht . . . Just. 1879, v. 7, p. 137, 5 cm.) W: T. (3562)

Trelease, W: The heterogony of *oxalis violacea*. (Amer. nat., Jan. 1882 [30 Dec. 1881], v. 16, p. 13-19, 5 fig.)

The flowers of *oxalis violacea* are believed to be dimorphic instead of trimorphic. They are visited for nectar by *nomada bisignata*, *ceratina dupla*, *augochlora pura*, *osmia* sp., and *halictus* sp. W: T. (3563)

Trelease, W: Protandry of *pastinaca*. (Bot. gazette, Mch. 1882, v. 7, p. 26-27, 9 cm.)

Remarks, apropos of A. F. Foerster's "*Pastinoca sativa* proterandrous" (op. cit., Feb. p. 21) [Rec., 3551], that most *umbelliferae* are strongly protandrous; and states that in Germany the flowers of *pastinaca* are, according to Hermann Müller, visited by hymenoptera and diptera. W: T. (3564)

Troop, J. Proterandry in *amaryllis reginae*. (Bot. gazette, Apr. 1882, v. 7, p. 42, 11 cm.)

The flowers of *amaryllis reginae* are said to be probably fertilized by "some moth with a long proboscis." W: T. (3565)

Verrill, Addison Emory. Additional observations on the parasites of man and the domestic animals. (5th ann. rept. secr. Connecticut board agric., for 1871-1872, 1872, p. 321-342.)

Additions to the lists of internal parasites of man, cattle, horse, hog and poultry, given in author's "The internal parasites of domestic animals" . . . (4th ann. rept. [etc.], 1870, p. 102-250) [Rec., 3509] with corrections and additional statements concerning some of these parasites; treats mostly of worms, but mentions *pentastoma sellenii* as a parasite of the horse and the occurrence of *dermatobia novialis?* in a woman in Mississippi. B. P. M. (3566)

Verrill, Addison Emory. The external and internal parasites of man and domestic animals. [Hartford, Conn., 1870.] t.-p. cover, 140 p., 23×14, t 17×6.5. il.

Reprint, as pamphlet, of author's "The external parasites of domestic animals" . . . (4th ann. rept. secr. Connecticut board agric., for 1869-1870, 1870, p. 72-122, fig. 1-48) [Rec., 3568], and "The internal parasites of domestic animals" . . . (op. cit., p. 102-250, fig. 49-84) [Rec., 3569]. G: D. (3567)

Verrill, Addison Emory. The external parasites of domestic animals: their effects and remedies. (4th ann. rept. secr. Connecticut board agric., for 1869-1870, 1870, p. 72-122, fig. 1-48. (VERRILL, A. E. The external and internal parasites of man and domestic animals . . . [1870], p. 1-51, fig. 1-48.)

Characterises the several subclasses of insects and orders of hexapods, with illustrations of each; describes and figures the principal species of *pulicidae*, *hippoboscidae*, *costridae*, *cimicidae*, *pediculidae*, *mallophaga* and *acarina*, which are parasitic on domestic animals, with some account of their habits, and of means against them, and mention of related species. B: P. M. (3568)

Verrill, Addison Emory. The internal parasites of domestic animals: their effects and remedies [with discussion]. (4th ann. rept. secr. Connecticut board agric., for 1869-1870, 1870, p. 162-256, fig. 49-84.) (VERRILL, A. E. The external and internal parasites of man and domestic animals . . . [1870], p. 51-140, fig. 49-84.)

Additions and corrections, by author, entitled "Additional observations on the parasites of man and the domestic animals." (5th ann. rept. [etc.], 1872, p. 321-342.)

Characterises the orders *cestoda*, *trematoda*, *acanthocephala* and *nematoda*, to which belong the parasitic worms of man and domestic animals; gives a list of some of the more important general works on parasitic worms; gives lists of the internal parasites of man, dog, cat, sheep, cattle, horse, hog and poultry; describes and figures the principal species of these parasites with accounts of their habits, transformations and ravages and means against them; *pentastoma taeniorides*, with its immature form *p. denticulatum*, and *p. constrictum*, which are *acarina*, are here treated of (p. 249-251, fig. 81, 82) and the discussion (p. 252-256) contains remarks on means against *gastrophilus equi* by E. S. Hubbard, N. C. S. S., —Sedgwick and author. B: P. M. (3569)

[Walsh, B: Dann and Riley, C: Valentine.] The cotton army-worm. *Noctua (anomis) yllina*. Say. (Amer. entom., July 1869, v. 1, p. 209-212, 145 cm., fig. 147-149.)

Description and figures of all stages of *altia yllina*, and civil and natural history of this insect, and means of preventing its ravages, mostly compiled from the writings of T. Glover and from J. B. Lyman's "Cotton culture;" difficulties and dangers in the pursuit of observations in the southern United States; distinctions between various insects severally termed "army-worms." B: P. M. (3570)

[Walsh, B : Dann and Riley, C : Valentine.]
The chinch bug. *Micropus leucopterus*,
Say. (Amer. entom., 1869, v. 1: May, p.
169-177, 315 cm., fig. 122; June, p. 194-199,
221 cm., fig. 135-139.)

Reprint, with changes, by C : V. Riley,
entitled "The chinch bug: *micropus leuco-*
pterus, Say." (2d ann. rept. state entom.
Mo., [Mich.] 1870, p. 15-37, fig. 1-10.)

Supreme noxiousness of *blissus leucopterus* in grain-
field; past civil history and cause of former scarcity of
this pest; value of a fore-knowledge of its probable
future occurrence; its hibernation, seasons, oviposition,
prolificacy, swarming, migrations, dimorphism and
ravages, and means against it; its enemies, especially
hippodamia maculata, *coerinella munda*, *chrysopa flo-*
rubunda, *anthocoris insidiosus* and *ortyx virginiana*;
distinctions between insects having and not having
complete metamorphoses; differences in number of an-
nual generations and in periods of development of in-
sects; effects of meteoric conditions on insects; fallacy
of H: Shimer's theory of the epizootic disease of the
blissus, and failure of Shimer's prophecies.

B: P. M. (3571)

[Walsh, B : Dann and Riley, C : Valentine.]
The gigantic root borer. *Prionus laticollis*,
Drury. (Amer. entom., Aug. 1869, v. 1,
p. 231-234, 123 cm., fig. 169-173.)

Description and figure of larva and figure of pupa
and imago of *prionus laticollis*; habits, food-plants,
ravages and geographical distribution of and means
against this species; differences between its imago and
that of *p. imbricornis*; figure of imago of *orthosoma*
cyndricum; characters of larvae of *prionidae*.

B: P. M. (3572)

[Walsh, B : Dann and Riley, C : Valentine.]
The grape-berry moth. *Penthina vitivo-*
rana, Packard. (Amer. entom., May
1869, v. 1, p. 177-179, 74 cm., fig. 123.)

Remarks on the appearance of new and the disap-
pearance of old pests; recent occurrence of *penthina*
vitivorana [*eudemis botrana*] as a pest in grapes; sea-
sons and habits of and means against this insect.

B: P. M. (3573)

[Walsh, B : Dann and Riley, C : Valentine.]
Imitative butterflies. (Amer. entom., June
1869, v. 1, p. 189-193, 202 cm., fig. 132-134.)

General exemption of *danaïdæ* from and liability of
peridæ to the attacks of predaceous animals; attempted
explanation of these phenomena; protective imitation
of *danaïdæ* by certain *peridæ*; theory of the origin of
this imitation; mimicry of *danaïs archippus* by *limen-*
itis disippus, and consequent protection of the latter
from foes; hibernating habits and description of larva
of the *limenitis*, figures of the larva, pupa, imago and
hibernaculum of this species; figure of imago of *danaïs*
archippus.

B: P. M. (3574)

[Walsh, B : Dann and Riley, C : Valentine.]
Leafy oak-gall. (Amer. entom., Sept.-
Oct. 1869, v. 2, p. 25, 14 cm., fig. 20.)

Answer to inquiry; description and figure of the gall
of [*cynips*] *quercus-frondosa*.

B: P. M. (3575)

[Walsh, B : Dann and Riley, C : Valentine.]
The parasites of the human animal.
(Amer. entom., Jan. 1869, v. 1, p. 84-88,
180 cm., fig. 73-74.)

General prevalence of parasites in nature; brief ac-
counts of *pediculus humanus*, *p. cervicalis*, *p. pubis*,
oestrus hominis, *pulex irritans*, *p. penetrans*, *acanthia*
lectularia, *conorhinus sanguisuga* and *acarus scabiei*,
and mention of some other articulates parasitic on hu-
mans; figures and habits of *rotuvus personatus* (larva
and imago), of Europe, and of *pirales biguttatus*; fig-
ure of *conorhinus sanguisuga*; classificatory relations
of *pediculina* and *mallophaga*.

B: P. M. (3576)

[Walsh, B : Dann and Riley, C : Valentine.]
The periodical cicada. (Amer. entom.,
Dec. 1868, v. 1, p. 63-72, fig. 58-64.)

Extract, from p. 68, by authors, with
same title. (*op. cit.*, June 1869, p. 202,
7 cm.)

Discovery of the existence of 13-year broods of
cicada, and characterisation of these broods as a new
species, *c. tredecim*; dimorphism of this species and of
c. septendecim; seasons, habits, transformations, ovipo-
sition, enemies, diseases, ravages and sting of these
species, and chronological statement of their several
known broods.

B: P. M. (3577)

[Walsh, B : Dann and Riley, C : Valentine.]
Potato bugs. (Amer. entom., 1868, v. 1:
Oct., p. 21-27, fig. 10-19; Nov., p. 41-49,
fig. 33-48.)

Remarks on the usual failure of popular writers to
distinguish between the several species of insects in-
festing the potato plant; brief accounts of *gortyna*
nitela, *baridius trinitatus*, *sphinx quinque maculata*,
epicauta vittata, *macrobasis unicolor*, *m. murina*, *epi-*
cauta pensylvanica, *e. marginata*, *lema trilineata* and
epitrix cucumeris, treating of the geographical distribu-
tion, habits, food-plants and seasons of most of them,
and giving figures of each in one or more states of
growth; full account of *doryphora decemlineata*, its
distinctness from *d. juncta*, its migrations, habits and
enemies, and means against it; figures of *d. decemlin-*
cata and *d. juncta* in their several states, and of nu-
merous enemies of the former; habits of many of these
enemies; inability of larva of *sphinx quinque maculata* to
sting; distinctness of *s. carolina* from this species; geo-
graphical distribution of *s. carolina*; characteristics of
lepidoptera and coleoptera; vesicant properties of *lyt-*
tinæ; means against *lyttinæ*; stercoracious larval pro-
tections; poisonousness of larvae of *doryphora decemlin-*
cata; natural fluctuations in the abundance of insects.

B: P. M. (3578)

[Walsh, B : Dann and Riley, C : Valentine.]
The royal horned-caterpillar. *Ceratocam-*
pa (citheronia) regalis, Fabr. (Amer.
entom., Aug. 1869, v. 1, p. 230-231, 64 cm.,
pl. 1)

Description of young and of full-grown larva and of
pupa of *ceratocampa regalis*; figure of larva, pupa and
imago; seasons, habits, food-plants, sexual differences,
odor and vernacular names of this species; popular
dread of it.

B: P. M. (3579)

[Walsh, B : Dann and Riley, C : Valentine.]
A swarm of butterflies. (Amer. entom.,
Oct. 1868, v. 1, p. 28-29, 34 cm., fig. 20-22.)

Record of flights of swarms of *danaïs archippus*;
figures of larva, pupa and imago of this species; *ascle-*
pius its food-plant.

B: P. M. (3580)

[Walsh, B: Dann and Riley, C: Valentine.]
Swarms of ladybirds. (Amer. entom.,
Nov. 1869, v. 2, p. 55, 13 cm.)

Occurrence of countless millions of *coccinellidae* in
England; their origin and movements.

B: P. M. (3581)

[Walsh, B: Dann and Riley, C: Valentine.]
The true army-worm: *leucania unipuncta*
[sic], Haworth. (Amer. entom.,
July 1869, v. 1, p. 214-217, 106 cm., fig.
152-155.)

Ravages and beneficial action of *leucania unipuncta*
in Missouri, in 1869; favorite localities of occurrence,
sudden appearance and disappearance, seasons and
enemies of this insect; description and figures of larva,
pupa and imago; figure of imago of *exorista militaris*.

B: P. M. (3582)

[Walsh, B: Dann and Riley, C: Valentine.]
Wasps and their habits. (Amer. entom.,
Mch. 1869, v. 1, p. 122-143, 900 cm., fig.
96-112; p. 164, 1 cm.)

Appendix, by B: D. Walsh, entitled
"Appendix to the article on 'Wasps and
their habits,' in No. 7." (*op. cit.*, Apr.,
p. 162-164, 120 cm.)

General account of the habits of North American
predatory hymenoptera, i. e., *mutillidae*, *fossores* and
diplopteryga; structural, classificational and sexual
characters of these insects; correspondence of structure
with habits, and gradation of habits in insects as re-
gards the making of provision for the care of the
young; occurrence of parasites, inquilines and tenants
of deserted abodes of these insects; figures of imagos
and special accounts of habits of *chlorion coeruleum*,
bembex fasciata, *sphex ichneumonoides*, *ammophila picti-
pennis*, *pepsis formosa*, *stizus grandis*, *s. spectosus*, *pe-
lopoecus lunatus*, *agenia bombycina*, *trypoxylon albi-
tarsis*, *ceropalus rufiventris*, *euemnes fraterna*, *vespa
maculata*, and *polistes rubiginosus*; figure of imago of
cryptus juncus and of several abodes of wasps.

B: P. M. (3583)

[Walsh, B: Dann and Riley, C: Valentine.]
The wavy-striped flea-beetle. *Haltica*
(*phylloreta*) *striolata*, Illiger. (Amer.
entom., Apr. 1869, v. 1, p. 158-159, 62 cm.,
fig. 119.)

Habits and ravages, food-plants and description
and figure of larva and ravages and description and
figure of imago of *phylloreta striolata*, mostly quoted
from H: Shimer's "The wavy-striped flea-beetle"
(Amer. nat., Dec. 1868, v. 2, p. 514-517) [Rec., 3554];
habits of larva of *ph. nemorum*.

B: P. M. (3584)

Watson, J. A. Reputed parthenogenesis of
anarta myrtilli. (Entomologist, Nov.
1882, v. 15, p. 261-262.)

Record of the hatching of unfertilized eggs of *anarta
myrtilli*.

G: P. (3585)

Webster, Francis M. Leaves from my note-
book. (Our home and science gossip,
Sept. 1881, v. 5, p. 103, col. 1-2, 44 cm.)

Notes on the food-habits and localities of occurrence
of numerous coleoptera.

B: P. M. (3586)

Weismann, August. Studien zur descen-
denz-theorie. 2. Ueber die letzten ursach-
en der transmutationen. Leipzig, W.
Engelmann, 1876. 1-p. cover, 24+336 p.,
5 col. pl., 26X17, t 18X10. pam., M. 10.

Rev., entitled "Weismann's Final cause
of transmutation." (Amer. nat., Feb.
1877, v. 11, p. 109-110.)

Notice. (Entom. nachrichten, 1 April
1877, jahrg. 3, p. 58.)

Rev., by [F. C.] N[oll], (Zool. garten,
1877, jahrg. 18, p. 142-144.)

"The present work is divided into four divisions, of
which the first presents a striking array of facts on the
origin of the markings of caterpillars. The author de-
scribes the nature and morphology of the markings of
larvae of the family *sphingidae*, their biological value
and tribal development, concluding that the oldest
sphingid caterpillars were without markings; that the
oldest style of markings were longitudinal lines, the
later ones oblique streaks, and the last to be developed,
the spots."—*Amer. nat.*, l. c. The second part dis-
cusses the relation of changes in the structure of larvae
to their changes as imagos; variation and dimorphism.
The third part treats of the changes of the axolotl into
amblystoma. The fourth part is on the mechanical
conception of nature. The plates contain figures of
lepidopterous larvae, especially of *sphingidae*. [J: Lub-
bock's "Scientific lectures" . . . 1870 [Rec., 3438]
contains (lecture 2) [Rec., 3437] an abstract of Weismann's
studies on larvae of *sphingidae*.]

G: D. (3587)

Whitney, C: P. Descriptions of some new
species of *tabanidae*. (Can. entom. Feb.
1879, v. 11, p. 35-38.)

Crit. rev., by E: Burgess. (*op. cit.*, Apr.
1879, p. 80.)

Describes *chrysops euclux*, *ch. nigribimbo*, *ch. cursim*,
tabanus superjumentarius, *t. sparus*, all new species,
from New Hampshire, and *tabanus dodgei* n. sp. from
Nebraska.

B: P. M. (3588)

v. Wielowiejski, Heinrich. Studien über
die lampyriden. (Zeitschr. f. wissenschaft.
zool., 1 Nov. 1882, bd. 37, p. 354-428, pl.
23-24.)

Abstract, by E: Burgess, entitled "Lu-
minosity of fire-flies." (Science, 9 Mch.
1883, v. 1, p. 150, 22 cm.)

Anatomical, physiological and biological considera-
tions of the luminosity of the imago, larva and eggs of
lampyrus (*l. splendidula* and *l. noctiluca*); anatomy of
parts of the related systems (nervous, tracheal, etc.);
historical and literature (30 titles).

G: D. (3589)

Witlaczil, Emanuel. Zur anatomie der
aphiden. (Arbeiten aus dem zool. instit.
d. univ. Wien und d. zool. stat. in Triest.
1882, bd. 4, heft 3, p. 397-441, 3 pl.)

Abstract of portions. (BUCKTON, G: B.
Monograph of British aphides, v. 4, 1883,
p. 142-143.)

Abstr., entitled "Anatomy of aphides."
(Journ. Roy. micros. soc., Feb. 1883, s. 2,
v. 3, p. 49-51.)

General external and internal anatomy of *aphididae*
considered by different systems of organs.

G: P. (3590)

ENTOMOLOGICAL ITEMS.

A NEW fungus has been found which is parasitic on *Drosophila nigricornis*. Prof. C. H. Peck has named the fungus *Appendicularia entomophila*.

MR. A. BALDING records, in *Nature* for 10 July 1884, the capture of dragon-flies (*Pyrhosoma minium*), measuring about five centimetres in expanse of wing, by leaves of *Drosera rotundifolia*.

A BRIEF memoir of the late Dr. Hermann Müller of Lippstadt, has been written by Ernst Krause, the proceeds of the sale of which are to be added to the "Müller Fund." The brochure contains an excellent autotypic portrait of the deceased, and the memoir is accompanied by a chronological list of Müller's writings.—*Amer. naturalist*, Aug. 1884, v. 18, p. 848.

DR. F. BRAUER gives a brief notice of parts of the life history of *Hirmonoura obscura*, a dipteran, in the *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen gesellschaft in Wien*, for 1883. The larva of this species lives in the grub and pupa of the European June-beetle, *Rhizotrogus solstitialis*.

AN EXCELLENT idea for publications of local scientific societies is carried out by the Verein für naturkunde zu Cassel, in its Bericht for 1883 to 1884. Over one-half of this Bericht is devoted to a list, by Dr. Carl Ackermann, of scientific works of all kinds pertaining to Cassel and its vicinity. In the portion of the list devoted to the distribution of animals is to be found mention of many papers upon the insect fauna of the above-mentioned region.

AT THE Montreal meeting of the British association for the advancement of science but one entomological paper was read. This paper, "A contribution to our knowledge of the *phytopti*," was by Prof. Playfair McMurrick, of Guelph, Ontario, Canada. Entomology was better represented at the Philadelphia meeting of the American asso-

ciation for the advancement of science. Dr. C. S. Minot read a paper "On the skin of insects"; Prof. Geo. Macloskie, on "The dynamics of the insect-crust"; Dr. C. V. Riley, "On the hitherto unknown mode of oviposition in the *carabidae*"; and Lillie J. Martin, a paper entitled, "A botanical study of the mite-gall found on the petiole of *Juglans nigra*, known as *Erineum anomalum* Schw.

AT A recent meeting of the Baltimore Naturalists' field club, Mr. Otto Lugger gave an account of a strange hymenopterous parasite infesting the larva of *Tiphia*. The *Tiphia* lays its eggs in the larva of *Lachnosteria fusca*; the larva of *Tiphia* when nearly mature eats the white grub and then spins for itself a beautiful silken cocoon. This larva in turn is often infested by the larva *Rhipiphorus pectinatus* or *R. limtatus*, the eggs of which have become fastened to the *Tiphia*, and in this way reach the *Tiphia* cocoon. Mr. Lugger has also found in the same cocoons small hymenopterous parasites. The order of events in this case appears to be that the larva of a large coleopterous insect is destroyed by a hymenopterous larva, this in turn by a coleopterous larva, and this again by a hymenopterous larva.—*Science record*, 15 Aug. 1884, v. 2, p. 232.

ACKNOWLEDGEMENT OF CONTRIBUTIONS.

THE CAMBRIDGE ENTOMOLOGICAL CLUB being so constituted that entomologists in all parts of North America may become active members thereof and acquire the same rights to control its affairs and direct its policy that are possessed by members resident in Cambridge, expects from North American entomologists a support as liberal as its constitution.

PSYCHE, being conducted under the direction of the Club, free from local or partisan interests, is likewise entitled to liberal support. Subscribers to PSYCHE may borrow from the library of the Club any works

which could be replaced in case of loss, upon compliance with the simplest conditions practicable. Thus subscribers who live at a distance from libraries may obtain, through the mails, the benefit of access to a valuable entomological library, constantly increasing by means of donations and the receipt of publications in exchange for PSYCHE.

A Permanent Publication Fund has been established by the Club, the income alone of which is used to assist in defraying the cost of the publication of PSYCHE. As yet the fund is too small to furnish the amount of income needed. The Club does not hesitate to ask the friends of entomology to contribute to this fund, believing that their favorite science will be benefitted thereby.

In default of a regular income sufficient to defray the cost of the publication of PSYCHE, reliance has had to be placed on the timely assistance of special friends of the work. As yet such friends have not been wanting, who have assisted by donations or the advancement of the money needed.

In March 1884 a statement of the financial condition of the Club for the year 1883 was sent to a large number of subscribers to PSYCHE, with a form of agreement for subscription to a guarantee fund for the payment of the deficit on the cost of publishing PSYCHE for 1883, as that deficit might stand on 1 July 1884. Bills were at the same time sent to all persons who were indebted to the Club, with a special request for payment of dues. The following persons agreed to pay the amounts set against their names, or so much *pro rata* as might be needed to meet the deficit:—

T: W. Higginson, Cambridge, Mass.	\$5.00
H. Osborn, Ames, Iowa	5.00
W: H. Patton, Waterbury, Conn.	5.00
F. G. Sanborn, Worcester, Mass.	5.00
S. A. Forbes, Normal, Ill.	10.00
H: G. Hubbard, Crescent City, Fla.	10.00
B: P. Mann, Washington, D. C.	25.00
	<hr/>
	\$65.00

Mr. Sanborn having since died, but \$60 were called for.

The financial condition of the Club, for 1883 stood as follows on 1 July 1884:—

EXPENSES.

For printing PSYCHE, nos. 105-116	\$357.67
“ postage and Club expenses	27.04
	<hr/>
	\$384.71

RECEIPTS.

From membership fees	\$52.00
“ subscriptions to PSYCHE	167.77
“ publication fund (1880-1883)	39.59
	<hr/>
	\$259.36

Deficit \$125.35

Bills due 95.20

In contemplating this deficit it should be borne in mind that PSYCHE is sent in exchange to more than eighty societies or publishers, whose works enrich the library of the Club, and could be purchased only for a sum far in excess of the pecuniary deficit.

In the Annual reports of the Secretary, etc., for 1882, presented 12 Jan. 1883, and published in pamphlet form, are acknowledgments of donations to the Permanent Publication Fund, which, with other receipts, amounted to a principal of \$224.39. Since then have been received from:—

E. M. Aaron, Philadelphia, Pa.	\$1.00
Laurence Curtis, Boston, Mass.	5.00
Louis Curtis, Boston, Mass.	5.00
J. G. Gooch, Cambridge, Mass.	1.00
H: G. Hubbard, Crescent City, Fla.	2.00
J: G. Jack, Chateauguay Basin, P. Q.	1.00
Otis Norcross, Boston, Mass.	5.00
A. S. Packard, jr., Providence, R. I.	10.00
F. G. Sanborn, Worcester, Mass.	5.00
L. M. Sargent, Boston, Mass.	5.00
W. F. Wharton, Boston, Mass.	5.00
Previously acknowledged	224.39
	<hr/>
	\$290.34

B: PICKMAN MANN.

Treasurer C. E. C.

Nos. 122-123 were issued 23 Aug. 1884.

PSYCHE

A JOURNAL OF ENTOMOLOGY

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. Nos. 126-128.

OCTOBER-DECEMBER 1884.

CONTENTS:

ADVERTISEMENTS	214
NOTES ON THE HABITS OF <i>HYPOTRICHIA SPISSIPES</i> LEC., WITH DESCRIPTION OF THE FEMALES— <i>Henry Guernsey Hubbard</i>	215-217
DRINKING HABIT OF A MOTH	217
HEAD OF LARVAL <i>MUSCA</i> : PRELIMINARY NOTE— <i>George Macloskie</i>	218-219
NOTES ON SOME COLEOPTERA TAKEN IN SOUTH LOUISIANA— <i>Charles Henry</i> <i>Tyler Townsend</i>	219-222
INDEX TO ENTOMOLOGICAL LITERATURE— <i>Benjamin Pickman Mann</i>	223
PARASITES OF THE LARVA OF <i>LACHNOSTERNA FUSCA</i> — <i>Charles Valentine Riley</i>	224
FOOD-PLANTS OF <i>PULVINARIA INNUMERABILIS</i> — <i>Benjamin Pickman Mann</i>	224
PROCEEDINGS OF SOCIETIES— <i>Cambridge Entomological Club</i>	224-226
BIBLIOGRAPHICAL RECORD, no. 3591-3674	227-232
ENTOMOLOGICAL ITEMS.	233-236

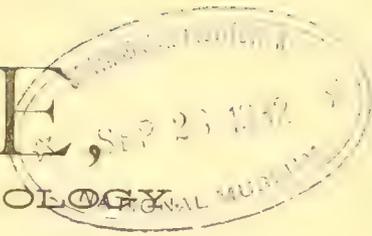
PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB.

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c

[Entered as second class mail matter.]



PSYCHE.

NOTES ON THE HABITS OF *HYPOTRICHIA SPISSIPES* LEC., WITH DESCRIPTION OF THE FEMALES.

BY HENRY GUERNSEY HUBBARD, CRESCENT CITY, FLORIDA.

Several years ago I found in Florida a male specimen of this beetle, impaled upon a needle of the long-leaved pine (*Pinus australis*) which had fallen and lay upon the ground with its pointed end projecting upwards. The body was pierced through the back, between the scutellum and the hinge of the elytron. The wing-cases were spread widely open, as in the act of flight. Recently a second male, which is caught in a precisely similar manner, on the end of a broken grass culm, has been sent from Florida to the U. S. Department of agriculture. The beetle is so firmly fastened that the long journey from Florida has not shaken it from the spear of grass.

The repetition of this accident in the case of an insect of such rare occurrence that it is almost unknown in collections, suggested to me that the beetle might have a mode of flight very different from that of related may-beetles (*melolonthidae*). This surmise I have been able to verify in a manner that throws some light upon the habits of the beetle.

One day, last spring, during a light shower succeeding a long drought, while standing in an open place I became aware of an insect flying around me with great rapidity, and with a buz-

zing noise. Presently I distinguished a beetle which I at first mistook for an abnormally active individual of *Euphoria* (*Cetonia*) *inda*. It flew in circles, close to the earth, and seemed to be in search of something. Finally it made a sudden dart into the loose sand, and almost immediately disappeared beneath the surface. A considerable subterranean commotion, however, marked the spot, and I easily uncovered it at a depth of about five centimetres. It proved to be a male of *Hypotrichia spissipes*, and as I took it in my hand, a second male, with which it had been locked in combat, disengaged itself and flew away. A female, which I fortunately secured, was immediately beneath the struggling males. It would seem, therefore, that *Hypotrichia* is not entirely crepuscular like its relatives the may-beetles (*Lachnosterna*), but that it also flies by day; at least in cloudy weather. Its flight resembles that of certain cetonians, which flit, hither and thither, keeping close to the ground. The latter, however, are abroad during the brightest noon-day sunshine. The body, especially in the males, is very thinly chitinized, and this, with its headlong flight, exposes it to such accidents as are recorded above. The females are exceedingly rare. They can

upon occasion make good use of their wings, but probably fly only at night.

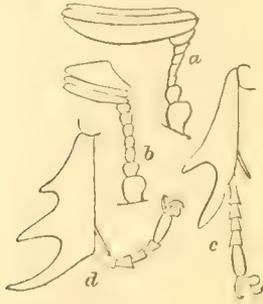


Fig. 13. *Hypotrachia spissipes* Lec. a, antenna of male; b, antenna of female; c, front tibia of male; d, ditto, female.

and are more subterranean in their habits than the males; this is indicated also by their form, which is heavier, more strongly built, and less pubescent than in the male. As this beetle has hitherto been known in the male sex only, I add a description of the female.¹

Description of the female.—Color piceo-rufous, head and thorax darker; body shining, beneath sparsely pubescent, above very sparsely covered with short, stiff hairs; head small, convex, eyes small, scarcely visible from above; two basal joints of antennae enlarged, as in the male, the five following joints globular; club equal in length to the five preceding joints, with a conical prominence on its outer face; thorax rounded, convex, coarsely punctate; scutellum short, nearly triangular, not

rounded behind; elytra shining, coarsely but obsoletely punctate, sutural stria well marked; pygidium much wider than long, finely and densely punctate.

The female is somewhat larger, more elongate and more convex than the male and is without the long and dense pubescence so conspicuous in that sex; the head, and especially the eyes are smaller; the thorax is larger, much more convex laterally and longitudinally, the base less lobed at middle, and is much less densely and more coarsely punctured; viewed from above the convexity of the sides conceals the true margin of the thorax which thus appears more regularly rounded than in the male. The five joints which constitute the scape of the antennae are well separated, and not connate as in the male, and the conical projection, which in the male appears upon the edge of the last joint, and gives to the antenna an irregular outline, is centrally placed in the female, and the club is regularly oval in outline.

The legs of the female are stouter, and project rigidly from the body, recalling the characteristic appearance of the *oryctini*. (*Oryctes*, *Aphonus*, etc.). The front legs are especially fossorial, the tibia being very broad, excavate within, and armed with three stout teeth on the outer edge. The male tibia is straighter and narrower, and has only two teeth.

The remarkable sexual differences in this species call to mind the still greater

¹ Leconte's original description of the male may be found in his "Classification of the coleoptera of North America . . . pt. 1" (Smithsonian misc. coll., 1862 v. 3), p. 137.

dissimilarity of the sexes in *Pleocoma*, which genus has been placed by Leconte in the distant coprophagous series of Lamellicorns. Quite recently Gerstäcker has pointed out² the close relationship which exists between *Pleocoma* and the European genus *Pachypus*, the latter an undoubted melolonthian. The females in these genera resemble each other closely, and in both are without wings or wing-covers.

It seems probable that Leconte was somewhat misled by the determination of a larva described by Osten Sacken as that of *Pleocoma*.³ This larva is supposed by Gerstäcker to belong to a lucanid beetle, but it may with greater

probability be conjectured to be the larva of a *Geotrupes*.

Between the females of *Hypotrichia* and those of *Pleocoma* evidences of relationship are not wanting, and as both must now be considered members of the melolonthian series, a closer comparison than has yet been made will possibly bring the two genera into still more intimate relations. The series of genera, *Hypotrichia*, *Plectrodes* and *Pleocoma*, exhibits a very instructive passage from a winged insect with active powers of flight, as in the male of *Hypotrichia*, to the degraded, wingless, and wholly subterranean female of *Pleocoma*.

² Entom zeit. . . . Stettin, 1883, jahrg. 44, p. 436.

³ Trans. amer. entom. soc., 1874, v. 5, p. 84.

DRINKING HABIT OF A MOTH.¹—E. D. Jones describes a remarkable drinking habit of a yellow and black Brazilian moth (*Panthera* [corr.] *pardalaria*). He found these moths sitting on the wet stones in small streams near San Paulo, sucking up the water in a continuous stream, and letting it escape in drops from the abdomen. These drops fell at the average rate of 50 per minute, and as near as he could judge of their size, the total quantity of water which must thus pass through the body of the moth in three hours must be a cubic inch, or about 200 times the bulk of its own body. Mr. Jones speculates on the possible meaning of this

and asks—"Can it be that the moth extracts nourishment from minute particles of organic matter contained in the water?" He remarks, however, that the water of the streams appear very clear and pure, and notes that the moths seems specially adapted for this habit. The tibiae of the hind legs are very thick, and are armed with long hairs; which by their capillary action prevent the moth being immersed in the water. "I have often," he adds, "seen one of them knocked down by a little spurt of water splashing over the stone on which it was standing, and it recovered itself almost immediately without being wetted in the least."—*Journ. roy. micros. soc.*, Oct. 1884, s. 2, v. 4, p. 741.

¹ Proc. lit. and phil. soc. Liverpool, 1883, v. 37, p. 75-77.

HEAD OF LARVAL MUSCA—PRELIMINARY NOTE.

BY GEORGE MACLOSIE, PRINCETON, N. J.

The *muscidae* are usually said to have headless larvae. The real state of matters however is that their head is buried in their thorax, to be thrust out at will during larva-hood, or permanently in the adult. Some years ago I spent fruitless time in attempting to investigate this structure; but recent researches on the head and proboscis of the adult have enabled me to return to the attack with greater success. Mr. Walter M. Rankin has cut for me some excellent transverse sections of the head of the larva of *Musca caesar*, and by their help as well as by teasing I have got the following results.

1. The head has a double skeleton, the one independent of the other: (1) a large dark-colored case, figured by Weismann,¹ consisting of proximal, mid-, and distant parts, the distant part being the well-known "hooks" (really a bifurcated piece); (2) a chitinous armature lining the pharynx: outside of the pharynx-wall (therefore organically in the head) are muscles which join it to the larger, dark-colored case.

2. The dark-colored part represents the fulcrum, mid-segment, and the forked distal supports of the proboscis of the adult. The relation of parts is the same as in the adult: the salivary duct, made by the union of the ducts of the paired salivary glands, enters the mouth at the mid-proboscis as in the adult.

and the longitudinal and transverse muscles are much as they shall always be.

3. The "hooks", or forked distal part, appear to be the precursors of the upper fork of the adult disti-proboscis: they have also inferior processes representing the inferior fork of the same. Perhaps these hooks are the mandibles.

4. The armature of the pharynx consists of a chitinous sheath lining its lumen. On the floor of this are eight longitudinal bars, which are found on cross-section to be hollow, each with a longitudinal slit opening towards the lumen of the pharynx.

5. On tracing the pharynx-armature to its anterior extremity we find that it terminates abruptly by a rim which supports a number of teeth at the roots of the longitudinal bars referred to. Here we have evidence that the longitudinal bars of the larva represent the pseudotracheae of the adult; they open by a long slit, and have transverse semi-rings so as to produce a resemblance to tracheae, all as in the pseudotracheae.

6. Hence the slit tubes which line the pharynx of the larva are identical with the pseudotracheae of the adult; and the swollen "labella" of the disti-proboscis of the adult are the everted stomodaeum, whilst its supporting forks are probably the mandibles.

7. The muscular apparatus for opening the pharynx is as in the adult. Long muscles descend from the walls of the

¹ Zeitschr. f. wiss. zool., 1863-1866.

fulcrum to the roof of the pharynx, so as by their contraction to raise the roof, to enlarge the cavity, and to turn it into a forcing pump. When the pharynx is not so distended its roof is arched upwards and its lumen on cross-section merely a transverse slit. Above it—within the hollow of the arch—is a system of radiating muscles which increase the curvature of the pharynx-roof and so close it unless when antagonised by the descending muscles.

8. Except by the muscles, and at its

inferior margin, the fulcrum has no organic connection with the pharynx. As the fulcrum transverses the length of the head, free externally of the outer wall of the head, and free internally of the proboscis which pierces it though separated from it, and as it is enclosed by muscles on both sides, it must be endoskeletal in its nature, *i. e.*, an ingrowth from the exoskeleton, like the endophragms of the thorax or the endocranium of the head of other insects.

12 Dec. 1884.

NOTES ON SOME COLEOPTERA TAKEN IN SOUTH LOUISIANA.

BY CHARLES HENRY TYLER TOWNSEND, CONSTANTINE, MICH.

The whole of Louisiana has been included by Leconte in the southern province of his great Atlantic district.¹ It would seem however, upon further consideration of the fauna, that the southern strip parallel with the coast should be connected with his "subtropical province, including the seacoast of Texas" (see map by Leconte); which, moreover, as he says, "belongs more properly to the eastern province of the tropical zoological district of Mexico."² It was in what might be called the subtropical province of the seacoast of Louisiana (being a continuation of the coast strip embraced in the eastern province of Mexico) that these notes were

collected, and the observations here given made.

It will be borne in mind that at the time of my visit, 29 March to 21 June 1884, a large tract of country near Bayou la Fourche was overflowed from the great crevasse of March the same year. For the identification of most of the species to which these notes refer, I am indebted to the kindness of Dr. G. H. Horn.

The *cicindelidae* seemed to be nearly absent or of local occurrence in southern Louisiana, and not to frequent the low lands of that part of the state. I saw only two specimens of this family (one larva of *Tetracha carolina*, and one *Cicindela repanda*) in the latitude of New Orleans. Afterwards I saw *C. tortuosa* with *C. repanda* at the mouth of Red River. Though I visit-

¹ LECONTE, J. L. The coleoptera of Kansas and eastern New Mexico; with map showing the entomological provinces of North America. Wash., *Smithsonian Institution*, 1859, p. iv.

² *Loc. cit.*, p. iii-iv.

ed Lake Pontchartrain several times in the first part of April, and also on 19 and 20 June, I could find no traces of *Cicindela* at all then, either on the beach or elsewhere. They are probably found here, however, at other times of the year. Not one was to be seen in the low country along Bayou la Fourche during April, May and June. Leaving New Orleans, and going up the river, I found them more plentiful in the higher country in the northern part of the state. They occur all along the river on the sand flats above the levee system and on the sandy mud-banks of the lower river.

Brachynus tormentarius is abundant under old wood in moist places. This is a much larger species than our northern bombardiers, and emits its explosions vigorously and with continued frequency, causing great pain unless carefully handled. Kirby and Spence state that they were informed by M. Lacordaire that the burning sensation arising from the discharges of the large exotic species was so painful that he had often been obliged to let those which he had taken escape.³ This species may be among those to which M. Lacordaire had reference; it is certainly one of the "large exotic species." These beetles have a way of curling the tip of the abdomen up so as to eject the burning liquid not only behind and on each side but also frontwards over the back, and it is often expelled in drops, and to a considerable distance. The bombardiers all seemed, when a log was rolled over,

to take the alarm from the one which first detected the danger and gave the signal by emitting its explosion; for all the others, wherever they might be, would follow with their explosions as soon as they heard that of one of their number. By this habit I often discovered individuals that had hidden in holes, or under leaves in the dirt.

In the flooded forest growths near Bayou la Fourche I found several of the ground-frequenting *carabidae* (*Chlaenius fuscicornis*, *C. laticollis* and others) under chips upon stumps that rose above the water. So this is how the carabs fared in their flooded home, taking to stumps and logs in default of the ground! Arboreal forms of these genera might be produced in this way, if inundation were to prevail for a sufficient length of time and the trees themselves continued to flourish in the water as well as before. Before the levee system was constructed the coleoptera as well as the other animals of southern Louisiana were undoubtedly accustomed to the periodical inundations caused by the risings of the Mississippi forcing them to seek habitation elsewhere than on the ground. The ground-frequenting species that survived probably then took to stumps and logs, as in the present instance; while others confined themselves to the foliage or bark of the trees, which previously had been frequented by them only a portion of the time. And thus they lived until the waters subsided and allowed them to betake themselves to their old retreats. Perhaps this ac-

³ Kirby and Spence's Entomology, 7th ed., p. 419.

counts for the scarcity of the *cicindeli-dæ*, and the absence of *Calosoma* (not a specimen of which could be found) in that part of the state. I might add in this connection that I also took a pair of *Eudocimus mannerheimii*, besides some *cerambycidae* (*Leptura abdominalis*) and some other coleoptera all on one stump a good distance out in the flooded forest.

Not a specimen of the *silphidæ* was taken; this is undoubtedly owing to the great numbers of buzzards, which effectually clean up every thing in the shape of carrion.

I noticed that specimens of *Dicerca obscura*, instead of taking immediate flight when alarmed, loosed their hold from the plants (wormwood [*Artemisia*] and ragweed [*Ambrosia*]) to which they were clinging, and dropped to the ground like weevils; which is a far more inactive mode of escape than that employed by some others of this family, for example *Chrysobothris femorata*.

Chauliognathus marginatus, which is very abundant upon patches of blossom in the South, seems to prefer yellow flowers, as its color assimilates better with the yellow; and upon these it is generally found. Though it is sometimes found upon white daisies, the stigmata of these are yellow, and help to blend the color of the insect with that of the flower. I noticed on 17 April that many of these insects were infested with a little red mite.

I took a specimen of *Neoclytus erythrocephalus* on a tuft of the common ragweed [*Ambrosia artemisiæfolia*], 18 May. Clinging in the green foliage

of the weed, this cerambycid, with the four bright yellow transverse markings of its elytra continuing clear around the body, resembled exactly *at first sight* a species of hornet or wasp which has the abdomen encircled with yellow bands, so that I hesitated a moment before capturing it. Its slender and cylindrical form and long legs so like a wasp's combine with the bright yellow bands to make up a deception calculated to imbue more animals than one with the dread of a concealed sting ready to prove effective should they have the audacity to meddle with it.

I noted an interesting fact relating to sexual selection in *Desmocerus palliatus*. These beetles are quite abundant on the elder leaves [*Sambucus*] in April, at this time pairing. On 22 April I noticed a very brightly colored pair in coitu upon a leaf, and on another leaf right by them an individual which had the orange bases of the elytra not nearly so bright or deeply colored as usual, but looking faded. On 27 April I observed a similar instance of a brightly colored pair with a dull colored, lone individual near by. This shows that the dull-colored individuals do not stand much chance of pairing, but that the bright ones select each other. Dull ones are not very common, and are probably of chance occurrence. I noticed that this species was much more plentiful on the leaves on cold and cloudy days than on warm and bright ones.

One morning, going by a wood-pile, I heard something suddenly drop from above and strike on one of the lower

sticks of wood. Supposing it to be a beetle, I looked carefully and found a specimen of *Acanthoderes quadrigibbus*, apparently lifeless, but lively enough as soon as I picked it up.

This species almost invariably drops when approached. In color it assimilates so well with the whitened boards, or other old, weathered pieces of wood to which it may be clinging, that it is often difficult to detect it. The habit of dropping and remaining perfectly motionless for a short time has been acquired by many coleoptera as a means of escape from some of their many enemies. But in this instance the beetle, instead of escaping, drew my attention right upon it by this habit.

When *Mecas inornata* sees any one approaching towards it, at some distance, it generally takes wing and flies a long way; but if one is very near and about to capture a specimen it usually drops and feigns death.

Plagioderma scripta was abundant in all stages on some cottonwood or poplar sprouts [*Populus monilifera*] along a ditch on a plantation. The editors of the *American entomologist* have illustrated several variations in the elytral markings of this species.⁴ But of the forty-three specimens taken by me in Louisiana every one is of the normal form. I did not notice that the species injured any planted cottonwoods here at this time.

On stems of elder [*Sambucus*] (also taken on young poplar or cottonwood sprouts) the little black *Chalco-dermus acutus* was quite abundant. These hard, finely punctured, chunky

little weevils take up their positions at the joints of the elder stalks, and thus easily pass for leaf-buds just appearing, and still enveloped in their dark red (nearly black) outer coverings. This is a very interesting and effective deception.

I took thirty-six specimens of *Rhodaenus 13-punctatus*. These show considerable variation in the elytral markings. Twenty-three have the thirteen spots more or less clearly defined; eleven have the two posterior and inner-medial spots united in one marking extending over both elytra; one has the two posterior, inner-medial and anterior spots united in one large marking, leaving only the outer-medial on each elytron in its normal form, and having the middle and two posterior prothoracic spots united, leaving the shield three-marked; and one is well defined, 11-punctate, having none of the spots united, but with the two outer-medial entirely wanting.

One day I noticed an individual of this species upon a plant that had been overrun by a party of ants. The weevil was running up and down trying to escape from its hymenopterous enemies, which kept running over it and attacking it. All the while it gave forth an agreeable scent very similar to peppermint; agreeable to me, but perhaps not to the ants, to repel whom it might have been intended. The scent did not seem to arrest the progress of the ants in the least, and the "sheath-wing" would probably have succumbed to the "vein-wings" in the end, had I not rescued the former for my collecting bottle.

⁴ *American entomologist*, 1880, v. 3, p. 160.

PSYCHE.

CAMBRIDGE, MASS., OCT.—DEC. 1884.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

INDEX TO ENTOMOLOGICAL LITERATURE.

The time consumed by special students in searching through a whole literature for those portions of it which bear upon their special studies is largely wasted. The literature of special subjects is so scattered, and that of different subjects so intermingled, that each student who tries to find for himself what relates to the subjects he is studying is obliged to peruse a great deal of literature that is not of service to him, far more, indeed, than that which he can use, in proportion as the subjects he is studying form but a fraction of all the subjects treated in the literature. Here, as in other fields of labor, specialization carries with it economy and efficiency. The diligent worker who, laboring to that end, by comprehensive methods forms an index to all the special subjects treated in the literature as he examines it finds himself at last able to refer without hesitancy or waste of time to all the literature which treats of any of these specialties. He is then in a position to supply the needs of the specialists first mentioned. While but few persons are interested in these references as a whole, each specialist finds the

portion referring to his own field of study of great value. Having accumulated an immense stock of references to the literature of entomology, I will furnish references on special subjects at ten cents each reference, or fifty cents per decade. The system upon which these references will be furnished is the following. The person seeking references shall send me his list of references already obtained; the references I furnish will then only be those additional to this list, so that no one will have to pay for that which he already has. If any person finds the transcription of the references which he already has not worth the saving of the cost under this rule, he can not complain of the cost of the references furnished him. Extracts from and translations of portions of literature on desired subjects will also be procured on demand.

The publication of bibliographical records in the pages of PSYCHE and other works and the indexing of these records place a considerable number of references at the disposal of specialists without special payment therefor. So rapidly as means admit these records and indices in PSYCHE will be enlarged. Meanwhile the pages of PSYCHE stand open for contributions from the stores of specialists who have already gathered for their own use references to the literature of their specialties. When it is considered with how great labor these lists of references are gathered, and how one student after another is obliged to perform this labor anew, for want of the publication of lists once made, it may be seen of how great service to the public would be the publication of these lists. The very persons who may be disposed to depreciate the value of general indexes such as mine, for the reason that they in their special fields have fuller indexes or those most complete to date, are the ones who may render the greatest service to their fellow-workers by publishing their lists.

B: PICKMAN MANN.

Washington, D. C., Nov. 1884.

PARASITES OF THE LARVA OF LACHNOSTERNA FUSCA. In an item quoted in PSYCHE, v. 4, p. 211, from *Science record*, Mr. Otto Lugger is reported as saying that "*Tiphia* lays its eggs in the larva of *Lachnosterna fusca*," and the larva "when nearly mature eats the white grub." Further, that the eggs of *Rhipiphorus*, a secondary parasite, "become fastened to the *Tiphia*." These statements are not strictly accurate. The conjecture in my 6th Missouri report,¹ p. 123-126, that the *Tiphia* larva preys externally on that of *Lachnosterna*, I have since verified, and of course it begins feeding as soon as hatched; while it would be quite exceptional for *Rhipiphorus* to lay its eggs on *Tiphia*. The probability, as stated in the report cited, is that the eggs are deposited on flowers frequented by *Tiphia*, to which the triungulin fastens and by which it is carried into the ground. It would be interesting to know whether Mr. Lugger speaks from observation or conjecture.—C. V. RILEY, at meeting of Entomological society of Washington, 6 Nov. 1884.

FOOD-PLANTS OF PULVINARIA INNUMERABILIS. On p. 338 of J. D. Putnam's "Biological and other notes on coccidae" [Psyche, Rec., no. 1989], it is stated that Mr. Putnam has observed *Pulvinaria innumerabilis* in great abundance on *Acer dasycarpum*, *A. saccharinum*, *Negundo aceroides* and *Tilia europaea*, on each of which it thrives well, best on the *Negundo*, but least on *A. saccharinum*. Mr. Putnam knew personally of the occurrence of this species also on *Robinia pseudacacia*, *Vitis labrusca* and *Rhus glabra*, in the vicinity of infested maples. In one instance he found a single undersized specimen, with its "nest," on *Vitis riparia*, more than 800 metres from the nearest infested *Acer*. He adds *Rosa* and *Fagus* to the list of food-plants, on the authority of S. S. Rathvon, who found it once on each of these

plants, and mentions with doubtful credence the opinions of Emily A. Smith and C. V. Riley that they had also found it on *Salix*, *Maclura*, *Quercus*, *Ulmus*, *Platanus*, *Ribes*, *Euonymus* and *Celtis*. It undoubtedly occurs in very great abundance on *Maclura* hedges in Washington, D. C., as I have observed. On the 30th of June this year (1884) I received from F. R. Rathbun, of Auburn, N. Y., three twigs of *Ulmus*, gathered on the 25th. in Auburn, bearing respectively 1, 1 and 3 specimens of mature *Pulvinaria innumerabilis*, with fully developed nests, from which the larvae have since hatched in great numbers. These all came from one tree. In sending specimens previously, Mr. Rathbun wrote that "the maples [*Acer*] especially have the silky pussys or cocoons to a large extent, and they are invariably found on the under sides of the twigs. Sometimes they are arranged thickly, in rows, and again singly." Mr. Putnam says "there is enough evidence to show that this insect is capable of thriving on quite a variety of food-plants, and in the cases where it has been directly introduced from the maple there is no question of its identity." The specimens referred to in this communication will be deposited in the Museum of comparative zoology at Cambridge, Mass., where they are more certain of good care and of being accessible to students than in any other collection of national extent in the country.—B: PICKMAN MANN at meeting of Cambridge entomological club, 10 Oct. 1884.

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

(Continued from p. 150.)

14 MAR. 1884.—The 100th meeting of the club was held at 61 Sacramento St., Cambridge, 14 Mar. 1884, the president, Mr. S: H. Scudder, in the chair.

The secretary announced the withdrawal from the club of Mr. Henry Savage, of Boston, Mass.

¹ PSYCHE, Rec., no. 39.

Mr. S: H. Scudder showed fossil specimens and figures of *Anthracomartus*, to illustrate the remarks which he had made at the last meeting.

Dr. G: Dimmock showed samples of the different grades of Central American cochineal, carmin of commerce, carminic acid and some of its salts.

Mr. S: H. Scudder exhibited some lithographic work and wood-cuts for comparison of methods of depicting fossil insects.

Mr. S: H. Scudder reviewed Part 1 of A. E. Eaton's "A revisional monograph of recent *ephemeridae*" (Trans. Linn. soc. Lond., Zool., s. 2, v. 3, p. 1-77, pl. 1-24).

11 APRIL 1884.—The 101st meeting was held at 61 Sacramento St., Cambridge, 11 April 1884. In the absence of the president. Mr. T. W: Harris was chosen chairman.

Mr. H. Hinkley showed several insects, among them a larva, probably that of *Eucronia maia*.

Dr. G: Dimmock showed specimens of several curious insects. Among them was a *Culex* with a parasitic nematod (? *Gordius*) dissected from its abdomen. The specimen was taken near Leipzig, Germany. The parasite was very large, relatively to the size of the *Culex*. No parasitic worms had been previously recorded from *Culex*, except *Filaria sanguinis-hominis*, altho *Mermis* had been found in *Simulium reptans*, in *Tanytus nebulosus* and in a species of *Chironomus*, and *Gordius* had been taken from *Chironomus plumosus*.

9 MAY 1884.—The 102nd meeting was held at 19 Brattle St., Cambridge, 9 May 1884, the president, Mr. S: H. Scudder, in the chair.

The secretary announced that Dr. C: E. Webster had removed his residence to Chicago, Ill., and had sent notice of withdrawal from membership in the club, to take effect at end of 1884. The secretary read a statement, from the treasurer, of the financial condition of the club on 1 May 1884.

Mr. S: H. Scudder made some remarks

concerning the late Dr. J: L. LeConte, who was an associate member of the club.

Dr. G: Dimmock mentioned certain habits of *Corixa* and *Notonecta*, a fuller account of which will be published later.

13 JUNE 1884.—The 103rd meeting of the club was held at 19 Brattle St., Cambridge, 13 June 1884, the president, Mr. S: H: Scudder in the chair.

The secretary announced the death of Mr. Francis Gregory Sanborn, an associate member of the club, who died 4 June 1884, at Providence, R. I. Mr. Sanborn was born 18 Jan. 1838, at Andover, Mass.

Mr. S: H. Scudder showed a portrait of the late Dr. J: L. LeConte.

Mr. S: H. Scudder gave the results of his studies upon the "Arachnidae of paleozoic formations." Numerous figures and specimens of fossils were shown. [See Proc. Amer. acad. arts and sci., 1884, v. 20, p. 13-22.]

Dr. G: Dimmock explained an apparatus by which he was enabled to rear insects in gases of different kinds or in determinate proportions of gases and air.

Dr. G: Dimmock described the way in which the red mites that were so abundant about Cambridge this year produced the fine, light colored lines upon leaves of clover, grass and other plants. Leaves which had been marked by these mites were shown.

Mr. R. Hayward stated that an *Onthophagus* which he had for some time supposed to be a new American species proved to be *O. luteicornis* from Europe.

10 OCT. 1884.—The 104th meeting was held at 61 Sacramento St., Cambridge, 10 Oct. 1884. The meeting was called to order at 8 p. m. In the absence of the president, Mr. R. Hayward was chosen chairman.

The secretary announced the withdrawal from the club of Mr. F. C. Bowditch, of Brookline, Mass.

Dr. H. A. Hagen made some inquiries in regard to the condition and accessibility of the library of the Club, and offered some

suggestions in regard to its management. After considerable discussion it was decided to refer the matter to the Executive committee.

Mr. B. P. Mann presented (through the secretary) a communication upon "Food-plants of *Pulvinaria innumerabilis*." [Printed in *Psyche*, Oct.-Dec. 1884, v. 4, p. 224.]

Dr. G. Dimmock showed a large larva of some species of *oestridae* (? *Cuterebra emasculator*), which had been sent to him by Mr. Leroy H. Sykes, of Suffield, Conn. This larva was taken by Mr. Sykes, about 20 Sept. 1884, from beneath the skin of a chip-squirrel (*Tamias striatus*) just at the right of the median ventral line near the umbilicus. Mr. Sykes thinks the squirrel was a castrated male.

Dr. H. A. Hagen commented upon and read some notes from a manuscript journal of Christoph Zimmermann, chiefly concerning the coleopterist Dr. F. E. Melsheimer and his relatives. Zimmermann, who came to Philadelphia in 1832, later visited Melsheimer at his home in Hanover, Pa., and describes his visit. [See *Canadian entomologist*, Oct. 1884, v. 16, p. 191-197.]

14 Nov. 1884.—The 105th meeting was held at 19 Brattle St., Cambridge, 14 Nov. 1884, the president, Mr. S. H. Scudder in the chair.

The secretary gave notice of the withdrawal from the club of Prof. E. L. Mark, of Cambridge, Mass.

Dr. H. A. Hagen alluded to some interesting points in the histology of the rectal muscles of a lepidopterous larva, recently brought to light by Rev. F. T. Hazlewood, of Lynn, Mass.

Mr. S. H. Scudder exhibited a piece of leather-like fabric produced by the larvae of some species of Mexican lepidoptera; and also showed seed-capsules of a species of *Pelargonium*, which were perforated by some insect in escaping from them.

Mr. S. H. Scudder exhibited a specimen of a carboniferous arachnid (*Geralinura carbonaria*) recently discovered at Mazon Creek.

Illinois, which was of interest because it was the first recorded instance of a fossil of the order to which it belongs,—the *pedipalpi*. It was described in June last in the Proceedings of the American academy of arts and sciences. Curiously enough, only nine days later, another species of the same genus, from Rakowitz, Bohemia, was described by Kusta under the name *Thelyphonus bohemicus*, in a paper in the Transactions of the Bohemian academy, which has just reached this country. This adds still another to the already frequent instances of the occurrence of the same generic type of arthropods in the carboniferous deposits of Europe and America.

Dr. H. A. Hagen made some remarks in regard to swarming of *Atropos divinatorius* in houses.

12 DEC. 1884.—The 106th meeting was held at 19 Brattle St., Cambridge, 12 Dec. 1884, the president, Mr. S. H. Scudder in the chair.

Mr. S. H. Scudder made some remarks upon a fossil beetle from Ontario, Canada, and upon a fossil scorpion from the silurian. This scorpion had been mentioned by Lins-tröm in a letter to a friend in this country, and an extended notice of it will be prepared in conjunction with Thorell. This discovery is important, as it places the origin of the *arachnoidea* back in the silurian, and because of its showing further peculiar characters which may ally it to the *merostomata*.

Dr. G. Dimmock showed pieces of the excrement of the larva of *Sphinx drupiferarum*, which are often of excessive length in proportion to their diameter, in comparison with the excrement of other *sphingidae*. This prolongation of the excrement of the larva of this species is coordinate with a prolongation of the part of the larva behind the "caudal horn." Dr. Dimmock also exhibited excrement of an undetermined larva which feeds on *Pinus strobus*; the excrement consisted of pieces, each made up of three spheroids arranged in a straight line.

Mr. S. H. Scudder reviewed a paper on fossil insects, mostly cockroaches, published by Moritz Kliver, in *Palacontographica* for 1883, under the title "Ueber einige neue blattinarien-, zwei dictyoneura- und zwei arthropleura-arten aus der Saarbrucker steinkohlenformation."

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Anderson, T. J. The paucity of neuropterists. (*Entomologist*, May 1882, v. 15, p. 117-118.)

Some reasons why there are so few students of neuroptera. *G: D.* (3591)

Andrews, W: Valentine. The cynthia silkworm. (*Amer. nat.*, Aug. 1868, v. 2, p. 311-320.)

Discusses the insects which have been mentioned or figured as [*attacus*] *cynthia*, and says, "the insect I am writing about is the one figured, tolerably well, in Duncan's Exotic moths, Plate 14, fig. 1." Describes briefly the egg, four larval stages, and cocoon of this species, which feeds on *ailanthus*, and discusses its value in sericulture. *G: D.* (3592)

Andrews, W: Valentine. Ravages of the *alypia octomaculata*. (*Amer. nat.*, Feb. 1869, v. 2, p. 666-667.)

Reprint, with slight omissions, in C: V. Riley's "Insects injurious to the grape-vine. No. 6" (*Amer. entom.*, Mch. 1870, v. 2), p. 151-152.

Notice of a grape-vine in New York city from which the leaves were entirely stripped by larvae of *alypia octomaculata*. *G: D.* (3593)

Annual meeting of the Entomological club of the American association for the advancement of science. (*Can. entom.*, 1878, v. 10: Sep. [Oct.], p. 170-178; Oct. [Nov.], p. 190-192.) [*Rec.*, 1348.]

Minutes of the meetings of the Entomological club of A. A. S., held 20-21 Aug. 1878, at St. Louis, Mo.; annual address of the president [J. A. Lintner]; proposal of amendment of constitution; election of officers; communications and discussions.

Contents further analyzed under following captions:—ENTOMOLOGICAL CLUB [etc.].—President. 1878. Annual address [*Rec.*, 3650].—GROTE, A. R. and WETHERBY, A. G. [Exhibition of moths, and on the number of broods of certain bombycid moths] [*Rec.*, 3659].—SMITH, Emily A., et al. [On the life history of *Icanium acerivorticis*, and on means of destroying this and similar insects] [*Rec.*, 3670].—RILEY, C: V. [Abstracts of some papers proposed to be read to the association] [*Rec.*, 3667].—LINTNER, J. A., et al. [On the collecting of noctuid moths by "sugaring," and on devices for collecting] [*Rec.*, 3663].—SMITH, Emily A. [Damage done to oaks by *argyrolepta quercifoliaria*] [*Rec.*, 3669].—[On instinct or reason displayed by insects] [*Rec.*, 3662]. *B: P. M.* (3594)

Anthony, A: Cox. *Hydrophilus triangularis* at Swampscott, Mass. (*Journ. Bost. zool. soc.*, April 1882, v. 1, p. 26.)

Records the capture of *hydrophilus triangularis* at Swampscott, Mass. *R: H.* (3595)

Anthony, A: Cox. New England *philampeli*. (*Journ. Bost. zool. soc.*, April 1882, v. 1, p. 18-19.)

Gives a brief account of the life-history of species of *philampelus*. *R: H.* (3596)

Arnhart, Ludwig. [Ein secundärer sexualcharakter von *acherontia atropos*.] (*Verhandl. k.-k. zool.-bot. gesells. in Wien*, 1879, bd. 29; Sitz.-ber., p. 54-55, fig.)

Describes and figures an evaginable organ, of doubtful function, at the sides of the first two abdominal segments of the male of *acherontia atropos*. *G: D.* (3597)

Ashmead, W: Harris. *Antigaster mirabilis* in Florida. (*Amer. entom.*, June 1880, v. 3, n. s., v. 1, p. 152, 5 cm.)

Antigaster mirabilis raised from eggs of *microcentrum retineræ* in Florida; comparison of *aphelinus* sp. with figure of a *mytilaspidis*. *B: P. M.* (3598)

Ashmead, W: Harris. Mite preying on orange scale. (*Amer. entom.*, Apr. 1880, v. 3, n. s., v. 1, p. 106-107, 13 cm.)

Description of eggs, immature stages and habits of *tyroglyphus glaverii*, which preys upon *coccidae* on leaves of *citrus*. *B: P. M.* (3599)

Ashmead, W: Harris. On the red or circular scale of the orange, *chrysomphalus ficus* Riley ms. (*Amer. entom.*, Nov. 1880, v. 3, n. s., v. 1, p. 267-269, 67 cm., fig. 146.)

Rev. [by C: V. Riley], entitled "New species of scale insects." (*op. cit.*, p. 275-276, 12 cm.)

Superficial descriptions of egg, larva, and female scale of *chrysomphalus ficus*, with references to the literature, remarks on the first appearance of this insect in Florida, on its probable origin and spread, its food-plants, and natural history, and means against it; figure of infested leaf of *citrus*. *B: P. M.* (3600)

- Austin, E: Payson.** Collecting *stylopidæ*. (Journ. Bost. zool. soc., April 1882, v. 1, p. 12-13.)
Describes a day's collecting of *stylopidæ*, at Readville, Mass. The males of *æneus* far outnumber the females. *R. H.* (3601)
- Austin, E: Payson.** Notes on collecting certain *buprestidæ*. (Journ. Bost. zool. soc., Oct. 1882, v. 1, p. 45-46.)
Habitats of and modes of collecting *buprestidæ*. *G: D.* (3602)
- Austin, E: Payson.** [Use of air-bubbles carried by water-beetles.] (Can. entom., Sep. 1879, v. 11, p. 176.)
Reply to an inquiry by J: G. Morris as to the purpose served by the globule of air which certain water-beetles carry with them when they dive; method of retention of this bubble; its gradual disappearance supposed to be due to its inhalation by the insect. *B: P. M.* (3603)
- Austin, Mrs. R. M.** *Darlingtonia californica*. Torr. (Bot. gazette, Aug. 1878, v. 3, p. 70-71, 6 cm.)
Notes the presence of large numbers of carnivorous larvae in the pitchers of *darlingtonia californica*, both in summer and winter. *W: T.* (3604)
- Bacon, W. D.** Season of 1816. (Memoirs Phil. soc. promot. agric., 1818, v. 4, p. 219.)
Means against *cecidomyia destructor*. *B: P. M.* (3605)
- Bailey, James Spencer.** [Noctuid moths coming to sugar and decomposing animal matter.] (Can. entom., Nov. 1879, v. 11, p. 203-204.)
Reply to inquiry by A: R. Grote whether *ecucullia* ever comes to "sugar"; capture of *ecucullia* and *plusia* "at sugar"; noctuid moths found feeding on decomposing animal matter, especially on partially decomposed deer hides. *B: P. M.* (3606)
- Balding, G:** On the urticating properties of the hairs of *liparis chrysoirrhæa*. (Entomologist, Nov. 1884, v. 17, p. 256-257.)
Describes poisonous effects of hairs of chrysalis of *liparis chrysoirrhæa* on the skin. *G: D.* (3607)
- Barbier, Fr.** Éducation des larves de dytiscides. (Feuille des jeunes naturalistes, June 1883, an. 13, p. 103.)
Mode of rearing larvae of *dytiscidæ*. *G: D.* (3608)
- Barbour, James.** Cultivation of wheat. (Amer. farm., 17 Dec. 1819, v. 1, ed. 3, p. 301-302, 84 cm.)
"The two principal enemies to wheat are the hessian fly and the smut;" discussion of these; hessian fly [*cecidomyia destructor*] first appeared in this locality in 1798; "Lawler" wheat is proof against it. *B: P. M.* (3609)
- Bargagli, Piero.** Note intorno alla biologia di alcuni coleotteri. (Bull. soc. entom. ital., 1884, anno 16, p. 92-96.)
Pinus fur obtained from the nest of *tespa crabro*; notes on other beetles belonging solely to the Europe; an fauna. *G: D.* (3610)
- Barlow, T:** *Atropis pulsatorius*. (Amer. Journ. agric. and sci., Oct. 1847, v. 6, p. 195-196.)
Direct testimony that *atropis pulsatorius* makes a tapping noise. *B: P. M.* (3611)
- Barnard, W: Stebbins.** *Bucculatrix coconis*. (Amer. entom., Mch. 1880, v. 3, n. s., v. 1, p. 76, 7 cm.)
Letter from "W. S. B.," with note [by C: V. Riley]; hibernation of *bucculatrix pomifoliella*; situations in which its cocoons are spun. *B: P. M.* (3612)
- Barnard, W: Stebbins.** *Campodea fragilis* Meinert. (Amer. entom., Aug. 1880, v. 3, n. s., v. 1, p. 199, 22 cm., fig. 104-105.)
Occurrence of *campodea fragilis* and *degeeria lanuginosa* at Ithaca, N. Y.; food-habits and systematic position of the former; figures of both species. *B: P. M.* (3613)
- Barnard, W: Stebbins.** The cotton worm, (Our continent, 22 Mch. 1882, v. 1, p. 93-116 cm., 1 fig.)
Importance of the ravages of *aletia argillacea* and difficulty of preventing them; habits of the larva and of its parasites, especially of *tachina aletia*; course of transformations of the *aletia*; figures of larva, pupa and imago and of injured cotton plant; habits and migrations of the imago of the *aletia*; improvements in devices for the application of poisons to the plants. *B: P. M.* (3614)
- Barnard, W: Stebbins.** Dominican case-bearer. (Amer. entom., Sep. 1880, v. 3, n. s., v. 1, p. 227, 9 cm., fig. 118.)
Food-habits of *coccinoptera dominicana*; figures of eggs, larva, imago, larva-case and anatomical details of this species. *B: P. M.* (3615)
- Barnard, W: Stebbins.** European tussock-moth. (Amer. entom., Mch. 1880, v. 3, n. s., v. 1, p. 77, 8 cm.)
Ravages of *orgyia antiqua* and of "canker worms" at Ithaca, N. Y., in 1879; description of egg-mass of the *orgyia*; no cocoons of males discovered. *B: P. M.* (3616)
- Barnard, W: Stebbins.** [Habits of *phymata crosa*.] (Can. entom., Oct. 1879, v. 11, p. 196.)
Carnivorous propensities of *phymata crosa*; *pieris rapae* killed by it; habitation of the insect. *B: P. M.* (3617)
- Barnard, W: Stebbins.** Notes on the development of a black-fly, *simulium*, common in the rapids around Ithaca, N. Y. (Amer. entom., Aug. 1880, v. 3, n. s., v. 1, p. 191-193, 94 cm., fig. 103.)
Description of eggs, larva, pupa and imago of *simulium* sp.; figures of eggs; habits of larvae of this species and of imagos of the genus; method of raising larvae of this species in confinement. *B: P. M.* (3618)

Barnard, W: Stebbins. Parasitic rove-beetle: *aleochara anthomyiae*, Sprague. (Amer. entom., Aug. 1880, v. 3, n. s., v. 1, p. 199-200, 13 cm.)

Occurrence and habits of a beetle alleged to be *aleochara anthomyiae*, at Ithaca, N. Y. B: P. M. (3619)

Barnard, W: Stebbins. Parthenogenesis in *orygia antiqua*. (Amer. entom., Sep. 1880, v. 3, n. s., v. 1, p. 227, 6 cm.)

Statement of conclusions drawn from finding many cocoons of the female and none of the male of *orygia antiqua* in winter and spring; this species believed to have no enemies, to be perfectly fitted to withstand the climate [at Ithaca, N. Y.], and to reproduce parthenogenetically. B: P. M. (3620)

Barrett, C: Golding. Notes on British *pterophoridae*. (Entom. mo. mag., Jan. 1882, v. 18, p. 177-180.)

Includes notes upon *platyptila bertrami* and *pterophorus monodactylus*, both American species. G: D. (3621)

Bassett, Homer Franklin. Arrangement of N. A. *cynipidae* by Dr. Mayr. (Amer. nat., Apr. [22 Mch.] 1882, v. 16, p. 329-330.) (RILEY, C: V. Entomology . . . [Apr. 1882], p. 329-330.)

Review of [author's] "List of North American *cynipidae*" (*op. cit.*, Mch. [24 Feb.] 1882, p. 246) [Rec., 3356]; Mayr enumerates in his list probably less than half the North American species of *cynipidae*; geographical distribution of the genera mentioned; note [by C: V. Riley] on the value of this list, which will replace, so far as it embraces the North American species, that given in C: R. Osten Sacken's "Contributions to the natural history of the *cynipidae* of the United States . . . Article 4th" (Proc. entom. soc. Philad., May 1875, v. 4) p. 379-380. B: P. M. (3622)

Bassett, Homer Franklin. [Former injuries by *pissodes strobi* at Waterbury, Conn.] (Can. entom., Sep. 1879, v. 11, p. 176-177.)

Finus strobis greatly injured by *pissodes strobi* at Waterbury, Conn., from 1864 to 1869, but very little since. B: P. M. (3623)

Bates, H: Walter. Contributions to an insect fauna of the Amazon valley. Lepidoptera: *heliconidae*. (Trans. Linn. soc. Lond., 1862, v. 23, p. 495-566, pl. 55-56.)

Extr. [from p. 509], entitled, "Mimetic forms among insects." (Amer. nat., May 1867, v. 1, p. 155-156.)

Classification, relationship, systematic position, and habits of species of *heliconidae*; discusses mimicry and its causes in these and other insects; freedom of the *heliconidae* from attack on account of their odor given as a reason why they are mimicked by other insects; discusses reasons for mimicry between species of *heliconidae* themselves; notes on the species of *heliconidae* of the Amazon valley; describes the new genera *callithomia*, *napeogenes*, and *melinaea* (of the *heliconidae*), and *ithomeis* (of the *erycinidae*). G: D. (3624)

Beling, Theodor. Beitrag zur biologie einiger käfer aus den familien *dasyllidae* und *parnidae*. (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1882, bd. 32; Abh., p. 435-442.)

Describes larva and pupa of *elodes coarctatus*, *e. serricornis*, *potaminius substriatus*, and *parnus auriculatus*; and pupa of *elmis volkmari* and *e. aeneus*. G: D. (3625)

Berg, Carlos. Analecta lepidopterologica. Contribuciones al estudio de la fauna de la República Argentina y otros países americanos. (Anales Soc. cient. argent., 1882, v. 14, p. 275-288.)

Separate, Buenos Aires, 1882. t.-p. cover, 16 p. [t.-p., p. 275-288], 25 × 16, t 18.5 × 10.5.

Synonymical and other notes on species of *heterocera*; describes 7 new species, viz.: *ocetionis platensis*, *mi-mallo cordubensis*, *chloridea molochitina*, *aconitia venusta*, *erastria nubila*, *trochisa (thalpochares) margaritae*, and *plusia bonaerensis*, all from South America. Some species of North American *noctuidae* are noted from South America. G: D. (3626)

Berg, Carlos. Miscellanea lepidopterologica. Contribuciones al estudio de la fauna argentina y países limítrofes. (Anales Soc. cient. argent., 1883, v. 15, p. 151-169.)

Separate, Buenos Aires, 1883. t.-p. cover, 21 p. [t.-p., p. 151-169], 25 × 16, t 18.5 × 10.5.

Synonymical and other notes on species of *heterocera* (all exclusively South American except *cindaphia bicoloralis*, which also occurs in North America); describes new species, viz.: *sphinx baruta*, *psoloptera meisteri*, *dirphia caisa*, *hyperchiria lama*, *micraticus fulviventris*, *coenopeta fusca*, *chadaca missionum*, *rhopalodes argentina*, *tomopteryx viduaris*, and *lagynopteryx valdiviana*, all from South America. G: D. (3627)

Bethune, C: James Stewart, et al. [Food-habits of larvae of Colorado potato beetle and other insects.] (Can. entom., Nov. 1879, v. 11, p. 202.)

Remarks by C: J. S. Bethune, W: S. Barnard, J. A. Lintner, W: Saunders, S: H. Scudder and J: H. Comstock, on the feeding of larvae of *doryphora decemlineata* on *asclepias* and other plants and on one another, and on the cannivorous propensities of larvae of *noctuidae* and *lycaenidae*, especially of *heliopsis armigera*; phytophagic variation of *doryphora decemlineata*. B: P. M. (3628)

Blaney, Dwight. Entomological notes from Laconia, N. H. (Ornithologist and oologist, Aug. 1884, v. 9, p. 101-102, 20 cm.)

List of butterflies taken in Laconia, N. H., with notes on the habits of a few species. G: D. (3629)

Bowditch, F: C. Notes on certain coleoptera. (Journ. Bost. zool. soc., July 1882, v. 1, p. 27-28.)

Describes briefly the transformations of *eucrada humeralis*; records the hibernation of several *buprestidae* in the loose bark at the foot of the trees and mentions the liking for sugar exhibited by *purpuricenus humeralis*. R. H. (3530)

Brauer, Friedrich. Biologisches über blutsaugende insecten mit besonderer berücksichtigung ihrer mundtheile. (Schr. d. vereins zur verbreitung naturw. kenntnisse in Wien, 1880-1881, bd. 21, p. 255-273.)

Habits and mouth-parts of *fulicidae*, *culi*, *simulium*, *phlebotomus*, *tabanidae*, *stomoxys*, *glossina*, *asilus*, *cimex* and *pediculus*; on phthiriasis. *G: D.* (3631)

Brunner von Wattenwyl, Carl. [Neues organon bei acridiern.] (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1879, bd. 29; Sitz.-ber., p. 26-27.)

Notice of an organ of doubtful function on the femur of certain acrididae. *G: D.* (3632)

Brush, E. F. Ameisen gegen skorbut. (Deutsch-amer. apotheker-zeit., 1 Apr. 1883, jahrg. 4, p. 49, 7 cm.)

Wood-choppers in Maine eat masses of black ants as a remedy for scurvy; a concentrated tincture of the ants, or other preparation of formic acid, useful for the same purpose. *B: P. M.* (3633)

Buckler, W: Description of the larva, &c., of *hydroecia nictitans*. (Entom. mo. mag., Feb. 1882, v. 18, p. 195-197.)

Describes larva and pupa of *hydroecia nictitans*. *G: D.* (3634)

Buckler, W: Some points in the natural history of *papilio machaon*. (Entom. mo. mag., April 1882, v. 18, p. 244-249.)

Account of the egg and different larval stages of *papilio machaon*. *G: D.* (3635)

Buckton, G: Bowdler. Note on the action of potassium cyanide on organic colouring matter. (Entom. mo. mag., Sept. 1884, v. 21, p. 82.)

The mode by which potassium cyanide acts in killing insects and in changing their colors. *G: D.* (3636)

Bush, Isidor. Phylloxera galls: inconstancy in their appearance. (Amer. entom., Sep. 1880, v. 3, n. s., v. 1, p. 226, 6 cm.)

Apparent change in the preferences of *phylloxera vitifoliae* for varieties and species of *vitis* on which to produce its galls. *B: P. M.* (3637)

Butler, Arthur Gardiner. Descriptions of some apparently new species of arctiidae from North America. (Entom. mo. mag., Nov. 1881, v. 18, p. 135-136.)

Describes *arctia douglai*, *a. ochreata*, and *a. rhoda*, 3 new species. *G: D.* (3638)

Cameron, P. On parthenogenesis in the *tenthredinidae*. (Entom. mo. mag., Oct. 1884, v. 21, p. 103-104.)

Gives a list of the thirteen British species of *tenthredinidae* known to be parthenogenetic. *G: D.* (3639)

Cameron, P. On a simple method of mounting objects for microscopic examination. (Proc. nat. hist. soc. Glasgow, 1880-1881, v. 5, pt. 1, p. 47.)

Mode of mounting specimens dry or in Canada balsam in pieces of cardboard so as to be pinned in a collection of insects; mode of drying small larvae for preservation in collections. *G: D.* (3640)

Candèze, Ernest. [La *doryphora decemlineata*.] (Ann. soc. entom. Belg., 1875, v. 18; Comptes-rendus, p. 12-17.)

Separate, entitled, "La *doryphora decemlineata*. Lecture faite à la séance du 6 février 1875, de la Société entomologique de Belgique." [Bruxelles, 1875.] 6 p., 25 X 16, t 18 X 10.5.

Opposes the prohibition of importation of American potatoes into Belgium, claiming that there is little to be feared in Europe from *doryphora*. *G: D.* (3641)

Candèze, Ernest. La *doryphora decemlineata*. Lecture faite à la séance du 6 février 1875, de la Société entomologique de Belgique. [Bruxelles, 1875.] 6 p., 25 X 16, t 18 X 10.5.

Separate of author's "[La *doryphora decemlineata*]" (Ann. soc. entom. Belg., 1875, v. 18; Comptes-rendus, p. 12-17) [Rec., 3641]. *G: D.* (3642)

Carrington, J: T. Sallows. (Entomologist, April 1883, v. 16, p. 85-89.)

Modes of collecting the insects that frequent the catkins of sallow [*salix*] in England. *G: D.* (3643)

Chapman, T. Note on a dark variety of *cicindela campestris*. (Entom. mo. mag., April 1867, v. 3, p. 251.)

Note upon the capture of *cicindela campestris* var. *funebis*, in Scotland. *G: D.* (3644)

Christy, Robert Miller. Memoranda on insects in their relation to flowers. (Entomologist, 1883, v. 16: July, p. 145-150: Aug., p. 177-181.)

Details of observations upon the methodic habits of insects—principally fossorial hymenoptera—when visiting flowers. *G: D.* (3645)

Edwards, H: The caterpillar pest. An interesting communication from a well known actor and entomologist. (Evening telegram [N. Y.], 3 July 1883, v. 17, no. 5543, p. 3, col. 2, 25 cm.)

Ravages of and means against *orgyia leucostigma* in New York city. *B: P. M.* (3646)

Edwards, W: H: Description of the preparatory stages of *papilio philenor*, Linn. (Can. entom., Jan. 1881, v. 13, p. 9-14.)

Describes egg, larva, and chrysalis of *papilio philenor*. See also C. V. Riley's "Notes on *papilio philenor*" (Amer. nat., April [25 Mch.] 1881, v. 15, p. 327-329) [Rec., 3668]. *G: D.* (3647)

Edwards, W: H: On the length of life of butterflies. (Can. entom., Oct. 1881, v. 13, p. 205-214.)

Paper read before the American association for the advancement of science, at Cincinnati, 19 Aug. 1881, containing many notes on the longevity of diurnal lepidoptera. *A. K. D.* (3648)

Edwards, W: H: List of species of the diurnal lepidoptera of America north of Mexico. Boston, *Houghton, Mifflin & Co.*, 1884. t.-p. cover + t.-p. + adv. p. + 12 p. [without pagination], 32 × 25, t 19.5 × 14.5.

A list of the 612 species of diurnal lepidoptera of America north of Mexico, with their varieties.

G: D. (3649)

Entomological club of the American association for the advancement of science — *President, 1878* (Joseph Albert Lintner). Annual address. (Can. entom., Sep. [Oct.] 1878, v. 10, p. 171-176.) [Rec., 1348.]

Increase in the number of known species of North American insects within forty years; progress made and making in the knowledge of the life-histories of our insects and in the extent and value of entomological collections and of entomological study and the publication of its results; the encouragement of entomological investigations by the United States government; commendation of biological investigations.

B: P. M. (3650)

Fauvel, Albert. Annuaire entomologique pour 1873. Caen, 1873. t.-p. cover, t.-p., 2 + 122 p., 15 × 10, t 11 × 7. fr. 1.50.

Contents:—Calendar, with blanks for memoranda; address-list of coleopterists of France, Belgium, Holland, Rhine provinces and Switzerland; lists of entomological societies and periodicals in Europe; bibliography, new species and synonymy, captures, excursions, habits of species, and other notes mostly on coleoptera; modes of collecting and preserving insects; necrology; exchanges desired and books for sale. *G: D.* (3651)

Fauvel, Albert. Annuaire entomologique pour 1874. 2e année. Caen, 1874. t.-p. cover, 140 p., 15 × 10, t 11 × 7. fr. 1.75.

Contents of similar nature to those of preceding year [Rec., 3651]. *G: D.* (3652)

Fauvel, Albert. Annuaire entomologique pour 1875. 3e année. Caen, 1875. t.-p. cover, t.-p., 140 p., 15 × 10, t 11 × 7. fr. 1.75.

Contents of similar nature to those of preceding years [Rec., 3651-3652]. *G: D.* (3653)

Fauvel, Albert. Annuaire entomologique pour 1876. 4e année. Caen, 1876. t.-p. cover, t.-p., 150 p., 15 × 10, t 11 × 7. fr. 1.75.

Contents of similar nature to those of preceding years [Rec., 3651-3653]. *G: D.* (3654)

Fauvel, Albert. Annuaire entomologique pour 1877. 5e année. Caen, 1877. t.-p. cover, 148 p., 15 × 10, t 11 × 7. fr. 1.75. *Contents* of similar nature to those of preceding years [Rec., 3651-3654]. *G: D.* (3655)

Fauvel, Albert. Annuaire entomologique pour 1878. 6e année. Caen, 1878. t.-p. cover, 137 p., 15 × 10, t 11 × 7. fr. 1.75. *Contents* of similar nature to those of preceding years [Rec., 3651-3655]. *G: D.* (3656)

Fauvel, Albert. Annuaire entomologique pour 1879. 7e année. Caen, 1879. t.-p. cover, 130 p., 15 × 10, t 11 × 7. fr. 1.75. Notice. (Bericht...d. entom., 1879, p. 111.)

Rev. (Entom. nachrichten, 1 Sept. 1879, jahrg. 5, p. 233.)

Contents of similar nature to those of preceding years [Rec., 3651-3656]. *G: D.* (3657)

Fauvel, Albert. Annuaire entomologique pour 1880. 8e année. Caen, 1880. t.-p. cover, 139 p., 15 × 10, t 11 × 7. fr. 1.75.

Notice, by [F.] K [atter]. (Entom. nachrichten, 1880, jahrg. 6; Lit. rev., p. 49-50.)

Contents of similar nature to those of preceding years [Rec., 3651-3657]. *G: D.* (3658)

Grote, A: Radcliffe and Wetherby, Albert Gallatin. [Exhibition of moths, and on the number of broods of certain bombycid moths.] (Can. entom., Sep. [Oct.] 1878, v. 10, p. 176.) [Rec., 1348.]

Exhibition, by A: R. Grote, of some bombycid moths from Georgia, specifically named; *actias lina*, *samia cecropia*, *telega polyphemus* and *saturnia io* double-brooded in southern United States, but *citheronia regalis* only single-brooded there; statement, by A. G. Wetherby, that many of the above-named moths are also double-brooded in north-western [northern central] United States. *B: P. M.* (3659)

Harrington, W: Hague. List of Ottawa coleoptera. (Trans. Ottawa field-nat. club, 1883-1884 [Oct. 1884], v. 2, no. 1, p. 67-85.)

List of 1003 species of coleoptera belonging to 524 genera and representing 67 families which were taken in or near Ottawa, Ontario. *G: D.* (3660)

Harrington, W: Hague, **Fletcher, James, and Tyrrell, J. B.** Report of the entomological branch for the season of 1883. (Trans. Ottawa field-nat. club, 1883-1884 [Oct. 1884], v. 2, no. 1, p. 134-140.)

Notes on numerous species of insects from Ottawa, Ontario, and vicinity; notes are chiefly upon hymenoptera, lepidoptera, diptera, coleoptera and arachnida. *G: D.* (3661)

Instinct or reason displayed by insects (On).] (Can. entom., Sep. [Oct.] 1878, v. 10, p. 192.) [Rec., 1348.]

"Instinct and reason differ in degree and not in kind."
B: P. M. (3662)

Lintner, Joseph Albert, et al. [On the collecting of noctuid moths by "sugaring", and on devices for collecting.] (Can. entom., Sep. [Oct.] 1878, v. 10, p. 191-192.) [Rec., 1348.]

Remarks, by J. A. Lintner, on the successful result of attempts to collect *noctuidæ* by the process known as "sugaring"; by A. G. Wetherby, on the question of the rarity of certain species of insects; and by Emily A. Smith, E. B. Reed and J. A. Lintner on devices by which collecting-bottles might be handled conveniently, and on the proper use of lanterns. B: P. M. (3663)

Moseley, H: Nottidge. On the sound made by the death's head moth, "*acherontia atropos*." (Nature, 20 June 1872, v. 6, p. 151-153, 115 cm., 1 fig.)

Rev., by A. W. B. [ennett], entitled "The sound produced by the death's head moth." (Amer. nat. Mch. 1873 v. 7, p. 173-174.)

Outline of previous researches to discover the mode of sonification of *acherontia atropos*; experiments by which the author is led to believe that "the sound is produced by expiration through the proboscis," the air being expelled from a dome-shaped cavity in the upper part of the head. G: D. (3664)

Packard, Alpheus Spring, jr. The hessian fly. Habits and natural history. (Amer. entom., May 1880, v. 3, n. s., v. 1, p. 118-121, 127 cm., fig. 46.)

Advance reprint, with slight changes and omissions, of section entitled "Habits of the hessian fly" in author's "The hessian fly, its ravages" . . . (Bull. no. 4 U. S. entom. comm.) [Rec., 2207], p. 12-15, pl. 1; seasons and number of broods of *cecidomyia destructor*; method of oviposition; habits of larva. B: P. M. (3665)

Packard, Alpheus Spring, jr. The hessian fly. . . (Amer. entom., June 1880, v. 3, n. s., v. 1, p. 140-141, 44 cm.)

Advance reprint of section entitled "Summary of the habits of and remedies against the hessian fly" in author's "The hessian fly, its ravages" . . . (Bull. no. 4 U. S. entom. comm.) [Rec., 2207], p. 38-39, and of paragraph entitled "Probable limits of the hessian fly" (l. c., p. 38); summary of the life-history of *cecidomyia destructor*; its parasites, present and prospective geographical distribution, and means it. B: P. M. (3666)

Riley, C: Valentine. [Abstracts of some papers proposed to be read to the association.] (Can. entom., Sep. [Oct.] 1878, v. 10, p. 177-178.) [Rec., 1348.]

Hornia is parasitic on *bombus*, and differs in several points from other *meloidæ*; application of vernacular names to larva and imago of *corydalus cornutus*; objections to A. S. Packard, jr's explanation of the manner in which *bombycidae* issue from their cocoons. B: P. M. (3667)

Riley, C: Valentine. Notes on *papilio philenor*. (Amer. nat., Apr., [25 Mch.] 1881, v. 15) (RILEY, C: V. Entomology. . . [Apr. 1881]), p. 327-329, fig. 1-3.

Describes egg and newly-hatched larva of *papilio philenor*; figures imago, larva and pupa of this species; its food-plant (*aristolochia*) and geographical distribution, and its occurrence in swarms. G: D. (3668)

Smith, Emily Adella. [Damage done to oaks by *argyrolepis quercifoliaria*.] (Can. entom., Sep. [Oct.] 1878, v. 10, p. 192.) [Rec., 1348.]

Statement that oak trees in Wisconsin and Illinois are injured by the larvae of *argyrolepis quercifoliaria*. B: P. M. (3669)

Smith, Emily Adella, et al. [On the life history of *lecanium aceris-corticis*, and on means of destroying this and similar insects.] (Can. entom., Sep. [Oct.] 1878, v. 10, p. 176-177.) [Rec., 1348.]

Abstract of summary of life history of *lecanium aceris-corticis*, by E. A. Smith, with remarks by T. H. Bassett and C. V. Riley, on the history of *lecanium aceris-corticis*, the mode of its propagation, and the means of its destruction, with a list of the plants, trees and shrubs, to which it is destructive of *coccidæ*. B: P. M. 37

Suffrian, E. Synonymische miscellaneen. 30. (Entom. zeitung. . . Stettin, t867, bd. 28, p. 445-449.)

Compares the varieties of *cicindela sexguttata* with those of *c. campestris*, with especial reference to the elytral markings. G: D. (3671)

Townsend, C: H: Tyler. Further remarks upon the variation of the elytral markings in *cicindela sex-guttata*. (Can. entom., July 1884, v. 16, p. 125-127.)

Additional remarks in continuation of the author's "On the variation of the elytral markings in *cicindela sexguttata*." (Can. entom., Nov. 1883, v. 15, p. 205-208) [Rec., 3559]. G: D. (3672)

Trelease, W: The fertilization of *aquilegia vulgaris* [Rec., 2202].

Rev., by T: Meehan, entitled "Fertilization of *aquilegia*." (Amer. nat., Feb. [25 Jan.] 1881, v. 15, p. 134-135, 4 cm.) H: T. (3673)

Trouvelot, L: The American silk worm. (Amer. nat., 1867, v. 1: Mch., p. 30-38; Apr., p. 85-94; May, p. 145-149; pl. 5-6.)

Description and figures of different stages of *teia polyphemus*, with an account of its life-history; its mode of exit from cocoon, expanding of wings, oviposition, hatching, rate of growth and consumption of food, number of molts, mode of molting, food-plants, enemies, power of sight in larva, presence of immature eggs in larva, structure of silk-glands; effect of temperature on pupæ, and of exclusion of air from pupæ; figure of *ophion macrum*, a parasite; processes of silk-culture with this species. G: D. (3674)

ENTOMOLOGICAL ITEMS.

STRAWBERRY PLANTS are damaged in parts of Michigan by *Otiorynchus ligneus*.

WE ARE SORRY to note that *Science record*, which its editor, Mr. J. S. Kingsley, has lately improved in many respects, has suspended publication.

F. MINÀ-PALUMBO, in an article concluded in the October-November numero of *Il naturalista siciliano*, enumerates 301 species of European lepidoptera which feed on oak.

THE ENTOMOLOGICAL club "Iris," in Dresden, has just reawakened to new activity and we are in receipt of numero one of its "Correspondenzblatt" issued for October 1884.

DR. AUGUST WEISMANN of Freiburg has been nominated as successor of Prof. K. T. von Siebold in the University of Munich. Prof. von Siebold has been made an *emeritus*.

AT THE June (1883) meeting of the Linnean society of New South Wales, Mr. Deane exhibited sandstone penetrated by burrows apparently dug by some hymenopterous insect.

A NEW locality reported to be infected by phylloxera is in the vicinity of Caltagirone, in Sicily. The same insect has been found near Linz, a town on the Rhine not far from Coblenz.

DR. W. G. STEVENSON reports, in the Transactions of the Vassar brothers institute, 1883-1884, v. 2, p. 135, a capture of *Papilio turnus* var. *glaucus* at Poughkeepsie, N. Y., in August 1882.

PHYLLOXERA HAS made its appearance in the Pomological institute of Proskau (Silesia). It is hoped, however, that the spread of the disease may yet be prevented.—*Science*, 21 Nov. 1884, v. 4, p. 481.

MISS JENNIE M. ARMS, teacher of natural history in Boston, Mass., read a paper on "Observation lessons on insects," at the fortieth annual meeting of the Massachusetts teachers' association, 29 to 31 December 1884, in Boston, Mass.

ONE COPY of no. 4 of vol 2 of *American entomologist* wanted. Also one copy of C: V. Riley's 6th annual report of the state entomologist of Missouri. Riley's 3d report offered in exchange or for sale. Address, stating price, B: PICKMAN MANN, Washington, D. C.

IN THE meeting of the Entomological society of London, on 1 Oct. 1884, Baron C: R. Osten Sacken communicated "Facts concerning the importation, or non-importation of diptera into distant lands" in which considerable curious information about North American diptera was given.

EXCHANGE OF EUROPEAN AND AMERICAN COLEOPTERA.—Mr. C. F. Lange, of Annaberg, in Saxony, offers to exchange European for American coleoptera, and refers to Mr. John B. Smith, 290 3d avenue, Brooklyn, N. Y., to certify that his specimens are well prepared and correctly named.

MR. S. H. SCUDDER's memoir upon Dr. J: L. LeConte, read before the National academy of sciences, 17 April 1884, published in vol. 11 of the Transactions of the American entomological society and as a separate, contains a fine portrait of Dr. LeConte and an account of the ancestry of his family.

MR. H. DONCKIER DE DONCEEL gives a list of the *anthribidae* described since the publication of Gemminger and Harold's catalog of coleoptera, in the Compte-rendu of the Belgian entomological society for 8 Nov. 1884. Twenty-four new species and ten new genera are accredited to North America.

SANDSTONE HAS been found perforated in all directions and to a considerable depth by an undetermined species of bee in New

South Wales. Mr. J. Norton exhibited specimens of this perforated sandstone, from Springwood, Blue Mountains, at the July meeting of the Linnean society of New South Wales.

MR. A. C. HORNER notes in the *Entomologist* for October 1884 that *Pterostichus melanarius*, an English species, attacks strawberries, and T. H. Hart, in the November numero of the same periodical, among other notes on phytophagic *carabidae*, mentions having seen "three specimens of *Carabus violaceus* disputing possession of a half-rotten apple."

IN A paper read before the Linnean society of New South Wales, Oct. 29 last, Dr. Lendenfeld contests the views of the French physiologists, that the position and movements of the wings of insects are merely the results of the mechanical influence of the resisting air, and gives instances where muscular contraction had been clearly proved.—*Science*, 19 Dec. 1884, v. 4, p. 562.

AT THE June meeting of the Linnean society of New South Wales, Mr. William Macleay exhibited, on behalf of Mr. Wilkinson, "a number of *Helix*-like shells, wound spirally-round the leaf-stalks of a species of Eucalyptus, at Branxton, on the Hunter. These shells, though calcareous, were pronounced not to be the production of any molluscous animal, and the general opinion was that they must be egg-cases of some insect."

MR. JAMES J. WALKER reports, in the *Entomologist's monthly magazine* for Dec. 1884, that he found *Dermestes vulpinus*, *Necrobia rufipes*, *Corynetes violaceus* and *Alphitobius piceus* in amazing abundance in a bone-boiling establishment in Sheppey, England. The first species literally blackened the whitewashed walls of the rooms, and their larvae did much damage by riddling the woodwork of the building with holes in which they pupated.

THE COMPOSITION and properties of the light emitted by insects of the Pyrophore genus form the subject of a paper recently presented to the Paris academy of sciences by Aubert and P. Dubois. The spectrum of the light, examined by the spectroscope, is very beautiful, but destitute of dark bands. When, however, the intensity diminishes, the red and orange disappear, and the green and yellow only remain.—*Science*, 28 Nov. 1884, v. 4, p. 505.

PROF. A. J. COOK read a paper before the Natural-history society of the Michigan agricultural college, on 12 Sept., on extrafloral nectar. "Bees had been noticed to be extensively at work on the heads of grasses. These proved to be covered with the sweetish secretion due to ergot. The honey made from this material was very agreeable to the taste, ranking with the best, while honey made from the secretions of plant-lice is often very poor and disagreeable."

ACCORDING TO *Science* for 21 Nov. 1884 (Bulletin, p. 5), at the meeting of the Trenton natural-history society "Prof. Austin C. Apgar detailed his experiments with naphthalin on *Anthrenus scrophulariac*. Larvae left an infested object, and for two weeks lived in an air-tight case, in vapor so dense that it crystallized on the cover-glass. Even then they only apparently died, for, on removal, one revived and walked away. Herbarium mites were killed in half an hour in a tumbler loosely covered."

THE PRIZE offered by M. Adrien Dollfus for anatomical work on insects (see PSYCHÉ, May 1884, v. 4, p. 175) was divided between Ph. François, of Poitiers, and A. Lameere, of Brussels, whose papers were judged equally worthy of the prize. M. François' paper treated of the anatomy of the larva of *Vanessa polychloros*, and was published, with a plate, in the *Feuille des jeunes naturalistes* for November 1884; Mr. Lameere described the anatomy of the larva of *Lasio-*

campa potatoria, and his article appears in the December numero of the same periodical.

G: D.

MISS MARY H. HINCKLEY, in her "Notes on the peeping frog, *Hyla pickeringii*, Leconte" (Mem. Bost. soc. nat. hist., May 1884, v. 3, no. 10), p. 317, writes in regard to enemies of this species that the tadpoles "are constantly being lessened in number by their enemies, the newts, water beetles, and the larvae of the beetles and dragon flies. On two occasions I have seen a spider (*Dolomedes sexpunctatus*) run along the surface of the water, suddenly dive, seize, and drag out on land a full-grown tadpole of this species; the spider coming out dry, evidently as much at home in as out of water."

IN THE new Hungarian entomological periodical, *Rovartani lapok* (v. 1, p. 171; Resumé, p. 2), Dr. O. Tömösváry records his observations "that two myriapods in captivity, a *Lithobius forficatus* and a *Geophilus foveolatus*, attacked each other with violence but soon withdrew. The latter species, during the attack and retreat, emitted from the extremity of its abdomen a light of bluish violet color, feeble, but nevertheless very perceptible in obscure light. This luminosity was visible scarcely a minute because the shining animal hid itself beneath the leaves at the bottom of its prison."

AT THE October meeting of the Natural science association of Staten Island, Mr. Davis exhibited a specimen of one of our green grasshoppers, *Conocephalus dissimilis*, which he had found without any head, and stridulating while perched upon a blade of grass. When touched by the finger, the insect did not close its wings tightly, as usual, but let them remain far apart. It had evidently not been long decapitated; for, when captured, the muscles in the thorax had their normal appearance. But gradually the tissues dried, and on the third day of its captivity it died without having stridulated again, though every means thought of was

employed to induce it.—*Science*, 7 Nov. 1884, v. 4, p. 448.

THE INVESTIGATIONS of M. Carlet enable him to affirm that the poison-apparatus of the hymenoptera is always composed of two distinct glandular systems, the one with a strongly acid, the other with a feebly alkaline secretion. These two systems unite at the sheath of the sting. The resultant venom is always acid. The action of this venom upon some animals, as rabbits, frogs and certain beetles, is slight, but the domestic fly and the flesh fly are killed immediately by it. The inoculation of a fly with the secretion of one of the glands does not produce death until after a considerable time, but death follows very quickly if the same fly is subjected to a second inoculation, this time with the secretion of the other gland.—*Amer. nat.*, Dec. 1884, v. 18, p. 1270.

ACCORDING to J. Murie's report of the meeting of the Linnean society of London, 7 Feb. 1884, printed in the *Zoologischer anzeiger* for 3 March 1884, "Mr. B. J. Lowne gave an interesting communication embodying his researches on the compound vision of insects. He compares the structures of the simple ocellus with those of the compound ocellus (common in larval insects) and with those of the compound eye. The compound eye according to him is but composed of aggregated compound ocelli, or the latter in the larval insect is merely equivalent to a single segment of a compound eye. He refers to the development of the compound eye and points out that in many larvae during moulting stages the "segregate" retina is finally replaced by another. He describes a deep spindle-like layer in intimate connection with the nervous structures and which he regards as playing an important part in the phenomena of compound vision, rather than that this kind of vision is solely dependent on the number of corneal facets."

MR. WOOD MASON of the Calcutta Indian museum has recently drawn up a report on

those insects from which the tea-gardens of Assam most suffer. He says the tea-bug or 'mosquito-blight,' and the tea-mite or 'red spider,' are the only two insects which are at present known to do such injury as to materially diminish the profits of the owners. Both these insects pass their whole lives on the tea-plant, and have never been found on any other plant. Such, at least, is the result of the most careful investigation. The mite lives in societies on the upper portion of the full-grown leaves, beneath an exceedingly delicate web which it spins for itself as a shelter. It punctures the leaves, and then pumps out the liquid contents of the epidermis. The only remedy which has been discovered to check their ravages, and it has not proved very effectual, is to sprinkle the affected bushes with muddy water. The tea-bug is still more destructive, and particularly to the trees of the milder juice; for those which afford a strong and rasping liquor enjoy an almost complete immunity from its attack. Mr. Wood Mason appends to his report engravings of these destructive creatures.—*Science*, 31 Oct. 1884, v. 4, p. 426.

AT THE meeting of the French entomological society held 23 July 1884, M. G. A. Poujade made the following remarks:

"Prof. Édouard Bureau has stated (Ann. soc. entom. Fr., 1854; Bull., p. 22) that in lepidoptera of the genus *Brephos*, specimens which had been dried six days showed evident spontaneous movements of the genital organs, which continued two days, but toward the last part of the time these movements were only produced when the extremity of the abdomen was touched. I have observed the same peculiarity in a *Rhodocera rhamni*, the extremity of the abdomen still moving when the rest of the insect was perfectly dry.

A few days ago some one gave me a male *Lucanus cervus* which had been killed with vinegar five or six days before; the flabbiness of the joints left no doubt as to the death of the animal,—the penis alone, which was

partly exerted, had very evident movements which lasted two or three days longer.

These facts, as M. Bureau has said, prove the predominance of the genital functions above all other functions, and it is not without interest to compare these observations with another well-known fact, the prolongation of life among insects that have not paired."

AMONG NATURALISTS who have been more or less interested in entomology we have lately noticed announcements of the following deaths: Dr. Alfred Edmund Brehm, born in 1829, in Renthendorf, Germany, where he died 11 Nov. 1884; well-known as the editor of the "Illustrirtes thierleben." Dr. Ernst Carstanjen, professor of chemistry in Leipzig university and lepidopterist, died 13 July 1884, in the forty-ninth year of his age. Auguste Chevrolat, a Parisian coleopterist and author of many entomological papers, died 16 Dec. 1884, in the eighty-sixth year of his age. O. J. Fahraeus, a coleopterist of Stockholm, Sweden, died in that place, 28 May 1884, aged eighty-eight. Leopold Joseph Fitzinger, zoologist, born 13 April 1802, in Vienna, Austria, died 22 Sept. 1884, in Hietzing, near Vienna. Dr. Arnold Förster, professor in Aachen, Germany, and hymenopterist, born 21 Jan. 1810, in Aachen, died 13 Aug. 1884, in the same place. A. Kefenstein, lepidopterist, died 28 Nov. 1884, in Erfurt, Germany. Johann Gottfried Gottlieb Mühlig, lepidopterist, died 12 April 1884, at Frankfurt-a.-Main, Germany, nearly seventy-two years old. Joseph Antoine Maximilian Perty, professor from 1834-1875 in the university at Berne, Switzerland, died at Berne, 8 Aug. 1884, nearly eighty years old. Edmond Tömösváry, a Hungarian naturalist, died 18 Aug. 1884, at Deva. Ernst Wehneke, a merchant in Harburg, Germany, and a specialist in *dytiscidae* and *hydrophilidae*, born 15 March 1835, died 19 Nov. 1883, in Harburg.

Nos. 124-125 were issued 3 Nov. 1884.

PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. Nos. 129-131.

[The numeros for October-December 1884 are Nos. 126-128.]

JANUARY-MARCH 1885.

CONTENTS:

ADVERTISEMENTS	238
THE INSECTS OF BETULA IN NORTH AMERICA— <i>Anna Katherina Dimmock</i>	239-243
SYSTEMATIC POSITION OF THE GENUS APOCERA— <i>Daniel William Coquillett</i>	243-244
THE GEOLOGICAL HISTORY OF MYRIOPODS AND ARACHNIDS— <i>Samuel Hubbard Scudder</i>	245-250
THE DOUBLE ROLE OF THE STING OF THE HONEY-BEE	251-252
PERMANENT MOUNTING OF TRACHEAE OF INSECTS— <i>F. T. Hazlewood</i>	253
PROCEEDINGS OF SOCIETIES—Zoological Society of London—Linnean Society of London	253-254
BIBLIOGRAPHICAL RECORD, no. 3675-3787	255-264
ENTOMOLOGICAL ITEMS	265-268

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

PSYCHE.

THE INSECTS OF *BETULA* IN NORTH AMERICA.

BY ANNA KATHERINA DIMMOCK, CAMBRIDGE, MASS.

My attention was first drawn to the number of insects which feed upon plants of the genus *Betula* when I set out to make a collection illustrating the different stages of insects found on *Betula alba*. I had exhibited stages of 39 determined species, and intended to publish a simple list of these, but so many additions to the list were found later in scattered publications that further notes were added. Finally, after the publication of Dr. G: Dimmock's "Notes on *pterophoridae* of North America,"¹ I determined to put the notes in the form adopted in that article, and to include the American insects of the entire genus *Betula*. The notes have steadily increased in bulk, until they now include 107 determined species. This number would be still further augmented by the determination of several species which I have reared from *Betula alba*. Kaltenbach² gives 270 European birch-feeding insects, and where the same species of insects are found in America I have added them to

this list. Packard³ enumerates only 19 species of American insects from *Betula*. The numerous bibliographical references here included, which were selected from those accumulated in the progress of my work, refer generally to easily accessible works and are not inappropriate in a bibliographical journal like PSYCHE. Most of the citations have been verified,—a few are quoted. For many of them and for the free use of notes I am indebted to my husband, Dr. G: Dimmock. We have for several years reared and studied insects together, and some of the larvae mentioned in this article will be described by him later. My thanks are due further to Prof. C: H: Fernald, Dr. S: W. Williston, and Messrs. S: Henshaw and R. Thaxter, for identifying insects belonging respectively to the microlepidoptera, diptera, coleoptera, and macrolepidoptera.

Quite extended lists of food-plants have been compiled in the case of certain lepidoptera, because these insects are often reared for pleasure, and because an accurate knowledge of food-plants is desirable, even for polyphag-

¹ Psyche, Sept.-Oct. 1882, v. 3, p. 402-404.

² Kaltenbach, J. H. Die pflanzenfeinde aus der classe der insecten. Stuttgart, 1874.

³ Bull. 7, U. S. entom. comm., Washington, 1881.

ous species. Here it might be added that *Betula alba* is very useful in rearing certain polyphagous species, since its leaves remain in good condition for a long time, and are the favorite food-plant of many insects. Certain polyphagous species, as *Attacus cecropia*, do not feed readily on other food-plants after having eaten birch. Larvæ (especially of *geometridæ*) of which the food-plant is unknown, can often be reared successfully on *Betula alba*, a fact to which I owe my successful rearing of *Endropia armataria*.

ORTHOPTERA.

Phaneroptera curvicauda De Geer (Mém. hist. ins., 1773, v. 3, p. 446, pl. 38, fig. 3). This species has been figured, together with the structure of its ovipositor, by Riley (6th rept. state entom. Mo., 1874, p. 164-166), who also gives descriptions of the younger stages, and eggs. Miss Murtfeldt (*l. c.*) describes the mode of oviposition: the eggs are laid in the margin of leaves—often of oak—between the upper and lower epidermis. Altho Riley writes (*l. c.*), "I have had as many as five of these eggs deposited in a single leaf, in one contiguous row, yet they are more often single," yet a single tender leaf of *Betula alba*, taken at Belmont, Mass., measuring about 8 cm. in length, had the entire margin filled with eggs, presumably of this species. Only two or three leaves were found thus attacked, and the one of which the size is given above contained 102 eggs.

Caloptenus femur-rubrum De Geer (Mém. hist. ins., 1773, v. 3, p. 498, pl. 42, fig. 5) often strips the leaves from low bushes of *Betula alba* about Cambridge, Mass.

RHYNCHOTA.

Eriosoma tessellata Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 68). According to Glover (Rept. U. S. commiss.

agric., 1876, p. 39) this species has been found in Maryland upon twigs of *Betula*.

Callipterus betulaecolens Riley and Monell (Bull. U. S. geol. and geog. surv. terr., 1879, v. 5, p. 30-31) [? = *Aphis betulaecolens* Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 66)]. Said by Fitch and Monell to feed on birch leaves.

Calaphis betulella Walsh (Proc. Entom. soc. Phil., Dec. 1862, v. 1, p. 301-302). Walsh (*l. c.*, p. 302) says this species is abundant in Illinois on *Betula nigra*.

Athysanus variabilis Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 60) is stated by Fitch (*l. c.*) to be "abundant on birch trees, in June," and the same author states (Ann. rept. N. Y. state agric. soc., 1858, v. 18, p. 853) that this species punctures leaves and succulent shoots of birch. A brief description of this insect is given by Packard (Bull. 7, U. S. entom. comm., 1881, p. 128).

Athysanus abictis Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 60) is stated by Fitch (Ann. rept. N. Y. state agric. soc., 1857, v. 17, p. 749) to feed on birch. Packard (Bull. 7, U. S. entom. comm., 1881, p. 235) briefly describes the species and gives *Betula* as food-plant.

Athysanus minor Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 60). Fitch (*l. c.*) writes "Common on birch trees," and adds (Ann. rept. N. Y. state agric. soc., 1858, v. 18, p. 853) that it punctures birch leaves. Packard (Bull. 7, U. S. entom. comm., 1881, p. 128) briefly describes this species.

Athysanus fenestratus Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 60) is stated by Fitch (*l. c.*) to be found "on birch trees," and (Ann. rept. N. Y. state agric. soc., 1858, v. 18, p. 853) to puncture birch leaves. This species is briefly described by Packard (Bull. 7, U. S. entom. comm., 1881, p. 128).

Thelia univittata Harris (Treatise on ins. injur. veg., 1842, p. 180). One specimen taken sucking juices of a twig of *Betula alba*, June 1884. This species is found on oak, ac-

cording to Harris (*l. c.*), where it is common in July, according to Packard (Bull. 7, U. S. entom. comm., 1881, p. 37).

Enchenopa binotata Say (Appendix Long's exped., 1824, p. 301-302). Common on twigs of *Betula alba*. Riley (Amer. entom., Aug. 1869, v. 1, p. 248) says its favorite home is *Ptelea trifolium*, but gives grape (*Vitis*) and red-bud (*Cercis*) as food-plants. Its egg is described in Amer. entom., Oct. 1880, v. 3, p. 254. Lintner (1st ann. rept. state entom. N. Y., 1882, p. 281-288) gives an excellent general account of imago and eggs, both of which are figured. As food-plants he adds *Celastrus scandens* and, upon the authority of others, *Fuglans* and *Robinia*.

Bythoscopus seminudus Say (Journ. Acad. nat. sci. Phil., 1829 [Mch. 1831], v. 6, p. 307). Fitch (4th ann. rept. [N. Y.] state cab. nat. hist., 1851, p. 58) writes "Found on birch trees."

Tingis juglandis Fitch (Ann. rept. N. Y. state agric. soc., 1856, v. 16, p. 466-467) is normally found, according to that author (*l. c.*) on *Fuglans cinerea*, but is sometimes met with also on *Betula*, *Salix*, and other trees. Packard (Bull. 7, U. S. entom. comm., 1881, p. 88) briefly describes this species, and mentions its food-plants.

DIPTERA.

Mallota posticata Fabr. (Syst. antl., 1805, p. 237). Packard (Guide study ins., 1869, p. 399) figures the pupa and imago of this species under the name of *Merodon bardus* Say. Lintner (1st ann. rept. state entom. N. Y., 1882, p. 211-216) gives an extended account of this insect, figuring the puparium and imago, and describing the larvae, which were taken from decaying birch wood.

Lonchaea zpolita Say (Journ. Acad. nat. sci. Phil., 1830, v. 6, p. 188). Reared in Cambridge, Mass., from decaying *Polyporus betulinus*, a fungus parasitic on dead trunks of *Betula alba*.

LEPIDOPTERA.

Argyresthia goedartella Linn. (Syst. nat., 1758, ed. 10, p. 897). Fabricius (Syst. entom., 1775, p. 664) writes of this species "Habitat in alnetis, in betulae gemmis," and Kaltenbach (Pflanzenfeinde, 1872, p. 604-605) states that the larvae of this species live in the catkins of *Betula* and *Alnus*. Chambers (Can. entom., Aug. 1875, v. 7, p. 144-145) notes the discovery of this species in North America, and, after describing the imago, adds "The larva feeds under the bark and in the young shoots of the birch in March and April." A. Balding (Entom. monthly mag., Feb. 1885, v. 21, p. 203-206) describes the larva, which he found feeding in catkins of *Betula* and *Alnus*.

Cryptolechia confertella Walk. (List lep. ins. Brit. mus., 1864, pt. 29, p. 563). The larvae of this species are common upon *Betula alba* during August and the early part of September. The larva feeds in a rolled portion of the margin of the leaf, where pupation takes place, lasting from three weeks to a month.

Paedisca similana Hübn. (Samml. auserl. vögel u. schmett., 1792, fig. 71). Kaltenbach (Pflanzenfeinde, 1872, p. 602) gives a very brief description of the larva of this species, which feeds upon *Betula*.

Paedisca transmissana Walk. (List lep. ins. Brit. mus., 1863, pt. 28, p. 375). The larva of this species is common, during October, about Cambridge, Mass., where it eats out the inside of the sterile catkins of *Betula alba*. It hibernates as pupa.

Paedisca sollicitana Walk. (List lepid. ins. Brit. mus., 1863, pt. 28, p. 387). Fernald (Trans. Amer. entom. soc., 1882, v. 10, p. 40) says of this species "Food.—*Betula alba* var. *populifolia*."

Scricoris urticana Hübn. (Samml. europ. schmett., Tort., 1800?, fig. 65). Kaltenbach (Pflanzenfeinde, 1872, p. 601) gives a very brief description of the larva, following Zeller (Isis, 1846, p. 229) and among other food-plants mentions *Betula*.

Penthina albotana Zeller (Verhandl. k.-k. zool.-bot. gesell. Wien., jahrg. 1875, 1876. bd. 25; Abh., p. 262-263, pl. 8, fig. 12). A single larva taken 4 Sept. 1882, at Cambridge, Mass., on *Betula alba*, pupated 6 Sept., and appeared as imago 24 May 1883. This species is evidently two-brooded, as Burgess took the specimen from which Zeller described the species, on 15 Aug., in Massachusetts.

Penthina dimidiata Sodoffsky (Bull. Soc. impér. natur. Mosc., 1830, v. 2, p. 73, pl. 7). Kaltenbach (Pflanzenfeinde, 1872, p. 615) briefly describes the larva of this species, which feeds upon *Betula* and on several other plants.

Penthina capreana Hübn. (Samml. europ. schmett., Tort., 1800?, fig. 250). Kaltenbach (Pflanzenfeinde, 1872, p. 601) compiles a brief description of the larva of this species, which feeds upon *Betula* and *Salix*.

Eccopsis ? var. of *permundana* Clemens (Proc. Acad. nat. sci. Phil., 1860, p. 356, 357). Two specimens reared from larvae taken in Cambridge, Mass., 17 June 1883, on *Betula alba*. Pupated about 30 June; one specimen emerged as imago 10 July and the other 15 July 1883. Clemens (*l. c.*) says of *E. permundana*, "The larva binds together the terminal leaves of *Spiraea*. It is pale green, touched with yellowish at the junction of the segments; head and shield black. The larva may be taken in the middle of June."

Eccopsis zelleriana Fernald (Trans. Amer. entom. soc., 1882, v. 10, p. 29) is said by its describer to feed upon "Leaves of *Betula alba* var. *populifolia*."

Lozotaenia musculana Hübn. (Samml. europ. schmett., Tort., 1800?, fig. 98). Kaltenbach (Pflanzenfeinde, 1872, p. 601) quotes Madame Lienig's description of the larva of this species, and states that the larvae, according to Fischer von Röslerstamm, feed between leaves of *Betula* and *Salix* which they have drawn together. Fernald (Trans. Amer. entom. soc., 1882, v. 10, p. 13) says, "Food.—In Europe, *Agrimonia*, *Genista*, *Solidago*, *Achillea*, *Stachys*, *Scrophularia*,

Rubus, *Betula*, *Salix*, *Galium*, *Quercus*, *Pyrus* and *Tilia*."

Cacoecia cerasivorana Fitch (Ann. rept. N. Y. state agric. soc., 1856, p. 382, pl. 2, fig. 3). Fernald (Trans. Amer. entom. soc., 1882, v. 10, p. 11) writes of this species, "Food.—Cherry, *Betula alba* var. *populifolia*."

Cacoecia rosaceana Harris (Rept. ins. injur. veget., 1841, p. 348). Harris (*op. cit.*, p. 347-348, and *op. cit.*, 1862, p. 480) describes the larvae of this species. Description and figure of larva and imago by Packard (Guide study ins., 1869, p. 335, pl. 8, fig. 12). Description of larva, with figure of larva, pupa, and imago, by Saunders (Ann. rept. Entom. soc. Ontario, 1873, p. 14). Packard (Papilio, Nov.-Dec. 1882, v. 2, p. 182-183) says that he has reared this species from *Betula alba* var. *populifolia*, the moth appearing, in Maine, on the first of September. Coquillett (Papilio, May-June 1883, v. 3, p. 100-101) describes the larva carefully and gives the names of twenty-four species of food-plants. To his list may be added *Viburnum dentatum* and *Philadelphus coronarius*.

Teras ferrugana Schiffermüller (Syst. verz. d. schmett. d. Wiener gegend, 1776, p. 128). Kaltenbach (Pflanzenfeinde, 1872, p. 600) says, on authority of Treitschke, that this species feeds on *Betula* and more rarely on *Populus* and *Alnus*; Fernald (Trans. Amer. entom. soc., 1882, v. 10, p. 9), on authority of Heinemann, adds *Quercus*, and cites Walsh for authority that the species is inquilinous in galls of *Cynips salicis-strobiloides*. Packard (Papilio, Nov.-Dec. 1882, v. 2, p. 182) reared the species from a larva swept from *Pinus strobus*, on which he thinks the larvae feed, and gives a description of larva and pupa.

Teras niveana Fabr. (Mant. insect., 1787, v. 2, p. 233). Kaltenbach (Pflanzenfeinde, 1872, p. 600) says, on authority of Anton Schmid, that the larva of this species lives on *Betula*.

Several species of microlepidoptera which are still undetermined are very abundant on *Betula alba*, about Cambridge, Mass. Among them may be mentioned a case-bearer (? *Coleophora*), a species having a ridged cocoon (? *Bucculatrix*), a species the larva of which has a case made of successive rings of leaf-epidermis arranged in the form of a cornucopia, and a large leaf-miner belonging to some genus allied to *Lithocolletis*; the larvae of the last two species are found very late in the season, just before the leaves are destroyed by the frost.

Operophtera boreata Hübn. (Samml. europ. schmett., Spanner, 1796, fig. 413-414). Kaltenbach (Pflanzenfeinde, 1872, p. 599) gives *Betula* and *Fagus* as food-plants of this species. Packard (Mon. geom. moths, 1876, p. 199) quotes Newman's description of the larva of this species.

Rheumaptera hastata Linn. (Syst. nat.,

1758, ed. 10, p. 527). Schmiedlein (Naturges. deutsch. schmett., 1805, p. 101-102) describes the larvae of this species, which he states live socially upon birch between the leaves which they spin together. Packard (Mon. geom. moths, 1876, p. 165-166) quotes Newman's description of the larva, in which it is stated to feed upon *Betula alba* and *Myrica gale*. Kaltenbach (Pflanzenfeinde, 1872, p. 413 and 599) compiles authorities for the following additional food-plants of this species: *Rhododendron hirsutum*, *Salix*, and *Vaccinium uliginosum*. A larva of this species, taken on *Betula alba*, at Belmont, Mass., 4 Aug. 1883, pupated 14 Aug., and appeared as imago 17 May 1884. This is one of the species of lepidoptera seen in swarms in parts of the White Mts., N. H., where specimens were taken from 8-14 July 1874 in the greatest abundance.

(To be continued.)

SYSTEMATIC POSITION OF THE GENUS *APIOCERA*.

BY DANIEL WILLIAM COQUILLET, ANAHEIM, CAL.

In the Berliner entom. zeitschrift for 1883, p. 287-294, Baron Osten Sacken gives his reasons for placing the genus *Apiocera* among the *asilidae*. I am strongly of the opinion, however, that its proper place is among the *therevidae*—an opinion which the following facts would appear to fully justify.

In the Monographs of the diptera of North America, part 1, p. 22 and p. 24, Dr. Loew defines the families *asilidae* and *therevidae* in the following words:

“*Asilidae*.—Three basal cells much prolonged. Third longitudinal vein of the wings furcate, the two intercalary veins always present. Third joint of the

antennae simple; under lip forming a horny sheath; empodium similar to a horny bristle.”

“*Therevidae*.—Three basal cells much prolonged; the two intercalary veins present; third longitudinal vein furcate. Antennae with a terminal style of variable form, sometimes wanting. No empodium. Under lip fleshy.”

In many of the larger *therevidae* the empodium, or third pulvillus, is present in the form of a slender bristle. The only character of importance, therefore, whereby either of these families may be distinguished from the other is the structure of the under lip or proboscis, which

is horny in the *asilidae* and fleshy in the *therevidae*; in other words, in the *therevidae* the proboscis terminates in two fleshy lips, while in the *asilidae* it is destitute of lips.

The genus *Apiocera* possesses all of the characters which Dr. Loew assigns to the *asilidae* except that the proboscis ends in two fleshy lips; and as this is the only character of importance wherein the *therevidae* differ from the *asilidae*, it naturally follows that this genus must be referred to the *therevidae*.

The characters which the Baron found to be common to *Apiocera* and the section *asilina* (*l. c.*, p. 289-291) also exist in the larger *therevidae*, with the exception of the closed marginal cell; moreover, the *therevidae* agree with *Apiocera* in several of the characters wherein this genus differs from the *asilina*. Thus the majority of the *therevidae* have a very short antennal style, as in *Apiocera*; whereas, in the *asilina* the style is usually long and bristle-like. In the *therevidae*, as in *Apiocera*, the face is very oblique, thus differing widely from the perpendicular or more or less convex face of the *asilina*, with its characteristic mystax, which is wanting in the *therevidae* and *Apiocera*. Moreover, the legs of the *therevidae* and *Apiocera* are weaker than in the *asilina*, and the tarsal joints are long and slender, instead of being short and robust. So that, if *Apiocera* is closely related to the *asilina*, it is still more closely related to the *therevidae*.

I admit that some species of *Apiocera* bear a very close resemblance to several species of *Erax*; however, our classifica-

tion is not based upon a superficial resemblance, but upon the presence or absence of certain well-marked characters. Were we justified in placing the genus *Apiocera* in the family *asilidae* it would become necessary to remove all of the *therevidae* to this family; but such a course is not at all desirable, as the family *asilidae* is already a very extensive one, and the presence or absence of lips at the tip of the proboscis is a character of very easy application.

There is not an entomologist living whose opinion on any subject relating to the diptera has greater weight than that of the Baron Osten Sacken; and I would not have ventured an opinion contrary to one expressed by the Baron were I not convinced beyond a doubt of the correctness of my own views. From the few words which he gives concerning the relationship of *Apiocera* to the *therevidae* it is quite evident that he had not compared them with the same care that he compared this genus with the *asilina*.

The genus *Apiocera* is represented in my collection by twenty-two specimens, which were collected in this state (California). Some of the males agree in all essential characters with Osten Sacken's description of his *A. haruspea*, but the others differ to such a degree from these, and also from each other (there being scarcely any two specimens marked exactly alike) that I am at a loss to know whether to regard them as belonging to several distinct species, or as merely varieties of one very variable species; but I incline to the latter view of the case.

THE GEOLOGICAL HISTORY OF MYRIOPODS AND ARACHNIDS.

BY SAMUEL HUBBARD SCUDDER, CAMBRIDGE, MASS.

[Eighth annual address of the retiring president of the Cambridge Entomological Club.]

As the only subject of a general nature to which I have given recent attention I venture to invite you to review with me the geological history, first of myriopods and then of arachnids. Unusual attention has recently been paid to these animals, on account of the discovery of their remains in formations much earlier than those from which they had for a long time been known, and the relation of these discoveries to our previous knowledge will be best brought out by such a review, and it will, to a certain extent, be timely.

Our knowledge of the morphology, systematic position and extent of the myriopoda has been greatly increased within a recent period. The discovery of the minute *Pauropus* by Lubbock, and the study of this and allied forms by Ryder and others, have led to the establishment of the *pauropoda* as a type of living myriopods of equal taxonomic value to the two groups of *chilopoda* and *diplopoda* which had long been looked upon as the only divisions of the group. Modern investigations into the structure of the anomalous *Peripatus* have extended our ideas concerning the types allied to the myriopoda; while the strange forms revealed by recent researches in the carboniferous and devonian faunas have compelled us to recognize a wider range in its structure and a multiplication of its primary groups. The relations of ancient to modern forms of life prove far more important and in-

teresting in the myriopoda than in either the arachnida or the hexapoda. That these relations are equally puzzling will appear from a brief review of the structure and development of the different groups.

In the early life of the *pauropoda* and of the *diplopoda* we have what may be fairly considered a true larval form, in which, for a brief period after leaving the egg, the body, much shorter than in after life, is provided with three pairs of legs borne upon the anterior segments of the body. These segments are never more fully provided with legs, though most of the segments posterior to them, both those which exist during this larval period and those which originate subsequently, bear two pairs. In the *chilopoda*, on the other hand, although the appendages of the anterior segments develop earlier than those behind them, there is no true larval condition, or perhaps one may say a larval condition is permanent, in that the same anterior legs become early and permanently developed as organs subsidiary to mastication, while the segments of the hinder part of the body develop only a single pair of legs.

The larval condition and resultant more or less highly developed metamorphosis of the higher hexapoda have been looked upon by many as a secondary after-development, and one which therefore in no sense gives any clue to the historical development of the group.

such as we frequently find mirrored in the embryonic growth of other animals. This view seems to be supported by a comparison of the modern and ancient types of myriopoda. The larval characteristics of the young of living types of myriopoda, marvelously analogous in their main features to those of the larvae of even the higher hexapoda, are confined to the apodal nature of the abbreviated abdomen, and more particularly to the specialized development of appendages on the segments directly following the head. This specialized condition of the anterior segments is, in a sense, analogous to the structure of the thorax of the hexapoda and is persistent throughout life,—in the *chilopoda* in a marked manner, in the other groups by the isolation of these segments as bearing but a single pair of legs. Now nothing of this specialization appears in the paleozoic types, of which of course we know only the mature forms; but the segments following the head differ in no point whatever from those of the remainder of the body in the character and number of their appendages. In one type, the *archipolypoda*, corresponding in a measure to the living type of *diplopoda*, two pairs of legs are borne on every segment; while in the other, the *protosyngnatha*, corresponding in a similar way to the *chilopoda*, a single pair of legs is found. If then we look upon the specialization of the segments (or the appendages of the segments) immediately following the head in living myriopodan types as a secondary development, or, we may say, as the initiatory stage in an acquiring metamorphosis;

then we may perhaps consider the *archipolypoda* as the true prototypes of the *diplopoda* and possibly also of the *pauropoda*, and the *protosyngnatha* as the prototypes of the *chilopoda*.

In this view, one principal distinction between the modern *diplopoda* and *chilopoda* is shown to have existed from paleozoic times, viz: that in one group there are, over most of the body, to each dorsal scute two ventral scutes, each bearing a pair of legs; in the other group a single ventral scute with a single pair of legs; and it becomes interesting to inquire whether we can discover any indication of the condition of things from which this diversity of structures arose, and what was the line of development through which it passed. It will also help to determine the question, whether the dorsal or the ventral scutes of the *diplopoda* are to be looked upon as the homologs of those of the *chilopoda*; or, in other words, whether the dorsal scutes of the *diplopoda* are compound, or the ventral scutes of the same are to be looked upon as subsegments.

It should be remarked at the outset that what we know of the embryology of recent types shows that in the *diplopoda* two pairs of legs, in the *chilopoda* one pair, arise from each original body somite beyond the front portion of the body. This would indicate that the dorsal scutes of the two groups were homologous and the ventral scutes of the *diplopoda* should be looked upon as representing subsegments. This, however, is not the answer indicated by the paleontological evidence, nor is it what we should expect from, among

other things, the presence of stigmata on *each* of the ventral scutes in *diplopoda*.* All the carboniferous *archipoly-poda* show a clear indication of the compound nature of the segments. Not only were the ventral scutes far more important and extensive than in the modern *diplopoda*, but some at least of the genera bore in addition to large stigmata outside the legs, a pair of segmental organs next the medioventral line on each ventral scute; the dorsal scute was also distinctly divided into two areas, an anterior and a posterior. In some types this latter distinction was more marked than in others, in some being carried so far that under certain conditions of preservation one would readily take them to be entirely separate; and this indeed appears to be absolutely the case in the older devonian forms, from the lower old red sandstone of Scotland. These show an apparently complete demarcation of the dorsal scutes of each segment as well as of the ventral, and present therefore a series of alternating larger and smaller segments, the larger bearing all the dorsal cuticular outgrowths, but each bearing a single pair of legs. Of this primal condition of the body segments the embryology of modern types gives no hint, its earliest indications showing nothing anterior to what must have been the condition of things wholly posterior to the paleozoic epoch, at least so far as the diplopodan series is concerned; nothing anterior, indeed, to the fixed condition of the present type.

*They are only borne in general on alternate segments in *chilopoda*.

This indicates that the present dorsal scutes of *diplopoda* are compound and formed of two originally distinct scutes; and that, as a later development of a similar sort, the ventral scutes of the anterior segments have likewise consolidated and lost each one pair of appendages.

Under this view the line which we follow back from the *chilopoda* through the *protosyngnatha* is the more nearly allied to the simple stock type. Yet it is the other line which has been found earliest in the rocks, clearly showing that the actual origin of the myriopodan phylum must be looked for at the very first appearance of land animals; indeed the evidence that some of the carboniferous types were amphibious may warrant our belief that the type may have fairly originated among aquatic animals.

Fossil myriopoda were first made known from the carboniferous rocks, when Westwood figured, in Brodie's work on the older fossil insects of England, the remains of what he supposed to be a lepidopterous larva. There had been indeed earlier references by name merely to tertiary myriopoda from amber and from Aix (Serres), but it was not until the publications, thirty years ago, of Koch, Berendt and Menge, that the amber species were known, and to them hardly any additions have since been made. In 1859 Sir William Dawson published the first account of a paleozoic myriopod recognized as such, and since 1868 our horizon, as regards the older forms, has been widened materially by the publications of Messrs. Dohrn, Meek and

Worthen, Peach, Scudder, and Woodward, until to-day the number of forms known from pretertiary deposits is nearly as great as those from the tertiary.

The oldest known are those described by Page and Peach from the lower old red sandstone of Scotland—two species belonging to the *archipolypoda*. In the carboniferous formation the *archipolypoda* culminate, showing a considerable variety of generic types distinct from those of the devonian, and embracing nearly thirty species, of which by far the greater number come from America, and the few remaining ones from Great Britain, with possibly a single species from Germany. Four species, imperfectly known, which have been referred to *Iulus*, and which come from the permian of central Europe may belong to the *archipolypoda*. The only

mesozoic forms known are the *Fulopsis cretacea* of Heer, from Greenland, which is either an archipolypod or a diplopod (it is impossible to tell which), and the uncertain *Geophilus proavus* of Münster from Solenhofen, which is probably to be looked upon as a nereid worm.

The tertiary species are still known almost entirely from the work of Koch and Berendt, and belong entirely to the *diplopoda* and *chilopoda*, the larger proportion to the former. A few species, however, have been indicated from Aix, a single one described from the brown coal of Rott and one from the Green River deposits of North America.

The following table presents a view of the distribution of the myriopoda in time.

GEOLOGICAL DISTRIBUTION OF MYRIPODA.

	Paleozoic.			Mesozoic.			Cenozoic.			Modern Period.	
	Devonian.	Carboniferous.	Dyas.	Lias.	Jurassic.	Cretaceous.	Eocene.	Oligocene.	Miocene.		Pliocene.
Protosyngnatha		1									0
Chilopoda					1?			17			0
Archipolypoda	2	31	(4?)			(1?)		23	1		0
Diplopoda											
Psilopoda											

The figures represent the number of species.

The geological history of arachnida, as known at the present time, presents some points of interest. Only a portion of the great groups into

which the order is divisible are represented in the older rocks, and these, which are not confined to the lower types, attain a degree of perfection and

a diversity of structure inconsistent with a belief in our having reached the primordial forms of this phylum in our retrograde search.

When, in 1858, Bronn published his prize essay on the distribution of fossils, only two species of pretertiary arachnida were known as such, one from the carboniferous and one from the jurassic formation, and the knowledge of tertiary forms was confined entirely to the then recently published work of Koch and Berendt on the species from amber. Since then Menge has increased somewhat our knowledge of the amber fauna, and it includes to-day nine-tenths or more of the known tertiary species. But it is only within the last fifteen years that our knowledge of pretertiary arachnida has been extended beyond the description of two or three species. The number is still exceedingly few—between 20 and 30 species—but it is being constantly extended, and the abundance of arthropoda brought to light in recent years in the carboniferous deposits of Allier, Bohemia, Scotland and Illinois leads us to expect an early and considerable extension of the list. This expectation is strengthened by Lindström's and Hunter's discoveries of scorpions in the upper Silurian rocks of Gotland and Scotland.

The forms that have been found fossil in the earlier formations have proved, as might be expected, to belong mostly to those having a dense integument, and in the two species believed to be true *araneae*, the abdomen was probably provided with more or less densely

chitinous dorsal plates. With these two exceptions, and a single genus of *pedipalpi*, all the paleozoic arachnida (only a single mesozoic form is known) belong either to the *scorpionides* or to a peculiar group, the *anthracomarti*. This group is not found later, and the single known species of mesozoic arachnida* is a true *Aranca*. The paucity of remains of arachnida in mesozoic strata is somewhat remarkable. Besides the species mentioned above, only one other has been indicated, a species supposed to belong to the *araneae*, from the English lias.

Thanks to the amber deposits of Prussia, we know far more about the tertiary history of arachnida than would be possible if our sole reliance were on the rocks, the latter furnishing us with only about double the number of those occurring in pretertiary deposits. In the amber alone occur all the suborders of arachnida, excepting the *pedipalpi* and the already extinct *anthracomarti*, as well as all the families of *araneae* excepting one peculiar to the jurassic; but in the tertiary rocks neither *chelone-thi*, *scorpiones* nor *opiliones* have been recognized; of the *pedipalpi*, a single species is referred to by Serres from the marnes of Aix, but too obscurely to take account of it.

Examining the *araneae* alone, which are far better represented in the tertiaries than are the other suborders, we find a very large number of extinct genera. In all, seventy-one are now known,

* *Palpipes* or *Phalangites*, believed even by Thorell to be an arachnid, has been shown by Seebach to be a stomatopodous crustacean.

sixty-six from Europe and thirteen from America, eight being common to both. Of these 37 are accounted extinct, 35 from Europe and 2 from America, and none of these have been found on both continents.

In the stratified tertiary deposits the same families of *araneae* are in every instance found in Europe and America, excepting the *dysderides*, which family has a single representative in America and none in Europe. It also appears that just those families which are represented abundantly in amber are also found to some extent in the American tertiary fauna, and (excepting, as before, the *dysderides*) in the European rocks.

It is only in the rocks of the temper-

ate regions of Europe and North America that any arachnida have been found in a fossil state, and these, so far as the indications have any meaning, invariably point, whether in carboniferous or tertiary deposits, to a warmer climate than now obtains in the localities where they occur. This becomes more marked when we reach the tertiary rocks and can compare the types more closely with existing forms, a number of the genera, to which, for instance, the amber spiders belong, being now exclusively tropical.

The following table gives a general systematic view of the distribution of arachnida in the different geological formations since their first appearance in the upper silurian.

GEOLOGICAL DISTRIBUTION OF ARACHNIDA.

	Paleozoic.				Mesozoic.				Cenozoic.			Modern Period.	
	Silurian.	Devonian.	Carboniferous.	Dyas.	Trias.	Lias.	Jurassic.	Cretaceous.	Eocene.	Oligocene.	Miocene.		Pliocene.
The figures represent the number of species.													
Acari									33	1	2		
Chelonethi									9				
Anthracomarti			16										
Pedipalpi			2										
Scorpiones	2		8						1				
Opiliones									13				
Araneae													
Saltigradae									15	3			
Citigradae									1				
Laterigradae									22	3	4		
Territelariae			2						1				
Tubitelariae						1			72	8	3		
Retitelariae									54	3	5		
Orbitelariae									17	12	3		

THE DOUBLE ROLE OF THE STING OF THE HONEY-BEE.*

Very important and highly interesting discoveries have recently been made in regard to a double role played by the sting of the honey-bee. These discoveries explain some hitherto inexplicable phenomena in the domestic economy of the ants. It is already known that the honey of our honey-bees, when mixed with a tincture of litmus, shows a distinct red color, or in other words has an acid reaction. It manifests this peculiarity because of the volatile formic acid which it contains. This admixed acid confers upon crude honey its preservative power. Honey which is purified by treatment with water under heat, or the so-called honey-syrup, spoils sooner, because the formic acid is volatilized. The honey of vicious swarms of bees is characterized by a tart taste and a pungent odor. This effect is produced by the formic acid, which is present in excess in the honey. Hitherto it has been entirely unknown in what way the substratum of this peculiarity of honey, the formic acid in the honey, could enter into this vomit from the honey-stomach of the workers. Only the most recent investigations have furnished us an explanation of this process. The sting of the bees is used not only for defense but quite principally serves the important purpose of contributing to the stored honey an

antizymotic and antiseptic substance. The observation has recently been made that the bees in the hive, even when they are undisturbed, wipe off on the combs the minute drops of bee-poison (formic acid) which from time to time exude from the tip of their sting. And this excellent preservative medium is thus sooner or later contributed to the stored honey. The more excitable and the more ready to sting the bees are, the greater will be the quantity of formic acid which is added to the honey, and the admixture of which good honey needs. The praise which is so commonly lavished upon the Ligurian race of our honey bees, which is indisposed to sting—and such praise is still expressed at the peripatetic gatherings of German bee-masters—is therefore from a practical point of view a false praise. Now we understand also why the stingless honey-bees of South America collect little honey. It is well known that never more than a very small store of honey is found in felled trees inhabited by stingless *Melipona*. What should induce the *Melipona* to accumulate stores which they could not preserve?! They lack formic acid. Only three of the eighteen different known species of honey-bees of northern Brazil have a sting. A peculiar phenomenon in the life of certain ants has always been problematical but now it finds also its least forced explanation. It is well known that there are different grain-gathering species of ants. The

* Translated from an article entitled "Ueber eine doppelrolle des stachels der honigbienen" in *Deutsch-amerikanische apotheke-zeitung*, 15 Jan. 1885, jahrg. 5, p. 664; there reprinted from "*Ind. blatter*."

seeds of grasses and other plants are often preserved for years in their little magazines, without germinating. A very small red ant, which drags grains of wheat and oats into its dwellings, lives in India. These ants are so small, that eight or twelve of them have to drag on one grain with the greatest exertion. They travel in two separate ranks over smooth or rough ground, just as it comes, and even up and down steps, at the same regular pace. They often have to travel with their booty more than a thousand metres, to reach their communal store-house. The renowned investigator Moggridge repeatedly observed that when the ants were prevented from reaching their magazines of grain, the seeds began to sprout. The same was the case in abandoned magazines of grain. Hence the ants know how to prevent the sprouting of the grains, but the capacity for sprouting is not destroyed. The renowned English investigator John Lubbock, who communicates this and similar facts in his work entitled "Ants, bees and wasps," adds that it is not yet known in what way the ants prevent the sprouting of the collected grains. But now it is demonstrated that here also it is only the formic acid whose preservative influence goes so far that it can make seed incapable of germination for a determinate time or continuously.

It may be mentioned that we have also amongst us a species of ant which lives on seeds and stores these up. This is our *Lasius niger*, which carries seeds

of *Viola* into its nests, and, as Wittmack has communicated recently to the *Sitzungsberichte der gesellschaft naturforschender freunde zu Berlin*, does the same with the seeds of *Veronica hederifolia*.

Syke states in his account of an Indian ant, *Pheidole providens*, that this species collects a great store of grass-seeds. But he observed that the ants brought their store of grain into the open air to dry it after the monsoon storms. From this it appears that the preservative effect of the formic acid is destroyed by great moisture, and hence this drying process. So that amongst the bees the honey which is stored for winter use, and among the ants the stores of grain which serve for food, are preserved by one and the same fluid, formic acid.

EDITORIAL NOTE.

This same theory has been suggested many times by our most advanced American bee keepers. It has been hinted that this same formic acid was what made honey a poison to many people, and that the sharp sting of some honey, notably that from bass wood or linden, originated in this acid from the poison sack. If this is the correct explanation, it seems strange that the same kind of honey is always peculiar for greater or less acidity as the case may be. We often see bees with sting extended and tipped with a tiny drop of poison; but how do we know that this poison is certainly mingled with the honey? Is this any more than a guess? A. J. Cook.

PSYCHE.

CAMBRIDGE, MASS., JAN.—MAR. 1885.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PERMANENT MOUNTING OF
TRACHEAE OF INSECTS.

I have succeeded in a very simple way in mounting permanently the tracheal system of insects. I dissect out the soft parts and spread them on a glass slide of the usual size; let them dry perfectly; then with pencil-brush give them a good coating of collodion, after which I melt a little hard, pure balsam in a test tube and put it on the object with a cover glass applied at once. This is, so far as I know, a new method. It is remarkable for its results. The intestines, the ganglia, and the brain are perfectly magnificent. The intestine makes thus one of the most beautiful objects for dark-ground illumination. The brain shows the most abundant ramifications of the trachea, especially in the immense parallel branches in the rods of the eyes. The ganglia can be floated on a cover glass, dried, and mounted in this way. The entire process is simple and easy, and gives the most satisfactory results. There are many points of histological interest in the brain which are thus demonstrated.

Lynn, Mass.

F. T. Hazlewood.

PROCEEDINGS OF SOCIETIES.

ZOOLOGICAL SOCIETY OF LONDON.

19 JUNE 1883.— . . . Prof. E. Ray Lankester, F. R. S., read a memoir on the muscular and endoskeletal systems of *Limulus* and *Scorpio*. . . These investigations seemed to confirm Prof. Lankester's previously expressed views as to the near affinity of these two forms, hitherto usually referred to different classes of the animal kingdom, and to justify the association of *Limulus* with the arachnida.

18 DEC. 1883.— . . . Dr. F. Leuthner read an abstract of a memoir which he had prepared on the *odontolabini*, a subfamily of the coleopterous family *lucanidae*, remarkable for the polymorphism of the males, while the females remained very similar. The males were stated to exhibit four very distinct phases of the development in their mandibles, which the author proposed to term "pseudodont," "amphiodont," "mesodont," and "telodont." These forms were strongly marked in some species, but in others were connected by insensible gradations, and had been treated by the earlier authors as distinct species. The second part of the memoir contained a monograph of the three known genera which constitute the group *odontolabini*. . . Mr. J. Wood-Mason, F.Z.S., read a paper on the *embiidae*, a little-known family of insects, on the structure and habits of which he had succeeded in making some investigations during his recent residence in India. He came to the conclusion that the *embiidae* undoubtedly belong to the true orthoptera, and are one of the lowest terms of a series formed by the familiar *acridiidae*, *locustidae*, *gryllidae*, and *phasmatidae*.

1 APRIL 1884.— . . . Mr. F. D. Godman, F.R.S., read a paper containing an account of the lepidoptera collected by the late Mr. W. A. Forbes on the banks of the Lower Niger, the rhopalocera being described by Messrs. F. D. Godman and O. Salvin, and the heterocera by Mr. H. Druce. The species

of butterflies were fifty in number, and comprised representatives of all the families of rhopalocera hitherto known from tropical Africa, except the *erycinidae*, a group but feebly developed in this region.—Selected from *Zoologischer anzeiger*.

— — —
LINNEAN SOCIETY OF LONDON.

21 FEB. 1884. — Mr. R. Miller Christy brought before the notice of the society a series of lepidoptera, hymenoptera, etc., captured by him in Manitoba, some of the humble-bees being supposed new to science.

20 MARCH 1884. — In illustration of his paper—"A contribution to the knowledge of the genus *Anaphc* Walker"—Lord Walsingham exhibited a large and remarkable nest of a congregating moth, a species of the genus, from Natal. It contained a packed mass of cocoons, specimens of the larvae and of the mature insect; there likewise was shown a living example of a dipterous parasite which had emerged from the moth eggs . . .

3 APRIL 1884. — . . . A paper was read by Mr. Francis J. Briant, On the anatomy and functions of the tongue of the bee (worker). The author, after referring to the structures of the more conspicuous parts of the endoskeleton and relations of the tongue thereto, treats specially of the manner in which the bee takes up the honey by its tongue. It appears that upon the nature and function of the organ in question authorities are by no means agreed. Kirby and Spence, supported by Huxley and partly Newport, aver that the bee simply laps up its food; while Hermann Müller and others rather attribute the action as due to the terminal whorl of hairs to which the honey adheres and therefrom is withdrawn inwards. The author of the paper on the other hand (from experiment and otherwise) is inclined to the view that the honey is drawn into the mouth through the inside of the tongue by means of a complicated pumping

action of the organ itself aided by the closely contiguous parts.

6 Nov. 1884.—Mr. R. A. Rolfe exhibited and made remarks on examples of British oak galls produced by cynipidan insects of the genus *Neuroterus*, collected by him chiefly at Kew Gardens. He admitted that, as a rule, the plan and detail of the galls depend on the nature of the irritating fluid deposited by the insect; but at the same time the various species of oak have special influence in determining color and often size of the galls.

20 Nov. 1884.—A paper was read, entitled "Notes on the habits of some Australian hymenoptera aculeata" by H. L. Roth. Therein he states that the wasps of the genus *Pelopoeus* (*P. laetus*) build their nests on the walls, ceilings, legs of chairs, under tables, in cupboards, vases, between pictures and the walls, on curtains and in all sorts of crevices in the house, or on the roof. No place is safe from their intrusion. When a cell is completed the wasp goes in search of spiders, and seizing these, packs their half dead bodies in the cell, lays an egg and closes the cell-top. Then afterwards rows of cells are added to the primary one and dealt with in the same fashion; generally finishing with a streaked coating of mud, to deceive as to the real contents beneath. Of the Australian ants *Formica ruginigra* is both numerous, bold and destructive. They destroy the webs of certain caterpillars and drive them out, to fall a prey to a host of attendant warrior ants.

Mr. F. M. Campbell exhibited a dragon fly caught in September on the left bank of the Dordogne from a flight of dragon flies (*odonata*) which were taking a southeasterly direction; numbers were observed passing continuously for an hour and a half. He also drew attention to the steady progressive movement of a sphingid moth when placed on its back.—Selected from reports by J. Murie in *Zoologischer anzeiger*.

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Anderson, Joseph, jr. Urticating properties of lepidoptera. (Entomologist, Feb. 1885, v. 18, p. 43-45.)

Discussion of stinging hairs of larvae of *bombycidae*; quotation of the part of G: Dimmock's "On some glands which open externally on insects" (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 387-401) [Rec., 2985] which pertains to this subject. G: D. (3675)

Anderson, Joseph, jr. The urticating properties of the hairs of some lepidoptera. (Entomologist, Dec. 1884, v. 17, p. 275-276.)

Reports that the imagos as well as the larvae of *li-paris* possess urticating properties, and discusses the probable causes. G: D. (3676)

Balding, G: Urticating properties of lepidoptera. (Entomologist, Feb. 1885, v. 18, p. 41-43.)

Discusses cause of urtication produced by the larvae of certain *bombycidae*; quotes portions of G: Dimmock's "On some glands which open externally on insects" (Psyche, Sep.-Oct. 1882 [1 Mar. 1884], v. 3, p. 387-401) [Rec., 2985]. G: D. (3677)

[**Bertkau, Philipp.**] Duftapparat an schmetterlingsbeinen. ("Kölnische zeitung" . . .) (Entom. nachrichten, 1 Sept. 1879, jahrg. 5, p. 223-224.)

Abstract, by E: Burgess. (Psyche, March [1 May] 1880, v. 3, p. 32.)

Describes glandular apparatus on the posterior tibiae of *hepialus hecta*, to be used in connection with another apparatus on the first abdominal segment to distribute an odor for sexual purposes. G: D. (3678)

Bessey, C: Edwin. A new species of insect-destroying fungus. (Amer. nat., Dec. [28 Nov.] 1883, v. 17, p. 1280-1281.)

Reprint in H. Osborn's "Notes on locust parasite" (Bull. Iowa agric. coll., Aug. 1884, no. 2), p. 84-85.

Describes the *tarichium* stage of *entomophthora calopteni*, a new species of fungus parasitic in *caloptenus differentialis*. G: D. (3679)

Briggs, T. R. Archer. On the fertilization of the primrose (*primula vulgaris*, Huds.). (Journal of botany, 1870, v. 8, p. 190-191.)

The writer does not agree with C: Darwin in his "On the specific differences between *primula veris*, Br. Fl., *p. vulgaris*, Br. Fl., and *p. elatior*, Jacq. . . ." (Journ. Linn. Soc., Bot., 19 Mar. 1868, v. 10, p. 437-454) [Rec., 2377] in believing that *primula vulgaris* is fertilized almost exclusively by moths. He finds the flowers visited by *anthophora acerorum*, *andrena groynana*, *go-nepteryx rhanni*, and *bombylius medius*. W: T. (3680)

Brongniart, C: Sur un gigantesque neuror-thoptère, provenant des terrains houillers de Commeny (Allier). (Comptes-rendus Acad. sci. France, 31 Mar. 1884, v. 98, p. 832-833.)

Brief account of the discovery of *dictyonera golden-bergi*, and notice of its affinities with other fossil orthoptera. G: D. (3681)

Camerano, Lorenzo. Ricerche intorno alla struttura dei peli-ventose dei tarsi dei coleotteri. Laboratorio del Regio museo zoologico di Torino. (Atti Accad. sci. di Torino, 1879, v. 14, p. 1148-1164.)

Separate. Torino, 1879. t.-p. cover + 20 p., 2 pl., 24 × 16, t 15 × 9.

Notice. (BERTKAU, P. Bericht . . . der entom. f. 1879, 1881, p. 260.)

Describes and figures the tarsal hairs of species chosen from twelve families of coleoptera. G: D. (3682)

Candèze, Ernest. Les moyens d'attaque et de défense chez les insectes. Lecture faite à la séance publique annuelle de la classe des sciences de l'Académie royale du 16 décembre 1874. (Bull. Acad. roy. . . Belg., 1874, s. 2, v. 38, p. 787-816.)

Separate. Bruxelles, F. Hayez, 1874. t.-p. cover, 32 p., 22 × 15, t 15 × 8.7.

Notice. (Naturaliste canadien, Mar. 1875, v. 7, p. 92-93.) [Rec., 764 b.]

Popular lecture on the means of attack and of defense employed by insects. G: D. (3683)

Carlet, G. Sur les muscles de l'abdomen de l'abeille. (Comptes-rendus Acad. sci. France, 24 Mch. 1884, v. 98, p. 758-759.)

Nomenclature proposed for the abdominal muscles of *apis*; these muscles, with the exception of the aliform ones which aid circulation, have respiratory movements as their function; these movements take place in the direction of all three diameters of the abdomen.

G: D. (3084)

Carlet, G. Sur le venin des hyménoptères et ses organes sécréteurs. (Comptes-rendus Acad. sci. France, 23 June 1884, v. 98, p. 1550-1551.)

Abstract. (Journ. Roy. micros. soc., Oct. 1884, s. 2, v. 4, p. 739.)

The poison of the sting of hymenoptera, altho acid, is the product of a mixture of secretions from two glands, one of which produces strongly acid, the other weak alkaline secretion; the presence of both these secretions is necessary for the toxic effect of the sting.

G: D. (3085)

Chambers, Vactor Tousey. On the changes that take place in the mouth-parts and legs of some leaf-mining lepidopterous larvae. (Amer. entom., Nov. 1880, v. 3, n. s., v. 1, p. 255-262, 316 cm., fig. 124-137, 139-144.)

Supplement, [by C: V. Riley], entitled "Mandible of *lithocolletis guttifiniatella*." (*op. cit.*, Dec., p. 294, 7 cm., fig. 138.)

Description and figures of mouth-parts of larvae of several genera of *tineina*; description of changes that take place in these mouth-parts and in the legs, and application of the facts observed to the theory of evolution.

B: P. M. (3086)

Chambers, Vactor Tousey. Wandering habit of larvae belonging to the genus *buculatrix*. (Amer. entom., Feb. 1880, v. 3, n. s., v. 1, p. 50, 9 cm.)

Larvae of *buculatrix* have the habit of wandering away from their food plants, frequently, to pupate, so that finding the pupae on a plant is not evidence that such is the food-plant; cocoons of *b. pomifoliella* found on *sambucus*; *b. thuiella* and *b. ambrosiacella* may not feed on *thuja* and *ambrosia* respectively.

B: P. M. (3087)

Chapman, A. W. On the preparatory stages of certain Florida butterflies. (Can. entom., Oct. 1879, v. 11, p. 189-193.)

Describes larva and pupa of *pamphila phyleus*, *p. brevis*, *p. acinus*, *p. maculata*, *p. arpa*, *p. delaware*, larva of *p. palata* and *andamus prodans*, and egg of *p. brevis*, with notes on food-plants; introductory note and comparisons of these descriptions with those based on Abbot's figures, by W: H: Edwards.

B: P. M. (3088)

Chapman, I: Some observations on the hessian fly: written in the year 1797. (Memoirs Phil. soc. promot. agric., 1826, v. 5, p. 143-153.)

History of *cecidomyia destructor*, in Bucks co., Pa., from 1786 to 1790; its natural history and seasons; description of it in all stages; precautions against it.

B: P. M. (3089)

Cholodkowsky, N. Sur les vaisseaux de Malpighi chez les lépidoptères. (Comptes-rendus Acad. sci. France, 10 Mar. 1884, v. 98, p. 631-633.)

Tincola bisellilla (? = *tinca pellionella*) and *tinca rusticella* have only two Malpighian vessels, while their larvae have four; this reduction of number of Malpighian vessels in the imago is regarded as a kind of periodic atavism.

G: D. (3090)

Clemens, Brackenridge. American micro-lepidoptera. (Proc. Entom. soc. Philad., Mar. 1863, v. 2, p. 314.)

Reprint. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 207-221.)

Re-describes the genera *colcophora*, *glyphipteryx*, *gracilaria*, *gelechia*; describes the new genus *marmara* and 16 new species of *tineina*; description of habits of imago of *strobisia levipedella* n. sp., of mines of larvae of *parectopa robinella*, *marmara salicella*, *phyllonistis liriodendronella* and *tischeria quercitella*, and larvae and larval habits of some of the species; discusses the species named *anacamptis robinella* and *argyro-miges pseudaciella* by Asa Fitch.

B: P. M. (3091)

Clemens, Brackenridge. American micro-lepidoptera. (Proc. Entom. soc. Philad., Aug. 1863, v. 2, p. 119-129.)

Reprint. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 222-236.)

Re-describes the genera *ypsolophus*, *depressaria*, *enicosoma*?, and *chauliodus*?; describes the new genera *holocera*, *brachitoma* and *homostia* (group of *tinca*), and 21 new species of *tineina*; gives synoptical table of 19 species of *gelechia*; remarks on larval habits of *depressaria*.

B: P. M. (3092)

Clemens, Brackenridge. Micro-lepidopterous larvae. Notes on a few species, the imagos of which are probably undescribed. (Proc. Entom. soc. Philad., Nov. 1861, v. 1, p. 75-77)

Reprint. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 161-178.)

Remarks on the characteristic appearance of the mines of leaf-miners, and the ease and interest of rearing leaf-miners; directions for collecting, observing and rearing these insects; monthly calendar showing when the larvae mentioned should be sought; descriptions of mines and habits of larvae of 7 species of *colcophora*, 2 *lithocolletis*, 2 *aspidisca*, 14 *nepticula*, 1 *ornix*, 3 *cataslepa*.

B: P. M. (3093)

Clemens, Brackenridge. New American micro-lepidoptera. (Proc. Entom. soc. Philad., Jan. 1862, v. 1, p. 131-137.)

Reprint. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 179-188.)

Describes the genera *opostega*, *solenobia*?, *lyonella*, *tenaga* n. g., *hybroma* n. g., and the new species *opostega albogaleriella*, *trichotapha alacella*, *solenobia? zualshella*, *nepticula fuscotibiella*, n. bifasciella, n. *platanella*, *lyonella speculella*, *tenaga pomitella*, *hybroma servulella*, *dysodia margaritana*; remarks on the larval habits of the *solenobia*? and those of a *phyllonistis*?; *gelechia? flavocostella* is a *trichotapha*. [The reprint omits the description of *dysodia margaritana*.]

B: P. M. (3094)

Clemens, Brackenridge. North American micro-lepidoptera. (Proc. Entom. soc. Philad., Mar. 1862, v. 1, p. 147-151.)

Reprint. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 189-194.)

Description of larva, pupa and mine of *bedellia sommitentella*, previously described by author as *b. staintonella* n. sp.; habits and affinities of larva and imago. Descriptions of mines of *nepticula platanius*, and two other species of *nepticula* in leaves of *platanus*; descriptions of larvae of the two new species; directions for rearing leaf-mining larvae. B: P. M. (3695)

Clemens, Brackenridge. North American micro-lepidoptera. (Proc. Entom. soc. Philad., Mar. 1864, v. 2, p. 415-460.)

Reprint. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 237-256.)

Re-describes the gener. *adela*, *dasypera*; *amesychia*, *elachista*?; describes the new genera *walshia*, *hamadryas*, *cycloplasis*, *wilsonia*; describes 3 new species of *tineina*, 3 of *tortricina* and *crambus inornatellus* n. sp., from Labrador, and 16 new *tineina* from United States; remarks on other species. [The reprint omits the descriptions of the *tortricina* and *crambus*.] B: P. M. (3696)

Clemens, Brackenridge. North American micro-lepidoptera. (Proc. Entom. soc. Philad., Dec. 1864, v. 3, p. 505-520, fig. 1-5.)

Reprint of p. 505-508. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 257-263.)

Describes 5 new species of *tineina* and 25 new species of *tortricina*, with some re-descriptions and notes on habits; re-describes the genera *ditula*?, *ptycholoma*? and *steganoptycha*? (all *tortricina*), and figures the neuuration of wings and structure of palpi of *anchylopera*, *ptycholoma*? and *steganoptycha*?; synopsis of the groups and list of species of *anchylopera*. [Only the portion relating to *tineina* is reprinted.] B: P. M. (3697)

Clemens, Brackenridge. North American micro-lepidoptera. (Proc. Entom. soc. Philad., Sep. 1865, v. 5, p. 133-147, il.)

Reprint from p. 142-147. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 264-273, 1 fig.)

Describes 23 new species and the following 3 new genera of *tortricina*, viz: *leptoris*, *euryptychia*, *callimosema*; *exartema* = *sericoris*; re-describes the genus *batrachetra* and describes as new species *b. salicifomellae*, *buculatrix trifasciella* and *incurvaria mediostriatella*; gives extensive notes, by B: D. Walsh, on the food-habits of the *batrachetra*, with description of larva; re-describes *gracilaria violucella* (re-named *g. desmodioliella*); describes imago of *nepticula saginella*, with notes on the habits of this species and of *buculatrix trifasciella*; lists and synoptical tables of the described species of *stigmatota*, *sericoris*, *lozotaenia*, *steganoptycha*, *gracilaria* and *nepticula*; figures neuuration of wings and structure of palpi of *leptoris*, *callimosema* and *batrachetra*. [Only the portion on the *tineina* is reprinted.] B: D. Walsh states, in his "The joint worm" (Pract. entom., 27 Nov. 1895, v. 1), p. 11, that *euryptychia saligueana* was bred from a gall on *solidago*. B: P. M. (3698)

Clemens, Brackenridge. Notes on *thyridopteryx ephemeraeformis*. (Proc. Entom. soc. Philad., Nov. 1866, v. 6, p. 221-222.)

Extract. (CLEMENS, B. The *tineina* of North America . . . Stainton. Lond., 1872, p. 274.)

Discussion of the synonymy of "*sphinx ephemeraeformis* of Haworth" = *thyridopteryx ephemeraeformis*, reprint of Stephens' generic diagnosis of *thyridopteryx* (Ill. Brit. entom. . . Faust., Lond., 1828, v. 1, p. 145). B: P. M. (3700)

Comstock, J: H: The apple maggot. *Trypeta pomonella* Walsh. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 195-198, pl. 14.) (COMSTOCK, J: H: Report on insects for the year 1881 . . . 1882, p. 3-6, pl. 14.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 195-198 [135-138], pl. 14.)

Food-plants, ravages and geographical distribution of and means against *trypeta pomonella*; localities in which ravages occur; description and figures of larva, pupa and imago and of respiratory apparatus. B: P. M. (3700)

Comstock, J: H: [Carnivorous habits of a pyralid moth.] (Can. entom., Oct. 1879, v. 11, p. 196.)

Carnivorous habits of [*dakruma coccidivora*].

B: P. M. (3701)

Comstock, J: H: [Habits of species of *retinia* injurious to pine trees.] (Can. entom., Sep. 1879, v. 11, p. 176.)

Food-habits of *retinia* [*frustrana*] and of *r. rigidana*.

B: P. M. (3702)

Comstock, J: H: Lac insects. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 209-213, pl. 19; pl. 20, fig. 1.) (COMSTOCK, J: H: Report on insects for the year 1881 . . . 1882, p. 17-21, pl. 19; pl. 20, fig. 1.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 209-213 [149-153], pl. 19; pl. 20, fig. 1.)

Describes the generic characters of *carteria* and describes and figures *c. lucca*, *c. tarrae* n. sp. and *c. mexicana* n. sp.; references to articles on *c. lucca*.

B: P. M. (3703)

Comstock, J: H: Ladybirds. *Coccinellidæ*. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 204-206, pl. 18.) (COMSTOCK, J: H: Report on insects for the year 1881 . . . 1882, p. 12-14, pl. 18.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 204-206 [144-146], pl. 18.)

Habits of *coccinellidæ*; descriptions and figures of larva, pupa and imago of *cycloneda abdominalis*, *c. senaria*, *chilocorus cincti* and *hippodamia ambigua*, and of imago of *cycloneda ocellata*, *coccinella quinque-notata* var. *californica*, and *hippodamia convergens*.

B: P. M. (3704)

Comstock, J: II: Methods of destroying scale insects. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 206-209.) (COMSTOCK, J: II: Report on insects for the year 1881 . . . 1882, p. 14-17.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 206-209 [146-149].)

Introduces letters from S. P. Chapin and Matthew Cooke, to show the beneficial effect of the use of lye and whale-oil soap and sulphur as means against *coccidae* and *trombididae* on orchard trees, and the superiority of these substances to kerosene for the purpose; method of spraying trees and use of a "bamboo extension" for carrying spray into large trees. Preceded by an interjected critical review, by C: V. Riley. The "author's edition" of Comstock contains a reply to this review and the "author's edition" of Riley contains a rejoinder to this reply; both inserted on fly-slips.

B: P. M. (3705)

Comstock, J: II: On a new predaceous lepidopterous insect. (N. A. entom., Oct. 1879, v. 1, p. 25-29, pl. 4.)

Description and figures of egg, mature larva, pupa and imago of *dakruma coccidivora* n. sp., predatory on *pulsinaria innumerabilis*; description of newly hatched larva; habits and seasons of larva and imago; discussion of accounts of parasitic, inquilinous and predaceous lepidopterous larvae hitherto observed.

B: P. M. (3700)

Comstock, J: II: A new wax insect. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 213-214, pl. 20, fig. 2.) (COMSTOCK, J: II: Report on insects for the year 1881 . . . 1882, p. 21-22, pl. 20, fig. 2.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 213-214 [153-154], pl. 20, fig. 2.)

Description of *cerococcus* n. g. [*coccidae*] and *c. quercus* n. sp., from twigs of several species of *quercus*; description and figure of sacs of male and female and of body of female.

B: P. M. (3707)

Comstock, J: II: Note on the structure of mealy bugs. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 214.) (COMSTOCK, J: II: Report on insects for the year 1881 . . . 1882, p. 22.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 214 [154].)

Position of opening of oviduct in *dactylopius*, and presumably in other *coccinea*; anal ring improperly called ano-genital ring; position and homology of dorsal secretory openings.

B: P. M. (3708)

Comstock, J: II: The ocellate leaf gall of red maple. *Sciara ocellaris* O. S. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 202-204, pl. 17.) (COMSTOCK, J: II: Report on insects for the year 1881 . . . 1882, p. 10-12, pl. 17.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 202-204 [142-144], pl. 17.)

Habits, ravages and synonymy of *sciara ocellaris*; description and figures of gall, larva and male imago; figures of cocoon and pupa-skin; habits of *sciara* and of *s. tilicola*; description of gall of *s. tilicola*.

B: P. M. (3700)

Comstock, J: II: [Plan of formation of the biological collection of insects in the Department of agriculture at Washington.] (Can. entom., Nov. 1879, v. 11, p. 202-203.)

Response of Comstock to requests for information; subject expressed by title. Remarks of S: H. Scudder on the importance of the formation of a national collection at Washington.

B: P. M. (3710)

Comstock, J: II: The pretty pomace-fly. *Drosophila amoena* Loew. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 201-202, pl. 16.) (COMSTOCK, J: II: Report on insects for the year 1881 . . . 1882, p. 9-10, pl. 16.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 201-202 [141-142], pl. 16.)

Habits and period of development of and means against *drosophila amoena*; description and figures of larva, pupa and imago and of respiratory apparatus.

B: P. M. (3711)

Comstock, J: II: Report on miscellaneous insects. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 195-214, pl. 14-20.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 195-214 [135-154], pl. 14-20.)

Separate, entitled "Report on insects for the year 1881. Author's edition. From the annual report of the Department of agriculture for the year 1881." Wash., 1882. t.-p. cover + t.-p., 22 p., pl. 14-20. 23 X 15.

Consists of the following sub-chapters, all cited under the name of J: II: Comstock:—The apple maggot. *Trypeta pomonella* Walsh [Rec., 3700].—The vine-loving pomace-fly. *Drosophila ampelophila* Loew [Rec., 3714].—The pretty pomace-fly. *Drosophila amoena* Loew [Rec., 3711].—The ocellate leaf gall of red maple. *Sciara ocellaris* O. S. [Rec., 3700].—Ladybirds. *Coccinellidae* [Rec., 3704].—Methods of destroying scale insects [Rec., 3705].—Lac insects [Rec., 3703].—A new wax insect [Rec., 3707].—Note on the structure of mealy bugs [Rec., 3708].

B: P. M. (3712)

Comstock, J: II: [Spread of the Colorado potato beetle into Manitoba.] (Can. entom., Oct. 1879, v. 11, p. 196.)

Doryphora decemlineata found in Manitoba in 1879, its most northern habitat so far known.

B: P. M. (3713)

Comstock, J: II: The vine-loving pomace-fly. *Drosophila ampelophila* Loew. (Rept. [U. S.] commiss. agric., for 1881 and 1882, 1882 [Jan. 1883], p. 198-201, pl. 15.) (COMSTOCK, J: II: Report on insects for the year 1881 . . . 1882, p. 6-9, pl. 15.) (RILEY, C: V. Report of the entomologist . . . [1 Dec.] 1882, p. 108-201 [138-141], pl. 15.)

Habits and ravages and period of development of and means against *drosophila ampelophila*; description and figures of egg, larva, pupa and imago and of respiratory apparatus.

B: P. M. (3714)

[Connecticut board of agriculture.] Poultry. (4th ann. rept. secr. Conn. board agric., for 1869-1870, 1870, p. 9-45.)

Communications and discussion on poultry-raising; includes, on p. 12-13, 18, 22, 26, 27, 30-36, 41-44, remarks on insects and worms injurious to fowl, and means against them, and on the usefulness of fowl as destroyers of insects, by T. S. Gold, P. M. Augur, W. H. Brewer, H. S. Collins, J. N. Blakeslee, W. A. Browning, N. Cressy, W. Plumb, — Hunt, J. M. Hubbard.

B: P. M. (3715)

Connecticut board of agriculture—*Entomologist*, 1872 (Sidney Irving Smith). Address of the state entomologist [with discussion]. (5th ann. rept. secr. Conn. board agric., for 1871-72, 1872, p. 203-234.)

Vote of thanks for the address. (*op. cit.*, p. 235-)

Ravages and usefulness and abundance and disappearances of and valid and invalid means against insects; importance to the farmer of a knowledge of entomology; special account of *sphenophorus sculptilis* (called *s. zeae*), *s. robustus*, *bruchus obsoletus*, *lema trilineata* and (by J. S. Gould) *cecidomyia tritici*, with briefer mention of numerous other insects and of means against insects, especially the use of dust or powders to kill moist-bodied insects, and the influence of parasites; discussion participated in by—Riggs, W. W. White, S. W. Johnson, — Danielson, J. S. Gould, and author.

B: P. M. (3716)

Connecticut board of agriculture—*Secretary*. 4th annual report. . . 1869-70. Printed by order of the legislature. Hartford, 1870. 423 p., [9 pl.], 24 × 15, il.

Contains a remark on means against *dermatodectes avis*, on p. 126, and articles of entomological contents recorded under the following titles:—CONNECTICUT BOARD OF AGRICULTURE.] Poultry [Rec., 3715], p. 9-45. —VERRILL, A. E. The external parasites of domestic animals; their effects and remedies [Rec., 3568], p. 72-122. —VERRILL, A. E. The internal parasites of domestic animals; their effects and remedies [Rec., 3569], p. 162-256.

B: P. M. (3717)

Connecticut board of agriculture—*Secretary*. 5th annual report. . . 1871-72. Printed by order of the legislature. Hartford, 1872. 386 p., [1 pl.], 24 × 15.

Contains a minute (p. 10) of the election of Sidney Irving Smith to be entomologist of the Connecticut board of agriculture, 16 Aug. 1871, and (p. 13) of an appropriation of \$200 to him, for investigations of insects; also remarks (p. 177, 178, 182, 204) on *macrostela carolina* and cut-worms as injuring tobacco plants, and means against them; and articles of entomological contents recorded under the following titles:—CONNECTICUT BOARD OF AGRICULTURE—*Entomologist*, 1872. Address of the state entomologist [Rec., 3716], p. 203-234, 235. —VERRILL, A. E. Additional observations on the parasites of man and domestic animals [Rec., 3569], p. 321-342.

B: P. M. (3718)

Coquillett, Daniel W: Description of noctuid larvae. (N. A. entom., Jan. 1880, v. 1, p. 52.)

Describes larvae of *telesilla cinereola*, *crambodes tulidiformis* and *adipophanes miscellus*.

B: P. M. (3719)

Darwin, C: "Ueber die einrichtungen zur befruchtung britischer und ausländischer orchideen durch insecten, und über die günstigen erfolge der wechselsebfruchtung". Stuttgart, 1862.

Germ. tr., by H. G. Bronn, of Darwin's "On the various contrivances by which British and foreign orchids are fertilized by insects" . . . [Rec., 3720]

W: T. 17.

Dewitz, Hermann. Ueber das durch die foramina repugnatoria entleerte sekret bei *glomeris*. (Biolog. centralbl., June 1884, bd. 4, p. 202-203.)

Discusses the function of the adhesive secretion of the foramina repugnatoria which in *glomeris* are unpaired along the middle line of the dorsum.

G: D. (3721)

Doppelrolle des stachels der honigbiene (Ueber eine). Deutsch-amer. apothekerzeitung, 15 Jan. 1885, jahrg. 5, p. 664, 46 cm.)

Engl. tr., by B: P. Mann, entitled "The double role of the sting of the honey-bee." (Psyche, Jan.-Mar. 1885, v. 4, p. 245-246.)

From "Ind. Matter." Remarks on the function of the sting of *apis mellifica* as introducing formic acid into the honey stored in cells, and on the preservative action of the formic acid upon honey. B: P. M. (3722)

Emerton, James H: New England spiders of the family *theridiidae*. (Trans. Conn. acad. arts and sciences, 1884, v. 6, p. 1-86, pl. 1-24.)

Separate. [New Haven, Conn., 1882.] t.-p. cover, p. 1-86, pl. 1-24. 25 × 15, t 18 × 10.5.

External anatomy of the *theridiidae*, and literature of New England species; descriptions of 134 New England species, with notes on localities of capture and on habits, and with numerous figures; describes 85 new species belonging to the genera *theridium*, *mimetus*, *steatoda*, *euryopsis*, *ulesanis*, *phalcomma*, *ceratinella*, *cornicularia*, *lophomma*, *lophocarenum*, *tmeticus*, *erigone*, *linyphia*, *diplostyla*, *bathyphantes*, *bolyphantes* and *microneta*, and to the new genera *ceratinopsis*, *grammonota*, and *spiropalpus*; a new genus, *theridula*, was made to include *theridion sphaerula* Heutz and the European *theridion gonygaster* Simon.

G: D. (3723)

Fletcher, James. [Correspondence.] (Can. entom., Feb. [18 Mar.] 1883, v. 15, p. 40.)

Rev. of T: W. Fyles' "Notes on a gall mite of the nettle tree" . . . (*op. cit.*, Oct. [14 Dec.] 1882, v. 14, p. 198-199) [Rec., 3727]; identification, as *psylla cellidis mamma*, of the insect described in Fyles' article, and remarks on the gall, and on the geographical distribution of *cellis occidentalis* in Canada. [For a reply to this review, see T: W. Fyles' "The parasite of *phyllopera vastatrix*" . . . (*op. cit.*, [26] May 1883 [Rec., 3728]), p. 84.]

B: P. M. (3724)

Fournier?, E[ug.]. [Rev. of] DARWIN, C: On the various contrivances by which British and foreign orchids are fertilized by insects, and on the good effects of intercrossing. . . (Bull. Soc. bot. de France. Aug. 1862, v. 9, p. 243-246.) W: T. (3725)

Fyles, T: W. Description of a dipterous

rit. rev. in C: V. Riley's "Dipterous enemies of the *phylloxera vastatrix*" (*op. cit.*, Feb. [18 Mch.] 1883, v. 15, p. 39).

; account, by W: Saunders, of this insect in leaf-galls of
B: P. M. (3729)

Fyles, T: W. Notes on a gall mite of the nettle tree, *cellis occidentalis*. (Can. entom., Oct. [14 Dec.] 1882, v. 14, p. 198-199.)

Rev., by J. Fletcher, entitled "[Correspondence]." (*op. cit.*, Feb. [9 Mar.] 1883,

Reply to Fletcher's rev., in author's "The parasite of *phylloxera vastatrix*"... (*op. cit.*, [26] May 1883, v. 15, p. 84.

Rev. in C: V. Riley's "Hackberry psyllid galls" (*op. cit.*, Aug. [1 Sep.] 1883, v. 15, p. 157-159, fig. 6-7).

Description of gall and of immature and mature stages of an unnamed "mite" [later determined as *psylla cellidis-mamma*].
B: P. M. (3727)

Fyles, T: W. The parasite of *phylloxera vastatrix*, and the gall insect of the nettle tree. (Can. entom., [26] May 1883, v. 15, p. 83-84.)

Crit. rev. in C: V. Riley's "Hackberry psyllid galls" (*op. cit.*, Aug. [5 Sep.] 1883, p. 157-159, fig. 6-7).

Communicates notes by H. A. Hagen on the insects described as *diplosis? grassator* in author's "Description of a dipterous parasite of *phylloxera vastatrix*" (*op. cit.*, Dec. 1882 [20 Jan. 1883], v. 14, p. 237-239, fig. 25) [Rev., 3721], and on the "gall-mite" described in author's "Notes on a gall mite of the nettle tree, *cellis occidentalis*" (*op. cit.*, Oct. [14 Dec.] 1882, v. 14, p. 198-199) [Rev., 3727]; the former insect is a cecidomyid, but not certainly a *diplosis*; the latter is identified as *psylla venusta* [later determined to be *pachytidis-mamma*]; reply to J. Fletcher's "[Correspondence]" (*op. cit.*, Feb. [18 Mar.] 1883, v. 15, p. 49) [Rev., 3721], stating that *cellis occidentalis* occurs in Vandromul co., Quebec, but author has not met with it at Cowansville, Missisquoi co., and criticising the orthography of the term *cellidis*.
B: P. M. (3728)

Jaworowski, Anton. Über die entwickelung des rückengefässes und speciell der musculation bei *chironomus* und einigen anderen insecten. (Sitzungber. d. k. akad. d. wissensch. Wien. 1879, v. 80, pt. 1, p. 238-258, pl. 1-5.)

Separate. [Wien, 1879.] t.-p. cover, 20 p., 5 pl., 25 X 16, t 17.5 X 10.

Abstract, by P. Mayer. (Zool. jahresber. f. 1880, 1881, abtheil. 2, p. 107.)

Abstract. (BERTKAU, P. Bericht... der entom. f. 1879, 1881, p. 115.)

Literature (16 titles); the main conclusions are that "to each nucleus on the contractile wall of the dorsal vessel belongs a muscle-cell, each ring-muscle consists of two lateral cells which are only partly grown together in the median line, parts of the muscle-cells serve as valves."
G: D. (3730)

Keyserling, Eugen. Neue spinnen aus Amerika. [1.] (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1879, bd. 29; Abh., p. 293-350, pl. 4.)

Includes descriptions of *taczanowskia, castaneira* and *stenoctonus*, (3 new genera of *araneina*); and of *epieira punctillata, c. baltimorensis* and *tetragnotha illinoensis* (3 new species from North America [United States]); re-describes *cyrtarachne cornigera, fistata capitata* and *f. hibernalis*, from southern United States.
G: D. (3737)

Keyserling, Eugen. Neue spinnen aus Amerika. 2. (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1880, bd. 30; Abh., p. 517-582, pl. 16.)

Advance notice. (Amer. nat., June [21 May] 1880, v. 14, p. 468.)

Notice. (Amer. nat., Oct. [21 Sep.] 1880, v. 14, p. 740.)

Includes descriptions of *pronous* and *eurymachus* (2 new genera of *araneina*) and of *epieira proadrepida* and *diatyna sedentaria*, (2 new species from North America [United States]); re-describes *meta argyrea* from Antilles, Cayenne, and Mexico.
G: D. (3734)

Keyserling, Eugen. Neue spinnen aus Amerika. 3. (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1881, bd. 31; Abh., p. 269-314, pl. 11.)

Describes 30 new species of *araneina*; includes descriptions of *azilia, cyrtagnatha* and *liocaranoides* (3 new genera), and of *epieira cavatica, cacotes juvenilis* and *liocaranoides unicolor* (from caves of Ky.); *diatyna volupis, d. volucrifera, xysticus vernilis, x. feroculus, misumena importuna, thomisus bigibbosus*, and *philodromus lentiginosus* (from United States); and *sceloporus insularis* (from Porto Rico, W. I.).
G: D. (3732)

Keyserling, Eugen. Neue spinnen aus Amerika. 4. (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1882, bd. 32; Abh., p. 195-226, pl. 15.)

Describes *segestrioides*, a new genus of *araneina*, *pachygnatha tristriata*, from "Boston," many new species of *araneina* from South America, and some from "Colorado" [? N. A.].
G: D. (3731)

Klemensiewicz, Stanislaus. Zur näheren kenntnis der hautdrüsen bei den raupen und bei *malachius*. (Verhandl. d. k.-k. zool.-bot. gesells. in Wien, 1882, bd. 32; Abhandl., p. 459-474, pl. 21-22.)

Abstract, by C. S. M[inot], entitled. Epidermal glands of caterpillars and *malachius*. (Science, 9 Nov. 1883, v. 2, p. 632, 17 em.)

Literature (10 titles), description and figures of the external glands of the larvae of *liparis dispar, leucova salicis, lorthesia auriflua, papilio machaon, leucopygia zinula* and *vanessa io*, and of the excretory glands of the imago of *malachius*; mention (on his own or others' authority) of glands in larvae of *argyria gonostigma, o. fasciata, liparis detrita, l. rubra, papilio asterias, f. odalivius, thais polyxena, doritis apollo, d. mnemosyne*; in larvae of all European species of *vanessa, melitaea* and *argynnis*; and in larvae of *bryophila, most eucaulia, habrosola, cleophana linaria, aporia stratoegi*, many *satyridae, apteka nebulosa, leucania straminea, l. hispania* and *l. nungruioides*; mention, on authority of Laboulbène, of excretory glands on imago of *anthoconus equestris* and *chaus thoricus*.
G: D. (3731)

Künckel d'Heroulais, Jules. Recherches morphologiques et zoologiques sur le système nerveux des insectes diptères. (Comptes-rendus Acad. sci. France, 1 Sept. 1879, v. 89, p. 491-494.)

Notice. (Month. Journ. sci., Oct. 1879, s. 3, v. 1, p. 703.)

Abstract, by P. Mayer. (Zool. jahresber. f. 1879, 1880, p. 483.)

Abstract, by E. Burgess. (Psyche, March [1 May] 1880, v. 3, p. 39.)

General considerations on the nervous system of diptera, and on its application to their classification.

G: D. (3735)

Künstler, J. Sur une forme aberrante du phylum *sporozoa*. (Comptes-rendus Acad. sci. France, 10 Mar. 1884, v. 98, p. 633-634.)

Peculiarities and development of a species of gregarina parasitic in the intestinal canal of *periplaneta americana* [corr.].

G: D. (3736)

Laboulbène, Alexandre. Sur les différences sexuelles du *coraeus bifasciatus* et sur les prétendus œufs de cet insecte coléoptère nuisible au chêne vert. (Comptes-rendus Acad. sci. France, 25 Feb. 1884, v. 98, p. 539-541.)

Notes on the anatomy of the genitalia, and on the supposed eggs of *coraeus bifasciatus* which were found to be in reality the expanded abdomens of some species of acarid (near *tyroglyphus*); the ovoid abdomens of these mites contained eggs, and called to mind the abdomen of *pulex penetrans*.

G: D. (3737)

McLachlan, Robert. *Eucalyptus* galls. (Entom. mo. mag., Dec. 1880, v. 17, p. 145-147, 2 fig.)

Crit. rev., [by C: V. Riley], entitled "Galls on *eucalyptus*." (Amer. nat., May [16 Apr.] 1881, v. 15) (RILEY, C: V. Entomology . . . [May 1881] p. 402.)

Description and figures of galls, supposed to be dip-
terous, on *eucalyptus gracilis*, and of galls, supposed to be lepidopterous (pyralid) on a species of *eucalyptus*, in Australia.

B: P. M. (3738)

Muellerhoff, K. Die bedeutung der ameisen-säure im honig. (Deutsch-amer. apoth. zeitung, 1 Nov. 1884, jahrg. 5, p. 494-495, 32 cm.)

Abstract of a paper read before 57th assembly of German naturalists and doctors, at Magdeburg, Sept. 1884; Honey, when thus sealed in the comb, is preserved by formic acid [CH₂O₂] from the sting of the bee, and the bee-keeper can preserve honey that has not been sealed in comb by adding this acid; price of the acid, and amount of it required; consideration of the changes which formic acid produces in honey.

(: D. (3739)

Müller, Fritz. "Blumen der luft." (Kosmos, May 1878, bd. 3, p. 187, 10 cm.)

Note on the agreeable odor of the male of *papilio grayi*.

G: D. (3740)

Müller, Hermann. "Asa Gray. Darwin's werk über die wirkungen der kreuz und selbst-befruchtung im pflanzenreiche." (Bot. jahresbericht . . . Just, 1877, v. 5, p. 713, 5 cm.)

Notice of Asa Gray's "Fertilization of orchids through the agency of insects" (Amer. Journ. sci. and arts, 1862, v. 84, s. 2, v. 34: July, p. 133-144; Nov., p. 420-429) [Rec., 2410].

W: T. (3741)

Müller, Hermann. Ueber die besonderen beziehungen zwischen pflanzen und insecten, welche sich auf inseln darbieten. (Bot. jahresbericht . . . Just, 1876, v. 4, p. 941-942.)

Rev. of A. R. Wallace's "President's address" of the British association for the advancement of science—[40th meeting]—Glasgow meeting, 1876—Section of biology [Rec., 2362].

W: T. (3742)

Müller, Hermann. Darwin's werk: "Ueber die wirkungen der kreuzung und selbst-befruchtung im pflanzenreich" und seine bedeutung für unser verständniss der blumenwelt. (Kosmos, Apr. 1877, v. 1, p. 57-67.)

Rev. of C: Darwin's "The effects of cross and self-fertilization in the vegetable kingdom" [Rec., 2369].

W: T. (3743)

Müller, Hermann. Die wirkungen der kreuzung und selbstbefruchtung im pflanzenreiche. (Bot. jahresbericht . . . Just, 1876, v. 4, p. 936-938.)

Rev. of C: Darwin's "The effects of cross and self-fertilization in the vegetable kingdom" [Rec., 2369].

W: T. (3744)

Müller, Wilhelm. Ueber einige im wasser lebende schmetterlingsraupen Brasiliens. (Arch. f. naturgesch., 1884, jahrg. 50, heft 2, p. 194-212, pl. 14.)

Describes and figures the aquatic larva of *cataclysta pyropalis*, a Brazilian pyralid, with especial reference to the anatomy of its respiratory system, in which oxygenation takes place entirely by tracheal gills; describes the larval case, and the pupa which has two pairs of open stigmata; explains the building and structure of the aquatic pupal case, and how pupal respiration is possible in it; the larva never leaves its case, feeds upon unicellular algae, and lives with its dorsum toward the stone to which the larval case is attached, having its ventral surface dark colored and its dorsal surface light, while the reverse of this coloration is found in the pupal state; notes on larvae of other species of the genus *cataclysta*.

G: D. (3745)

Osborn, Herbert. The ash saw fly: *selandria barda* Say. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 80-83, pl. 3, fig. 9.)

Partial life history, habits and parasites of and means against *selandria barda*, injurious to *fraxinus*; eggs and larvae described.

G: D. (3746)

Osborn, Herbert. The corn root worm: *diabrotica longicornis*. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 61-69, pl. 2.)

Life history of *diabrotica longicornis*; extent of its injuries to corn (*zea mays*); much of the account is stated to be copied from a report by Prof. S. A. Forbes.

G: D. (3747)

Osborn, Herbert. An epidemic disease of *caloptenus differentialis*. (Amer. nat., Dec. [28 Nov.] 1883, v. 17) (RILEY, C.: V. Entomology . . . [Dec. 1883]), p. 1286-1287.

Reprint, and crit. rev. of Riley's note, in author's "Notes on locust parasite" (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 83-86).

Note of *entomophthora calopteni*, a fungus parasitic in *caloptenus differentialis*. [A note by C.: V. Riley follows, in which he suspects "that the *entomophthora* is a result rather than a cause of disease and debility in this case.".] G.: D. (3748)

Osborn, Herbert. External parasites of domestic animals. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 69-79.)

General notes on external parasites of vertebrates; brief descriptive and other notes on certain species of *pediculidae*, *mallophaga*, *sarcoptidae* and *ixodidae*; remedies for different kinds of parasites. G.: D. (3749)

Osborn, Herbert. Gall and blister mites. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 54-61, pl. 1.)

Reprint, with a few alterations and additions, of author's "Leaf and gall mites" (Trans. Iowa state hortic. soc., 1883, v. 18, p. 127-135) [Rec., 3753].

G.: D. (3750)

Osborn, Herbert. Insecticides and their application. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 105-107.)

Brief popular account of the more commonly used insecticides and how to use them. G.: D. (3751)

Osborn, Herbert. Insects of the orchard. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 87-97.)

Notes on habits and ravages of 27 species of rhynchota known to infest orchards, with bibliographical references "to the works that contain the principal notes on each species." G.: D. (3752)

Osborn, Herbert. Leaf and gall mites. (Trans. Iowa state hortic. soc., 1883, v. 18, p. 127-135.)

Reprint, with slight changes, entitled "Gall and blister mites." (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 54-61, pl. 1.)

A popular account of the habits and life-history of the *phytoptidae*; especial mention of *phytoptus pyri* and *ph. quadripes*, and of species on *alnus*, *fraxinus* and *negundo*. G.: D. (3753)

Osborn, Herbert. Notes on locust parasite. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 83-86.)

Reprint of author's "An epidemic disease of *caloptenus differentialis*" [with Riley's note] (Amer. nat., Dec. [28 Nov.] 1883, v. 17, p. 1286-1287) [Rec., 3748], and of C.: E. Bessey's "A new species of insect-destroying fungus" (*op. cit.*, p. 1280-1281) [Rec., 3679], with addition of further notes showing that *entomophthora calopteni* is a true parasite of the *caloptenus*. [Contains numerous typographical errors, not in the original articles.] G.: D. (3754)

Osborn, Herbert. The pine louse. (Bull. Iowa agric. coll., Aug. 1884, no. 2, p. 97-105, pl. 3, fig. 10.)

Bibliography, habits, life-history, and arthropod enemies of *chermes pinicorticis*. This paper is an amplification of the author's "On a species of plant-louse infesting the Scotch pine" (Trans. Iowa state hortic. soc., 1879, v. 14, p. 96-107) [Rec., 3755]. G.: D. (3755)

Osborn, Herbert. On a species of plant-louse infesting the Scotch pine. (Trans. Iowa state hortic. soc., 1879, v. 14, p. 96-107.)

Observations on the life-history of *chermes pinicorticis*; descriptions of different stages, and notes on habits, classification, and insect parasites of and means against this insect. H. O. (3756)

Osborne, J. A. Caterpillars. (Nature, 2 Nov. 1876, v. 15, p. 7; 8 cm.)

Four out of nine lepidoptera that regularly pupate succinctly succeeded in pupating as *suspens* when the girdle of the pupa was cut just before pupation.

G.: D. (3757)

Poisoning insects in herbarium specimens. (New remedies, July 1882, v. 11, p. 215, 9 cm.)

Describes a box specially arranged for applying the vapors of carbon disulphide [CS₂] to herbarium specimens. G.: D. (3758)

Riley, C.: Valentine. Dipterous enemies of the *phylloxera vastatrix*. (Can. entom., Feb. [9 Mch.] 1883, v. 15, p. 39.)

Crit. rev. of T.: W. Fyles' "Description of a dipterous parasite of *phylloxera vastatrix*" (*op. cit.*, Dec. 1882 [29 Jan. 1883], v. 14, p. 237-239) [Rec., 3720]; the characters given of *diplosis grassator* are not sufficient to distinguish the species; the galls of *phylloxera vastatrix* [vitifoliae] are inhabited by another enemy, named *leucopis phylloxerae* in author's MS.; comparison of larvae and pupae of these two diptera. B.: P. M. (3759)

[Riley, C.: Valentine.] Galls on *eucalyptus*. (Amer. nat., May [16 Apr.] 1881, v. 15) (RILEY, C.: V. Entomology . . . [May 1881]), p. 402.

Crit. rev. of T.: W. McLachlan's "*Eucalyptus* galls" (Entom. mo. mag., Dec. 1880, v. 17, p. 145-147) [Rec., 3738]; the supposed dipterous galls probably cecidomyioidous; the supposed lepidopterous galls probably not lepidopterous, but inhabited by a lepidopterous inquiline. B.: P. M. (3760)

Riley, C.: Valentine. Hackberry psyllid galls. (Can. entom., Aug. [5 Sep.] 1883, v. 15, p. 157-159, fig. 6-7.)

Crit. rev. of T.: W. Fyles' "The parasite of *phylloxera vastatrix*, and the gall insect of the nettle tree" (*op. cit.*, [20] May 1883, p. 83-84) [Rec., 3728]; *phylloxera vitifoliae* has many parasites and *celtis* is attacked by many species of gall-insects; description of characters of *fachypsylla* n. g.; figures of galls of *fachypsylla* [*celtidis*] *venusta* and *p. c. mamma*, to the latter of which species belongs the insect described in Fyles' "Notes on a gall mite of the nettle tree, *celtis occidentalis*" (*op. cit.*, Oct. [14 Dec.] 1882, v. 14, p. 108-109) [Rec., 3727]; *psylla c. grandis* = *fachypsylla venusta*; derivation and orthography of the generic term *celtis*. B.: P. M. (3761)

Schilde, Johannes. Frühlingsbeobachtungen über die naturinmanente erzeugung der flügelpracht und anpassung von schmetterlingen. (Entom. nachrichten, May 1884, jahrg. 10, p. 141-147.)

Separate. [Berlin, 1884.] 7 p., 23 × 14, t 16 X 9.5.

The author argues against the views held by Darwin, Weismann, and Lubbock in regard to the origin of certain types of coloration in butterflies' wings.

G: D. (3762)

Scudder, S: Hubbard. The pine moth of Nantucket, *retinia frustrana*. (MASSACHUSETTS SOCIETY FOR THE PROMOTION OF AGRICULTURE. Publications.) BOSTON, A. Williams & co., 1883. t-p. cover, 20 [+ 2] p., 1 col. pl., 24 × 15, t 17 × 10.

Notice. (Nation [N. Y.], 19 Apr. 1883, no. 929, v. 36, p. 341, 5 cm.)

Habits and description of *retinia frustrana*, a new species, which attacks *pinus rigida* in Nantucket, Mass.; description and colored figures of the larva, pupa and imago, and of twigs of *pinus* attacked by this insect; notes on other species of *retinia*. Appended [p. 18-22] is a notice of and extract from J: H: Comstock's "Report of the entomologist" (Rept. [U. S.] Commiss. agric. for 1879, 1880), p. 233-235.

G: D. (3763)

Scragg, N. Zur embryologie der chilopoden. Vorläufige mittheilung. (Zool. anzeiger, 6 Nov. 1882, jahrg. 5, p. 582-585.)

Researches on the embryology of chilopoda, chiefly based on two species of *geophilus*.

G: D. (3764)

South, Richard. On the urticating hairs of some lepidoptera. (Entomologist, Jan. 1885, v. 18, p. 3-6.)

Notes on the urtication produced by larvae, cocoons, and possibly by the imagos of certain lepidoptera, among which *liparis auriflua*, *bombyx rubi* and species of *cethocampa* are especially mentioned; discusses causes of the urtication; quotes from T. P. Bigg-Wither's "Pioneering in Brazil," in regard to stinging caterpillars in Brazil.

G: D. (3765)

Speziesfrage (Zur). (Entom nachrichten, 15 Nov. 1881, jahrg. 7, p. 321-323.)

Extract from the *Correspondenzblatt der Irmitzschia*, 1881, no. 10) of the report of a lecture, delivered 3 July 1881, in Erfurt, Thuringia, by Dr. Schmeideknecht, of Gumperta, on the difficulty of defining limits for species and varieties, based especially on studies of *bombus*.

G: D. (3766)

Trimen, Roland. Protective resemblances in insects. (Entomologist, Feb. 1885, v. 18, p. 25-30.)

Part of an address on mimicry among insects including spiders, delivered at the annual meeting of the South African philosophical society.

G: D. (3767)

Trouessart, E. L. and Mégnin, P. Sur la classification des sarcoptides plumeoles. (Comptes-rendus Acad. sci. France, 21 Jan. 1884, v. 98, p. 155-157.)

Modifications are proposed in the classification of the *analgesinae*, with some notes on the synonymy of certain genera.

G: D. (3768)

Wallace, Alfred Russell, see BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE—[46th meeting]—Glasgow meeting, 1876—Section of biology. President's address [Rec., 2362].

Walsh, B: Dann. The grape-leaf gall-louse. *Dactylospheera vitifoliae*, Fitch. (1st ann. rept. acting state entom. Ill., 1868, p. 21-24.) (Trans. Ill. state hort. soc. for 1867, n. s., v. 1, 1868; Appendix, p. 21-24.)

Remarks on the natural restriction of the ravages of *phylloxera vitifoliae* to the leaves of certain species and varieties of *vitis*, and on the rule that a given species of *aphididae* or *coccidae* is generally confined to a given species of plant, and invariably to a given family; discussion of the synonymy of *dactylospheera globosa*, the male of which is *phylloxera caryaeglobuli* and the female is *d. [ph.] caryaesemen*; *hamamelidis cornu* = *hormaphis hamamelidis*; description of habits and of gall and insects of *d. [ph.] caryaesemen* n. sp.; list of species and galls of *dactylospheera* known to the author; references to discussions of the characters of the genera mentioned.

B: P. M. (3769)

[Walsh, B: Dann and Riley, C: Valentine.] The joint-worm. *Isosoma hordei*, Harris. (Amer. entom., Apr. 1869, v. 1, p. 149-158, 388 cm., fig. 113-118; p. 185, 1 cm.)

Ravages, food-plants and indications of the attacks of *isosoma hordei*; seasons, habits and parasites, phytophagic variation and generic classification of and means against this insect; figures of male and female imago; figures of male and female imagos of *semiotellus chalcidiphagus* n. sp., *eurytoma* sp. and *decatoma* sp., and of female imago of *antigaster mirabilis*; protective habits of various insects.

B: P. M. (3770)

Webster, Francis M. Notes from Illinois on grain-feeding habits of field cricket. (Amer. nat., June [20 May] 1882, v. 16, (RILEY, C: V. Entomology.... [June 1882]), p. 513-514.)

Reprint, entitled, "Habits of field crickets." (Sci. amer., 17 June 1882, v. 46, p. 283, col. 2, 13 cm.)

Notes on *gryllus*, *epicauta pennsylvanica*, *diabrotica fossata* and *d. longicornis* as destroyers of corn [see *mays*].

G: D. (3771)

Weir, J: Jenner. Danaine butterflies not subject to the attack of mites. (Entomologist, July 1882, v. 15, p. 160-161.)

Species of *danaidae* and *papilio pammon* in collections seem to be distasteful to mites; quotations of other authorities on the same subject.

G: D. (3772)

Weir, J: Jenner. Effect of temperature on lepidoptera. (Entomologist, May 1882, v. 15, p. 115-116.)

Sudden paralyzing of *vanessa urticae* by cold.

G: D. (3773)

Weir, J: Jenner. Note on the use of naphthaline in cabinets for the protection of insect collections. (Entomologist, July 1882, v. 15, p. 165-166.)

The author warns lepidopterists against using C: A. Blake's cones of naphthalin in their collections.

G: D. (3774)

Weir, J: Jenner. Notes on the lepidoptera-rhopalocera of Hudson's bay. (Entomologist, May 1881, v. 14, p. 97-100.)

Notice and crit. rev., [by C: V. Riley], entitled "Hudson bay lepidoptera." (Amer. nat., July [22 June] 1881, v. 15, p. 572-573.) (RILEY, C: V. Entomology . . . [July 1881, p. 572-573.]

List of lepidoptera rhopalocera collected by Walton Haydon, at Moose Factory, St. James' bay, British America, in 1879 and 1880; attempt to account for the relations of this fauna to that of Europe.

B: P. M. (3775)

Weir, J: Jenner. Variations in the colour of lepidoptera. (Entomologist, Aug. 1883, v. 16, p. 169-176.)

Discusses the various forms of aberrations (heteromorphism) in colors of lepidoptera under the names albinism, xanthism, melanism, heteropocillism, gynandochromism, and hermaphroditism; and the forms of constant variation (orthopocillism) under the names polymorphism, topomorphism, atavism, dimorphism, trimorphism and homomorphism; gives examples of each of these forms of variation.

G: D. (3776)

Westhoff, Friedrich. Der maikäfer auf der wanderschaft. (11ter jahresber. d. westfäl. prov.-vereins f. wissensch. u. kunst. pro 1882, 1883, p. 9-12.)

Record of observation of a great swarm of *melolontha vulgaris* seen migrating from the west toward the east.

G: D. (3777)

Weyenbergh, H. Sobre la familia pulicidae con descripcion de algunas nuevas especies. (Periódico zoológico argentino, 1881, v. 3, p. 261-268, 9-17.)

Separate. Córdoba, 1881. t. p. cover+p. 261-268, 9-17, 23×17, t 16.5×10.

List of 53 species of pulicidae and their hosts; describes, as new species, *ceratophyllus rufulus* (from *ceruus rufus*), *c. isidori* (from *vespertilio isidori*), *pulex* (*hectopsylla?*) *testudo* (from *strix perlata*), *p. nasuae* (from *nasua socialis*), *p. obscurus* (from *canis azarae* and *c. gracilis*), *p. concoloris* (from *felis concolor*) and *p. cavicola* (from *cavia leucopyga*).

G: D. (3778)

Williston, S: Wendell. An anomalous hombylid. (Can. entom., Nov. 1879, v. 11, p. 215-216.)

Description of a new species [unnamed] of *anthrax*, with remarks on anomalous neurulation in the wings of one specimen of this species.

B: P. M. (3779)

Williston, S: Wendell. On the classification of North American diptera. 1st paper. (Bull. Brooklyn entom. soc., Feb. 1885, v. 7, p. 129-139, 3 fig.)

Separate. [Brooklyn, N. Y., 1885.] t.-p. cover + p. 129-139, 22 × 15, t 16.5 × 10.

General characters of the *syrrhidae*; table of the genera of North American *syrrhidae*; discusses the characters and their value in the genera *euceratomyia*, *merapioidus*, and *pelococera*.

G: D. (3780)

Williston, S: Wendell. Dipterous larvae from the western alkaline lakes and their use as human food. (Trans. Conn. acad. arts and sciences, July 1883 [Sept. 1884], v. 6, p. 87-90, 1 fig.)

Separate. [New Haven, Ct., Aug. 1883.] p. 1-4, 23 × 15, t 17.5 × 10.

Account of the dipterous larvae, living in alkaline lakes of Nevada and California, which are used as food by Pac-Ute Indians; figure of the larva and description of the imago under the name of *ephydra californica*, under which name A. S. Packard, Jr. has already described larvae presumably of the same species; an account of the mode of preparing the larvae for food is quoted from a letter by W: H. Brewer. G: D. (3781)

Williston, S: Wendell. On the North American asilidae (*dasygogoninae*, *laphrinae*), with a new genus of *syrrhidae*. (Trans. Amer. entom. soc., Dec. 1883, v. 11, p. 1-35, pl. 1.)

Table of genera of North America *dasygogoninae* and *laphrinae*; describes one new genus, *lestomyia*, of the *dasygogoninae*, and one, *nausigaster*, of the *syrrhidae*; describes 22 new species of *asilidae* and one of *syrrhidae*.

G: D. (3782)

Williston, S: Wendell. On the North American *asilidae*. Part 2. (Trans. Amer. entom. soc., Jan. 1885, v. 12, p. 53-76.)

Continuation of author's "On the North American *asilidae* (*dasygogoninae*, *laphrinae*), with a new genus of *syrrhidae*" (*op. cit.*, Dec. 1883, v. 11, p. 1-35) [Rec., 3782]. Tables of genera of *asilinae*, and of species of *laphria*, *mallophora*, *promachus*, *crax*, and *proctacanthus*; describes 16 new species and gives numerous synonymical notes.

G: D. (3783)

Williston, S: Wendell. North American *conopidae*: *stylogaster*, *dalmannia*, *oncomyia*. (Trans. Conn. acad. arts and sciences, July 1883 [Sept. 1884], v. 6, p. 91-95.)

Separate. [New Haven, Ct., Aug. 1883.] p. 5-12, 23 × 15, t 17.5 × 10.5.

Describes the following new species: *stylogaster neglecta*, *dalmannia picta*, *oncomyia modesta*, and *o. baroni*; redescribes several species belonging to the same genera.

G: D. (3784)

Wilson, Owen S. Remarks on rearing lepidopterous larvae in confinement. (Entomologist, Feb. 1883, v. 16, p. 47-48.)

Description of a mode of rearing larvae of lepidoptera in anchovy jars.

G: D. (3785)

Worthington, C: Ellis. A model collecting box. (Our home and science gossip, Sept. 1881, v. 5, p. 103, col. 2-4, 38 cm.)

Description of an excellent field-collecting box, capable of preserving small lepidoptera for a long time limber, and containing several conveniences.

B: P. M. (3786)

Wright, W. T. Hermaphrodite *odonestis potatoria*. (Entomologist, Aug. 1883, v. 16, p. 188.)

Description of a specimen of *odonestis potatoria* in which the right antenna is that of a male and the rest of the insectis female.

G: D. (3787)

ENTOMOLOGICAL ITEMS.

DR. A. GESTRO, whose address is at the Museo Civico, Genoa, Italy, would like a correspondent with whom he could exchange coleoptera of Italy, New Guinea, and the Malay archipelago, for those of North America.

HERR LEHRER FRANZ BUZEK, in Rakowitz, Hungarian Austria, desires to exchange coleoptera and lepidoptera of his own locality for those of North America. Address as above given.

ASSISTANT WANTED.—DR. C. V. Riley is looking for some one experienced in collecting and mounting insects, to assist in the work of the Division of Entomology at the Department of Agriculture in Washington. Salary according to ability. Applicants may address him at the Department.

SOUTH AMERICAN INSECTS FOR SALE.—M. Louisa Ross, Hyde Park, N. Y., offers for sale a 15-drawer cabinet containing ten drawers of butterflies, one of moths, one of more than 200 beetles, and one variety drawer, all South American; one of moths and one of butterflies, both North American; systematically arranged. Price, \$500, which is stated to be very much below cost. The beetles will be sold for \$60, if bought separately or with the most rare of the butterflies. The other specimens may be sold by the drawer. The collection is at the Cooper Institute, New York City, where it can be seen.

STAPHYLINIDAE OF BUENOS AIRES.—MR. Félix Lynch Arribáizaga has just completed a paper, entitled "Estafilinos de Buenos Aires," which occupies the first 392 pages of vol. 7 of the Boletín de la Academia nacional de ciencias en Córdoba, and which is an important contribution to the coleopterous fauna of the Argentine Republic. The author gives descriptions and notes upon 118 species (belonging to 58 genera) which are found in the province of Buenos Aires. A few of the species are North American.

ENTOMOLOGICAL CLUB OF A. A. A. S.—The next meeting of the American association for the advancement of science will be held at Ann Arbor, Mich., commencing Aug. 26th 1885. The Entomological club will meet at that place on August 25th 1885, according to its by-laws; exact locality not yet determined.

Will those members of the club or other entomologists who expect to be present please notify one of the undersigned, and also send in the title of any papers they expect to read, and state the length of time they expect to occupy, so that a program can be arranged? The exact place and hour of meeting, as well as the program so far as fixed, will be published later.

John B. Smith, Brooklyn, N. Y., *Chairman*.
Herbert Osborn, Ames, Iowa.

B. Pickman Mann, Washington, D. C.

Committee.

DATA ON ANNUAL ADDRESSES. The earlier annual addresses of the retiring presidents of the Cambridge entomological club, of which we publish in this numero that for 1885, were as follows:—

1st annual address, by S: H. Scudder, Jan. 1878. [*See* PSYCHE, Jan.-Feb. (14 June) 1878, v. 2, p. 97-116 (Rec., 1401).]

2nd, by E: P. Austin, 10 Jan. 1879. [*See* PSYCHE, 1879, v. 2: (14) Mar., p. 217-223; (11) Apr., p. 227-228 (Rec., 1434).]

3rd, by E: Burgess, 9 Jan. 1880. [*See* PSYCHE, Mar. (1 May) 1880, v. 3, p. 27-43 (Rec., 2943).]

4th, by E: Burgess, 14 Jan. 1881. [Not published; *see* PSYCHE, Jul.-Sep. 1881 (7 Mar. 1882), v. 3, p. 245 (Rec., 2950).]

5th, by E: L. Mark, 13 Jan. 1882. [Not published.]

6th, by S: H. Scudder, 12 Jan. 1883. [Not published; *see* PSYCHE, Jan.-Feb. (5 May) 1883, v. 4, p. 13.]

7th, by B: P. Mann, 11 Jan. 1884. [*See* PSYCHE, Apr. (14 June) 1884, v. 4, p. 155-159.]

PRESERVATION OF INSECTS.—To remove the verdigris which forms upon the pins the pinned insects should be immersed in benzine and left there for a time; several hours is generally long enough. The administration of this bath cannot be too highly recommended for beetles which have been rendered unrecognizable by grease, especially when dust has been mixed with the grease. This immersion, of variable duration according to circumstances, will restore to these insects, however bad they have become, all their brilliancy and all their first freshness, and the efflorescences of cupric oxide will not reappear. This preventative and curative method is also readily applicable to beetles glued upon paper which have become greasy: plunge them into benzine in the same way, and as gum is insoluble in the liquid, they remain fastened to their supports. Pruinose beetles, which are few in number, are the only ones that the benzine bath can alter; the others which are glabrous, pubescent, or scaly, can only gain by the process, and they will always make a good show in the collection . . .—A. Dubois in *Feuille des jeunes naturalistes*, March 1885, p. 71.

NECROLOGY. Since our last issue announcements of the deaths of the following entomologists have come to our notice: Constant Bar, entomologist at Cayenne, French Guiana, died there in 1884. Professor Lauritz Esmark, director of the zoological museum of the university of Christiania, died there in Dec. 1884. George Mawson, an English lepidopterist, died 10 Nov. 1884. L. Rudolf Meyer-Dür, who has published articles upon entomology since 1841, died 2 March 1885, at Zürich, Switzerland, aged 73. Louis Auguste Remacle Mors, a Parisian entomologist and civil engineer, died at Paris, 7 Dec. 1884, at the age of 58 years. Major Frederic J. Sidney Parry, a London coleopterist, died 1 Feb. 1885, at The Warren, Bushey Heath, aged 74. Titian Ramsay Peale, lepidopterist, born Oct. 1799, died 13 March 1885, in Philadelphia, Pa. Ed-

ward Caldwell Rye, a well-known English coleopterist, and editor of the Zoological record, born in London 10 April 1832, died of the small-pox, in the same city, 7 Feb. 1885. Sidney Smith, entomologist and conchologist, died at Walmer, England, 28 Dec. 1884, aged nearly 80 years. Friedrich Stein, professor in the university of Prague, who was born in 1818 in Niemegek, Prussia, died 9 Jan. 1885 in Prague; Dr. Stein was a well-known writer upon infusoria, and in earlier life the author of a number of entomological papers, among which the most prominent was one upon the sexual organs and the structure of the abdomen of female beetles, with nine large plates, published in 1847. The January (1885) numero of *Rovartani lapok* gives a biographical notice, list of publications, and portrait of Dr. O. Tömösváry, whose death we have already noted; he was born 12 Oct. 1852, at Magyaró, Hungary, and died 14 August 1884, at Déva, Hungary. *G: D.*

UPON A PECULIAR ORIENTAL LOCALITY FOR HONEY.*—Xenophon, in his description of the "Retreat of the ten thousand," says that his soldiers drank barley wine, oinon kritys, as it had been introduced into Egypt by Osyris 4000 years previously, according to the Egyptian tradition, to take the place of other spirituous liquors. Sophocles and other writers mention this barley wine also. Xenophon says likewise that his soldiers were in the habit of getting drunk by the use of a certain kind of honey, and were poisoned by it. It seems that the bees suck the nectar from the flowers of poisonous plants which are found in that region. Such an intoxicating, soporific honey is still found there under the name of *Meli menomonon*. I have succeeded by many tedious investigations in establishing the following. I obtained the information principally through a former pupil of mine who is now settled in Kerchasund in Persia as a physician and apothecary.

* Translated from Prof. Dr. Xaver Landerer's "Mittheilungen aus dem orient" (Deutsch-amer. apothekerzeitung, 15 Dec. 1882, jahrg. 3, p. 582).

I have already reported to you upon the oriental mania for opium. But the opium which is produced for the western countries and for China is very little in comparison with the domestic consumption. In the districts around Erzerum, around Kerchasud and farther into the Persian districts are to be found colossal plantations, whose product is almost exclusively used where produced.

In all probability it is the nectar of these poppy plants which gives the honey in those regions its toxic qualities.

This honey is used as a soporific for children and is employed also against various affections, especially such as arise from improper food—sour milk, badly cooked rice, goat's milk, etc.—as for instance colic, and often is of aid where symptoms of death have already appeared.

The opium which is collected from the poppy plants in those regions contains usually 12 per cent. and rarely less than 10 per cent. of morphium. I had an opportunity to see such opium in the possession of a Persian merchant. It consisted of round balls of a few drachms weight which were wrapped in goldleaf. This is the kind which is used principally for smoking and chewing.

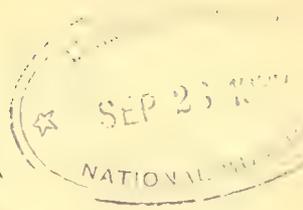
PUPAL RETREAT OF CHARAGIA VIRESCENS.—Mr. G: Vernon Hudson, in an article in the *Entomologist* for February 1885, entitled "Life-history of *Charagia virescens*," gives some interesting observations in regard to the habits of this bombycid from New Zealand. The larva bores in the wood of living trees, often in that of *Aristotelia racemosa* (New Zealand currant), *Olea apetala* (black maize) and *Leptospermum* (manuka). When ready to pupate the larva constructs a complicate tunnel, described as follows. "It consists of a spacious, irregular, but shallow, cavity just under the bark, having a large opening to the air, which is entirely closed with a thin silken covering almost exactly the same shape and size as the numerous scars which occur at intervals on the trunks of nearly all the trees. Three large tunnels

open into this shallow cavity; one in the centre, which runs into the middle of the stem; and one on each side, which run right and left just under the bark. These are usually very short, but sometimes extend half-way round the tree, and occasionally even join one another on the opposite side. The central tunnel has a slightly upward direction for a short distance inwards, which effectually prevents it from becoming flooded with water; afterwards it pursues an almost horizontal course until it reaches the centre of the tree, when it appears to suddenly terminate. This, however, is not the case, for, if the gallery floor is carefully examined a short distance before its apparent termination, a round trap-door will be found compactly constructed of very hard, smooth silk, corresponding with the surrounding portion of the tunnel so exactly that it almost escapes detection. When this lid is removed a long perpendicular shaft is disclosed, which runs down the middle of the tree to a depth of fourteen or sixteen inches [35-40 cm.], and is about six lines [13 mm.] in diameter; at the bottom of this the elongate *virescens* pupa sleeps quietly and securely in an upright position, the old larval skin forming a soft support for the terminal segment of the pupa to rest on. The upper end of this vertical shaft is lined with silk, which forms a framework on which the trap-door rests when it is closed: the lid itself, being of a larger size than the orifice, which it covers, causes it to be extremely difficult, if not impossible, to open it from the exterior, especially when it fits down very closely, which is nearly always the case as long as the insect remains in its burrow. The object of this most ingenious contrivance is in all probability, to prevent the ingress of insects; blattae, slugs, spiders, and immature 'wetas' (*Hemideina*) are frequently found in both central and lateral tunnels, but they are quite unable to pass the trap-door, and are most likely entirely ignorant of the existence of the vertical burrow."

METAMORPHOSES OF ARCTIC INSECTS. In the chapter entitled, "Das Insektenleben in arktischen Ländern," which Dr. Christopher Aurivillius contributes to the account of A. E. Nordenskiöld's arctic investigations, published this year in Leipzig,* the author says: "The question of the mode of life of insects and of its relation to their environment in the extreme north is one of especial interest. Knowing, as we do, that any insect in the extreme north has at the most not more than from four to six weeks in each year for its development, we wonder how certain species can pass through their whole metamorphosis in so short a period. R. McLachlan adverts, in his work upon the insects of Grinnell Land, to the difficulties which the shortness of the summer appears to put in the way of the development of the insects, and expresses the belief that the metamorphosis which we are accustomed here to see passed through in one summer there requires several summers. The correctness of this supposition has been completely shown by the interesting observations which G. Sandberg has made upon species of lepidoptera in South Varanger, at 69° 40' north latitude. Sandberg succeeded in following the development from the egg onward of some species of the extreme north. *Oenisc bore*, Schn., a purely arctic butterfly, may be taken as an example. This species never has been found outside of arctic regions and even there occurs only in places of purely arctic stamp. It flies from the middle of June onward, and lays its eggs on different species of grass. The eggs hatch the same summer; the larva hibernates under ground, continues eating and growing the next summer, and does not even then reach its full development, but winters a second time and pupates the following spring. The pupa, which in closely-related forms, in regions further to the south,

is suspended free in the air upon a blade of grass or like object, is in this case made in the ground, which must be a very advantageous habit in so raw a climate. The imago leaves the pupa after from five to six weeks, an uncommonly long period for a butterfly. In more southern regions the butterfly pupa rests not more than fourteen days in summer. The entire development, then, takes place much more slowly than it does in regions further south. Sandberg has shown, then, by this and other observations, that the arctic summer, even at 70° N., is not sufficient for the development of many butterflies, but that they make use of two or more summers for it. If then more than one summer is requisite for the metamorphosis of the butterflies, it appears to me still more likely that the humble-bees need more than one summer for their metamorphosis. With us only the developed female lives over from one year to the next; in spring she builds the new nest, lays eggs, and rears the larvae which develop into workers who immediately begin to help in the support of the family; finally, toward autumn, males and females are developed. It seems scarcely credible that all this can take place each summer in the same way in Grinnell Land, at 82° N., especially as the access to food must be more limited than it is with us. The development of the humble-bee colony must surely be quite different there. If it was not surely proved that humble-bees occur at so high latitudes, one would not, with a knowledge of their mode of life, be inclined to believe that they could live under such conditions. They seem, however, to have one advantage over their relatives in the south. In the arctic regions none of those parasites are found which in other regions lessen their numbers, such as the *conopidae* among the flies, the mutillas among the hymenoptera, and others."

* NORDENSKIÖLD, A. E. Studien und forschungen veranlasst durch meine reisen im hohen norden. Autorisirte ausgabe. Leipzig, *Brockhaus*, 1885. 9 + 521 p., 8 pl., maps, O. il.



PSYCHE,

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Normal,
Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wisc.*

Vol. 4. Nos. 132-134.

APRIL-JUNE 1885.

CONTENTS:

ADVERTISEMENTS	270
THE INSECTS OF BETULA IN NORTH AMERICA— <i>Anna Katherina Dimmock</i>	271-286
NEW SOLVENT OF CHITIN	286
HERBERT KNOWLES MORRISON	287
PROCEEDINGS OF SOCH FILS—Linnean Society of New South Wales	287-288
OBSERVATIONS ON DECAPITATED SILKWORM MOTHS	288
BIBLIOGRAPHICAL RECORD, no. 3788-3884	289-296
ENTOMOLOGICAL ITEMS	297-300

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

PS Subscriptions not discontinued are considered renewed.

PS Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

PS Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

PS Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " "	1.25	1.00
Half " " "	2.25	1.75
One " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U. S. A.

Subscriptions also received in Europe by
R. FRIEDLANDER & SOHN,
Carlstrasse 11, Berlin, N. W.

THIS PAPER may be found on file at Geo. P. Rowell & Co's Newspaper Advertising Bureau (10 Spruce St.), where advertising contracts may be made for it **IN NEW YORK.**

AMERICAN AGRICULTURIST

100 Columns and 100 Engravings in each issue.

43rd YEAR. \$1.50 A Year.

Send three 2c. stamps for Sample Copy (English or German) of the **Oldest and Best Agricultural Journal in the World.**

ORANGE JUDD CO., DAVID W. JUDD, Pres.
751 Broadway, New York.

INDEX TO ENTOMOLOGICAL LITERATURE.

Having accumulated an immense stock of references to the literature of entomology, I will furnish references on special subjects at ten cents each reference, or fifty cents per decade. For further particulars see PSYCHE for Oct.-Dec. 1884, v. 4, p. 223.

B: PICKMAN MANN,
Washington, D. C.



The most popular **Weekly** newspaper devoted to science, mechanics, engineering, discoveries, inventions and patents ever published. Every number illustrated with splendid engravings. This publication, furnishes a most valuable encyclopedia of information which no person should be without. The popularity of the SCIENTIFIC AMERICAN is such that its circulation nearly equals that of all other papers of its class combined. Price, \$3.20 a year. Discount to Clubs. Sold by all newsdealers. MUNN & CO., Publishers, No. 361 Broadway, N. Y.

PATENTS. Munn & Co. have also had **Thirty-Seven** years' practice before the Patent Office, and have prepared more than **One Hundred Thousand** applications for patents in the United States and foreign countries. Caveats, Trade-Marks, Copyrights, Assignments, and all other papers for securing to inventors their rights in the United States, Canada, England, France, Germany and other foreign countries, prepared at short notice and on reasonable terms. Information as to obtaining patents cheerfully given without charge. Hand-books of information sent free. Patents obtained through Munn & Co. are noticed in the Scientific American free. The advantage of such notice is well understood by all persons who wish to dispose of their patents. Address MUNN & CO., Office SCIENTIFIC AMERICAN, 361 Broadway, New York.

PSYCHE.

THE INSECTS OF *BETULA* IN NORTH AMERICA.

BY ANNA KATHERINA DIMMOCK, CAMBRIDGE, MASS.

(Concluded from p 243.)

Amphidasys cognataria Guenée (Hist. nat. d. ins., 1857, v. 9, Uran. et phal., v. 1, p. 208). Cramer (Bull. Brooklyn entom. soc., Aug. 1883, v. 6, p. 48) briefly describes the eggs of this species, of which about five hundred were deposited 3 June. Bowles (Can. entom., April 1871, v. 3, p. 11-12) (Ann. rept. Entom. soc. Ontario, 1871, p. 38-39) describes a variety of the larva which fed on "black currant" [*Ribes nigrum*], and Goodell (*op. cit.*, April 1878, v. 10, p. 67) describes another variety which fed on apple and pear. Lintner (Entom. contrib., no. 3, 1874, p. 166) briefly describes the larva, giving *Acer* as food-plant, and Packard (Guide study ins., 1869, p. 322) gives a few notes on the larva, which he states feeds upon *Ribes aureum*, *R. ♀grossularia*, and *Spiraea tomentosa*. Pilate (Papilio, May 1882, v. 2, p. 71) gives "honey-locust" (*Gleditschia triacanthos*) as food-plant. Lintner (Entom. contrib. [no. 1], 1869, p. 64) gives plum as food-plant. To the above food-plants may be added *Betula alba*, *B. lenta*, *Castanea vesca*, *Salix*, and *Spiraea sorbifolia*. The larva varies from pea-green to brownish grey or even brownish black in general color; as far as noticed the green form is from *Ribes*, *Salix* and *Spiraea*, while those from apple exhibit all the color variations; on *Betula* and *Castanea* the larvae are grey. Similar variations have been noticed in the larvae of *Amphidasys betularia*, a European species. The larvae often rest in a partially twisted position, with their rigid bodies at a considerable angle from the stem to which they cling, thus imitating very closely twigs and petioles. The larvae are common in New England in July and August:

they pupate from the latter part of July to September, the pupa hibernating under leaves and rubbish.

Cymatophora crepuscularia Treits (Schmett. v. Europa, 1827, v. 6, pt. 1, p. 190). Goodell (Can. entom., Apr. 1878, v. 10, p. 67) has described the larva of this species from a single specimen taken on plum, 30 May; pupation took place 6 June, and the imago emerged 19 June. In Europe this very variable larva has often been reared. Herr (Anleitung d. schmett. u. raupen... 1833, pt. 2, p. 272) gives a good description of the larva, and states that its food-plants are *Aquilegia*, *Salix*, *Populus*, *Alnus*, *Ulmus*, *Spartium*, and *Sambucus*. Kaltenbach (Pflanzenfeinde, 1872, p. 614-615) writes "A very common geometrid whose larva is very differently marked according to its food-plant. On *Salix* Borkhausen found it brownish-green, on Italian poplar grey-green, on *Alnus* brownish-grey, on *Ulmus* lighter green than on *Salix*, on *Sambucus* grey-brown, etc. Treitschke's specimens reared on plum were yellowish. Pupation takes place under the ground; the moth appears in two generations, in spring from hibernated pupae and again in July. The larvae appear in June and in September." Kaltenbach (*op. cit.*, p. 110, 234, 302, and 435) adds the following to previously mentioned food-plants: *Betula alba*, *Genista*, *Quercus*, *Rubus*, *Lonicera*, and *Ligustrum*. The larva of this species is common on *Betula alba* in eastern Massachusetts, where it is found ready for pupation as early as the middle of June. Of three larvae taken 12 Aug. 1882, one pupated 29 Aug. and hibernated as pupa, developing an

imago the next spring; another pupated 2 Sept. and died later, and the third pupated 2 Sept. and the imago appeared 28 Sept. of the same year. Two annual broods of larvae are therefore probable in New England, as in Germany, but part of the second brood apparently emerge and oviposit in late autumn, while the rest hibernate as pupae.

Paraphia subatomaria Guenée (Hist. nat. d. ins., 1857, v. 9, Uran. et Phal., v. 1, p. 272). A larva taken on *Betula alba*, at Belmont, Mass., 12 Aug. 1882, pupated 19 Sept. and a male imago emerged 8 Oct. 1882. This larva was mistaken for a young larva of *Cymatophora crepuscularia*. Another larva, taken on the same species of plant, at Cambridge, Mass., 10 Sept. 1882, pupated 27 Sept. and produced a female imago 28 Oct. 1882. A third larva taken in Cambridge, on the same plant in the fall of 1883, pupated, and would have hibernated as pupa had it not been kept in a warm room; the moth emerged during the winter. Packard (Mon. geom. moths U. S., 1876, p. 418) writes "The moth has been raised by Mr. W. Saunders, of London, Canada, from a 'brown geometric larva on the pine, the imago appearing June 24th'."

Ephyra pendulinaria Guenée (Hist. nat. d. ins., 1857, v. 9, Uran. et phal., v. 1, p. 414). Packard (Mon. geom. moths U. S., 1876, p. 363-364) gives a description, by S. H. Scudder, of the larva and pupa of this species; the larva fed on *Comptonia asplenifolia*. A larva of this species, taken on *Betula alba*, at Wachusett, Mass., 26 Aug. 1882, pupated 28 Aug., and the imago appeared 14 May 1883.

Anagoga pulveraria Linn. (Syst. nat., 1758, ed. 10, p. 521). Herr (Anleitung d. raupen d. deutsch. schmett., 1833, p. 284) describes larva and pupa, and gives *Salix caprea* as food-plant of this species. Kaltenbach (Pflanzenfeinde, 1872, p. 571 and 598) gives *Salix* and *Betula* as food-plants. Packard (Mon. geom. moths, 1876, p. 488-489) quotes Merryfield's description of the larva, and states, on authority of Goodell, that the larva is found on *Corylus*.

Endropia armataria Herrich-Schaeffer (Samml. neuer od. wenig bekannter ausser-cur. schmett., 1850-1858, pl. 65, fig. 373-374). Saunders (Can. entom., Oct. 1871, v. 3, p. 130-131) (Ann. rept. Entom. soc. Ontario, 1871, p. 38) describes the larva of this species which he found on species of *Ribes*. A female of this species taken 15 June 1883, in Cambridge, Mass., was confined over fresh twigs of *Acer*, *Ribes rubrum* and *R. aureum*. On 18 June she laid two rows of elongated, flattened eggs upon a leaf of *Acer*; their color was light green, but by 20 June they had become shining carmin-red, which later became dull-red. The eggs were 0.7 mm. long, 0.5 mm. wide and 0.4 mm. high, and were placed closely side by side in rows, and gummed to the leaf. They hatched 27 June. The larvae would not readily eat leaves of *Ribes*, but ate, in order of preference, leaves of *Betula alba*, of *Acer*, and of apple. One pupated 2 Aug. 1883 and the imago appeared 19 Aug. 1883; the second pupation occurred 6 Aug. 1883, but the imago did not appear until 3 June 1884; two more pupated 17 Aug. 1883, both of which produced imagos about 7 June 1884. In this case, of the four larvae which succeeded in producing imagos, all were subjected as nearly as possible to equal conditions, being reared in the same jar, upon the same plants, which were kept fresh with their stems in water, yet one of the imagos appeared the same fall, only seventeen days after pupation, while the three others remained about ten months in the pupal state. Those reared by Mr. Saunders hibernated as pupae.

Eugonia alniaria Linn. (Syst. nat., 1758, ed. 10, p. 519) [= *E. magnaria* Guenée]. The eggs of this species are flattened, oblong, 1.1 mm. long, 0.6 mm. wide, and 0.5 mm. high. They are of a greenish-brown, somewhat polished bronze color, and when laid upon a smooth surface are arranged side by side in a curve having the length of the abdomen of the female moth for its radius. When laid upon bark and rough surfaces the eggs are in

broken, short rows. A single female deposits five hundred to six hundred eggs. Oviposition takes place in September and October, and the eggs hatch in May and June, hibernation taking place in the egg state, as is the case with some other species of *geometridae*. Hellins (Entom. mo. mag., Mar. 1870, v. 6, p. 222) gives similar dates for oviposition and hatching in England. The larva and pupa are described by Herr (Anleitung d. raupen, d. deutschen schmett., 1833, p. 258) who enumerates the following food-plants: *Betula*, *Alnus*, *Corylus avellana*, *Carpinus betulus*, *Ulmus*, apple, pear, stone-fruit, and *Tilia*. Herold (Teutscher raupenkalender, 1845, p. 135) gives *Fagus* in addition to the above-mentioned trees. Harris (Entom. corresp., 1869, p. 320) gives notes on different stages of this species. Kaltenbach (Pflanzenfeinde, 1872, p. 89, 218, and 552) adds *Acer*, *Rosa* and *Populus* as food-plants. Lintner (Entom. contrib., no. 3, 1874, p. 165), in a note on *Eugonia magnaria*, gives *Syringa vulgaris* as food-plant. Packard (Mon. geom. moths, 1876, p. 530) quotes descriptions of larva and pupa by Goodell and by Scudder; the former entomologist gives *Castanea vesca*, and the latter *Betula lenta* as food-plant. Rouast (Annales Soc. linn. de Lyon, ann. 1882, [1883], v. 29, p. 340) adds *Quercus robur* to the food-plants. Packard (Bull. no. 7, U. S. entom. comm., 1881, p. 92) repeats Goodell's description of the larva and pupa, adds one of the moth, and further remarks that Scudder's description "is so different from Mr. Goodell's that I fear it refers to a different insect." This is not, however, the case, but the larva is very variable in coloration. Worthington (Can. entom., Jan. 1878, v. 10, p. 16) writes, "This larva evidently changes its color somewhat with different food, as these [larvae] closely resemble the bark of this tree [maple]." The general coloration may vary to match that of the bark of the tree on which the larvae feed, but the head, which is the part of the larva that varies most, is slate-grey, green, or dull red in specimens taken

from maple. These larvae, having molted at least four (probably five) times, pupate from the latter part of July to the end of September; the pupal state lasts from eighteen to twenty days, the imago flying from the middle of September until the last of October in New England. The larvae are not rare upon *Betula alba* and *B. lutea*.

Catocala relicta Walk. (List lep. ins. Brit. mus., 1857, pt. 13, p. 1192-1193.) Bunker (Can. entom., May 1883, v. 15, p. 100) states that *Populus* is the favorite food-plant of the larva of this species. Hulst (Bull. Brooklyn entom. soc., July 1884, v. 7, p. 48) says "Food-plant, white birch and silver poplar; and probably all species of *Betula* and *Populus*." The same author (*l. c.*, June 1884, v. 7, p. 15-16) gives structural characters and habits of the larvae of *Catocala*. The European *C. fraxini*, regarded by some authors to be a synonym of *C. relicta*, feeds, as larva, on *Populus*, *Betula*, *Acer*, *Ulmus*, *Quercus*, and *Fraxinus*. *C. relicta* has been reared by G: Dinmock, in Springfield, Mass., from a full-grown larva taken under circumstances which made it almost certain that its food-plant was *Acer*.

Brephos infans Möscher (Wien. entom. monatsschr., Mar. 1862, v. 6, p. 134-136, pl. 1, fig. 6). Harris (Entom. corresp., 1869, pl. 1, fig. 4) figures the imago of this species. Lintner (Entom. contrib., no. 4, 1878, p. 227-229) gives notes upon the habits of the imago which render it almost certain that the larva feeds upon *Betula*. The larvae of the European species of this genus feed upon *Betula alba*, the larva of *Brephos parthenias* living between leaves that it spins together upon high twigs. The imagos of *B. infans* are not rare about *Betula alba*, extremely early in the spring, both in eastern and western Massachusetts.

Orthosia instabilis Fabr. (Entom. syst., 1793, v. 3, p. 119) [= *Taeniocampa incerta* Hübn.]. Kaltenbach (Pflanzenfeinde, 1872, p. 429-430, 550, 640) gives the following food-plants for the larva of this species in Europe:

Apple, *Ulmus*, *Tilia*, *Salix*, *Quercus*, *Fraxinus*, *Betula alba*, *Populus* and *Carpinus*; to this list Roüast (Annales Soc. linn. Lyon, ann. 1882, [1883], n. s., v. 29, p. 315-316) adds *Amygdalus communis*, *Crataegus oxyacantha*, and *Centaurea jacea*.

Apatela xyliniformis Guen. (Hist. nat. d. ins., 1852, v. 5, Noct., v. 1, p. 56). Thaxter (Papilio, Jan. 1883, v. 3, p. 17) states that the larva of this species feeds on *Betula* and blackberry [*Rubus*].

Apatela brumosa Guen. (Hist. nat. d. ins., 1852, v. 5, Noct., v. 1, p. 52). Thaxter (Papilio, Jan. 1883, v. 3, p. 17) states that the larva of this species feeds on *Betula*, *Salix*, and *Populus*.

Apatela dactylina Grote (Proc. Bost. soc. nat. hist., April 1874, v. 16, p. 239). Thaxter (Psyche, May-June [9 July] 1877, v. 2, p. 35) gives *Betula* and *Salix* as food-plants of the larva of this species.

Apatela americana Harr. (Rept. ins. injur. veg., 1841, p. 317). Harris (*op. cit.*, p. 317-318) describes the larva and cocoon of this species: he writes, "The caterpillar eats the leaves of the various kinds of maple and sometimes also those of the elm and chestnut." The same author (Treatise on ins. injur. veg., 1862, p. 436-437) figures larva, pupa, and imago of this species and adds *Tilia* to the food-plants; and (Entom. corresp., 1869, p. 311) again describes the larva. In Amer. entom., April 1869, v. 1, p. 166, this species is stated to feed on *Populus dilatata* and *P. monilifera*, and Riley (2nd rept. state entom. Mo., 1870, p. 121) gives *Betula* and *Alnus* as food-plants. Coquillett (Papilio, Jan. 1881, v. 1, p. 6) describes the larva, and gives red oak (*Quercus*) as food-plant. Thaxter (Papilio, Jan. 1883, v. 3, p. 17) adds *Fuglans*, *Fraxinus* and *Platanus* to the recorded food-plants.

Apatela vulpina Grote (Can. entom., Jan. 1883, v. 15, p. 8-9). Thaxter (Papilio, Jan. 1883, v. 3, p. 14-15) describes the larva of this species, and gives *Populus* and *Betula* as food-plants.

Apatela spinigera Guen. (Hist. nat. d. ins., 1852, v. 5, Noct., v. 1, p. 45). Thaxter (Psyche, March-April [24 Sept.] 1878, v. 2, p. 121-122) describes the larva of this species and gives as food-plants *Rubus* and *Betula*.

Apatela occidentalis Grote and Rob. (Proc. Entom. soc. Phil., May 1866, v. 6, p. 16). The larva of this species is described by Harris (Entom. corresp., 1869, p. 311-312), who found it feeding on plum, cherry, and *Pyrus americana*. Lintner (Entom. contrib. [no. 1], 1869, p. 62) adds apple to the food-plants. Saunders (Can. entom., March 1872, v. 4, p. 50) describes the larva. Packard (Papilio, Nov.-Dec. 1882, v. 2, p. 181) briefly describes the larva and pupa. Thaxter (Psyche, May-June [9 July] 1877, v. 2, p. 35) gives *Ulmus* as food-plant. A specimen taken on *Betula lutea*, at Wachusett, Mass., 26 Aug. 1882, pupated 30 Aug., and the imago appeared 12 June 1883. This larva, which also ate *Betula alba*, did not entirely agree in coloration with Saunders' description.

Charadra propinquinella Grote (Trans. Amer. entom. soc., Jan. 1873, v. 4, p. 293-294). Goodell (Papilio, Feb. 1881, v. 1, p. 15) describes the larva of this species and gives "white birch" as food-plant. Thaxter (Papilio, Jan. 1883, v. 3, p. 11-12) gives notes on the larva, which feeds on *Betula*, *Fuglans*, *Acer* and *Quercus*.

Charadra deridens Guen. (Hist. nat. d. ins., 1852, v. 5, Noct., v. 1, p. 35-36). Saunders (Can. entom., Sept.-Oct. 1870, v. 2, p. 145-146) describes the larva, and Lintner (Entom. contrib., no. 3, 1874, p. 157) figures and describes it. Thaxter (Papilio, Jan. 1883, v. 3, p. 11-12) describes the egg, the seven larval stages, and the cocoon; the larva feeds upon red oak (*Quercus*), *Betula* and *Ulmus*.

Cossus sp. Lintner (Entom. contrib., no. 4, 1878, p. 244-245) states that the larvae of a *Cossus*, the pupal cases of which prove to be those of some as yet undescribed species, bore in the wood of *Betula populifolia*.

Gastropacha americana Harris (Rept. ins. injur. veg., 1841, p. 273-274). This author

(*J. c.*, and Treatise on ins. injur. veg., 1862, p. 377-378) briefly describes the larva, which he states feeds upon apple, and, on authority of Abbot, upon *Quercus* and *Fraxinus*. Lintner (Entom. contrib. [no. 1], 1869, p. 193), in a note upon the larva, gives *Betula* as food-plant, and later (Entom. contrib., no. 3, 1874, p. 154-155) describes the larva, which he states to feed on *Betula lenta* and *Acer*. Lyman (Can. entom., Aug. 1874, v. 6, p. 158) describes the eggs of this species.

Clisiocampa silvatica Harris (Rept. ins. injur. veg., 1841, p. 271-272) [= *C. distria* Hübn.]. Harris (*op. cit.*, p. 272) describes the larva of this species, giving as food-plants, *Quercus*, *Fuglans* and apple; later (Treatise on ins. injur. veg., 1862, p. 375-376, pl. 7, fig. 18-19) he repeats the description, and adds a colored figure of the larva and imago, adding wild cherry to the food-plants; again he describes (Entom. corresp., 1869, p. 292) the larva. Morris (Synop. lepid. N. A., 1862, p. 326) quotes Harris's descriptions (1841) of the larva and imago. Riley (Amer. entom., July-Aug. 1870, v. 2, p. 261-265, and 3rd rept. state entom. Mo., 1871, p. 121-127) describes eggs and egg-mass, larva and imago, giving, in addition to the food-plants mentioned above, *Fraxinus*, *Tilia*, *Rosa*, *Carya*, plum, and peach. Saunders (Can. entom., July 1872, v. 4, p. 134) repeats Riley's figures, and (*op. cit.*, Aug. 1877, v. 9, p. 159) gives another figure of the larva, adding *Acer*, *Crataegus* and *Fagus* to the food-plants; later Saunders (*op. cit.*, Feb. 1878, v. 10, p. 21-23) gives notes on the eggs of this species and of *C. americana*, and on the destruction of these eggs by mites. Packard (Bull. 7, U. S. entom. comm., 1881, p. 40-41) figures egg, larva, and imago, and describes the larva and the male and female imagos. The larva of this species eats leaves of *Betula alba*.

Anisota senatoria Abb. & Smith (Nat. hist. lepid. ins. Ga., 1797, v. 2, p. 113, pl. 57). Harris (Rept. ins. injur. veg., 1841, p. 291-

292) describes the larva, pupa, and imago of this species; the larva, he states, feeds upon white and red oaks [*Quercus* sp.]. Morris (Synop. lepid. N. A., 1862, p. 231) describes the larva and imago. Harris (Treatise on ins. injur. veg., 1862, p. 405-406) figures and describes larva, pupa, and imago, and (Entom. corresp., 1869, p. 298, pl. 2, fig. 9, and pl. 4, fig. 12) gives a colored figure of the larva and a black one of the pupa. Riley [?] (Amer. entom., Sept.-Oct., 1869, v. 2, p. 26) states that the larva eats raspberry [*Rubus* sp.]. Lintner (Entom. contrib., no. 2, 1872, p. 51-52) describes the early stages of the larva, which, he writes, has four molts (five stages), and feeds on *Quercus prinoides*. Packard (Bull. 7, U. S. entom. comm., 1881, p. 45) briefly describes the larva, and gives a few notes upon its habits. The larva feeds on *Betula alba*.

Hyperchiria io Fabr. (Syst. entom., 1775, p. 560). Harris (Rept. ins. injur. veg., 1841, p. 283-285) describes the larva and male and female imagos; later (Treatise on ins. injur. veg., 1862, p. 393-396) he adds to the descriptions figures of the larva, pupa, cocoon, and male and female imagos; and still later (Entom. corresp., 1869, p. 295-297) he gives a more extended description of the larva. Morris (Synop. lepid. N. A., 1862, p. 220) briefly describes the larva. Packard (Guide study ins., 1869, p. 299) gives brief notes on this species, under the name of *Hyperchiria varia* Walker. Bethune (Can. entom., Oct. 1869, v. 2, p. 19-20) briefly describes the larva, and Minot (*op. cit.*, Nov. 1869, v. 2, p. 28-29) describes egg and larva without recognizing the species. Lintner (Entom. contrib., no. 2, 1872, p. 146-149) describes the egg, the six larval stages, the pupa, and the cocoon. Riley (5th rept. state entom. Mo., 1873, p. 133) describes egg, larva in its six stages, cocoon, and imago of this species, figuring larva and male and female imagos; and (Can. entom., June 1873, v. 5, p. 109) describes the egg in detail. Reed (Can. entom., Dec. 1874,

v. 6, p. 227-229, and Ann. rept. Entom. soc. Ontario, 1874, p. 11-13) repeats Riley's figures, and describes the different stages very briefly. Grote (Can. entom., Sept. 1878, v. 10, p. 176) states that this species is double-brooded in the south. The food-plants, as compiled, in chronological order, from the above and from other notices of this species are as follows: *Populus balsamifera*, *Ulmus*, *Trifolium*, *Zea mays*, and, according to Abbot, *Cornus* and *Sassafras* [Harris, 1841]; *Quercus* and *Robinia viscosa* [Harris, 1869]; *Cornus florida* and *Liriodendron* [Morris]; *Humulus* [Freeman (Amer. entom., Oct. 1868, v. 1, p. 39)]; *Gossypium* and *Acer* [Packard]; *Salix* [Bethune]; *Populus tremuloides*, *Robinia pseudacacia*, and *Cerasus virginiana* [Lintner]; *Amorpha fruticosa*, *Baptisia*, *Prunus serotina*, and currant [Riley]; *Corylus avellana* [Reed]; *Betula*, *Comptonia asplenifolia*, apple, *Lespedeza*, *Symphoricarpos*, and *Fraxinus* [Goodell (Can. entom., Sept. 1877, v. 9, p. 180)]; *Prinos verticillatus*, *Rubus villosus* and *R. canadensis* [Goodell (*op. cit.*, Apr. 1879, v. 11, p. 78)]; and *Trifolium pratense* [Pilate (Papilio, May 1882, v. 2, p. 67)]. The larva also eats *Betula alba*.

Attacus cecropia Linn. (Syst. nat., 1758, *ed. 10*, p. 809). Harris (Rept. ins. injur. veg., 1841, p. 279-280) describes the larva, imago and cocoon of this species; later (Treatise on ins. injur. veg., 1862, p. 385, 387-389) he adds figures of the larva, pupa, cocoon, and male imago; and still later (Entom. corresp., 1869, p. 294-295) he again describes the larva. Morris (Synop. lepid. N. A., 1862, p. 223-224) describes larva, cocoon, and imago. Trouvelot (Amer. nat., March 1867, v. 1, p. 31) gives a note on the cocoon. Riley (Amer. entom., Feb. 1870, v. 2, p. 97-102, and 4th ann. rept. state entom. Mo., 1872, p. 103-107) describes the eggs, and figures and describes the larva, pupa, cocoon, and male imago. Sprague (Can. entom., April 1870, v. 2, p. 82) describes the eggs. Saunders (Can. entom.,

Oct. 1871, v. 3, p. 149-155) figures and describes the larva, cocoon, and male imago. Lintner (Entom. contrib., no. 3, 1874, p. 125) describes the young larva. Worthington (Can. entom., Sept. 1876, v. 8, p. 165-166) notices some color-varieties of the imago. Gentry (Can. entom., March 1877, v. 9, p. 41-49) describes the egg, different stages of the larva, and cocoon. Grote (Can. entom., Sept. 1878, v. 10, p. 176) says this species is double-brooded in the southern United States. Packard (Bull. 7, U. S. entom. comm., 1881, p. 113) figures the larva. Neumoegen (Papilio, Jan. 1882, v. 2, p. 18) states that this species usually emerges from the pupal state at about 5 p.m.; Brodie (*op. cit.*, May 1882, v. 2, p. 83), on the contrary, states that the emergence normally takes place about 10 a.m. Riley and others state that the larva has five stages, but Wailly (Bull. Soc. acclim. France, May 1882, s. 3, v. 9, p. 266-267) writes that it has six stages. Brodie (Papilio, Feb. 1882, v. 2, p. 32-33) gives a list of 49 species of plants belonging to 20 genera on which the larva will feed: the genera are *Tilia*, *Acer*, *Negundo*, *Prunus*, *Spiraea*, *Crataegus*, *Pyrus*, *Amelanchier*, *Ribes*, *Sambucus*, *Ulmus*, *Quercus*, *Fagus*, *Corylus*, *Carpinus*, *Betula*, *Alnus*, *Salix*, and *Populus*. From other authors the following genera are compiled: *Berberis*, *Liriodendron*, *Syringa*, *Carya*, *Gleditschia*, *Rubus*, *Ceanothus*, *Ampelopsis*, *Cephalanthus*, *Fraxinus*, *Vaccinium*, and *Rosa*.

Attacus promethca Drury (Illus. nat. hist. . . 1770, v. 2, pl. 11-12). Harris (Rept. ins. injur. veg., 1841, p. 280-281) describes larva, cocoon, and imago of this species, giving *Sassafras*, wild-cherry, *Azalea*, and *Cephalanthus* as food-plants; later (Treatise ins. injur. veg., 1862, p. 390-391) he repeats these descriptions, adding figures of the male and female imagos. Morris (Synop. lepid. N. A., 1862, p. 224-225) describes larva, cocoon, and imago, and adds *Laurus benzoin* to the food-plants. Trouvelot (Amer. nat., Mar. 1867,

v. 1, p. 31) gives a note on the cocoon, and adds *Syringa* to the food-plants. Minot (Can. entom., May 1870, v. 2, p. 100) compiles a list of the food-plants of the larva, adding to those mentioned above, *Berberis*, *Betula*, *Acer*, *Quercus*, sometimes *Thuja*, and *Pinus*, *Fagus*, apple, peach, plum, silver-bell [*Halesia*]. Riley (4th ann. rept. state entom. Mo., 1872, p. 121-123) describes the egg, five larval stages, and the cocoon, and figures larva, cocoon, and male and female imagos; he adds *Liriodendron* to the food-plants. Lintner (Entom. contrib., no. 3, 1874, p. 126) describes egg and young larva. W. H. Edwards (Psyche, Jan. [27 June] 1881, v. 3, p. 161, 171-174) discusses the variability in the number of molts of *A. promethæa*, showing that it molts, in West Virginia, only three times, thus having four stages. Brodie (Papilio, May 1882, v. 2, p. 83) gives a note on time of emergence, copulation, and oviposition of this species. Saunders (Can. entom., Dec. 1883, v. 15, p. 231-233) uses Riley's figures of larva, cocoon, and male and female imagos, and adds *Populus* to the food-plants of the larva.

Atacus polyphemus Fabr. (Species insector., 1781, v. 2, p. 168). Among the very numerous articles which have been published concerning this species the following are worthy of citation. Harris (Rept. ins. injur. veg., 1841, p. 278-279) describes larva, cocoon and imago; later (Treatise on ins. injur. veg., 1862, p. 384-386) he adds a figure of the imago, and (Entom. corresp., 1869, p. 294, pl. 4, fig. 17) a figure of the larva. Morris (Synop. lepid. N. A., 1862, p. 226-227) describes larva and imago, and (*op. cit.*, p. 209) describes the egg, which he mistook for that of *Smerinthus excacatus*. Trouvelot (Amer. nat., 1867, v. 1, p. 30-38, 85-94, 145-149, pl. 5-6) gives an extended account of this species which he tried to rear, on a considerable scale, for its silk; he describes the egg, larva, pupa, and cocoon, and figures the larva, pupa, cocoon, and male and female imagos, as well as *Ophion macrurum*, a parasite of the larva:

he says there are at least six varieties of the imagos. Packard (Guide study ins., 1869, p. 297, pl. 6-7) repeats Trouvelot's figures. Riley [?] (Amer. entom., March 1869, v. 1, p. 121-122) figures the imago and describes the larva and imago. Riley (4th ann. rept. state entom. Mo., 1872, p. 125-129) describes egg, larva, cocoon, pupa, and imago, and figures larva, pupa, cocoon, and male and female imagos; contrary to Trouvelot, who stated that there are six larval stages, Riley gives the number of molts as four, making five larval stages. Lintner (Entom. contrib. [no. 1], 1872, p. 6) gives a note on the coloration of the eggs, and (*op. cit.*, no. 3, 1874, p. 152) describes the egg. Gentry (Can. entom., May 1874, v. 6, p. 86) describes the normal form and a variety of the larva. Grote (Can. entom., Sept. 1878, v. 10, p. 176) states that this species is double-brooded in the south; Trouvelot (*l. c.*) was unable to raise two broods to maturity in Massachusetts, and Brodie (Papilio, April 1882, v. 2, p. 60) writes that, "in long and warm seasons about 50 per cent. are double brooded, but this is against the increase of the species, as cold weather usually sets in before the larvae are fully matured." Packard (Bull. 7, U. S. entom. comm., 1881, p. 48) figures the larva. Saunders (Can. entom., March 1882, v. 14, p. 41-45) figures and describes the larva, pupa, cocoon, and male and female imagos; he further figures *Ophion macrurum*, a parasite of the larva. Brodie (Papilio, May 1882, v. 2, p. 83) states that normally this insect comes from its cocoon at about 11 a.m. Wailly (Bull. Soc. acclim. France, May 1882, s. 3, v. 9, p. 265) gives some notes upon the larva and imago. A compilation of the food-plants results as follows: *Quercus*, *Ulmus*, *Tilia* [Harris, 1841 and 1862]; *Tilia americana* and *Rosa* [Harris, 1869]; *Acer*, *Salix*, *Populus*, *Corylus*, *Betula*, *Vaccinium* [Trouvelot]; *Carya*, *Fuglans nigra*, *F. cinerea*, *Crataegus* (Amer. entom., 1869, v. 1, p. 121); *Quercus virens*, [Chambers (Amer. entom., March 1870, v. 2, p. 156)]; apple, quince.

plum, *Prunus virginiana*, *Platanus*, *Gleditschia* [Riley]; *Betula lenta* [Young (Can. entom., Oct. 1880, v. 12, p. 212)]; *Hama-melis virginica* [Kyle (*op. cit.*, p. 213)]; *Castanea vesca*, *Fagus* [Wailly (Journ. Soc. arts, 31 March 1882, v. 30, p. 528)]; *Tilia europæa*, *Crataegus coccinea*, *C. tomentosa*, *C. crux-galli*, *Amelanchier canadensis*, *Ribes cynosbati*, *Quercus alba*, *Q. macrocarpa*, *Q. rubra*, *Corylus americana*, *C. rostrata*, *Fagus ferruginea*, *Carpinus americana*, *Ostrya virginica*, *Carya tomentosa*, *C. amara*, *C. alba*, *Betula lenta*, *B. excelsa*, *B. alba*, *B. papyracea*, *Alnus incana*, *A. serrulata*, *Salix alba*, *S. humilis*, *Populus grandidentata*, *P. tremuloides* [Brodie (Papilio, April 1882, v. 2, p. 58-59)]. Chestnut, as a food-plant, is only mentioned by Wailly, who reared the larvae in England, but they are often found, in eastern Massachusetts, on *Castanea vesca*.

Attacus luna Linn. (Syst. nat., 1758, ed. 10, p. 210). Harris (Rept. ins. injur. veg., 1841, p. 277-278) describes larva, cocoon, and imago, and gives *Fuglans* and *Carya* as food-plants; he repeats (Treatise on ins. injur. veg., 1862, p. 382-384) these descriptions, adding a figure of the cocoon and imago; later (Entom. corresp., 1869, p. 293-294, pl. 4, fig. 14) he describes and figures the larva, specifying the food-plants as *Carya porcina* and *Fuglans cinerea*. Morris (Synop. lepid. N. A., 1862, p. 225-226) describes the larva and imago. Trouvelot (Amer. nat., Mar. 1867, v. 1, p. 31) gives a note on the cocoon, and adds *Quercus* and *Platanus* to the food-plants. Minot (Can. entom., Nov. 1869, v. 2, p. 27) describes the egg. Riley (4th ann. rept. state entom. Mo., 1872, p. 123-125) describes the egg and larva, which he states to have five stages, and figures larva, cocoon, and imago; among food-plants he mentions *Liquidambar*, *Fagus*, *Betula*, *Salix*, and plum. Lintner (Entom. contrib. no. 3, 1874, p. 126-128) describes the larva, which molts four times. Gentry (Can. entom., May 1874, v. 6, p. 86) describes the normal form of the larva, and a variety of it. Bunker (Can.

entom., April 1875, v. 7, p. 63) mentions how to distinguish the cocoon of this species from that of *A. polyphemus*. Rogers (Can. entom. 1875, v. 7: Aug. p. 141-143; Oct., p. 199-200) describes egg, larva, cocoon, and imago. Thaxter (Psyche, Sept. [10 Nov.] 1876, v. 1, p. 194) adds *Ostrya virginica* and *Castanea* to the food-plants of the larva. Saunders (Can. entom., Feb. 1877, v. 9, p. 32-33) figures and describes the imago. Grote (Can. entom., Sept. 1878, v. 10, p. 176) states that this species is double-brooded in the southern United States.

Drepana sp. A pupa taken 5 July 1883, at Cambridge, Mass., upon *Betula alba*, upon which the larva had evidently fed, gave as imago, 16 July 1883, a species of *Drepana*.

Platypteryx bilineata Packard (Proc. Entom. soc. Phil., Nov. 1864, v. 3, p. 359). Packard (*l.c.*) writes "Dr. Harris has reared this from the larva, which pupated July 25; imago Aug. 15." Harris (Entom. corresp., 1869, p. 142) gives a crude figure of the larva of some American species of *Platypteryx*?, and Packard (Guide study ins., 1869, p. 293) repeats this figure as that of a species of *Dryopteris*; no food-plant is mentioned by either author. The European species, *Platypteryx lacertula*, feeds on birch. The larva of *P. bilineata* is found upon *Betula alba*, in eastern Massachusetts, about the first of July and again early in September; hibernation takes place as pupa in the September brood. Dr. G. Dimmock will later describe the egg, larva and pupa of this insect in detail, but the following notes will suffice for the recognition of the larva and pupa. The full-grown larva is about 12 mm. long, tapering from the anterior to the posterior end, which latter terminates in a single point, turned upward, in place of the anal legs. The dorsal surface of each segment bears four tubercles, each supporting a single short hair. The arrangement of these tubercles is peculiar: segment 1 has small tubercles arranged thus . . . ; segments 2 and 3 each have large tubercles arranged * * * (the head in each case sup-

posed to be upward); segments 4-10 each have small tubercles arranged . . . ; segments 11-12 each have two large and two small tubercles arranged The slight cocoon is made between leaves of the birch which the larva has drawn together for the purpose, and the pupa within it is densely covered with a white bloom.

Coclostus unicornis Abb. & Smith (Nat. hist. lepid. ins. Ga., 1797, v. 2, p. 165, pl. 86). Harris (Rept. ins. injur. veg., 1841, p. 306-307) describes the larva of this species and gives as food-plants plum and apple, and adds to them, on authority of Abbot, *Prinos verticillatus*. Harris (Entom. corresp., 1869, pl. 2, fig. 8) gives a colored figure of the larva. Payne (Amer. entom., Oct. 1870, v. 2, p. 341) notes that the larva mimics partly dead and partly living margins of leaves. Lintner (Entom. contrib., no. 3, 1874, p. 131) describes and figures the larva, adding *Corylus americana* and *Prunus virginiana* to the previously known food-plants; his figure is copied in Amer. nat., Nov. 1874, v. 8, p. 691-692. Packard (Bull. 7, U. S. entom. comm., 1881, p. 136) adds *Crataegus* to the food-plants. The larva also feeds on *Betula alba*.

Notodonta concinna Abb. & Smith (Nat. hist. lepid. ins. Ga., 1797, v. 2, p. 169, pl. 85). Harris (Rept. ins. injur. veg., 1841, p. 307-309) describes larva and imago of this species, and gives as food-plants apple, cherry, plum, *Rosa* and *Crataegus*; this description is quoted by Morris (Synop. lepid. N. A., 1862, p. 242), and is repeated with figures of larva and imago (Treatise on ins. injur. veg., 1862, p. 425-426, pl. 6, fig. 11) and with a colored figure of the larva by Harris (Entom. corresp., 1869, p. 303, pl. 1, fig. 3). Riley (Amer. entom., Sept.-Oct., 1869, v. 2, p. 27) figures larva, pupa, and imago, and adds pear to the food-plants; Riley's figures are repeated by Saunders (Can. entom., July 1881, v. 13, p. 138-140). The larva also eats *Betula alba*.

Notodonta dictæa Linn. (Syst. nat., 1767, ed. 12, p. 826) [= *Pheosia rimosa* Packard

(Proc. Entom. soc. Phil., Nov. 1864, v. 3, p. 358)]. Lintner (Entom. contrib., no. 4, 1878, p. 188-193) gives descriptions of the larvae and other notes on this species, for which, on authority of Stephens, he gives the food-plants *Populus*, *Salix*, and *Betula*.

Datana ministra Drury (Illust. nat. hist. 1773, v. 2, p. 25, pl. 14, fig. 3). Harris (Rept. ins. injur. veg., 1841, p. 311-312) describes the larva and imago, and this description is repeated, with the addition of a wood-cut of the larva and a colored figure of the imago, in his Treatise on ins. injur. veg., in 1862; he gives (Entom. corresp., 1869, p. 308-310, pl. 2, fig. 4) a description with colored figure of the larva. Grote and Robinson (Proc. Entom. soc. Phil., 1866, v. 6, p. 11-12) describe the imago and the larva with especial reference to distinguishing it from the larvae of other species of *Datana*. Harris (*l.c.*) gave as food-plants of the larvae, apple and cherry; Riley (Amer. entom., July-Aug., 1870, v. 2, p. 263) adds *Fuglans nigra*; and Southwick and Beutenmüller (Science record, 15 April 1884, v. 2, p. 133), in a list of the food plants of larvae of species of *Datana*, add, for *D. ministra*, *Quercus*, *Corylus*, *Carya*, *Crataegus*, *Robinia*, *Betula*, *Tilia*, *Castanea*, and *Fagus*. The eggs of this species, which are often found in groups beneath the leaves of *Betula alba*, are, at least in eastern Massachusetts, very often nearly all destroyed by a minute hymenopterous parasite.

Limacodes scapha Harr. (Rept. ins. injur. veg., 1841, p. 303). Harris (*l.c.*, and Treatise on ins. injur. veg., 1862, p. 420) describes the species as larva, which he states to live on *Fuglans*; later (Entom. corresp., 1869, p. 300, pl. 3, fig. 8) he figures the larva, and adds apple to the food-plants. Walsh (Proc. Bost. soc. nat. hist., Feb. 1864, v. 9, p. 298-299) first describes the imago and says, "The larva fed on hickory leaves, but I have met with two specimens on the button-wood or sycamore." Packard (Guide study ins., 1869, p. 290 and Bull. 7, U. S. entom. comm., 1881,

p. 77) briefly describes the larva, cocoon and imago, figuring the last. A single larva of this species, taken on *Betula alba* at Belmont, Mass., 12 Aug. 1882, pupated 17 Sept., and emerged 1 July 1883. The excrement of the larva has a peculiar form, being cup-shaped, with a deep concavity, and comparatively thin walls which are somewhat shrivelled about the margin in drying. The larva, when disturbed, exhales an odor difficult to describe. A short time before pupation it turns whitish.

Phobetron pithecium Abb. & Smith (Nat. hist. lepid. ins. Ga., 1797, v. 2, p. 147, pl. 74). Harris (Rept. ins. injur. veg., 1841, p. 304-305) describes the larva and imago of this species, stating that the larva feeds on oak, and, according to Melshemer, on wild cherry; later (Treatise on ins. injur. veg., 1862, p. 421-422) he adds to this description a poor figure of the larva and of the cocoon; he gives a brief note (Entom. corresp., 1869, p. 244-245) on the larva. Riley (Amer. entom. v. 2: Sept.-Oct. 1869, p. 25; Oct. 1870, p. 340) gives a good figure of the larva, which he states to feed on apple and Siberian crab-apple; he later (5th ann. rept. state entom. Mo., 1873, p. 126) gives this species in a list of larvae which have urticating power. Lintner (Entom. contrib., no. 3, 1874, p. 149) describes the cocoon, and adds plum, pear, and *Corylus americana* to the food-plants. This larva is rarely found in eastern Massachusetts and a little more abundant in the western part of the state; a favorite food-plant is *Betula alba*.

Orgyia leucostigma Abb. & Smith (Nat. hist. lepid. ins. Ga., 1797, v. 2, p. 157, pl. 79). Harris (Rept. ins. injur. veg., 1841, p. 261-263) describes the eggs, larva and imago of this species; apple and *Rosa* are given as food-plants. The same author (Treatise on ins. injur. veg., 1862, p. 366-368) figures and describes the eggs, larva, cocoon, and male and female imagos, and adds *Aesculus hippocastanum* to the food-plants; later (Entom. corresp., 1869, p. 291) he adds further *Salix*,

Celtis and *Carya* to the food-plants. Fitch (1st and 2nd rept. ins. N. Y., 1856, p. 202-220) describes the different stages of this species, noting in addition to food-plants mentioned above, *Ulmus*, *Acer*, *Quercus*, and plum. Riley (1st ann. rept. state entom. Mo., 1869, p. 144-147) figures and describes briefly the eggs, larva, pupa, cocoon and male and female imagos; the figure of the larva is repeated in Amer. entom., Sept. 1870, v. 2, p. 306. Saunders (Can. entom., Apr. 1871, v. 3, p. 14-15) repeats Riley's figure of the larva, and describes the egg and egg-mass. Packard (Bull. 7, U. S. entom. comm., 1881, p. 239) repeats Riley's figures of the different stages of this species. Coleman (Papilio, Nov.-Dec. 1882, v. 2, p. 164-166) describes some variations in the coloration of the larvae. Clarkson (Can. entom., Sept. 1883, v. 15, p. 168) mentions that this larva particularly attacks the silver-leaf *Populus*, and calls attention to the fact that ichneumons oviposit in cocoons of this species. The larva feeds upon *Betula alba* and *B. lenta*.

Hyphantria textor Harr. (N. E. farmer, 22 Aug. 1828, v. 7, no. 5, p. 34). Harris (Rept. ins. injur. veg., 1841, p. 254-255) describes the larva, cocoon and imago of this species, giving apple and *Ulmus* as food plants of the larva; later (Treatise on ins. injur. veg., 1862, p. 357-358, pl. 7, fig. 10-12) he repeats these descriptions and adds figures of larva, cocoon, and pupa. Morris (Synop. lepid. N. A., 1862, p. 344) gives a brief description of larva and imago. Harris (Entom. corresp., 1869, p. 360) quotes the original descriptions of larva and imago. Riley [?] (Amer. entom., Nov. 1869, v. 2, p. 39) gives as food-plants, *Carya*, *Prunus serotina*, apple, crab, *Fraxinus*, *Ulmus*, *Salix*, *Quercus*, *Betula* and *Platanus*. Riley (3rd ann. rept. state entom. Mo., 1871, p. 130-132) describes and figures larva, pupa, and imago, adding *Fuglans*, *Quercus*, hop-plantain, *Phaseolus* and *Helianthus*. Riley's figures are given, with descriptions, by Saunders (Can. entom., Aug. 1873, v. 5, p. 141-143) and by Packard (Bull. 7, U. S.

entom. comm., 1881, p. 67). The larvae also feed on *Syringa vulgaris*, *Ribes rubrum*, and *Betula alba*.

Spilosoma virginica Fabr. (Syst. entom., Suppl., 1775, p. 437). Harris (Rept. ins. injur. veg., 1841, p. 247-248) describes the larva and imago, stating that the larva feeds on leaves of *Plantago*, *Pisum*, *Phaseolus*, *Zea mays*, *gramineae*, *Vitis*, *Ribes rubrum* and *R. grossularia*; later (Treatise on ins. injur. veg., 1862, p. 349-351) he adds a figure of the larva and imago, and (Entom. corresp., 1869, p. 287-288) he describes the larva and pupa. Morris (Synop. lepid. N. A., 1862, p. 342-343) describes larva and imago. Riley (Amer. entom., July-Aug. 1870, v. 2, p. 272-273 and 3rd ann. rept. state entom. Mo., 1871, p. 68-69) describes and figures the larva, pupa, and imago, adding to the above-mentioned food-plants, *Fuglans cinerea*, *Syringa*, *Convolvulus*, *Gossypium*, *Helianthus*, *Polygonum*, *Verbena* and *Geranium*; he also states that the larva has been known "to subsist entirely, from the time it cast its last skin till it spun up, on dead bodies of the camel cricket (*Mantis carolina*)": later (*op. cit.*, Oct. 1870, v. 2, p. 336) he adds *Petunia* and *Salix* to the food-plants. Lintner (Entom. contrib., no. 3, 1874, p. 143) describes two varieties of the larva. Bates (Can. entom., Jan. 1880, v. 12, p. 20) adds *Rumex* to the food-plants. Saunders (*op. cit.*, March 1880, v. 12, p. 56-57) reprints Riley's figures of the larva, pupa, and imago, and describes them. Packard (Bull. 7, U. S. entom. comm., 1881, p. 88-89) describes larva and imago (reprinting Riley's figures of these and the pupa) and adds *Rhamnus* and *Pinus* to the food-plants. The larva also eats *Ampelopsis quinquefolia*, *Ulmus americana*, *Betula alba*, *Fuchsia fulgens*, *Tropaeolum*, *Prunus serotina*, *Syringa vulgaris*, *Vitis labrusca*, *Ipomoea purpurea*, *Petargonium*, *Martynia proboscidea*, *Acer saccharinum*, *Ricinus communis*, *Lappa officinalis*, and *Nicotiana tabacum*, but specimens fed on *Datura meteloides* died soon after.

Spilosoma isabella Abb.—Smith (Nat. hist. lepid. ins. Ga., 1797, v. 2, p. 131, pl. 66). Har-

ris (Rept. ins. injur. veg., 1841, p. 252-253) describes larva and imago giving *Trifolium*, *Taraxacum dens-leonis*, and narrow-leaved *Plantago* as food-plants; to this he adds (Treatise on ins. injur. veg., 1862, p. 355-356) a figure of the larva. Walsh [?] (Pract. entom., June 1867, v. 2, p. 103) gives apple as a food-plant of the larva. Riley (Amer. entom., April 1870, v. 2, p. 182) figures and briefly describes the larva, pupa, and imago, mentioning only grass as a food-plant of the larva; later (4th ann. rept. state entom. Mo., 1872, p. 143-144) he reprints these figures. Riley's figures, with a brief description, are again repeated by Saunders (Can. entom., April 1873, v. 5, p. 75-77, and Ann. rept. entom. soc. Ontario, 1873, p. 22-23), and Westcott (Can. entom., July 1873, p. 137) adds a few notes on the larva. Siewers (Can. entom., July 1877, v. 9, p. 127-128) notes a few habits of the larva. Mann (Psyche, Sept.-Dec. 1879 [9 Apr. 1880], v. 2, p. 270) gives some notes on the larva. Riley (Amer. entom., June 1880, v. 3, p. 133-134) reprints his figures of larva, pupa, and imago, and adds some notes on the larva and its parasites. Coleman (Papilio, Jan. 1882, v. 2, p. 18) gives some notes on the variations of color of the larva. Experiments show that the larva feeds readily on leaves of the following plants: *Ricinus communis*, *Acer saccharinum*, *Viburnum dentatum*, *Lappa officinalis*, *Polygonum persicaria*, *Tropaeolum majus*, *Vitis labrusca*, *Syringa vulgaris*, *S. persica*, *Ampelopsis quinquefolia*, *Prunus serotina*, *Ulmus americana*, *Clethra alnifolia*, *Martynia proboscidea*, *Helianthus annuus*, *Plantago major*, *Spiraea sorbifolia*, *Ribes aurum* and *Betula alba*; the larva refused *Solanum nigrum* and *Apios tuberosa*.

Ceratonia amyntor Hübn. (Samml. exot. schmett., 1806-1824, v. 2, Lepid. 2, Sph. 3, leg. 4, mand. B, pond. 4) [= *C. quadricornis* Harr. (Amer. journ. sci. and arts, July 1839, [s. 1], v. 36, p. 293)]. Harris (*l. c.*) describes the larva and imago; the same author (Rept. ins. injur. veg., 1841, p. 227-228) briefly describes the larva and imago, and later (Treatise

on ins. injur. veg., 1862, p. 323-324) adds a figure of the larva and imago; still later (Entom. corresp., 1869, p. 282) he briefly describes the egg, young larva, and pupa. Morris (Synop. lepid. N. A., 1862, p. 205-206) describes larva, pupa, and imago. Lintner (Proc. Entom. soc. Phil., Dec. 1862, v. 1, p. 286-293) gives an excellent description of the egg, the five stages of the larva, and the pupa. Minot (Can. entom., Nov. 1869, v. 2, p. 28) describes the egg and the young larva; he states that the larva molts six times. Andrews (Can. entom., Feb. 1876, v. 8, p. 40) and Bunker (*op. cit.*, June 1876, v. 8, p. 120) discuss the brown form of the larva. The before-mentioned authors give only *Ulmus* as food-plant; Goodell (Psyche, July [Dec.] 1882, v. 3, p. 368) gives *Ulmus* and *Betula alba* as food-plants. Taken in Cambridge, Mass. oftener on *Betula alba* than on *Ulmus*.

Smerinthus excaecatus Abb. & Smith (Nat. hist. lepid. ins. Ga., 1797, v. 1, p. 49, pl. 25). Harris (Amer. journ. sci. and arts, July 1839, [s. 1], v. 36, p. 290) gives a brief description of larva and imago of this species, which he states to feed upon apple and *Rosa carolina*; Morris (Syn. lepid. N. A., 1862, p. 209) gives Harris' description of the larva, with slight addition, and adds a description of the young larva, and of what he supposed to be the egg,—really, however, the egg of *Attacus polyphemus*. Harris (Treatise on ins. injur. veg., 1862, p. 327-328) describes and figures the imago. Lintner (Proc. Entom. soc. Phil., 1864, v. 3, p. 666) describes the larva, without knowing the species, and later (Entom. contrib., no. 2, 1873, p. 23) he gives its name, and states that the larva described by him (Proc. Entom. soc. Phil., 1864, v. 3, p. 665) as *S. excaecatus* was in reality *S. geminatus*. Sanborn (Can. entom., Jan. 1869, v. 1, p. 48) calls attention to the squeaking noise produced by the larva of this and of other species of *Smerinthus*. Lintner (Entom. contrib., [no. 1], 1869, p. 56) gives *Prunus pennsylvanica* and *Crataegus* as food-plants of the larva. Mann (Psyche, Sept.-Oct. 1877 [8 Mar. 1878], v. 2, p. 69-72) compares descrip-

tions of the larva of this and of other species of *Smerinthus*, giving *Acer* as food-plant of the larva of *S. excaecatus*. Goodell (Psyche, July [Dec.] 1882, v. 3, p. 368) describes egg and first larval stage of this species. Fletcher (Can. entom., Nov. 1883, v. 15, p. 203-204) gives as food-plants apple, plum, wild cherry, *Populus balsamifera* and *P. alba*, and further states that the larvae varied much in coloration. Saunders (Can. entom., Jan. 1884, v. 16, p. 9-11) describes and figures the last stage of the larva and the imago. Fischer (*op. cit.*, p. 17) adds *Tilia* and *Salix* to the food-plants. In Cambridge, Mass., the larva of this species is not rare on low shrubs of *Betula alba*, where it occurs throughout August and September. The larvae, as observed on *Betula alba*, exhibit no variation. They are somewhat difficult to rear; of 38 larvae, of which rearing was begun, 8 were put in alcohol for preservation; three produced imagos (2♂ and 1♀); 16 died without apparent parasitism, while 11 were killed by *Thyreodon morio*, of which ichneumon only 2 reached the imago state. One of the pupae of *Thyreodon* produced a large number of minute hymenoptera—secondary parasites. The egg of *S. excaecatus* often harbors very minute hymenopterous parasites; more than thirty of these hymenoptera sometimes emerge from a single egg of *Smerinthus*, a fact that will give an idea of their microscopical minuteness.

Limenitis arthemis Drury (Illust. nat. hist. . . . 1773, v. 2, pl. 10, fig. 3-4). Lintner (Proc. entom. soc. Phil., May 1864, v. 3, p. 62-63) describes the larva and pupa of this species, giving as larval food-plant *Populus balsamifera*. Scudder (Amer. nat., Aug. 1869, v. 3, p. 330) gives *Crataegus* as food-plant, and again (Psyche, Aug. 1874, v. 1, p. 13) adds *Betula lenta* and *Populus* to the food-plants.

Vanessa antiopa Linn. (Syst. nat., 1758, ed. 10, p. 476). Besides numerous references in European literature, in which *Salix*, *Populus*, *Betula* and *Tilia* are noticed as food-plants, the following citations of American

authors may be mentioned. Harris (Rept. ins. injur. veg., 1841, p. 219, and Entom. corresp., 1869, p. 280) describes the larva of this species, adding *Ulmus* as food-plant; later (Treatise on ins. injur. veg., 1862, p. 296-298) he figures and describes larva, pupa, and imago. Packard (Guide study ins., 1869, p. 258) and Saunders (Can. entom., April 1869, v. 1, p. 75) describe the larva.

Papilio turanus Linn. (Mantissa, 1767, v. 1, p. 536). Harris (Treatise on ins. injur. veg., 1862, p. 268-269) describes and figures the larva and imago of this species, which is stated to feed on wild cherry. Morris (Synop. lepid. N. A., 1862, p. 2) describes larva and imago, giving for food-plant "various species of *Prunus*." Saunders (Can. entom., Feb. 1869, v. 1, p. 53-54) describes egg and young larva, and later (*op. cit.*, Apr. 1869, v. 1, p. 74) describes adult larva. Scudder (Amer. nat., Aug. 1869, v. 3, p. 330) gives as food-plants: apple, *Crataegus*, *Prunus virginiana*, cultivated cherry, *Alnus*, *Liriodendron tulipifera*, *Fraxinus sambucifolia*, *Betula*, *Tilia* and *Quercus*, and later (Can. entom., May 1872, v. 4, p. 84), on authority of Abbot, gives *Fraxinus trifoliata* and *F. ?platycarpa*. Saunders (Can. entom., Jan. 1874, v. 6, p. 2-5) describes and figures larva and imago, and (*op. cit.*, Nov. 1883, v. 15, p. 204) adds *Magnolia acuminata* to the recorded food-plants. Gruber (Papilio, May 1884, v. 4, p. 86-87) gives notes on the five stages of the larva.

COLEOPTERA.

Chlamys plicata Fabr. (Entom. syst., Suppl., 1794, p. 111). This species is sometimes found feeding, as imago, on *Betula alba*. The larvae feed on *Quercus*, *Platanus*, *Rubus* and *Comptonia asplenifolia*. Riley (6th. ann. rept. state entom. Mo., 1874, p. 128-129) describes egg, larva and pupa; and Packard (Guide study insects, 1869, p. 510) describes and figures the larva and its case.

Gonioctena pallida Linn. (Syst. nat., 1758, ed. 10, p. 370). Cornelius (Entom. zeit. . . . zu Stettin, 1850, jahrg. 11, p. 19-20) describes

the larva of this species, which, according to Gyllenhal, among other plants, feeds upon *Betula alba*.

Syneta tripla Say (Journ. Acad. nat. sci. Phil., 1827, v. 5, p. 281) eats leaves of *Betula*, according to Fitch (Ann. rept. N. Y. state agric. soc., 1858, v. 18, p. 853). Packard (Bull. 7, U. S. entom. comm., 1881, p. 128) briefly describes this beetle.

Tylonotus bimaculatus Hald. (Trans. Amer. philos. soc., 1847, v. 10, p. 38) is said by Packard (Bull. 7, U. S. entom. comm., 1881, p. 129) on authority of G. Hunt, to be found "Under bark of white or paper birch, northern New York."

Gracilia minuta Fabr. (Spec. ins., 1781, v. 1, p. 235). Lugger (Psyche, Aug.-Sept. 1884, v. 4, p. 204) mentions breeding this species from a band of wood (*Betula lenta*) around a gin-barrel.

Bellamira scalaris Say (Journ. acad. nat. sci., 1827, v. 5, p. 278-279). Packard (Bull. 7, U. S. entom. comm., 1881, p. 129) writes, on authority of G. Hunt, "Beetle and pupa found under the bark of the yellow birch in July, northern New York."

Clytus? Packard (3rd rept. U. S. entom. comm., 1883, p. 259; pl. 12, fig. 3) mentions and figures the mouth-parts of a larva from "black birch, "nearly allied if not identical with *Xylotrechus colonus*."

Aphrastus taeniatus Gyll. (Schönh., Synon. insectorum, Gen. et spec. curcul., 1834, t. 2, p. 460). Good description in Le Conte and Horn's Rhynchophora of Amer. north of Mex. (Proc. Amer. philos. soc., 1876, v. 15), p. 99. This species is not rare in Cambridge, Mass., on *Betula alba*.

Dendroides concolor Newm. (Entom. mag., 1838, v. 5, p. 375). G. Dimmock has a specimen in his collection, which he reared from the bark of *Betula papyracea* at the White Mts., N. H., the beetle emerging 8 July 1874.

Dendroides canadensis Latreille (Consid. génér., 1810, p. 212). Schaupp (Bull. Brooklyn entom. soc., July 1881, v. 4, p. 23) writes of this species, "Pupae in birch July 19, in beech July 23." G. Dimmock found a pupa

of this species, 30 June 1874, under decayed bark of *Betula papyracea*, on Mt. Washington, N. H.; the beetle emerged from this pupa 8 July 1874.

Meracantha contracta Beauv. (Ins. Afr. et Amer., 1805, p. 121, pl. 30, fig. 2). Halde-
man (Proc. Amer. assoc. advanc. sci., 1850, v. 2, p. 347) briefly notices the larva of this species. Specimens in the collection of G: Dimmock were taken at Suffield, Conn., by Leroy H. Sykes, in decaying bark of *Betula lutea*.

Bolitotherus bifurcus Fabr. (Entom. syst., Suppl., 1794, p. 40). The larvae, pupae and imagos of this species are found in *Polyporus betulinus*, which grows on dead birch trees. Larva, pupa, and a male imago are figured by Packard (Guide study ins., 1869, p. 474). Kirby, as quoted by Bethune (Can. entom., Nov. 1873, v. 5, p. 211), says that this species is found in a beetus of the birch. Some habits of this beetle are mentioned by Harrington (Can. entom., Dec. 1882, v. 12, p. 260-261). Candèze (Mém. soc. sci. Liège, 1861, v. 16, p. 365-368, pl. 3, fig. 9) gives a detailed description of the larva, with figure; and Hayward (Bull. Bost. zool. soc., July 1882, v. 1, p. 35-36) briefly describes the larva and pupa.

Hoplocephala bicornis Fabr. (Gen. ins. mant., 1777, p. 215). This insect feeds upon different kinds of fungi, some of them parasitic on decaying wood of *Betula*. Kirby's description of the imago is quoted by Bethune (Can. entom., Nov. 1873, v. 5, p. 210-211). Harrington (*l. c.*, Dec. 1880, v. 12, p. 261) mentions its fungivorous habits.

Diaperis hydni Fabr. (Syst. eleuth., 1801, v. 2, p. 585). This species, both as larva and imago, feeds upon *Polyporus betulinus*, a fungus that grows on dead trees of *Betula alba*, and the beetles, according to G: Dimmock, are often very abundant about the first of July. Harrington (Can. entom., Dec. 1880, v. 12, p. 261) briefly describes the imago.

Centronopus calcaratus Fabr. (Entom. syst., Suppl., 1794, p. 52). Coquillett (Can. entom., June 1883, v. 15, p. 102) describes

this larva very briefly. This larva is often very abundant in decaying birch wood.

Nyctobates pensylvanica De Geer (Mém., 1775, v. 5, p. 52; pl. 13, fig. 10). Schaupp (Bull. Brooklyn entom. soc., July 1881, v. 4, p. 23) writes of this species, "Pupae in beech July 15; in hemlock July 18; in birch July 21."

Phellopsis obcordata Kirby (Fauna bor.-amer., 1837, pt. 4, p. 236). The larva of this species has been found by G: Dimmock, on Mt. Washington, N. H., in *Polyporus betulinus*, the large white fungus common on dead trees of *Betula alba*. The imago frequents the same fungus during June, July, and August.

Telephorus bilineatus Say (Journ. Acad. nat. sci. Phil., 1823, v. 3, p. 182). Packard (1st ann. rept. inj. and benefic. ins. Mass., 1871, p. 26-28, pl. 1, fig. 7-8) describes and figures larva and imago and writes that the pupa of this species "early in May becomes a beetle, when it eats the newly expanded leaves of the birch." Riley (4th ann. rept. state entom. Mo., 1872, p. 29-30) describes and figures the larva and imago, stating that the larva has been found to eat larvae of *Carposcapsa pomonella*.

Campylus denticornis Kirby (Fauna bor.-amer., 1837, pt. 4, p. 145). G: Dimmock has reared this species from larvae found in partly decayed bark of *Betula papyracea*, on Mt. Washington, N. H. The imagos emerge from the pupae about 1 July, and are abundant during July in the White Mts.

Melanotus ? parumpunctatus Melsh. (Proc. Acad. nat. sci. Phil., Nov. 1844, v. 2, p. 151-152). A *Melanotus*, probably this species, was taken in the same cavity with its pupal skin, in decaying wood of *Betula alba*, at Milton, Mass., 17 Oct. 1884.

Melanotus ? communis Gyllenhal (Schönh., Syn. ins., v. 1, pt. 3; App. 1817, p. 138-139.) A *Melanotus*, probably this species, was taken in decaying wood of *Betula alba*, at Milton, Mass., 17 Oct. 1884.

Elater protervus LeConte Trans. Amer. philos. soc., 1853, s. 2, v. 10, p. 471). Two

specimens of this beetle were taken, 17 Oct. 1884, at Milton, Mass., in decaying wood of *Betula alba*, under circumstances that left no doubt that they were bred in the wood.

Elater nigricollis Herbst (Natarsyst. . . ins.; Käfer, 1806, v. 10, p. 73, pl. 164, fig. 7). Coquillett (Can. entom., June 1883, v. 15, p. 101) briefly describes the larva, which he obtained from decayed wood of *Quercus*. Reared from decayed wood of *Betula alba*, the beetle emerging 3 May 1883 from wood collected the preceding April, in Cambridge, Mass.

Chrysobothris sexsignata Say (Trans. Amer. phil. soc., 1839, v. 6, p. 158). Packard (Bull. 7, U. S. entom. comm., 1881, p. 128) writes of this species, "Beetle and pupa found in the yellow birch June 1, Providence."

Ceruchus piceus Weber (Observ. entom., 1801, p. 84). The pupae are mentioned by Fuchs (Bull. Brooklyn entom. soc., Dec. 1882, v. 5, p. 59) as being very common in an old beech stump, and are briefly described. The larvae are mentioned by G: Dimmock (Direct. collect. coleopt., 1872, p. 20) as living "in decayed chestnut and willow." The larvae are very abundant in decayed and fallen wood of *Betula alba* during autumn. Quite a large number of larvae taken in Milton, Mass., 10 Nov. 1883, fed through the winter and produced a single beetle. From these larvae were reared seven tachinid flies (allied to *Morinia*), which emerged from 4 June to 6 July 1884. The digestive tract of the larva of *C. piceus* is often inhabited by a microscopic undescribed nematod worm.

Macrodactylus subspinosus Fabr. (Syst. entom., 1775, p. 39). This beetle devours the leaves of *Betula alba*. Its metamorphoses were described by Harris (Mass. agric. repos. and journ., 1827, v. 10, p. 1-12), and many subsequent descriptions and figures have been given, among which may be mentioned Fitch (1st and 2nd rept. ins. N. Y., 1856, p. 245-252), Packard (Guide study ins., 1869, p. 454), Riley (5th ann. rept. state entom. Mo., 1873, p. 108-110), Thomas (6th rept. state

entom. Ill., 1877, p. 103) and Lintner (1st ann. rept. state entom. N. Y., 1882, p. 227-232).

Dichelonycha elongatula Schönh. (Synon. insectorum, 1817, t. 1, theil 3, p. 210). Packard (Guide study ins., 1869, p. 454) says this species "is found in June on the leaves of the birch."

Thymalus fulgidus Erichson (Germar zeits., 1844, bd. 5, p. 458). G: Dimmock (Direct. collect. coleopt., 1872, p. 19-20) writes "The larvae feed upon a fungus (*Polyporus betulinus*) which is parasitic upon the trunks of white birch trees." This beetle is common in New England, and its larva agrees very closely with the description and figure of the larva of *T. limbatus* from Europe, as given by Chapuis and Candéze (Mem. Soc. sci. Liège, 1855, v. 8, p. 417-419, pl. 2, fig. 6). A large number of larvae, taken in Belmont, Mass., produced beetles after a short period of pupation, on or about 27 June 1878.

Trogosita corticalis Melsh. (Proc. Acad. nat. sci. Phil., Oct. 1844, v. 2, p. 109). Schaupp (Bull. Brooklyn entom. soc., July 1881, v. 4, p. 23) writes of this species, "Larvae in birch July 8, in beech Aug. 14, in sugar maple July 19."

Ips sanguinolentus Oliv. (Entom., 1780, v. 2, no. 12, p. 8; pl. 2, fig. 14). G: Dimmock (Can. entom., April 1871, v. 3, p. 15) notes that he found this species "about fresh-cut maple and birch stumps where the sap was flowing."

Ips fasciatus Oliv. (Entom., 1780, v. 2, no. 12, p. 7-8; pl. 2, fig. 13). G: Dimmock (Can. entom., April 1871, v. 3, p. 15) mentions that this species is found about fresh-cut stumps of *Betula* where the sap is flowing.

HYMENOPTERA.

Tremex columba Linn. (Syst. nat., 1758, ed. 10, p. 929). Harris (Rept. ins. injur. veg., 1841, p. 389-391) describes the egg, larva, and imago of this insect, giving wood

of pear, *Ulmus* and *Platanus* as food of the larva; and (Entom. corres., 1869, p. 360) again describes the egg and imago. In Amer. entom., Nov. 1868, v. 1, p. 59, this species is mentioned as injuring oak and pear trees. Packard (Guide study ins., 1869, p. 228) quotes Harris' account of the habits of this species. Huggins (Amer. entom., Feb. 1870, v. 2, p. 128) found this insect ovipositing in an apple tree. Packard (Bull. '7, U. S. entom. comm., 1881, p. 105-106) figures the larva, which he states to attack *Ulmus*, *Quercus*, *Acer* and *Platanus*; and (*op. cit.*, p. 129) says, "In yellow birch at Providence." R. I. Harrington (Can. entom., Dec. 1882, v. 14, p. 225) gives some notes upon this species and adds *Fagus* to the food-plants.

Croesus latitarsus Norton (Proc. Entom. soc. Phil., 1862, v. 1, p. 199). Norton (*l.c.*) describes the male of this species and later (Trans. Amer. entom. soc., 1867, v. 1, p. 84) describes the female, and adds, "Bred by Mr. Walsh from larvae feeding on birch."

Xyphidria attenuata Norton (Proc. Entom. soc. Phil., 1862, v. 1, p. 144). Norton (*l.c.*, and Trans. Amer. entom. soc. 1869, v. 2, p. 354) describes the male of this species, and Patton (Can. entom., Jan. 1879, v. 11, p. 14-15) describes the female. Patton (*l.c.*) writes of his specimen, "Taken from a dead stick of *Betula nigra*," and mentions that *Rhyssa humida* is a parasite of this species.

NEW SOLVENT OF CHITIN.—Dr. Looss, assistant in the Zoological institute at Leipzig, has found that a solution of sodic hypochlorite (*eau de Labarraque* of the druggists), or of potassic hypochlorite (*eau de Javelle*), is a fine solvent for chitin in making microscopical preparations. He writes (*Zool. anzeiger*, 1 June 1885, jahrg. 8, p. 334):

"The liquid, as bought, completely dissolves, when heated, even the solidest and hardest chitinous parts of insects in a short time, first making them glass-like, transparent, and entirely colorless. If the liquid is diluted with six or seven times its volume of water, and the chitinous parts, either fresh or after they have been hardened, are put in it for twenty-four hours, or even longer according to size, the chitin will be altered, altho not noticeably externally; it loses much of its original brittleness,

and above all things is more permeable to staining solutions. The objects require, for complete staining greater or less time according to size, but the coloration is beautiful and distinct with either alcoholic or aqueous staining reagents. In our Institute *pediculidæ* and *mallophaga* have been prepared by this method which show, besides their great transparency, complete and clear coloration. This is likewise the case with nematodes and their eggs. It is furthermore especially remarkable that by this treatment the underlying soft parts are entirely spared and admit studying upon them the finest structural relationships, such as the elementary structures of striate muscular fibres ('Muskelkästchen') and the nerve endings. Sections of bees' heads have been made which were as beautiful as could be desired. At all events this reagent deserves to be experimented with further."

PSYCHE.

CAMBRIDGE, MASS., APR.—JUNE 1885.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

HERBERT KNOWLES MORRISON.

Born 24 Jan. 1854, at Boston, Mass.

Died 15 June 1885, at Morganton, N. C.

Herbert Knowles Morrison was the eldest of the six children of William Albert and Mary Elizabeth Morrison (née Butler), of Cambridge, Mass. In early life he showed an observing and practical turn of mind, and when not more than twelve years of age employed all his time out of school in hunting for insects. In later years he made a special study of noctuid moths, preparing his specimens with great neatness; and from 1873 to 1875 he contributed largely to the literature of that subject in this country. After 1876 he published little, and apparently nothing later than 1883. He was one of the original members of the Cambridge entomological club, and was also a member of the Boston society of natural history. He was a member of the first excursion party of the Cambridge entomological club to Mount Washington, in 1874, and seems to have determined from his experience at that time to devote himself entirely to the collection and sale of insects

as a means of gaining his livelihood. He was a most diligent and energetic collector, as was shown by his success in 1875, when he returned to the White Mountains early in the season, and came back late with 20,000 specimens. In 1876, he visited the southern United States expressly to explore the field which John Abbot had made famous. His captures there were doubly successful, for he found occasion to return there the next year to be married, and he made his home there ever after. In 1874 he collected insects in Colorado, in 1878 in Nevada, in 1879 in Washington territory, near the close of the season losing his entire collection and outfit by fire, in 1880 in Washington territory and southern California, in 1881 in Arizona and southern California, in 1882 in New Mexico, in 1883 in Florida, in 1884 near Key West, Fla., and later in Nevada, in the spring of 1885 at Key West where he had an attack of dysentery which proved fatal. He was a very muscular man, and endowed with wonderful powers of endurance, which he tasked to the utmost. The physician who attended him in his last illness, and who had been an army surgeon, said that Morrison had the finest physique of any man he ever saw. Not infrequently he would walk forty miles a day in pursuit of insects, and then would take care of them before he slept, filling up the time while thus engaged in capturing the moths that were attracted to his light. His collections have furnished abundant material for the studies of many entomologists in America and in Europe. A widow and two daughters survive him. *B: P. M.*

PROCEEDINGS OF SOCIETIES.

LINNEAN SOCIETY OF NEW SOUTH WALES.

29 AUG. 1883.—... The president [C. S. Wilkinson, government geologist] exhibited some specimens of fossil insects found in the tin-bearing tertiary deep leads near Vegetable

Creek, New England. This is the second discovery of fossil insects in Australia, and the specimens show the impressions of larvae and pupae of *Ephemera* or "May-fly."

26 Nov. 1884.— . . . On the larvae and larva cases of some Australian *aphrophoridae*. By F. Ratte, M.E. This paper describes the larval state of some small species of rhynchota closely allied to the genus *Aphrophora* and belonging probably to the genus *Ptyelus*. They are as yet imperfectly known; but the description of their larva-cases and of some of the larvae discloses a feature probably quite new to the science of entomology. These cases, unlike those of insects generally, are true shells, containing at least three-fourths of carbonate of lime, and resembling in shape some fossil and recent serpulæ, some being conical, others serpuliform, or helicoidal. The conical shells are fixed on the branches of some species of eucalyptus, the mouth turned upwards, the larva being placed in it with the head downwards. It introduces its suctorial apparatus into the bark of the stem, sucks the sap of the tree, and emits from time to time, by its anus, drops of clear water. This property of emitting water is possessed by all the family.

The president exhibited four specimens of the shell-like covering of a species of *Phryganea*. These are built up entirely of small round nodules of brown iron ore, fastened together by a silky web. They were obtained on the north end of New Caledonia, by Dr. Storer, in a creek flowing over rocks composed of iron ore.

31 Dec. 1884.— . . . Mr. E. P. Ramsay, F.R.S.E., exhibited for Mr. E. G. W. Palmer a native bees' nest which had been obtained in the neighborhood of Smithfield. For the last seven years it had been suspended from a branch of a pear tree in Mr. Palmer's garden, and a quart of honey had often been obtained from it, but during the last winter a caterpillar formed its cocoon in the only aperture and so effectually closed it that all the bees were killed.—Selected from *Zoologischer anzeiger*.

OBSERVATIONS ON DECAPITATED SILKWORM MOTHS.

N. Passerini finds that decapitated silkworm moths live a long time, but are torpid, move with difficulty and only under direct external excitation, and often disconnect themselves if they are paired. They live longer than those which have not been decapitated; often living for more than a month, whereas normally the males die in six or seven days after they have issued from the chrysalis. The females live even longer than the males, but do not lay eggs. In one case three or four eggs were obtained from a female which had been decapitated while coupled with a male whose head had been left on, but although these eggs appeared to be fecundated, they did not hatch in the following year. The moths did not couple after both had been decapitated, but if the female alone was decapitated copulation did sometimes take place. If they were decapitated while coupled they very often separated; but sometimes they remained connected, without moving, until they died. If the male only was decapitated while coupled, they separated; but this was not the case if the female only was decapitated. This is readily understood, since the male holds the female by a special genital armature. Death does not follow decapitation instantly because the principal nervous centre does not reside in the head. Life is prolonged because the vital force of the insect is not consumed in the procreation of new individuals. The author could not find a satisfactory explanation for the failure of the decapitated females to lay their eggs, since the female normally lays all or nearly all her eggs even if they are not fecundated, but he thinks that possibly the ganglia of the oesophageal ring operate, or at least regulate the emission of eggs in this insect.—Summarized from "Passerini, N. Esperienze sulla decapitazione delle farfalle del baco da seta" (Bull. soc. entom. ital., 31 Dec. 1884, an. 16, p. 285-286).

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, or note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Balbani, E. G. Sur l'origine des cellules du follicule et du noyau vitellin de l'oeuf chez les géophiles. (Zool. anzeiger, 1883, jahrg. 6: 10 Dec., p. 658-662; 24 Dec., p. 676-680; 10 fig.)

Notice, by P. Mayer. (Zool. jahresb. für 1883, 1884, abth. 2, p. 1, 8.)

States that there is a genetic connection between the cells of the follicle and the nucleus of the egg. In *geophilus longicornis* the cells are produced at the end of a kind of stolon formed by a prolongation of the nucleus; in *g. carpophagus* they arise by a process of budding at several points of the surface of the nucleus.

E: L. M. (3788)

Chatin, Joannes. Note sur la structure du noyau dans les cellules marginales des tubes de Malpighi chez les insectes et les myriapodes. (Annal. sci. nat., 1882 [Jan. 1883], s. 6, v. 14, no. 3, p. 1-7, pl. 19 B.)

The intimate structure of the nucleus in the marginal cells of the malpighian tubes, especially the structure of the moniliform nuclear cord and its relation to the nucleoli, are discussed and illustrated by figures from *Julus*, *gryllotalpa*, *carabus*, *papilio* and *apis*. There is an intimate connection (continuity?) between the cord and the nucleoli in which it terminates. The moniliform may appear like surposed globules, or dark disks alternating with clear spaces, which may be transverse or inclined so as to appear like a spiral. The last condition may be natural or may result from a shifting of the disks due to treatment; according to the latter hypothesis the cord must have a limiting membrane.

E: L. M. (3789)

Cresson, Ezra Townsend. Catalogue of a collection of hymenoptera made by Prof. F. Sumichrast near Cordova, Mexico. Part I. (Trans. Amer. entom. soc., May 1868, v. 2, p. 1-38.)

Notice, by A. S. Packard, jr. (Record of Amer. entom. for 1868, 1869, p. 1, 4-5.)

Introductory remarks on the excellence and value of F. Sumichrast as a collector, the paucity of European writings on American *hymenoptera terebrantia*, the difficulties of the study of these insects, especially the *entomophaga*, and the merging of the characters of *Ichneumon*, *Hoplismenus*, *Jappa* and *Trogus*; synopses of groups and descriptions of species of 35 (37 new) *Ichneumon*, 13 new *Hoplismenus*, 3 new *Oedicephalus* (n. g.), 8 (7 new) *Jappa*, 1 new *Stilpnus*, 7 new *Mesoleptus*, 2 new *Tryphon*, 2 new *Evochoides* (n. g.), 3 new *Evochus*, collected by F. Sumichrast near Cordova, Mexico.

B: P. M. (3790)

Cresson, Ezra Townsend. Catalogue of a small collection of hymenoptera made in New Mexico during the summer of 1867. (Trans. Amer. entom. soc., Jan.-Feb. 1868, v. 1, p. 375-388, 1 fig.)

Describes *Urocerus arcolatus* (and figures fore wing), *scolia (discalia) lecontei*, *s. (d.) flavocostalis*, *coloptera zwiggii*, *gorytes propinquus*, *g. tricolor*, *odynerus rufiventris*, *o. toas*, *pleurochilus lewisii*, *polistes navajoe*, *p. flavus*, *andrena mellea*, *nomia nortoni*, n? *apachi*, *perdita? albipennis*, *anthidium occidentale*, *a. atrifrons*, and *melissotes menachus*, all new species, and gives a list of some other species collected in New Mexico and neighboring territories; *scolia regina* ♀ = *elis xantiana* ♀, *s. flavosignata* ♂ may be = *e. xantiana* ♂, in which case *s. consors* ♂ Cress. must be named *e. zonaria* n. sp.; *s. ridingsii* may be *s. nobilitata* var. B: P. M. (3791)

Cresson, Ezra Townsend. Catalogue of hymenoptera in the collection of the Entomological society of Philadelphia, from Colorado Territory. (Proc. Entom. soc. Philad., 1865, v. 4: April, p. 242-313; June, p. 426-488.)

Notice. (GERSTAECKER, A. Bericht . . . 1865-1866, hálfte 2, 1869, p. 5, 21, 22, 25, 26, 29, 33, 36, 43.)

Enumerates 205 (104 new) species of hymenoptera, in general of all families except *vespariæ* and *afariæ*, from Colorado, with synonymical references, and describes the new species; describes *ceratosoma* and *tenthredoïdes*, 2 new genera of *ichneumonidae*.

B: P. M. (3792)

Cresson, Ezra Townsend. Catalogue of North American *apidae*. (Trans. Amer. entom. soc., Feb.-Mch. 1879, v. 7, p. 215-232.)

Systematic list of the *apidae* of North America, including Central America and West Indies, with references to original descriptions and to habitats of the species; comprises 45 genera and 632 species.

B: P. M. (3793)

Cresson, Ezra Townsend. Description of a new species of *masaris* from California. (Trans. Amer. entom. soc., May 1872, v. 4, p. 87-88.)

Describes *masaris edwardsii* ♀ ♂ n. sp., from California.

B: P. M. (3794)

Cresson, Ezra Townsend. Description of a new species of *masaris*, from the Rocky Mountains. (Proc. Entom. soc. Philad., June 1863, v. 2, p. 69-74, pl. 4.)

Describes *masaris vespidoides* n. sp. ♂ ♀ and ♀ variety from Colorado and institutes a comparison with *m. vespidiformis*, "the type of the genus"; points out errors in the figures. B: P. M. (3795)

Cresson, Ezra Townsend. Descriptions of new North American hymenoptera in the collection of the American entomological society. (Trans. Amer. entom. soc., Mar. 1878, v. 7, p. 61-136, il.)

Describes 8 species of *panurgus*, 15 *calliopsis*, 5 *perdita*, 4 *macrotera*, 31 *nomada*, 2 *osiris*, 4 *phileromus*, 10 *epolus*, *evocisa?* 1 *ata*, 3 *melecta*, 9 *stelis*, *coelioxoides* n. g., *c. punctipennis*, 10 *coelioxys*, 18 *osmia*, *heriades?* *denticulatum*, *chelostoma californicum*, *alcidamea truncata*, 23 *anthidium*, 37 *megachile*, 4 *ceratina*, *xylocopa azteca*, 5 *exomalopsis*, 7 *tetrapedia*, in all 1 new genus and 213 (212 new) species of *apidae* from North America, mostly described in but one sex and from not more than three specimens; *epolus mercatus* re-described; figures the venation of fore wing of *coelioxoides*, and characteristic structural details of 11 species of *coelioxys*, and 2 of *osmia*, 6 of *anthidium*, and 1 each of *heriades?* and *alcidamea*. B: P. M. (3796)

Cresson, Ezra Townsend. Descriptions of new North American hymenoptera in the collection of the American entomological society. (Trans. Amer. entom. soc., Feb. 1879, v. 7, p. 201-214.)

Describes 2 species of *calliopsis*, *perdita zonalis*, 4 *nomada*, *phileromus?* *productus*, 3 *melecta*, *stelis interrupta*, 2 *heriades?*, 8 *anthidium*, 4 *megachile*, 2 *melissoides*, 8 *anthophora*, 2 *xylocopa*, 3 *centris*, *apathus?* *californicum* and *panurgus nevadensis*, in all 43 new species of *apidae* from North America; describes also 2 new varieties; *calliopsis lateralis* is a variety of *c. edwardsii*. [Cont. from p. 136, and on p. 255.] B: P. M. (3797)

Cresson, Ezra Townsend. Descriptions of new North American hymenoptera in the collection of the American entomological society. (Trans. Amer. entom. soc., May 1879, v. 7, p. 255-256.)

Describes 5 new species of *aulacus* from Colorado and Nevada, and 1 from Vancouver's Island

B: P. M. (3798)

Cresson, Ezra Townsend. Descriptions of new species belonging to the sub-family *pimplariæ* found in America north of Mexico. (Trans. Amer. entom. soc., Sep. 1870, v. 3, p. 143-172.)

Describes *aconites rufipulvensis* Walsh, 2 species of *ephialtes*, *epimecis willii*, 15 *pimpla*, 3 *polysphincta*, *distopoga annulipes*, 22 *glypta*, *schizopoga frigida*, 3 *arenetra*, *cyloceria occidentalis*, 18 *lampronota*, 2 *monicus*, 2 *phytodictus*, *xorides borealis*, *euxorides* n. g., *e. americanus*, 2 *xyloinus*, 2 *odontomerus*, in all 1 new genus and 79 new species of North American *pimplariæ*, and gives a list of the 24 genera and 127 species; gives synoptical tables to discriminate the 21 species of *pimpla*, 3 *polysphincta*, 23 *glypta*, 4 *arenetra*, 22 *lampronota*, 6 *xyloinus*, 5 *odontomerus*. B: P. M. (3799)

Cresson, Ezra Townsend. Descriptions of Mexican *ichneumonidae*. (Proc. Acad. nat. sci. Philad., [v. 25]: 25 Mar.-8 Apr. 1873, p. 104-176; 13 Jan.-17 Feb. 1874, p. 374-413.) [Rec., 40.]

Describes 205 (210 new) species of 47 (*nomus*, *toxophoroides* = 2 new) genera or subgenera of *ichneumonidae* from Mexico. B: P. M. (3800)

Cresson, Ezra Townsend. Descriptions of North American hymenoptera in the collection of the Entomological society of Philadelphia. (Proc. Entom. soc. Philad., June 1864, v. 3, p. 131-196.)

Describes 5 (4 new) species of *foenus*, 2 new *aulacus*, 70 new *ichneumon* and 12 new *ischnus* all from North America, with a synoptic table of groups of *ichneumon* to facilitate determination; gives alphabetic index to the species here described. B: P. M. (3801)

Cresson, Ezra Townsend. Descriptions of North American hymenoptera in the collection of the Entomological society of Philadelphia. (Proc. Entom. soc. Philad., Sep. 1864, v. 3, p. 257-321.)

Describes 30 species of *mesoleptus*, 16 *tryphon*, 5 *cteniscus*, 7 *evochus*, *trogon flavipennis*, *hoplisomenus thoracicus*, 25 *cryptus*, 7 *phygadruon*, 5 *mesostenus*, and 3 *rhyssa*, all new North American species, with synoptic tables of groups of *mesoleptus*, *tryphon* and *cryptus*, to facilitate the determination of the species here described, and with alphabetic index to the species here described. B: P. M. (3802)

Cresson, Ezra Townsend. Descriptions of several new species of North American *apidae*. (Proc. Entom. soc. Philad., Apr.-May 1864, v. 3, p. 38-45.)

Describes *epolus bifasciatus* ♂, *stelis montana* ♀, *xylocopa californica* ♀, *bombus consimilis* ♀, *b. centralis* ♀, and *apathus ashtoni* ♀, all new North American species, and re-describes *bombus borealis* ♀ ♂ ♂. B: P. M. (3803)

Cresson, Ezra Townsend. Descriptions of some new species of *mutilla*, from California. (Proc. Entom. soc. Philad., June 1865, v. 4, p. 385-390.)

Notice. (GERSTAECKER, A. Bericht... 1865-1866, hálfte 2, 1869, p. 25-26.)

Describes 7 new species of *mutilla*, from California and Lower California. B: P. M. (3804)

Cresson, Ezra Townsend. Descriptions of two new genera of North America *ichneumonidae*. (Proc. Entom. soc. Philad., Nov. 1864, v. 3, p. 397-402, 1 fig.)

Describes *grota* n. g., *g. anguina* n. sp., *labena* n. g., *l. apicalis* n. sp., and re-describes T. Say's *cryptus grallator* as *labena grallator*; figures structural characters of *grota*. B: P. M. (3805)

Cresson, Ezra Townsend. Descriptions of two new species of *arotes*. (Trans. Amer. entom. soc., Feb. 1869, v. 2, p. 260.)

Gives a synoptical table of the 5 known North American species of *arotes*, and describes *a. vicinus* and *a. zeustus*, 2 new species. B: P. M. (3806)

Cresson, Ezra Townsend. Descriptions of two new species of *masaris*. (Proc. Entom. soc. Philad., Dec. 1864, v. 3, p. 672-678.)

Describes *masaris zonalis* ♀ ♂ and *m. marginalis* ♀, 2 new species, and re-describes *m. vespoidea*, all from Colorado. *B: P. M.* (3807)

Cresson, Ezra Townsend. Descriptions of two new species of *masaris*. (Trans. Amer. entom. soc., Dec. 1871, v. 3, p. 348.)

Describes *masaris occidentalis* and *m. texanus*, 2 new species, from Texas. *B: P. M.* (3808)

Cresson, Ezra Townsend. Descriptions of two new species of *trigonalys*. (Proc. Entom. soc. Philad., Feb. 1867, v. 6, p. 351-352.)

Describes *trigonalys pulchellus* ♂ n. sp., from West Va., and *l. (lycogaster) costalis* ♂ n. sp., from Mass.; if *lycogaster* is a distinct genus, as author is "inclined to believe," *trigonalys gundlachii* belongs to it.

B: P. M. (3809)

Cresson, Ezra Townsend. On the hymenoptera of Cuba. (Proc. Entom. soc. Philad., Jan. 1865, v. 4, p. 1-200, fig. 1-6.)

Notice. (GERSTAECKER, A. Bericht . . . 1865-1866, hälfte 2, 1869, p. 4, 17, 21, 22, 25, 26, 32-38, 40, 43.)

Enumerates 321 (257 new) species of hymenoptera found in Cuba, in general of all families except *proctotrupidae*, *formicidae* and the smaller *chalcididae*, with synonymical references, and describes the new species; describes *antacodes*, n. g. of *evanitidae*, and *epirhyssa*, *eiphosoma*, *rhopalosoma* and *chaonia*, new genera of *ichneumonidae*. *B: P. M.* (3810)

Cresson, Ezra Townsend. Hymenoptera texana. (Trans. Amer. entom. soc., Nov. 1872, v. 4, p. 153-292.)

"List of all the species of hymenoptera known to me from Texas, except those belonging to the families *chrysididae*, *formicidae* and the smaller *chalcididae*; . . . of the 10 families studied in this paper, over 600 species are enumerated, nearly 300 of which appear to be new, and are herein described."—Author, op. cit., p. 153. Systematic index of species (p. 286-292).

B: P. M. (3811)

Cresson, Ezra Townsend. List of the North American species of *bombus* and *apathus*. (Proc. Entom. soc. Philad., July 1863, v. 2, p. 83-116.)

Corrections, by author, with no title. (*op. cit.*, Oct. 1863, p. 164-166.)

Quotes description of generic characters of *bombus* from F. Smith's "Catalogue of British Hymenoptera" . . . 1855, pt. 1, p. 207, and mentions other characters; describes generic characters of *apathus*; gives synoptical table and special description of 47 (15 new) North American species of *bombus*, and descriptions of 7 (1 new) *N. A.* species of *apathus*; discusses the sexual characters of *bombus*; gives alphabetic index (p. 116) to species here described. *B: P. M.* (3812)

Cresson, Ezra Townsend. List of the North American species of the genus *aleiodes* Wesm. (Trans. Amer. entom. soc., Nov. 1869, v. 2, p. 377-382.)

Gives a synoptical table of the 22 North American species of *aleiodes*, and describes 20 new species.

B: P. M. (3813)

Cresson, Ezra Townsend. A list of the North American species of the genus *anthophora*, with descriptions of new species. (Trans. Amer. entom. soc., Mar. 1869, v. 2, p. 289-293.)

Gives a synoptical table and synonymical list of the 14 North American species of *anthophora* known to the author, and describes 8 new species; 3 described species not recognized. *B: P. M.* (3814)

Cresson, Ezra Townsend. On the North American species of several genera of *apidae*. (Proc. Entom. soc. Philad., Feb.-Mar. 1864, v. 2, p. 373-411.)

Describes 10 (1 new) species of *anthidium*, 2 *chlostoma*, 2 (new) *heriades*, *andronicus* n. g., *a. cylindricus* n. sp., *alcidomea* n. g. and 2 n. spp., *monimetha* n. g. and 3 n. spp., 4 (1 new) *ceratina*, 9 (1 new) *epclus*, 12 (3 new) *colioxys*, and 4 (2 new) *stelis*, in all 3 new genera and 49 (16 new) species of *apidae* from North America; quotes the descriptions of the not new genera from F. Smith's "Catalogue of British Hymenoptera" . . . 1855, pt. 1; *colioxys* parasitic on *megachile*. *B: P. M.* (3815)

Cresson, Ezra Townsend. On the North American species of the genus *nomada*. (Proc. Entom. Soc. Philad., Nov.-Dec. 1863, v. 2, p. 280-312.)

Quotes descriptions of generic characters of *nomada* from F. Smith's "Catalogue of British Hymenoptera" . . . 1855, pt. 1, p. 116, and mentions other characters and variations of wing-venuration; describes 33 (17 new) North American species. *B: P. M.* (3816)

Cresson, Ezra Townsend. On the North American species of the genus *osmia*. (Proc. Entom. soc. Philad., Apr. 1864, v. 3, p. 17-38.)

Quotes description of the generic characters of *osmia* from F. Smith's "Catalogue of British Hymenoptera" . . . 1855, pt. 1, p. 157, and describes the 33 (28 new) North American species, 31 of which are known to the author; refers to Smith's work, p. 158-162, for "a very interesting account of the economy of these bees." *B: P. M.* (3817)

Cresson, Ezra Townsend. Notes on the *pompilidae* of North America, with descriptions of new species. (Trans. Amer. entom. soc., June 1867, v. 1, p. 85-150, fig. 1-17.)

Notice, by F. Brauer. (GERSTAECKER, A. and BRAUER, F. Bericht . . . 1867-1868, 1871, p. 87.)

Enumerates 57 (15 new) species of *pompilus* subg. *pompilus*, 25 (13 new) *pompilus* subg. *priocnemis*, 23 (10 new) *pompilus* subg. *agenia*, 3 *ferreola*, 2 *notocyphus*, *parapompilus naomi*, 5 (2 new) *plaiiceps*, *aporus fasciatus*, 8 (2 new) *ceropales*, 3 (2 new) *mygminia*, 20 (1 new) *pepsis*, from North America; describes the new species and re-describes nearly all the old species enumerated, or refers for their description to author's "On the Hymenoptera of Cuba" (Proc. Entom. soc. Philad., Jan. 1865, v. 4) [Rec., 3810], p. 121-134, and author's "Catalogue of Hymenoptera . . . from Colorado Territory" (Proc. Entom. soc. Philad., June 1865, v. 4) [Rec., 3792], p. 451-454; characterizes the genera and subgenera mentioned, and figures the venuration of the wings and other structural characters of some of the genera and species. *B: P. M.* (3818)

Cresson, Ezra Townsend. Notes on Cuban hymenoptera, with descriptions of new species. (Trans. Amer. entom. soc., Mar. 1869, v. 2, p. 293-298.)

Describes *sphex mandibularis* ♀, *tarrada luteipennis* ♀, *agapostemon obscurata* ♀, *megacillusa nigrescens* ♂, *m. subaurata* ♂, *megachile armaticipes* ♀, *coelioxys regularis* ♀, *melissodes mimicus* ♂, and *Centris armillatus* ♂, 9 new species; *odynerus dejectus* ♂, *o. cingulatus* ♂, *o. cubensis* ♂, *megachile curta* ♀ and var. *tibialis* ♀, *coelioxys producta* ♂, and *examalopsis similis* ♀, new sexes of not new species; with further descriptions of *monedula insularis* ♀ and var. ♀, *bombex argentifrons* ♀ ♂, and *b. armata* ♂, all from Cuba.

B. P. M. (3819)

Cresson, Ezra Townsend. Notice of three new hymenopterous parasites. (Amer. entom., Jan. 1880, v. 3, n. s., v. 1, p. 24, 21 cm.)

Description of *lyctus opsetma lycti* n. sp. parasitic on the larva of *lyctus striatus*, and of *a. utilis* and *a. minima* both new species parasitic on the larva of *trogoxylon parallelepipedum*.

B. P. M. (3820)

Cresson, Ezra Townsend. [On some species of *bombus*.] (Proc. Entom. soc. Philad., Oct. 1863, v. 2, p. 164-166.)

Corrections of author's "List of the North American species of *bombus* and *apathus*" (op. cit., July 1863, p. 83-116) [Rec., 3812], and additional notes on *bombus pensylvanicus*, *b. virginicus* and *apathus elatus*; "*b. nidulans*" a variety of *a. elatus*, *b. impatiens* = *b. virginicus*; specimens of *b. separatus* n. sp. (here described) formerly confounded with *b. virginicus*; *b. virginicus* re-described; "*apis griseicollis*" ♀ = ? *b. virginicus* ♀; "*apis griseicollis*" ♂ = ? *xylocopa virginica* ♂.

B. P. M. (3821)

Cresson, Ezra Townsend. Synopsis of the North American species belonging to the genera *leucospis*, *smicra* and *chalcis*. (Trans. Amer. entom. soc., Feb. 1872, v. 4, p. 29-60.)

Describes 10 (8 new) species and 1 new variety of *leucospis*, 52 (33 new) species and 1 new variety of *smicra*, and 4 (3 new) species of *chalcis*, from North America; quotes descriptions of 3 *leucospis* and 20 *smicra* unidentified, and refers to descriptions of 2 (unidentified) *smicra* and 6 (3 unidentified) *chalcis* not here described; gives synoptical tables to discriminate the identified species of each of these genera.

B. P. M. (3822)

Csokor, Johann. Ueber haarsackmilben und eine neue varietät derselben bei schweinen, *demodex phylloides*. (Verhandl. k.-k. zool.-bot. gesells. in Wien, 1879, v. 29, p. 419-450, pl. 8.)

History, literature, classification and description of five varieties of *demodex*; anatomy, natural history and occurrence of *d. phylloides*, which lives in the skin of the hog.

G. D. (3823)

Dahl, Friedrich. Ueber die hörhaare bei den arachnoiden. (Zool. anzeiger, 21 May 1883, jahrg. 6, p. 267-270, 2 fig.) [not seen.]

Notice, by P. Mayer. (Zool. jahresb. für 1883, 1884, abth. 2, p. 58-59.)

Demonstration of auditory hairs on the legs, palpi and claws of arachnida; position and action of these hairs.—Mayer, l. c.

B. P. M. (3824)

Dahl, Friedrich. Beiträge zur biologie der spinnen. (Zool. anzeiger, 3 Nov. 1884, jahrg. 7, p. 591-595.)

Partial Engl. tr. entitled "Contributions to the biology of spiders." (Ann. and mag. nat. hist., Jan. 1885, s. 5, v. 15, p. 70-72.)

Notes upon the intelligence, instinct, acuteness of sight and of hearing, and reparation of nests of spiders; secondary sexual characters of spiders and their dependence upon sexual selection.

G. D. (3825)

Dahl, Friedrich. Contributions to the biology of spiders. (Ann. and mag. nat. hist., Jan. 1885, s. 5, v. 15, p. 70-72.)

Partial tr. of the author's "Beiträge zur biologie der spinnen" (Zool. anzeiger, 3 Nov. 1884, jahrg. 7, p. 591-595) [Rec., 3825].

G. D. (3826)

De Garmo, James M. Some evidence of intelligence in butterflies. (Trans. Vassar brothers' institute, 1883-1884, 1884, v. 2, p. 129-135.)

Considers how far the actions of certain butterflies are governed by intelligence.

G. D. (3827)

Dewitz, H. Die befestigung durch einen klebenden schleim beim springen gegen senkrechte flächen. (Zool. anzeiger, 21 May 1883, jahrg. 6, p. 273-274.)

Notice, by P. Mayer. (Zool. jahresb. für 1883, 1884, abth. 2, p. 1, 7.)

Dewitz endeavors, upon *a priori* grounds, to show that a viscid secretion is essential to the instantaneous fixing of springing insects, especially such as live on trees and bushes, and springing spiders.

E. L. M. (3828)

Dorfmeister, Georg. Ueber den einfluss der temperatur bei der erzeugung der schmetterlings-varietäten. (Mittheil. Naturwissensch. ver. f. Steiermark, jahrg. 1879 [Graz, 1880]; Abhandl., p. 3-8, pl.)

Separate. Graz, author, 1880. 8 p., 1 col. pl., 23 X 15, t 17.5 X 10.1.

Colored figure of a *vanessa atalanta* of normal coloration and one in which the coloration was varied by exposing its pupa to a low temperature; results of other experiments in producing varieties with this and other butterflies by varying the temperature to which the pupa was exposed.

G. D. (3829)

Druce, Herbert. Descriptions of new species of *aegeriidae* and *sphingidae*. (Entom. mo. mag., June 1882, v. 19, p. 15-18.)

Describes 10 new species, one of which, *choerocampa godmani*, inhabits Panama.

B. P. M. (3830)

Du Bose, J. W. Influence of winds on *aletia*. (Amer. entom., Apr. 1880, v. 3, n. s., v. 1, p. 105-106, 35 cm.)

Record of author's observation that *aletia xyliana* only injures cotton plants after the prevalence of east and south-east winds; the character of foliage and fruitage is favorable to the insects and unfavorable to the crop in seasons when those winds prevail.

B. P. M. (3831)

Dury, C: Notes on food of raptorial birds. (Journ. Cincinnati soc. nat. hist., April 1885, v. 8, p. 62-67.)

Among other animals found in crops of birds, insects were found in *buteo linearis*, *bubo virginianus* and *scops asio*. *G. D.* (3832)

Dwight, W: Buck. Appearance of the bean-weevil, *bruchus fabae*, (*varicornis*), at Poughkeepsie. (Trans. Vassar brothers' inst., 1881-1883, v. 1, p. 80-87.)

Notes on the habits of *bruchus fabae*. *G. D.* (3833)

Eaton, Alfred Edwin. Dragon-flies and telegraph wires. (Entom. mo. mag., Nov. 1879, v. 16, p. 135.)

Reprint. (Amer. entom., Jan. 1880, v. 3, n. s., v. 1, p. 20, 5 cm.)

Observation upon a habit of small species of *libellula* of alighting on telegraph wires and eating their prey there. ["*Libellulidae*" in the reprint (corrected) substituted for "*libellulæ*" in the original.] *B: P. M.* (3834)

Edes, R: A. Cotton culture and the insects affecting the plant at Bahia, Brazil. (Amer. entom., May 1880, v. 3, n. s., v. 1, p. 128-129, 29 cm.)

Letter, with notes [by C. V. Riley]; cotton not much cultivated at Bahia, Brazil; its insect enemies and their seasons; direction of the winds in fall and winter. Description of egg, larva and pupa of "the cotton worm of Bahia" (*anomis* sp.); suggestion of the identity of this insect with *atelia argillacea* of Hübner; list of insects found in bolls of cotton sent from Bahia.

B: P. M. (3835)

Edible insects. (Prairie farmer, 5 Nov. 1864, [v. 30], n. s., v. 14, p. 298, 31 cm.)

Mentions use of locusts, ants, white-ants, various larvae and pupae, a *psylla*, spiders, worms, snails and other small animals, as food for humans.

B: P. M. (3836)

Edwards, W: H: On certain North American species of *satyrus*. (Proc. Entom. soc. Philad., July 1866, v. 6, p. 195-200.)

Discussion of the genetic relations and specific characters of *satyrus pegala* and *s. alope*, which form one group of the genus, and *s. nephele*, *s. ariane* and *s. boopis*, which form another group; detailed comparisons of *s. alope* and *s. nephele* in characters and geographical distribution; *s. nephele* perhaps the ancestral form; limits to range of variation of butterflies: criteria of species.

B: P. M. (3837)

Edwards, W: H: Description of a new hesperian. (Trans. Amer. entom. soc., July 1868, v. 2, p. 122.)

Describes *hesperia waco* n. sp., from Texas.

B: P. M. (3838)

Edwards, W: H: Description of a new species of *limenitis*. (Proc. Entom. soc. Philad., Sep. 1865, v. 5, p. 148.)

Describes *limenitis proserpina* n. sp., from N. Y.

B: P. M. (3839)

Edwards, W: H: Description of certain species of diurnal lepidoptera found within the limits of the United States and British America. No. 1. (Proc. Entom. soc. Philad., Mar. 1863, v. 2, p. 14-22, pl. 1, 5, 11.)

Describes and figures *colias alexandra* and 10 species of *hesperia*, and describes *thecla clothilde* and *hesperia onaha*, all new species, from United States or British America.

B: P. M. (3840)

Edwards, W: H: Description of certain species of diurnal lepidoptera found within the limits of the United States and British America. No. 2. (Proc. Entom. soc. Philad., July 1863, v. 2, p. 78-82.)

Describes *parnassius sayii* ♀, *colias christina*, *c. helena*, *lycaena amica* ♂ and *melitæa texana* ♂, all new species, and describes *anthocaris ansonoides* and *chionobas chryxus*, previously mentioned or figured, but not described; all from United States or British America.

B: P. M. (3841)

Edwards, W: H: Description of certain species of diurnal lepidoptera found within the limits of the United States and British America. No. 3. (Proc. Entom. soc. Philad., Mar. 1864, v. 2, p. 501-507.)

Describes *peris vernalis*, *eresia cincta*, *argynnis hesperia*, *melitæa pallida*, *m. phoon*, *lycaena echo*, *l. lyca* and *hesperia nemoris*, new species, and *peris nasturtii* and *argynnis ephithore*, 2 new species named by Boisduval *in litt.*, all from United States; and remarks upon the distribution of some related species.

B: P. M. (3842)

Edwards, W: H: Description of certain species of diurnal lepidoptera found within the limits of the United States and British America. No. 4. (Proc. Entom. soc. Philad., Jan. 1865, v. 4, p. 201-204, pl. 1, fig. 2-6.)

Describes *melitæa picta* ♀, *satyrus ridingsii* ♀, *hesperia napa* ♂ ♀ (fig.), *h. maculata* ♀ (fig.), *h. viator* ♂ (fig.) ♀, *h. ricara* ♂ (fig.), *lycaena rustica* ♂ ♀, 7 new U. S. species.

B: P. M. (3843)

Edwards, W: H: Description of certain species of diurnal lepidoptera found within the limits of the United States and British America. No. 5. (Proc. Entom. soc. Philad., July-Oct. 1866, v. 6, p. 200-208.)

Describes *papilio bairdii* ♂, *colias behrii*, *lycaena violacea*, *l. merila* ♀, *syrichtus alba* ♂, *hesperia oltæ* ♂, *h. mingo* ♂, and *h. yreka* ♂, 5 new United States species; quotes the original description of *lycaena lucia* in full, re-describes *l. pseudardiolus*, and compares these two species, *l. violacea* and *l. neglecta* as to their characters, seasons, and geographical distribution; list of 13 species of butterflies received from Arizona.

B: P. M. (3844)

Edwards, W: H: Description of the female of *argynnis diana*. (Proc. Entom. soc. Philad., Nov. 1864, v. 3, p. 431-434.)

Describes *argynnis diana* ♀ for the first time; habits and seasons of ♂ and ♀; "the males of most, if not all, species of butterflies appear some days earlier than the females, and disappear as much sooner"; notes on the relative abundance of more than 30 species of diurnal lepidoptera and of a few *sphinxidae* in West Virginia; seasons of the species of *lycaena* observed; occurrence of dimorphic forms of *papilio turnus* and *limenitis ursula*.

B: P. M. (3845)

- Edwards, W: II:** Descriptions of certain species of *catocala*, found within the United States. (Proc. Entom. soc. Philad., Mar. 1864, v. 2, p. 508-512.)
Describes 11 new species of *catocala*, from United States. B: P. M. (3846)
- Edwards, W: H:** Descriptions of certain species of diurnal lepidoptera found in the United States. (Trans. Amer. entom. soc., Apr. 1869, v. 2, p. 311-312.)
Describes *hesperia zwakulla* ♂ and *h. eufala* from Florida, and *h. melane* from California; occurrence of *limetes elucha* in Florida. B: P. M. (3847)
- Edwards, W: II:** Descriptions of certain species of diurnal lepidoptera found within the limits of the United States and British America. No. 2. (Proc. Acad. nat. sci. Philad., Feb. 1862, [v. 14], p. 54-58.)
Describes *argynnis atlantis*, *thecla acadica* ♂, *th. laeta*, *lycaena neglecta*, *pamphila xerxa*, *p. rurea*, and *hesperia viatis*, all new species, and describes *chionobas taygete* ♀; all from North America; remarks upon the comparative characters and geographical distribution of species closely allied to the *argynnis* and *lycaena*. B: P. M. (3848)
- Edwards, W: H:** Descriptions of certain species of diurnal lepidoptera, found within the limits of the United States and of British America. No. 3. (Proc. Acad. nat. sci. Philad., Apr. 1862, [v. 14], p. 221-226.)
Describes *argynnis nokomis* ♂, *grapta jaunus*, *thecla californica*, *th. viridis*, *th. affinis*, *lycaena behrii*, *l. pembina* and *l. shasta*, all new species; describes *parnassius smiltheus* and *limenitis eulalia*, previously figured but not described; and describes *lycaena scuderi* ♀; all from North America. B: P. M. (3849)
- Edwards, W: II:** Descriptions of certain species of diurnal lepidoptera found within the United States, figured in Doubleday's Genera but undescribed. (Proc. Entom. Soc. Philad., July 1862, v. 1, p. 221-224.)
Describes *argynnis astarte*, *melitaea chalcodon*, and *m. anicia*, all three from Pacific coast or Rocky Mountains of United States, and *limetes coresia*, from Texas; *m. anicia* also from Kansas. B: P. M. (3850)
- Edwards, W: II:** Descriptions of new North American diurnal lepidoptera. (Trans. Amer. entom. soc., Nov. 1870, v. 3, p. 189-196.)
Describes *pietis calyce* ♂, *argynnis bischoffii*, *melitaea sterope*, *m. thekla* ♂, *eresia punctata* ♂, *chionobas stretchii*, *satyrius gabbi*, *thecla dryope*, *lycaena mintha*, *l. fulla*, *lemonias palmerii*, *syrictus petreus* ♂, *cycloptides skada* ♂, and *hesperia minima* ♂, 14 new species from North America. B: P. M. (3851)
- Edwards, W: II:** Descriptions of new species of diurnal lepidoptera found within the United States. (Trans. Amer. entom. soc., Sep. 1869, v. 2, p. 369-376.)
Describes *anthocaris reaktivii*, *pietis hulda*, *argynnis behrensii*, *melitaea vesta*, *m. arachne*, *grapta orcas*, *g. satyrus*, *cocoonympha kodiak*, *c. brenda*, *thecla chalcid*, and *lycaena orcus*, all new species from North America, with descriptive comparative notes on larvae and imagos of *grapta*. B: P. M. (3852)
- Edwards, W: II:** Descriptions of new species of diurnal lepidoptera found within the United States. (Trans. Amer. entom. soc., Jan. 1870, v. 3, p. 10-22.)
Describes *parnassius behrii* ♂, *colias edwardsii* Behr, *c. emilia*, *c. ariadne*, *pietis virginiensis*, *argynnis nevadensis*, *grapta silenus* ♂, *g. zephyrus* ♂, *g. marsyas*, *g. dryas*, *thecla behrii*, *th. leira* Behr, *th. dryope*, *lycaena kodiak*, *chrysophanus cupreus*, *ch. hermes*, *ch. virginiensis* and *hesperia hayhurstii*, 18 new species from North America. B: P. M. (3853)
- Edwards, W: II:** Descriptions of new species of diurnal lepidoptera found within the United States. (Trans. Amer. entom. soc., Jan. 1871, v. 3, p. 205-216.)
Describes *anthoc[h]aris hyantis*, *phyciodes orseis*, *ph. canace* ♂, *thecla cygnus* ♀, *th. castalis*, *lycaena helios*, *l. viaca* ♂, *l. ardea* ♂, *l. glaucon*, *l. gyas* ♂, *l. fea*, *chrysophanus ianthe*, *charis nemesis* ♂, *euplychia rubricata*, *cocoonympha ampelos*, *syrictus oceanus* ♀, *stereoptes skada* ♂, *heteropterus arene* ♂, *h. procris*, *hesperia tamenud* and *h. ophis*, 21 new species from North America; states in note, on authority of A. G. Butler, that *thecla castalis* = *papilio* (*thecla*) *damon*; note also on *euplychia rubricata*. B: P. M. (3854)
- Edwards, W: II:** Descriptions of new species of North American butterflies. (Trans. Amer. entom. soc., Feb.-Apr. 1871, v. 3, p. 266-267.)
Describes *anthoc[h]aris olympia*, *colias meadii*, *argynnis helena*, *phyciodes camillus* ♂, *ph. emissa*, *chrysophanus sirius*, *thecla minus* ♂, *th. antiochus* ♂, *th. alcetis* ♀, *lycaena danna* ♂, *l. alce* ♂, *erebia rhodia*, *e. callias*, *thymetis hylax* ♂, *pamphila draco*, *p. licinus* ♂, *p. altalus* ♀, *hesperia eos* ♂, *h. dacotah* ♀ and *h. horus* ♀, 20 new species from United States; describes also *lycaena lycæa* ♀. B: P. M. (3855)
- Edwards, W: II:** Larva of *apatura alicia*. (Amer. entom., Aug. 1880, v. 3, n. s., v. 1, p. 206, 2 cm.)
Larva of *apatura alicia* obtained from Florida, its coloration and distinctness from the larva of *a. cellis*. B: P. M. (3856)
- Edwards, W: II:** List of species of butterflies collected by Campbell Carrington and William B. Logan, of the expedition, in 1871. (HAYDEN, F. V. Preliminary rept. U. S. geol. surv. Montana... 1872, p. 466-467.)
List of 31 species of butterflies collected in Montana and adjacent territories; describes *erebia haydenii* n. sp. B: P. M. (3857)
- Edwards, W: II:** Notes on a remarkable variety of *papilio turnus*, and descriptions of two species of diurnal lepidoptera. (Trans. Amer. entom. soc., Sep. 1868, v. 2, p. 207-210.)
Records the capture of a *papilio turnus* ♀, one half of black (*p. glaucus*) and one half of yellow (*p. turnus*) coloration; describes *melitaea marcia* and *thecla ontario* ♀, 2 new species from North America; gives synonymy and descriptive comparative notes on several species of *melitaea*. B: P. M. (3858)

Edwards, W: H: Notes on graptas *c-aurum* and *interrogationis*. Fab. (Trans. Amer. entom. soc., Jan. 1870, v. 3, p. 1-9.)

Crit. rev., by J. A. Lintner, entitled "On graptas *interrogationis* and *fabricii* of Edwards." (*op. cit.*, Dec. 1870, p. 197-204.)
Synonymical and comparative descriptive notes on the 3 species of *grapta* to which have been applied the trivial names *c-aurum*, *angelica*, *interrogationis* and *umbrosa*, and re-description of one of these species as *grapta fabricii* n. sp.; describes *g. dryas* n. sp., and eggs, larvae and pupae of *g. interrogationis* and *g. fabricii*; compares imago of *g. comma* with the other species. *B: P. M.* (3859)

Edwards, W: H: Notes upon *grapta comma*, Harris, and *grapta faunus*, Edwards (*c-album*, of some authors). (Proc. Entom. soc. Philad., Mar. 1862, v. 1, p. 182-184.)

Distinguishes *grapta comma* from *g. faunus*, and both from *g. c-album*; describes larvae and pupa of *g. comma*; food-plants, seasons and geographical distribution of *g. comma* and *g. faunus*; distinguishes three varieties of *g. interrogationis*. *B: P. M.* (3860)

Edwards, W: H: Notes upon *papilio asterias* and *saturnia promethea* hermaphrodites. (Proc. Entom. soc. Philad., June 1865, v. 4, p. 390.)

Mentions a specimen of *papilio asterias* with right wings male and left wings female, and one of *saturnia promethea* with male and female characteristics intermixed. *B: P. M.* (3861)

Entomological club of the American association for the advancement of science—President, 1879 (Joseph Albert Lintner). Annual address. (Can. entom., Sep. 1879, v. 11, p. 163-175.)

Review of the progress in entomology in North America during the past year, with notices and reviews of some of the entomological publications of the year; statistics of the number of entomologists in North America. *B: P. M.* (3862)

French, G: Hazen. A new species of *arctia*. (Can. entom., Mar. 1879, v. 11, p. 45-46.)

Describes *arctia rectilinea* n. sp. *G: D.* (3863)

French, G: Hazen. Some new species of *noctuidae*. (Can. entom., Apr. 1879, v. 11, p. 76-78.)

Describes *dicopsis vilis*, *orthosia signata*, and *heilothis illinoensis*, 3 n. sp. of *noctuidae*, the last from Ill. *G: D.* (3864)

Goding, F. W. Insects injurious to vegetation in Iowa. (Rept. Iowa state agric. soc. for 1882, 1883, p. 322-329.)

Reprint, by author, entitled "A report on insects injurious to vegetation in Iowa, to the secretary of the state agricultural society, for the year 1882. Ancona, Ill., *Advocate publ. co.*, 1883. 11 p., 23 X 16, t 16 X 11.

Treats in a general and popular manner, typographically very inaccurate, of *anisopteryx* [corr.] *zyrenata*, *clisiocampa americana*, *selandria rubi*, *phyllophaga fusca*, *leucania unipuncta*, *blissus leucopterus*, *doryphora decemlineata*, *pionea rimosalis* and *pieris rapae*, and how to destroy them. *G: D.* (3865)

Goding, F. W. A report on the insects injurious to vegetation in Iowa, to the secretary of the State agricultural society, for the year 1882. (Reprint from the Transactions.) Ancona, Ill., *Advocate publ. co.*, 1883. 11 p., 23 X 15.5, t 16 X 11.

Reprint of author's "Insects injurious to vegetation in Iowa" (Rept. Iowa state agric. soc. for 1882, 1883, p. 322-329) [Rec., 2865], with many typographical blunders. *G: D.* (3866)

Grote, A: Radcliffe. A new *catocala* from Florida. (Can. entom., Jan. 1879, v. 11, p. 15.)

Describes *catocala sinuosa* n. sp., from Florida. *G: D.* (3867)

Grote, A: Radcliffe. On a new species of *folia*. (Can. entom., May 1879, v. 11, p. 94-96.)

Notes on the generic characters of *folia*; description of *p. illepidia* n. sp., from Nev. and Col. *G: D.* (3868)

Guillebeau, A. and Luchsinger, B. Fortgesetzte studien zu einer allgemeinen physiologie der irritabeln substanzen. Ein beitrug zur kenntnis des centralmarkes der annulata Cuvieri. (Arch. gesammte phys. . . Pflüger, 27 June 1882, v. 28, p. 1-60.)

Notice by P. Mayer. (Zool. jahresb. für 1883, 1884, abth. 2, p. 1, 4.)

Gives the result of experiments with various poisons (kalmum, strychnin, morphium, curare, conium) upon several insects, insect larvae, and other invertebrates, treating of insects especially on p. 12, 25, 26, 45. A comparison of their results with the histological conclusions of their predecessors leads to the conviction that the latter seriously need revision. They controvert Leydig's claim that a part of the fibres of the commissures enter the ganglia to emerge at once in the lateral nerves [i. e., without the interpolation of ganglionic cells.] *E: L. M.* (3869)

Horn, G: H: Memoir of John L. LeConte, M. D. (Proc. Amer. philos. soc., 16 Nov. 1883 [1884], v. 21, p. 294-299.)

Account of the life and life-work of Dr. John Lawrence LeConte. *G: D.* (3870)

Kingsley, J: Sterling. Is the group arthropoda a valid one? (Amer. nat., Oct. [Sep.] 1883, v. 17, p. 1034-1037.)

Germ. tr., with additions, entitled "Bilden die arthropoden eine natürliche gruppe?" (Kosmos, Dec. 1883, jahrg. 7, v. 13, p. 688-691, 136 cm.)

Notice, by P. Mayer. (Zool. jahresb. für 1883, 1884, abth. 2, p. 1, 4.)

Both upon anatomical and developmental grounds Kingsley urges the separation of tracheata from crustacea. The common feature of the possession of compound eyes, not otherwise easily explicable, is the only feature not readily made consistent with the view that the two groups are not nearly related. [The (anonymous) article in Kosmos reproduces Kingsley's "with some not unessential additions," to which it is added further that Balfour had previously arrived at similar conclusions from embryological data.] *E: L. M.* (3871)

ENTOMOLOGICAL ITEMS.

MR. W. M. MASKELL has lately described a curious species of *coccidae* from New Zealand under the name of *Rhizococcus fossor*. The female of this species, which lives on *Santolium cunninghamii*, does not cover herself with a scale, but sinks herself bodily in a circular pit in the substance of the leaf and there lays her eggs.

ENTOMOLOGICAL SOCIETY OF LONDON.—This society, on the fiftieth year of its existence, 1883, decided to take measures to obtain a royal charter. This charter has now been granted the society under date of 20 July 1885, and ensures the society a legal existence and increased privileges and responsibilities.

INTRODUCTION OF HUMBLE-BEES INTO NEW ZEALAND. The attempts to introduce humble-bees (*Bombus*) into New Zealand, in order that they may fertilize the red clover, have been hitherto unsuccessful, but this year a few have been landed alive in that country, having been brought in their dormant winter condition from England, and set free upon awakening.

ELECTION OF HONORARY MEMBERS. At the session of the Entomological society of France, 11 March 1885, E. de Sélys Longchamps, of Liège, Belgium, S. A. de Marseul, of Paris, and Dr. G. H. Horn, of Philadelphia, Pa., were elected honorary members of that society, and at the session of 8 April 1885, Dr. Auguste Puton, of Remiremont, France, was also chosen an honorary member.

TYPES OF LEPIDOPTERA TRANSFERRED TO CAMBRIDGE. Dr. Hagen informs us that the collection of lepidoptera heretofore at the Peabody museum, Salem, Mass., is now in his charge at Cambridge. The move is a good, and very necessary one. The collection contains many of Dr. Packard's and some of Mr. Morrison's types, and was slowly going to dust and *Anthrenus* when we last saw it.—*Entom. americana*, June 1885, v. 1, p. 54.

GROTE AS A COMPOSER.—Mr. A. R. Grote, the American lepidopterist, now residing in Bremen, has not only published numerous papers on moths, but several American magazines have printed verses by him. Shortly before leaving America he published a philosophical-religious essay, and he now takes the field as a composer of music, Fischer, of Bremen and New York, publishing his op. 2, which consists of Vier männerquartette, dedicated to Herr C. O. Ruyter.

CHEVROLAT'S COLLECTION OF COLEOPTERA.—The large collection of coleoptera belonging to the late Auguste Chevrolat is offered for sale, divided into families, by H. Deyrolle et Cie, of Paris. The prices vary from 10 francs for the box of *thorictidae*, of which there are 11 species represented by 30 specimens, up to 9000 francs for the *curculionidae* which are represented by 9000 species and 29000 specimens. The collection of *curculionidae* is said to be the largest excepting that of the museum at Brussels.

SPECIMENS FADED BY EXPOSURE TO LIGHT.—At a recent meeting (July 2) of the London entomological society, Mr. C. O. Waterhouse exhibited various species of phytophagous beetles to show the extraordinary effect that exposure to light had produced on their colors. Fiery red had turned to bright green, pale yellow to brown, blue to black, and green to purple. The specimens exhibited had been in the public galleries of the Bristol museum for twenty-five years.—*Amer. naturalist*, Jan. 1885, v. 19, p. 80.

TRIMEROUS SILPHIDAE.—Mr. D. Sharp describes a new species of the genus *Scotocryptus* (*silphidae*) in the Comptes-rendus de la Société entomologique de Belgique for 7 Feb. 1885. This species, *S. obscurus*, like *S. meliponae*, the one on which Girard founded the genus in 1874, is from Bahia, South America. The species of *Scotocryptus* are blind, but are still more interesting structurally from the fact that they have all the tarsi three-jointed, a character not common among coleoptera and otherwise un-

known among *silphidae*. *S. meliponæ* inhabits nests of *Melipona scutellaris*; the habits of *S. obscurus* are unknown.

FOOD-HABITS AND VESICATING POWER OF CANTHARIS. H. Beauregard, who has lately been completing his studies into the life-history of *Cantharis vesicatoria*, has succeeded in finding its pseudochrysalids in the sand about the cells of species of *Colletes*, upon the honey of which the larvae had subsisted. In the *Comptes rendus* for 8 June 1885, he also states that he has proved by direct experiment the inaccuracy of Neutwich's assertion that the vesicating power of *Cantharis* is only developed after copulation. As previously shown by Beauregard the cantharidin is chiefly located in the generative organs of these beetles, but experiments with the generative organs of specimens just emerged, and that certainly had not copulated, showed the presence in them of strong vesicating power.

INFUSORIAL PARASITES OF WHITE ANTS. In a paper read before the Royal society of Tasmania, 17 Nov. 1884, Mr. W. Saville Kent described a new species of infusorian belonging to the genus *Trichonympha* of Leidy, and which Mr. Kent names *T. leidyi*. This species differs but little from the species (*T. agilis*) on which Leidy based the genus, and is found swarming in the intestinal canal of a Tasmanian species of *termitidae*, which has not yet been determined. Leidy recommends that, for the observation of these infusoria, the contents of the intestine of the white ant be emptied into a little white of an egg; Kent recommends milk for the same purpose. Kent further says "Of the two remaining infusoria found by me in the Tasmanian white ant the one is apparently referable to Dr. Leidy's genus *Pyrsonympha*, while the other belongs to Stein's multiflagellate genus *Lophomonas*, so far recorded as a parasite only of the orthopterous insects *Blatta* and *Grylotalpa*."

INSECTS MISTAKING LEAVES FOR FLOWERS. At the meeting of the Entomological society of London, 1 April 1885, according to the *Entomologist's monthly magazine*, for May 1885, v. 21, p. 278;—"Mr. R. M. Christy (present as a visitor) exhibited a drawing of the larva of the local form of *Platysamia columbica*, known as *nokomis*: he had found the larva in Canada feeding on *Elaeagnus argentea*, the peculiarly silvery appearance of which was strikingly in accord with the color of the larva, which latter was probably protected thereby. He also showed faded leaves of *Betula glandulosa*, and said he had observed *Papilio asterias* settle on similar patches of leaves, apparently mistaking them for flowers on account of the bright coloring. Mr. [J: J.] Weir said he had observed white butterflies settle on patches of variegated leaves in his own garden, and he alluded to the well-known case of bees coming to artificial flowers on a lady's bonnet."

PRESERVATION OF INSECTS.—Apropos of the different notes upon the preservation of insects, that have been addressed to us, Dr. Jacobs states that he has recommended, in the *Bulletin de la Société entomologique de Belgique* (1879), the use of a solution of naphthalin in benzin. The insect is immersed in it, and, after drying, the crystals of naphthalin which are formed on the surface of the body are removed with a small brush. The solution penetrates the interior of the insect, where the presence of the naphthalin can be recognized. This process can be used for coleoptera, but not for the diptera, bees, and other hairy insects, for the brush removes the hairs and spoils the insect.

Mr. Charles Zuber employs liquid ammonia to remove the salts of copper which form upon the pins; this process does not injure the insects. It is of course understood that the insects should not be replaced in their boxes until completely dried.—*Feuille des jeunes natur.*, April 1885, ann. 15, p. 81.

ENTOMOLOGY DURING THE YEAR 1883.—An examination of the index of new genera which were established in the year 1883, as given in the lately completed "Zoologischer Jahresbericht für 1883, herausgegeben von der Zoologischen station zu Neapel," under the careful editing of Dr. Paul Mayer and Dr. Wilhelm Giesbrecht (abtheilung 1, 1885; 2, [arthropoda], 3, 4, 1884), Leipzig, W. Engelmann, shows how rapidly our knowledge of insect forms progresses, and consequently also our collections are enriched by new species. According to this index the majority (455) of the 625 new genera among the insects belong to the coleoptera and lepidoptera, to the former 254, to the latter 201; the remaining 170 being divided as follows: the hymenoptera 70, hemiptera 46, neuroptera and amphibiotica 27, diptera 18, orthoptera and thysanura 8 genera.

This certainly astonishingly high number of new genera for a single year must attract all the more attention because all the other divisions of the animal kingdom together can boast only of 446 new genera during the same year.—*Entom. nachrichten*, June 1885, jahrg. 11, p. 191.

WHAT IS INVOLVED IN THE PRODUCTION OF A KILOGRAM OF HONEY.—Alexander Wilson, of Dublin, has lately published interesting details upon the amount of sugar contained in the nectar of different flowers, and upon the harvest which honey-collecting insects make. He calculates that 125 heads of clover blossoms, containing about 60 flowers in each head, or 7,500 blossoms, yield about 1 gram of sugar; the nectar from 7,500,000 flowers is necessary therefore to furnish a kilogram of sugar; but as out of every 100 parts of honey only 75 parts are sugar, a kilogram of honey exhausts in round numbers 5,600,000 flowers; and the bees of a hive must visit this enormous number of flowers to collect a kilogram of honey.—*Deutscher bienenfreund*, Feb. 1885, p. 60.

Since a colony of bees may make 30 or 40

kilograms of honey in a season of 90 days they must at this rate visit more than 2,000,000 flowers a day, but as a colony often contains 40,000 workers and a worker bee often visits 50 flowers in less than half a day, this calculation is not unreasonable. The amount of nectar in flowers varies very much with the flowers, and with conditions of weather and other conditions. *A. F. C.*

The almost unnoticed work of domesticated honey bees produces more than 15 million kilograms of honey yearly, in the United States, which, at the above estimate, implies an amount of labor hardly to be imagined.

NEW TEXT-BOOK OF ENTOMOLOGY.—Swan, Sonnenschein & Co., Paternoster square, London, announce the publication of "An elementary text-book of entomology," with 87 plates by Mr. W. F. Kirby, of the British museum. The publishers, in their circular, which is accompanied by a specimen of the first seven plates, containing 80 well-executed wood-cuts of coleoptera, make the following statement: "The object of the author of this book has been to prepare a portable handbook, freely illustrated, in which a number of the most typical and remarkable insects of all parts of the world should be popularly described and figured. Previous works of this nature have generally treated only of a limited group of insects, or of British insects. Unnecessary technicalities have been carefully avoided, and sufficient space has therefore been gained to give a short and readable, though necessarily somewhat condensed, account of all the more important families of insects. The classificatory and illustrative character of the work has been carefully made its chief aim throughout." The price in cloth, gilt top, is fixed at 15 shillings.

G. D.

LYCAENID LARVAE IN ANTS' NESTS. The *Entomologisk tidskrift* for 1884 (p. 227) records that at the meeting of the Entomological society of Stockholm, held 1 Oct. 1884, Prof. C. Aurivillius "communicated the discovery

which he had made in northern Småland of six chrysalids of *Lycaena argus* L. under the bark of a spruce which was inhabited by *Lasius niger*. The chrysalids were found in the cavities made and frequented by the ants and had envelops of an uncommon tenuity and transparency. As it is difficult to attribute the presence of these chrysalids in the colony of ants to any fortuitous circumstance, it is likely that it has some connection with the secretion of a sugary moisture which has already been observed in some larvae of *Lycaenidae*. Miskin reports that the larva of *Ogyris genoveva*, a large lycaenid from Australia, is entertained and taken care of by ants in the same way as are the aphides in our own country. An identical fact has also been shown in North America. It is also probable that, as a recompense for this sugary liquid, the ants lodge the larvae of *Lycaena argus* L. during their pupal state when they have their principal need for protection."

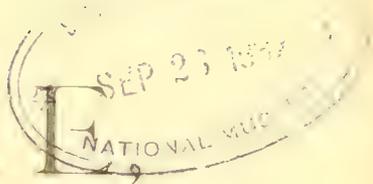
APHIS NECTAR AND HONEY. The nectar secretion from aphides is a well-known product. In many cases, however, notably the larch plant-louse, the lice so mimic the twigs on which they rest, that their presence is hard to detect, especially as the lice are often confined to the upper branches of the trees. Often this nectar is secreted so abundantly, that the leaves, and the grass beneath the trees, are covered at early morning by drops so large that it is easy to collect a considerable quantity of the nectar. Sufficient of this nectar can be secured directly from the larch lice and the elm cock's-comb gall lice to test it. Bees are also known to gather it in large quantities. This *Aphis* nectar is very pleasant and wholesome, and unquestionably forms at times no inconsiderable portion of our most beautiful honey. Such honey is light-colored, pleasing to the taste, and perfectly safe as a winter food for the bees. The truth of this statement is sustained by the fact that the bees work freely on such nectar, even though the flowers are yielding abundant nectar at the same time. The bees themselves practi-

cally proclaim the excellence of this *Aphis* nectar.—*Science*, 23 Jan. 1885, v. 5, p. 82.

HABITS OF SPIDERS. The following note is extracted from a partial translation [Rec., 3825] of Dahl's "Beiträge zur biologie der spinnen" (Zool. anzeiger, 3 Nov. 1884, jahrg. 7, p. 591-595), as it appears in the *Annals and magazine of natural history* for Jan. 1885.

"It has often been asserted that the geometrical spiders do not repair old webs. This, however, is true only in a limited sense. The outer framework and some of the radii which have become nearly free from transverse threads are probably always used again by *Zilla x-notata* and others. The rest is gathered up, worked into a ball with the mouth and thrown away. If the spider removes a lifeless object from the web, and damages the latter in so doing, it certainly sometimes reproduces the destroyed portion of the framework, the radii, and the central shelter. If we interrupt a spider in the formation of its web, by tearing away a portion of it with the corresponding part of the outer framework, all will be completed up to the part that has remained uninjured. In this case the completion of the framework is especially interesting, as this unaccustomed work is not usually successfully performed at once. Here we see very distinctly how reflection comes into play. I was still better able to ascertain reflection, or, what is the same thing, actual inference, in the case of *Attus arcuatus* Bl., when I offered it flies touched with oil of turpentine. Sometimes the spider despised the species of fly employed (*Homalomyia canicularis*, L.), whilst it attacked other insects (e. g. *Chironomus tendens*, Fab.) just as before. This spider also draws similar conclusions in those cases in which it cannot overcome insects in consequence of their chitinous armor being too hard. These it usually attacks only once, and is then for a long time forewarned. Dangerous insects, however, such as small bees, it avoids, without having seen their sting. Here therefore we have an instinctive dread. Bee-like flies are equally dreaded."

PSYCHE



A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;
ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Norml.*
Ill.; JOSEPH ALBERT LINTNER, *Albany, N. Y.*; FRANCIS HUNTING-
TON SNOW, *Lawrence, Kansas*; W: TRELEASE, *Madison, Wis.*

Vol. 4. Nos. 135-137.

JULY-SEPTEMBER 1885.

CONTENTS:

ADVERTISEMENTS	302
NOTES ON MELITTIA CUCURBITAE AND A RELATED SPECIES — <i>Samuel Hubbard Scudder</i>	303-304
THE LARVAE OF OESTRIDAE — <i>Friedrich Brauer</i>	305-310
WAXY SECRETIONS OF PSYLLID LARVAE	310
PROCEEDINGS OF SOCIETIES — Entomological Society of London	311-314
BIBLIOGRAPHICAL RECORD, no. 3885-4057	315-327
ENTOMOLOGICAL ITEMS	327-328

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20 c.

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

RATES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1883 the rate of subscription is as follows:—

Yearly subscription, entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 4 (1883-1885), as above, postpaid, \$5.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, tree at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,

Cambridge, Mass., U.S.A

Subscriptions also received in Europe by

R. FRIEDLANDER & SOHN,

Carlstrasse 11, Berlin, N. W.

THIS PAPER may be found on file at Geo. P. Rowell & Co's Newspaper Advertising Bureau (10 Spruce St.), where advertising contracts may be made for it **IN NEW YORK.**

AMERICAN AGRICULTURIST

100 Columns and 100 Engravings In each Issue.

43rd YEAR. \$1.50 A Year.

Send three 2c. stamps for Sample Copy (English or German) of the **Oldest and Best Agricultural Journal in the World.**

ORANGE JUDD CO., DAVID W. JUDD, Pres.
751 Broadway, New York.

INDEX TO ENTOMOLOGICAL LITERATURE.

Having accumulated an immense stock of references to the literature of entomology, I will furnish references on special subjects at ten cents each reference, or fifty cents per decade. For further particulars see PSYCHE for Oct.-Dec. 1884, v. 4, p. 223.

B: PICKMAN MANN,
Washington, D. C.



After Forty years' experience in the preparation of more than One Hundred Thousand applications for patents in the United States and Foreign countries, the publishers of the Scientific American continue to act as solicitors for patents, caveats, trade-marks, copyrights, etc., for the United States, and to obtain patents in Canada, England, France, Germany, and all other countries. Their experience is unequalled and their facilities are unsurpassed.

Drawings and specifications prepared and filed in the Patent Office on short notice. Terms very reasonable. No charge for examination of models or drawings. Advice by mail free.

Patents obtained through Munn & Co. are noticed in the **SCIENTIFIC AMERICAN**, which has the largest circulation and is the most influential newspaper of its kind published in the world. The advantages of such a notice every patentee understands.

This large and splendidly illustrated newspaper is published **WEEKLY** at \$3.00 a year, and is admitted to be the best paper devoted to science, mechanics, inventions, engineering works, and other departments of industrial progress, published in any country. It contains the names of all patentees and title of every invention patented each week. Try it four months for one dollar. Sold by all newsdealers.

If you have an invention to patent write to Munn & Co., publishers of Scientific American, 361 Broadway, New York. Handbook about patents mailed free.

PSYCHE.

NOTES ON *MELITTIA CUCURBITAE* AND A RELATED SPECIES.

BY SAMUEL HUBBARD SCUDDER, CAMBRIDGE, MASS.

THE tolerably full account of *Melittia cucurbitae* recently given by Mr. J. A. Lintner in his second Report on the injurious insects of New York recalled to me some observations made on the ravages of this insect in the squash vines on Cape Cod, and from my notes made at the time, now more than twenty-five years ago, I condense the following statement.

My examination was made in the early part of September, and there were to be found at that time two kinds of aegerian larvae within the plants, a larger and a smaller, and in the ground were found cocoons containing larvae of the larger kind—which subsequent observation showed remained through the winter without changing to chrysalis, and also a number of pupal exuviae protruding from the surface of ground which had not been hoed for a month or more.

There are thus apparently two species of aegerians destructive to the squash, and it seems to be probable that the one represented by the smaller larvae and the chrysalis-skins is either a later appearing species or that it is double-brooded, the brood represented by the smaller larvae in September being the later. There can be little doubt that both were aegerians, as they agreed closely in all structural peculiarities, and they could hardly have been differ-

ent stages of the same species, since they differed so much in the color of the head and thoracic segments and in the general markings. The following description of the larva of *M. cucurbitae*, fuller than before published, is drawn up from my notes.

Head very dark brown, deepening into black, with a median white band reaching to the frontal triangle and passing down its sides; a few scattered hairs are seen. Body white, the dorsal vessel visible through the cuticle, the surface smooth, but with two or three hairs on each segment, and on the terminal segment some faint light brown spots and four backward-projecting hairs. The first thoracic segment has on the dorsal surface two oblique, curved, light brown bands, nearly meeting posteriorly, their concavities outward; between their extremities on the front of the segment are a pair of transverse, almost microscopic, semicircular lines opening forwards. On second and third thoracic segments (my notes fail to say whether above or below) a transverse row of hair-bearing, scarcely perceptible, tubercles. Legs light brown; in place of prolegs, rings of black bristles. Spiracles light horn-color, surrounded by white, and this by a horny areola. Length 25 mm; breadth a little more than 6 mm.

As this and the smaller larva were at first taken for different stages of the same species, the difference in their habits was not so carefully noted as it should have been. The present species was, however, by far the more destruc-

five, being ten times more numerous than the other; nearly forty were taken from the inside of a single plant, they being found concealed in all parts from below the ground as far as they could burrow, to the base of the leaf stalks, and some were even in the squash itself; besides these, in the hill in which the same plant was growing, over twenty larvae were found in their chrysalis cases. They cast most of their excrement through holes eaten to the surface of the stalks. They appear to commence their work near the surface of the ground, and to work their way in each direction.

When ready for their change, they eat their way out of the stalk, reach the ground (probably by a thread, for they can spin one) enter the ground and make their cocoon there; this is formed externally of grains of earth adhering to silk, and is of considerable stoutness though very thin; it is of a light brown color within and blackish without, so that when the earth is removed, the cocoon has a reticulated appearance, from the brown showing through the black; the innermost layer of all is white. Some of these cocoons were kept, and the larvae were living within them on the 26th of the following May, having remained unchanged in the larval condition throughout the winter. They subsequently died. Thirty or forty cocoons were opened in the hills only to find the larva within.

This is all the history of this species which was followed. The second species has very nearly the same habits,

excepting that it perforates the base of the leaf stalks themselves and lives in the leaf stalks, often curled up. *M. cucurbitae* was also found there but not so frequently, and the present species seemed to prefer in addition the harder parts of the plant, such as the junction of the leaf and stalk, of the leaf stalk and main stalk, etc. The following is a description of the smaller species.

Head jet-black. Body white, with a faint, dusky stigmal band. Upper surface of first thoracic segment nearly black; a transverse series of eight brown spots on each segment behind the first, two faint ones being dorsal, one on each side infra-stigmal, and the others pleural; those of the thoracic rings are much the most conspicuous, and on the abdominal rings there is a brown dot on each ring in front of and a little within the dorsal spots; the last segment is brown above with spots similar to those of *M. cucurbitae* but more distinct; hairs as in that species. Length 13 mm.; breadth 2.5 mm.

No difference was noted between the cocoons beneath the surface with living larvae (*M. cucurbitae*) and those of the present species which were emptied, the chrysalis forcing off (how?) the entire end of the cocoon, and by means of the hooks on the abdominal rings working its way to the surface. A single larva, kept in captivity, made a cocoon in a small box partly filled with earth, and it was noted that the cocoon was thinner than that of *M. cucurbitae*.

Brief additional notes on *M. cucurbitae* will be found in Papilio, v. 2, p. 50, by N. Coleman; and in Bull. Brooklyn entom. soc., v. 6, p. 10, by G. D. Hulst.

THE LARVAE OF OESTRIDAE.

BY FRIEDRICH BRAUER, VIENNA, AUSTRIA.

[Translated by B. Pickman Mann from Friedrich Brauer's "Monographie der oestriden," Wien, 1863, p. 35-40.]

The larvae of the *oestridae*, although in many cases quite peculiarly shaped, are so nearly related to the larvae of the rest of the *muscidae-calyptera* that it has not yet been possible to discover for them a constant distinguishing character founded upon their structure. The reason of this lies in part in the oestrid larvae themselves, since they are very different among themselves, and in part also in our defective knowledge of the muscid larvae.

At present, it is true, no real muscid larvae are known with large thornwards,—as I will call the dermal formations which occur in many oestrid larvae, which are conical, soft at the base, fleshy, and corneous at the tip,—also none with the characteristic stigmatal plate of the *Gastrophilus* larvae; on the other hand very many are known with thorns, like those of *Dermatobia*, or naked, like those of the young *Hypoderma*, or with horny stigmatal plates, like those of *Cephenomyia*. The remarkable parasitic method of life in mammals can probably be looked upon as peculiar to the *oestridae*. I leave it therefore to a future observer to establish a character for the oestrid larvae whereby they may be distinguished from all other muscid larvae, and limit myself here

to the description of the larvae according to genera and species.

The oestrid larvae belong to the great division of those dipterous maggots which have been called headless, since they are segmented throughout and the usual regions of the insect body are not separated. Only a cephalic and an anal end, therefore, can be distinguished on the annulate body of such larvae. In general the following common characters and peculiarities of the oestrid larvae can be specified.

1. The body of all oestrid larvae is really composed of twelve rings. The first two are however not always distinctly separated, so that I take them together in the description, and designate them both by the name of cephalic ring, on which in many cases an anterior and posterior section is clearly to be distinguished. On that account I assume only eleven segments, as earlier authors have done. Only the newborn larvae of *Gastrophilus* make an exception to this number; they, if Joly's statement is correct, possessing thirteen segments.

2. Two anterior, external breathing-organs are always to be distinguished on the larvae, between the first and second segments of the body, and two posterior, external breathing-organs on

the last ring. The former are very small and appear either as points, knobs or fissures, or the anterior ends of the tracheae are hidden entirely in a cylindrical invagination of the skin (*Gastrophilus*). The posterior breathing-organs are either breathing-tubes which are protrusile and retractile (new-born *Gastrophilus* [p. 36] larvae and *Cephenomyia* larvae), or large stigmatal plates which are constructed according to two kinds of types. One of these types is represented in *Gastrophilus* and *Dermatobia*, the other in the rest of the genera. The stigmatal plates are more or less protected by lip-like organs on the last ring or by withdrawal into the preceding ring, and are in this way cleaned from substances which adhere to them.

I have described in detail under that genus the structure of the posterior stigmatal plates in *Gastrophilus*. The majority of the genera possess however two stigmatal plates in a real sense, consisting of corneous chitinous substance on the last ring. Each ring is usually crescent-shaped or reniform, in younger larvae even quite circular, and appears when magnified either as latticed with coarse meshes, finely porous or almost smooth, sometimes radially furrowed. On the inner border of each plate is in all larvae in the third and in many in the second stage a thinner, membranous or knob-like place superposed or imbedded, sometimes enclosed in the plate itself. The attachment of the trachea corresponds to this place on the inside. Since it usually has the

appearance of an opening, and also has been taken for such, I call it the false stigmatal opening. It has not yet been ascertained without doubt that breathing goes on in such stigmatal plates, but it probably takes place through pores of the plate. It seems to me as if the plates were penetrable especially at the circumference of the attachment of the tracheae.

3. The new-born larvae all possess external mouth-parts; in the later stages larvae with oral hooks and those without them are to be distinguished. An internal pharyngeal framework of various development always occurs; this encloses the membranous gullet and by its muscular structure is of essential service in the sucking of the larva. If oral hooks are present, they are connected with this by a joint.

Usually a U-shaped, bent chitinous plate is to be seen, whose open side looks upward; from the side it has the shape of a sitting butterfly whose large upper wing reaches far back and has the smaller, narrow under wing under it. Since the wings of the two sides are grown together firmly underneath, the whole pharyngeal framework appears like a flying insect, when the wings are bent apart from above, and with the base in a plane. The part lying more or less in front, which is to be found in the middle between the wings, and which really radiates out into these, or is united with them like a ligament, is what Schroeder van der Kolk calls the tongue-bone.

In the pharyngeal framework there-

fore there can be recognized a body (Schroeder's tongue-bone) and four wing-like processes which often again consist of several parts. The body is connected with the wings posteriorly. It is always bent in a U-shape, and so that the open end looks upward, *i.e.*, if other soft parts of its vicinity which also close this are disregarded. [p. 37] Bent flat, it shows a more or less distinctly H-shaped chitinous plate, with very broad side parts, which—in full-grown larvae—become confluent behind into a simple, broad plate, and only leave an oval hole in front of them for the passage of the discharge duct of the salivary glands, but posteriorly bear the four wing-shaped processes (two large upper, or in the outspread plate outer ones, and two smaller slenderer inferior or inner). On the anterior end of the body, in many genera, oral hooks are jointed to the short anterior side parts. In the anterior curved excavation of this lies in the membranous expansion a small corneous chitinous plate which is pierced like a sieve and whose nature has not yet been more closely investigated. It seems to me as if this plate lay at the outlet of the salivary ducts. It is especially distinct in *Cephenomyia* larvae. It is wanting in several others.

In young larvae the pharyngeal framework consists only of two chitinous rods which are united in front by a chitinous band; these chitinous rods radiate out behind in little wings. A (similar) pharyngeal framework occurs in all other muscid larvae, and corres-

ponds in the perfect insect to the chitinous frame of the proboscis. I have repeatedly convinced myself that such is really the case, since I have opened the coarctate pupae of *Cephenomyia* and *Gastrophilus* before the emergence of the flies. Since in these genera, as we will see later, the nymph is tightly enclosed by the puparium, it can be noticed how the already freed pharyngeal framework, which remains attached to the puparium, rests in the mouth-fissure of the nymph, and is drawn out of it as soon as the nymph is taken away or the lower lid is lifted off. It is also easy to form an idea that the pharyngeal framework together with its internal parts corresponds to the proboscis of the fly if it is observed how other muscid or syrphid larvae while alive project and withdraw this exactly as the fly does its proboscis.

In *Hypoderma* the mouth-parts undergo a retrograde metamorphosis from the second stage (after the first molt); the oral hooks disappear, and therewith all the external mouth-parts, but the internal pharyngeal framework remains.

4. The oestrid larvae show antennae (at least rudimentary ones) above the mouth-parts; these have the appearance of corneous or usually membranous knobs, and in the latter case are provided with one or two ocelli-like points. Subulate, many-jointed antennae, such as occur in many muscid larvae, are never found.

5. All possess an anus, which lies on the last ring, under the stigmal plates, and is very small.

6. They molt twice while they are parasitic. I have observed most closely the molting in *Hypoderma* larvae of the second stage. In *H. diana* the passage from this stage [p. 38] to the last one takes place about the beginning of February. If in a cutaneous muscle which is richly larded with such larvae the capsules of those larvae whose hinder stigmatal plates have the shape of the third stage, but are still clear yellowish-brown, are carefully slit open, the skin characteristic of the preceding stage, with the many little thorns heaped in groups, will be found either still partly attached to the front end of the larva or entirely dependent from the cephalic end or folded together along the dorsal side. The process of molting seems to be entirely similar to that in the *Melophagus* larvae; at least Leuckart states that the old skin in these is shoved together toward the cephalic end of the larvae and there remains attached. The *Hypoderma* larva, immediately after the molt, is pure white, very soft, and appears naked, since the thorns do not become dark and distinctly separated from their surroundings until they harden.

Three forms or stages are to be distinguished, corresponding to the molts, which forms in *Hypoderma*, *Gastrophilus* and *Dermatobia* show great differences. In the third stage the larvae reach their full size, usually change their color and that often very considerably, and then first leave their host-animal, crawl away and pupate, after the manner of the *muscidae*.

7. This pupation must be considered as a third molting, in which, however, the skin is only detached around the pupa, but is not stripped off, and remains in connection with it by means of four tracheae. The hardened larval skin, or puparium, is burst open at the cephalic end by the emerging fly by means of the frontal bladder filled with fluid, in the direction of the arcuate sutures in a double manner. Although the pupation resembles herein that of the *muscidae* in general, yet there occurs in one part of the *oestridae*, *i.e.*, in *Hypoderma*, a peculiarity which has not been observed before, namely, that the larva transforms in the puparium in a completely outstretched condition, and this therefore is far larger than the insect which comes forth from it.

8. So far as they have been observed, they lead a parasitic life in mammals, and feed upon the juices of these animals. In *Hypoderma* a blood-red intestine often shows through, and it is likely that these sometimes suck up blood in addition to the exudation which immediately surrounds them.

9. The closely observed larvae all show at first a slow and finally a rapid development, so that there occurs a resting stage which often lasts seven months, between the swarming of the imago and the first visible appearance of the larvae.

The larvae of the *oestridae* were formerly divided into two groups: into larvae with oral hooks and those without external mouth-parts. Such a separation is of service in distinguishing the

full-grown larvae, but scientifically unnatural and incorrect, since in the first place this peculiarity of the full-grown larvae corresponds to no similar degree of relationship of the perfect insects, and in the second place it is only temporary, [p. 39] since all oestrid larvae possess oral hooks when they are quite young. Such a division also as Clark attempted to make, into *cavicolae*, *cuticolae*, and *gastricolae*, is inadequate, for while the species of a genus do indeed always agree in life-history so far as their occurrence as parasites in a determinate organ is concerned, nevertheless the larvae of very different genera may also share this same manner of life with others; for instance, *Hypoderma*, *Cuterebra*, *Dermatobia*, among which there is far more difference between 1 and 2 than between *Cuterebra* and *Cephenomyia*, if the imagines are considered. Such a division is therefore likewise not a natural one, since it disturbs the natural relations of affinity. Two elements must be considered, in order to bring about an approximately natural division: in the first place the organization of the larvae, and in the second place their manner of life; and the latter in a subordinate degree, though this is here more important than in other animals, since as yet there is no example of two species of *oestridae* of one genus having been found parasitic in different systems of organs. Thus the *Cephenomyia* larvae belong to the oesophagus, the *Cephalomyia* and *Oestrus* larvae to the nasal and frontal cavity, those of *Gastrophilus*

to the intestinal tract, and those of *Hypoderma* to the subcuticular cellular tissue.

Although it is stated that the larva of *Gastrophilus* has been found in the oesophagus, this is one of the exceptional cases which are not authenticated. Of course only the full-grown larva is meant here, since young larvae may always be found in other places during the immigrations. So for instance the young *Oestrus* and *Cephenomyia* larvae both immigrate in like manner through the nose, and their roads do not separate until they get there, but the former migrate into the frontal cavity, and the latter into the oesophageal cavity.

Of the organs in which *oestridae* occur, the skin, or really the subcuticular cellular tissue, is that which is the most strongly attacked; the larvae of four genera: *Hypoderma*, *Oestromyia*, *Dermatobia*, *Cuterebra*, live in it. The nasal and frontal cavity are inhabited by the genera *Cephalomyia* and *Oestrus*, the nasal and oesophageal cavity by the genus *Cephenomyia*, the intestinal canal by the genus *Gastrophilus*. The transformations of the other genera of *oestridae* are unknown.

It is interesting farther that many genera occur only as parasites of certain families of mammals, while others have a somewhat wider or very wide range of distribution, and so have for hosts the different mammals, yet not quite without choice, and often even seek men for their breeding places.

Thus until now the larvae of *Cephe-*

nomymia have only been found in the throats of *cervina*, those of the genera *Cephalomyia* and *Oestrus* only in *tylo-poda* and *cavicornia*, those of the genus *Gastrophilus* in *solidungula* and *multungula* (*Rhinoceros*), but *Hypoderma*, on the other hand, in *cavicornia* (*Bos*, *Capra*, *Antilope*), *cervina* (*Cervus*, *Moschus*), and *equida*, *Cuterebra* larvae in *rodentia* and *marsupialia*, and finally those of *Dermatobia* in dogs, oxen, horses, and even upon man.

[p. 40] Another picture is formed if the perfect insects are divided according to a peculiar character into those with pectinate antennal bristles (*Cuterebra*, *Dermatobia*), and those with naked antennal bristles (*Hypoderma*, *Gastrophilus*, *Cephenomyia*, *Cephalomyia*), since the larvae of the former are parasitic in ungulate animals as well as especially in *rodentia* and *marsupialia*, but those of the latter only in *ungulata*. This hitherto so convenient and practical division likewise cannot

be relied upon for an inference, since *Oestrus leporinus* belongs to the group of *oestridae* with naked bristle, but its larva lives upon a rodent. It is seen that such divisions are only artificial and serve for orientation, but that nevertheless nature cannot be forced into them. Such divisions are therefore only temporary, and only too often become untrue so soon as new discoveries are published. It is therefore best to treat of the larvae according to their genera, and to limit these as naturally as possible, since it has thus far been found constantly in this family that the larvae of one genus all have a like life-history, and conversely the generic characters of the imagines can scarcely lead us astray if we wish to draw an inference as to the life-history of a larva perhaps not yet investigated. In the case of a new genus, however, we can infer its life-history with very little certainty. Experience alone teaches this.

WAXY SECRETIONS OF PSYLLID LARVAE.
Dr. Franz Löw, in his "Beiträge zur Kenntniss der Jugendstadien der psylliden" (Verhandl. K.-k. zool.-bot. gesells., 1884, v. 34; Abh.), p. 144, thus describes a curious secretion in the larvae of *Psylla ulmi*: "From wax-glands surrounding the anus the larva emits a white secretion, which appears as a hollow, vermiform thread that allows the passage through it of the fluid excrement of the larva. This white thread, which reveals the presence of the larvae hidden in the axils of the leaves behind the stipules, elongates continuously, but breaks

off repeatedly on account of its own weight and consequently reaches no very considerable length. Furthermore this larva secretes from the wax-glands on the dorsal surface of the last abdominal segment extremely fine white threads, which form unitedly a very loose, light flock." The larvae of *Trioxa*, three species of which larvae are described in the same paper, have their entire outer margin surrounded by hyaline, silky, very fine, threads of wax, which lie close to one another, and seem to form a short, closely-trimmed fringe around them.

PSYCHE.

CAMBRIDGE, MASS., JULY—SEPT. 1885.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

PROCEEDINGS OF SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

6 JUNE 1883.—Prof. J. O. Westwood, the honorary life-president, read an address, upon taking the chair, in which he briefly reviewed the progress entomology had made in times within his remembrance.

Mr. Frank Cheshire, who was present as a visitor, made some observations on section-cutting of the probosces of honey-feeding insects, as referred to by Prof. Westwood in his address. He recommended that the insect to be operated upon should be kept fasting for some time and then fed upon honey mixed with gelatine impregnated with some highly colored dye; the insect should be immediately decapitated and the head rapidly cooled; it should then be embedded in gelatine and the section cut by means of the microtome. The mouth-passage is then easily seen from the presence of the dye. Mr. Cheshire then made some extended remarks on his various observations upon the minute structure and anatomy of the honey-bee, stating that many of his results differed much from the generally received authoritative statements.

With regard to the tongue of the honey-bee, many authorities regarded it as a tube through its entire length, others as a gutter or trough, while in reality it is a trough on the upper side at the apex and a tube for the rest of its length; the structure of the extreme apex (Réaumur's "bouton"),—about which there existed so much difference of opinion,—was easily made out by the use of the means Mr. Cheshire recommended.

4 JULY 1883.—Miss E. A. Ormerod exhibited a bunch of *Atherix ibis*, Fabr., found on a sprig of alder [*Alnus*] overhanging water at Hampton Court by Mr. J. Arkwright. The swarm of flies measured about 6 in. [15 cm.] long by 3 in. [7.5 cm.] broad, and consisted of many thousand specimens.

Mr. E. A. Fitch called attention to a figure of a similar swarm of this species in the *Compte-rendu* of the Société entomologique de Belgique, for July 4th, 1874.

Mr. W. L. Distant exhibited specimens of four of the five known species of American *fulgoridæ*. Three were from Central America.

Mr. G. C. Champion stated that in Central America he had kept forty or fifty specimens of *fulgoridæ* alive for days, and had seen no trace of luminosity, neither did they stridulate; the evidence of the natives also was quite against these insects being luminous. The *fulgoridæ* were very sluggish in their habits, Mr. Champion observing that he commonly found specimens on the trunks of trees, where they sometimes remained for days; he had never seen a specimen on the wing. Mr. Champion also related that he had not infrequently found larvae attached to and feeding on the white cottony secretion so abundant about some of the smaller *fulgoridæ*; he had found as many as three larvae attached to one imago.

Prof. Westwood commented on the great interest of this last announcement, remarking that the three cases of lepidopterous parasitism on the *fulgoridæ* already recorded by him (*Trans. Entom. soc. Lond.*, 1876, p.

519; 1877, p. 433) occurred on eastern species. He was glad to hear that Mr. Champion had sent home specimens of the parasitic larvae, and hoped that further information would be attainable.

Mr. G. Lewis remarked on the different forms existing in the various species of *Lucanidae*, and stated that he believed these were due to the food of the larvae—whether the diet of the individual larva was nutritious and abundant or otherwise.

Prof. Westwood remarked that the great modifications in the size, curvature, deflection and dentition of the mandibles in male *Lucanidae* required great caution in not too hastily assuming identity of species in cases of great individual divergences.

1 AUG. 1883.—Sir Sidney Saunders communicated the purport of two letters addressed to him by M. Edmond André, of Beaune, upon the subject of the terminal segments “des chalcides à queue”; stating that, after further investigation, he concurred in considering Sichel’s so-called *hypopygium* in those genera (Proc. Entom. soc. Lond., 1882, p. 26, fig. 7D) as a conjoint segment comprising the dorsal and ventral arcs of the 7th. This he intends to notice in the *Annales* of the French entomological society.

Mr. R. Meldola read notes from Dr. Fritz Müller, on the following subjects: “Persecution of distasteful butterflies by birds,” “The colour of the pupa of *Papilio polydamas*” [showing that the green or brown coloration of the pupa does not depend upon the color of the object on which it pupates], and “How the caterpillar of *Eunomia cagrus*, Cram., employs its hairs” [showing by a figure how this glaucopid moth distributes its hairs each way from the pupa along the twig on which it pupates in order to defend the pupa from ants and non-flying foes.]¹

5 SEPT. 1883.—Mr. F. Enock exhibited a perfectly bilateral hermaphrodite *Macropis labiata*, Panz., the antennae, face, palpi, mandibles, legs, and genitalia showing very characteristically; the right side was male, the left female. [This bee is figured (Trans. Entom. soc. Lond., 1883; Proc. p. 25)].

In discussion, *Vanessa cardui*, L., *Pantala flavescens*, Fabr., and the trimorphic forms of *Nezara viridis*, L., were mentioned as being of cosmopolitan distribution, and *Danaüs archippus*, Fabr., was instanced as a species which had but lately taken to migration, being now found in Britain, the Azores, New Caledonia, and various oceanic islands, where it was previously known not to occur.

3 OCT. 1883.—Mr. W. F. Kirby, on behalf of M. Alfred Wailly, who was present as a visitor, exhibited a large box containing numerous bred specimens of various silk-producing *bombycidae*. . . . One extraordinary specimen of a *Samia* was very notable; . . . on this Mr. Kirby read a note entitled “Abnormal specimen of the genus *Samia*.” [This note, describing the specimen in detail, is printed in Trans. Entom. soc. Lond., 1883; Proc., p. 27. Concerning this specimen and description the following remarks are furnished to the editors of PSYCHE:—

ABNORMAL SPECIMENS OF SAMIA AND AL-LIES. The *Samia* described by Kirby is nothing but a suffused aberration of *cecropia*. It emerged from a cocoon received among many others of *cecropia* from the United States by Mons. Wailly, of London, Eng., who afterwards disposed of the moth to Mons. Godeffroi Mollinger, residing in the Netherlands. The latter sent me at the time an excellent, full size photograph of the insect, from which I saw in a moment that it was an abnormal *cecropia*. I have two agreeing with it almost exactly, save that they are not so large; have also seen another in a collection in New York that is nearly like it; in fact those things are not such rarities; almost any one who breeds large numbers of this or other species is likely out of the number to find some such monsters.

¹The last two papers are printed in German under the titles “Die farbe der puppen von *Papilio polydamas*” and “Wie die raupe von *Eunomia cagrus* ihre haare verwendet” in *Kosmos*, March 1883, jahrg. 6, v. 12, p. 448-449.

or "Spielarten" as the Germans designate them. I have at various times bred or acquired otherwise examples of *Telea polyphemus* destitute of the ocellate spots of the primaries; also of endless variety of color; of *Antheraea yamamai* I have some sulphur, others olive, and one black; of *Tropaea luna* some with two ocelli on one upper wing, and one without ocelli on any of the wings; and so on, I might go on enumerating hundreds in my own possession, besides many more scattered in various collections over the world.—Herman Strecker, Reading, Penn.]

5. DEC. 1883.—Mr. F. P. Pascoe exhibited some remarkable insects' nests from Delagoa Bay. They varied from half an inch [13 mm.] to an inch and a quarter [32 mm.] in length, and in shape from globular to ovate. They were semitransparent, yellowish, and the surface, under a lens, had a reticulate appearance; on one side, from the base to the apex was a stout suture, to which was attached a septum extending about two-thirds across the interior; on each side of this septum, but away from the suture, were placed in an erect position about 120 cylindrical eggs. These nests had much the appearance of the dried pods of the "bladder senna;" they were retained by a movable loop to the slender twigs of a shrub which Sir Joseph Hooker had pronounced to be a *Rhamnus*.

Mr. R. McLachlan considered that these curious bladder-like egg-cases belonged to one of the *mantidae*.

Mr. Wood-Mason did not think they should be attributed to the *mantidae*, altho possibly it might be so; he pointed out that the eggs were arranged in quite a different manner to those of any *Mantis* he had seen. He also suggested that the large vacant space existing between the egg-mass and the outside of the capsule would probably be protective against parasitic insects.—*Abstracted and compiled from Trans. Entom. soc. Lond., 1883; Proc., p. 15-15.*

2 APRIL 1884.—Mr. H. J. Elwes read a paper, "On the genus *Parnassius*," especially

referring to the anal pouch in the females as a specific character, and to the geographical distribution of the species; and made some remarks on their life-history. Mr. Elwes commented on the fact that almost every systematic writer except Boisduval had entirely overlooked the presence of the anal pouch. He illustrated his remarks by numerous diagrams, and by the exhibition of specimens of every known species and form occurring in the genus.

Lord Walsingham communicated a paper on "North American *tortricidae*." [Rec., 3938.]

7 MAY 1884.—Mr. W. F. Kirby exhibited a remarkably small and dark variety of *Samia cecropia* Linn., bred by Mr. Alfred Wailly.

Mr. A. S. Olliff exhibited a new species of *Helota*, collected in Angola by Dr. Welwitsch. The genus was previously known only from eastern Asia. Mr. Olliff said that Lord Walsingham had pointed out to him a similar and equally unexpected case of geographical distribution in the genus *Deuterocopus* of Zeller, belonging to the *pterophoridae*, which up to this time had only been known from Java, and of which he has lately received an undescribed species from Bathurst, West Africa.

Mr. A. G. Butler communicated a short paper by Mr. A. R. Grote entitled, "Note on the North American genus *Hemileuca*."

Mr. W. H. Patton communicated "Some notes on the classification and synonymy of fig-insects."

2 JULY 1884.—Dr. Fritz Müller (of Blumenau, Santa Catharina, Brazil) and Dr. A. S. Packard (of Providence, Rhode Island, U. S. A.) were elected honorary members of society.

Mr. T. R. Billups exhibited specimens (some living) of *Pelopaeus architectus*, and its nest, which was found attached to a leaf of tobacco from Owensboro, Kentucky, and taken from a hogshead recently opened at Whitechapel, England.

Mr. W. F. Kirby said that he had seen a

nest similar to the one now exhibited attached to a pod [ear] of maize.

Mr. T. R. Billups stated that he had frequently witnessed encounters between the larva of *Ocyfus olens* and earthworms, and had kept *Carabus auratus* alive on nothing but earthworms for more than five months.

Dr. D. Sharp remarked that *Cybister rosceli* had been kept alive from five to seven years by being fed on earthworms once or twice a day; he thought . . . that earthworms were the favorite food of carnivorous coleoptera.

Mr. W. L. Distant exhibited an ordinary specimen of *Cilix spinula*, and remarked that though its peculiar position when at rest had been described, it had not been noticed that it thus perfectly resembled a species of the homopterous genus *Flata*. . . . He further remarked that the term "mimicry," recently loosely-used, could not be applied here, as the moth could hardly be considered to mimic a *Flata* which did not occur in our fauna.

Mr. E. A. Fitch called attention to the great resemblance that *Cilix spinula* bore to the excrement of a bird, when at rest on the upper side of a leaf, as was its common practice.

Mr. A. G. Butler remarked on the great similarity sometimes existing between lepidopterous and homopterous insects; he had lately described a lithosiid allied to *Nudaria*, from New Holland, which he certainly thought at first was a homopteron; the resemblance was so striking that he had named the genus *Homopsyche*; the hairs along the costa were very striking, and he quite believed this was a case of mimicry. Quite lately he had found a second specimen in the [British] museum collection, which had been put away in the supplementary cabinet as not a lepidopterous insect.

Mr. F. P. Pascoe, in connection with the above, exhibited a large and pretty chalcid (which Mr. Fitch determined as one of the *cleonymidae*), which he had lately captured

at St. Helier's, quite thinking it was a hemipteron; when running it had its wings overlapping in true bug fashion.

Miss E. A. Ormerod exhibited a piece of leather perforated by *oestridae*, the punctures being more than one to the square inch [16 to the square decimetre]. Miss Ormerod called attention to what is known of the life-history of our bot-flies, and especially of the warble-fly (*Hypoderma bovis*), and alluded to the practical necessity of attempting to lessen the amount of injury occurring both to the cattle themselves and to the hides.

Messrs. W. L. Distant, E. A. Fitch, and C. V. Riley made further remarks upon the same subject.

Mr. A. Wailly exhibited a large box of bred lepidoptera, especially of silk-producing *bombyces*. Amongst them . . . were larvae hybrid between *Samia cecropia* and *S. ceanothi californica*; the parents had paired without forcing in any way, but no pairing between the sexes of *S. ceanothi* could be obtained; he believed these larvae would produce *S. gloveri*. . . .

3 SEPT. 1884.—Mr. W. F. Kirby, on behalf of Mr. A. Wailly, who was present as a visitor, exhibited . . . cocoons of *Ceratocampa imperialis*, and Mr. Wailly said that his suspicions that this larva was a cannibal had been fully verified by Mr. E. F. Hitchings, of Warren, Mass., who thus writes respecting this species:—

"In the fall of 1881 I obtained several almost full-grown larvae and put them in a box with plenty of pine and button-wood leaves; in a few days I noticed that several had disappeared, and upon examination found the skins with the juice all extracted. They were all of large size, and I found one or two of these skins held in the manner described by you. I then put in several full-grown larvae of *Telca polyphemus*, and they were disposed of in the same way. This led me to conclude they were carnivorous. In 1882 I noticed the same thing."

(To be continued.)

BIBLIOGRAPHICAL RECORD.

Authors and societies are requested to forward their works to the editors as soon as published. The date of publication, given in brackets [], marks the time at which the work was received, unless an earlier date of publication is known to recorder or editor. Unless otherwise stated each record is made directly from the work that is noticed.

A colon after initial designates the most common given name, as: A: Augustus; B: Benjamin; C: Charles; D: David; E: Edward; F: Frederic; G: George; H: Henry; I: Isaac; J: John; K: Karl; L: Louis; M: Mark; N: Nicholas; O: Otto; P: Peter; R: Richard; S: Samuel; T: Thomas; W: William. The initials at the end of each record, o; note, are those of the recorder.

Corrections of errors and notices of omissions are solicited.

Anderson, Joseph, jr. Aphides and their partiality for strongly-scented plants. (Entomologist, June 1885, v. 18, p. 173-174.)

Notes the preference of *aphididae* for strongly-scented conservatory plants, and plants bearing fragrant flowers. G: D. (3885)

Ashmead, W: Harris. On a parasite bred from the eggs of the orange tree plant bug; being another insect friend of the orange grower. (Florida agriculturist, 2 Nov. 1881, v. 4, no. 25, p. 193, col. 1-2, 56 cm.)

Describes *telenomus brochymenae*, a new species of *proctotrupidae*, parasitic upon the eggs of *brochymena arborea*, and gives notes on its habits. G: D. (3886)

Bailey, James Spencer. The natural history of *cossus centerensis*. (Can. entom., Jan. 1879, v. 11, p. 1-5, pl.)

Figures and describes the larva, pupa and imago of *cossus centerensis*; gives notes on its habits; the larva bores in wood of *populus tremuloides*. G: D. (3887)

Barnard, G: Fruit versus sugar. (Entomologist, June 1885, v. 18, p. 160-161.)

Describes the mode of collecting lepidoptera by using fruit, in place of sugaring, as the author has practised in Queensland. G: D. (3888)

Barrett, C: Golding. The influence of meteorological conditions on insect life. (Entom. mo. mag., June 1882, v. 19, p. 1-8.)

Abstract, by B: P. Mann, with above title. (Psyche, Sept.-Oct. [16 Nov.] 1883, v. 4, p. 83-87.)

Effect of severely cold winters in promoting the abundance of certain species of lepidoptera, and of wet weather in destroying other species. B: P. M. (3889)

Bassett, Homer Franklin. New cynipidae. (Can. entom., 1881, v. 13: April. p. 74-79; May. p. 92-113.)

Describes 24 new species of *cynipidae*. G: D. (3890)

Bijerinck, M. W. [Heterogonie der cynipiden.] (Entom. nachrichten, 1 March 1880, jahrg. 6, p. 45-46.)

Notice. (Entom. nachrichten, 1 April 1880, jahrg. 6, p. 71.)

Dimorphism and mode of oviposition of *biarhiza aptera*. G: D. (3891)

Bell, James Thompson. [On *alans*.] (Can. entom., May 1881, v. 13, p. 116.)

Answer to J: L. Le Conte's "[On *alans gorgops*]" (Can. entom., April 1881, v. 13, p. 80) (Rec., 2888). G: D. (3892)

Berlese, Antonio. Acarorum systematis specimen. (Bull. Soc. entom. ital., 1885, an. 17, p. 121-135.)

Classificatory table of the *acar*i, extending to genera; the families are as follows: *demodicidae* (including the *phytopti*), *sarcoptidae*, *oribatidae*, *gamasidae*, *ixodidae*, *trombididae* and *hoplopidae*. G: D. (3893)

Bettany, G. T. The galleries of the cutting ants of Texas. (Nature, 16 Oct. 1879, v. 20, p. 583, 23 cm.) (Littell's living age, 22 Nov. 1879, s. 5, v. 28, p. 512, 33 cm.)

Notes on the habits and habitations of *atta fervens*, based on accounts given by H: C. McCook. G: D. (3894)

Biro, Lajos. Szabadban alvó méhek és darázsok. (Rovartani lapok, Aug. 1885, v. 2, p. 169-172; Résumé, p. 23-24.)

Observations on the posture of about twenty species of hymenoptera while asleep upon *centaurea arenaria*. G: D. (3895)

Blanchard, F: Note on the habits of *amphicomma vulpina*. (Bull. Brooklyn entom. soc., Apr. 1883, v. 5, p. 90.)

Record of occurrence and diurnal habits of *amphicomma vulpina* at Lowell, Mass. B: P. M. (3896)

Brauer, Friedrich. [Entwicklungsgeschichte der *hirmoncra obscura*.] (Verhandl. K.-k. zool.-botan. gesells. in Wien, 1883, jahrg. 33; Sitzb., p. 19.)

Notes on larvae of *hirmoncra obscura* which live in larvae of *rhizotrogus solstitialis*. G: D. (3897)

Breitenbach, Wilhelm. Ein neuer feind der honigbiene. (Entom. nachrichten, Feb. 1884, jahrg. 10, p. 42.)

An undetermined hemipteron destroys many honey bees (*apis mellifica*) in southern Brazil. G: D. (3898)

Buel, Jesse. The *saperda bivittata*, or apple borer. (Mass. agric. repos. and journ., July 1826, v. 9, no. 2, p. 191-195.)

Communicates a letter from Philip Heatt, describing the ravages of *saperda bivittata*, and a letter from T: Say, concerning the same insect, with a copy of Say's original description of it. B: P. M. (3899)

Cameron, P: Descriptions of new species of *tenthredinidae* and *cynipidae* from Mexico. (Trans. Entom. soc. Lond., 1884, p. 481-488.)

Describes 9 new species of *tenthredinidae* and 5 of *cynipidae*, all from Mexico. G: D. (3900)

Cameron, P: A monograph of the British phytophagous hymenoptera. *Tenthredo, sirex* and *cynips*, Linné. Vol. 1. Lond., Ray soc., 1882. 7 + 340 p., 21 pl., each with 1 p. expl., 27 p. [announcements of Ray soc.], 23 X 14, t 16.5 X 9.7.

Rev. (Ann. and mag. nat. hist., May 1885, s. 5, v. 15, p. 416-417.)

A general monographic work on the British phytophagous hymenoptera, to which are prefixed general statements, which may be comprised under the following heads, about these insects: external anatomy of the head, mouth-parts, thorax, legs, veins and their venation, abdomen, ovipositor, and male anal appendages; spiracles, coloration, secondary sexual characters; habits—such as food, feigning death, copulation, oviposition, and parthenogenesis; the egg, larval habits, list of food-plants of larvae of British species; anatomy of larvae, and the differences between these and lepidopterous larvae; protective coloration of the larvae, offensive secretions and other means by which some larvae are protected; synopsis of the larvae of British species; mode and localities of pupation, and external anatomy of the pupa; generic and specific characters of the phytophagous hymenoptera, their geographical distribution, their classification and literature; analytical tables of genera and species belonging to the British fauna, with descriptions, and notes on habits and habitats of each species. G: D. (3901)

Campbell, G: Douglas (GLASSELL), *Sth duke of Argyll*. Mimicry in moths. (Nature, 7 Dec. 1882, v. 27, p. 125-126. 24 cm.)

Notice and abstract, by F. P. Pascoe. (Trans. Entom. soc. Lond., 1883; Proc., p. 2.)

A moth, of a species unknown to the writer, was observed at Cannes, France, mimicking a crumpled leaf. G: D. (3902)

Chambers, Vactor Tousey. *Cicada septendecim* in Colorado. (Amer. entom., Mch. 1880, v. 3, n. s., v. 1, p. 77, 2 cm.)

Record of occurrence of *cicada septendecim* in Cheyenne cañon, Colorado, in June 187 B: P. M. (3903)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., July 1871, v. 3, p. 54-58.)

General remarks on the genus *lithocolletis*, its two forms of larva and the differences in their mines and habits; classification of the known North American species by their coloration, with descriptions of new species: characters, food-plants and habits of six species, of which three (*l. liliacella*, *l. clemensella*, *l. caryac-albella*) are new, with remarks on other species. [Cont., op. cit., Sep., p. 84-88 (Rec., 3905).] B: P. M. (3904)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Sep. 1871, v. 3, p. 84-88.)

[Cont. from op. cit., July, p. 54-58 (Rec., 3904).] Characters, food-plants and habits of four species of *lithocolletis*, of which one (*l. virginicella*) is new, with remarks on other species, including *anacamptis robinicella*. [Cont., op. cit., Sep., p. 108-112 (Rec., 3908).] B: P. M. (3905)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Sep. 1871, v. 3, p. 108-112.)

[Cont. from op. cit., Sep., p. 84-88 (Rec., 3905).] Characters, food-plants and habits of seven species of *lithocolletis*, of which four (*l. nonfasciella*, *l. bethunella*, *l. tritenianella*, *l. corylicella* ["*corylisella*"]) are new, and *l. aesculisella* and *l. ostryacella* are new varieties. tabular synopsis of the characters of the larvae of *l. corylicella*, *l. guttifurcicella*, *l. aesculisella* and *l. ostryacella*. [Cont., op. cit., Oct., p. 127-130 (Rec., 3907).] B: P. M. (3906)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Oct. 1871, v. 3, p. 127-130.)

[Cont. from op. cit., Sep., p. 108-112 (Rec., 3906).] Characters, food-plants and habits of five species of *lithocolletis*, of which three (*l. ambrosiacella*, *l. celtipiliella*, *l. celtisella*) are new. [Cont., op. cit., Oct., p. 149-149 (Rec., 3908).] B: P. M. (3907)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Oct. 1871, v. 3, p. 146-149.)

[Cont. from op. cit., Oct., p. 127-130 (Rec., 3907).] Characters, food-plants and habits of four species of *lithocolletis*, of which two (*l. cincinnatiella*, *l. ulmiella*) are new. [Cont., op. cit., Nov., p. 161-166 (Rec., 3909).] B: P. M. (3908)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Nov. 1871, v. 3, p. 161-166.)

[Cont. from op. cit., Oct., p. 146-149 (Rec., 3908).] Characters, food-plants and habits of three species of *lithocolletis*, of which 1 (*l. ornata*) is new, with remarks on several others not known in the imago state. [Cont., op. cit., Nov., p. 182-185 (Rec., 3910).] B: P. M. (3909)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Nov. 1871, v. 3, p. 182-185.)

[Cont. from *op. cit.*, Nov., p. 161-166 (Rec., 3909).] Condensed account of species of *lithocolletis* described by Clemens, Packard and Fitch, but unknown to author; discussion of the number and sequence of broods of several genera of *tineina*. [Cont., *op. cit.*, Dec., p. 223-229 (Rec., 3911).] *B: P. M.* (3910)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Dec. 1871, v. 3, p. 205-209.)

[Cont. from *op. cit.*, Nov., p. 182-185 (Rec., 3910).] Describes *leucanthiza? saundersella*, *phyllocnistis vitifoliella* and *ph. ampelopsella* as new species, and remarks upon the generic characters of *phyllocnistis*, *tescheria* and *comioctoma*, and upon the North American species of these genera. [Cont., *op. cit.*, Dec., p. 221-224 (Rec., 3912).] *B: P. M.* (3911)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Dec. 1871, v. 3, p. 221-224.)

[Cont. from *op. cit.*, Dec., p. 205-209 (Rec., 3911).] Remarks upon the generic characters of *laverna* and *aspidisca*, and upon the North American species of these genera, including *lyonetta sacatella*; describes *laverna cephalanthidella* and *aspidisca ella* as new species. [Cont., *op. cit.*, Jan. 1872, v. 4, p. 7-12 (Rec., 3913).] *B: P. M.* (3912)

Chambers, Vactor Tousey. Micro-lepidoptera. (Can. entom., Jan. 1872, v. 4, p. 7-12.)

[Cont. from *op. cit.*, Dec. 1871, v. 3, p. 221-224 (Rec., 3912).] Remarks upon the generic characters of *gracilaria* ["*gracillaria*"], including *parectopa*, *coriscium* and *cuspilapteryx*; characters, food-plants and habits of five species of *gracilaria*, of which three (*g. eupatoriella*, *g. plantaginifella*, *g. 12-lineella*) are new. [Cont., *op. cit.*, Feb., p. 25-29.] *B: P. M.* (3913)

Chretien, P. De l'influence du froid sur les chrysalides. (Feuilles des jeunes naturalistes, May 1885, an. 15, p. 95-96.)

General résumé of the researches of W: H: Edwards upon the effect of cold upon the chrysalids of rhopalocera. *G: D.* (3914)

Clarke, Cora H. Description of two interesting houses made by native caddis-fly larvae. (Proc. Bost. soc. nat. hist. 24 May 1882, v. 22, p. 67-71, fig. 1-6.)

Separate, with t.-p. cover. p. 67-71. 24 X 15, 117 X 9.7; fig. 1-6.

Describes and figures the larval cases of a species of *hydropsyche* and one of *plectrocnemia*, found near Boston, Mass., and adds a few notes on the habits of their larvae and pupae. *G: D.* (3915)

Clemens, Brackenridge. Synopsis of families of heterocera. (Proc. Entom. soc. Philad., Mar. 1862, v. 1, p. 173-181.)

Reprint. (CLEMENS, B. *The tineina* of North America . . . Stainton. Lond., 1872, p. 195-206.)

Description of author's and of A. Guenée's methods of denuding wings of lepidoptera; definition of pterological terms; dichotomic synoptical table to discriminate all the families of *lepidoptera heterocera*; directions for using this table. *B: P. M.* (3916)

Clements, James. Description of the *oestrus ovis*, or the botts of sheep. (Amer. mo. mag. and crit. rev. . . . Biglow . . . , Feb. 1818, v. 2, no. 4, p. 249-250, 45 em.)

Valuable description of larva and imago and method of attack of *oestrus ovis*. *B: P. M.* (3917)

Clifford, J. R. S. The urticating properties of the hairs of *parthesia chrysorrhoea*. (Entomologist, Jan. 1885, v. 18, p. 22-23.)

Notes on the stinging hairs and the urtication produced by them, in certain species of *bombycidae*. *G: D.* (3918)

Cockerell, T. D. A. Scientific nomenclature. (Entomologist, April 1885, v. 18, p. 120.)

The author objects to the extensive use of names of persons in scientific names of animals. *G: D.* (3919)

Cockerell, T. D. A. The urticating hairs of lepidoptera. (Entomologist, Mar. 1885, v. 18, p. 74-75.)

Cocoons of *parthesia similis* which have been exposed to the weather for months, still produce urtication; the author thinks "this militates strongly against the theory of the effects being caused otherwise than by the mechanical properties of the hairs." *G: D.* (3920)

Coleman, Nathan. Notes on the changes in the larvae of *orgyia leucostigma*. (Journ. Bost. zool. soc., Oct. 1882, v. 1, p. 39-42.)

Account of observations made on changes of color in the larvae of *orgyia leucostigma*. *R. H.* (3921)

Coleman, Nathan. Notes on the larvae of certain heterocerous lepidoptera. (Journ. Bost. zool. soc., July 1882, v. 1, p. 28-29.)

Describes certain of the earlier stages of *carpopapasa pomonella*, *ageria cucurbitae* and *arctia isabella*. *R. H.* (3922)

Coleman, Nathan. *Papilio cresphontes* at Berlin, Conn. (Journ. Bost. zool. soc., Oct. 1882, v. 1, p. 53.)

Records the capture of a number of specimens of *papilio cresphontes* at Berlin, Conn. *R. H.* (3923)

Comber, T: Insects and colour in flowers. (Nature. 19 Nov. 1874, v. 11, p. 47, 13 cm.)

Thinks we cannot, with our present knowledge, decide whether beauty is an "object in nature." *G: D.* (3924)

Comstock, J: H: On the transmission of insects through the U. S. mails. (Amer. entom., Apr. 1880, v. 3, n. s., v. 1, p. 104, 23 cm.)

Statement of the laws in force in United States regarding the transmission of insects by mail; dead specimens, pinned or free, may be mailed if properly packed; live specimens can only be mailed in sealed letters. *B: P. M.* (3925)

Cook, Albert J: Another bee enemy. (Can. entom., Jan. 1879, v. 11, p. 17-20, fig. 1-8.)

Phymata erosa siezes bees and sucks their blood, and can sting quite severely; description of *ph. erosa*, with figures of the entire insect, its proboscis, its antenna, and its interior and middle leg; predaceous habits, and geography of the species. *G: D.* (3926)

Cook, Albert J. Remarks on some insects injurious to vegetation, in Michigan. (7th ann. rept. secr. state board agric. Mich., for 1868, 1868 [1869], p. 163-170.)

Characters of insects; occurrence and habits of, and remarks against, *doryphora decemlineata*, *cicada septendecim*, *dryocampa senatoria*, *sphinx quinquemaculata*, *carpocapsa pomonella*, *aspidiotus conchiformis*, and the *pemphigus* of *fagus*. B: P. M. (3927)

Cooke, E. Naphthaline. (Entomologist, April 1885, v. 18, p. 125-126.)

Notes some ill effects of using impure naphthalin in collections of insects. G: D. (3928)

Cooper, Joseph. Letter from Mr. Joseph Cooper to William Russel, esq. on the hessian fly and the early white wheat. (Papers on agric., Mass. soc. for promot. agric., 1799, p. 26-28.)

Cecidomyia destructor first appeared at Cooper's Point, N. J., in 1788; seasons of the insect, whose ravages may be diminished by late sowing of early white wheat. (3929)

Cope, E. Drinkard. On some new and little known myriapoda from the southern Alleghenies. (Trans. Amer. entom. soc., May 1870, v. 3, p. 65-67.)

Describes *petasertes* n. g. [*polyzonidae*] and *p. rosalbus* n. sp.; remarks on the occurrence and habits of several myriapoda in Tennessee and North Carolina, and especially on the physical characters of the defensive secretions of *strongylia* and *sugentia*. B: P. M. (3930)

Corning, Erastus, jr. Naphthaline. (Entomologist, Oct. 1882, v. 15, p. 240.)

Advocates the use of naphthalin (C10H8) in natural history collections to prevent the ravages of museum pests. G: D. (3931)

Couper, W. Entomology. No. 1. (Can. entom., June 1871, v. 3, p. 32-35.)

Rev., in C. V. Riley's "Friendly notes" (*op. cit.*, Sep., p. 117-119).

Advice to beginners in entomology; recommends neatness, patience, the keeping of field note books, and the formation of collections illustrating insect architecture; states that "every species of insect has a peculiar mode of working in its early stages, and there is a kind of non-deviation in the work which a practical eye can trace." B: P. M. (3932)

Coverdale, G. Additional notes upon setting lepidoptera unpinned. (Entomologist, July 1885, v. 18, p. 183-188.)

Describes a mode of spreading the wings of lepidoptera and mounting them for the collection, which is especially applicable to microlepidoptera. The editor of the *Entomologist* (J. T. Carrington) appends a note on the method. G: D. (3933)

Cox, E. W. Intellect in brutes. (Nature, 31 July 1879, v. 20, p. 315, 29 cm.)

Reprint. (Saturday mag., 6 Dec. 1879 . . .) [not seen.]

Describes actions of ants in carrying home a carcass of a cockroach (*blatta orientalis*), which go to show that the ants have intelligence and means of communication. G: D. (3934)

Cramer, A. W. Putnam. A new collecting ground. (Bull. Brooklyn entom. soc., Apr. 1883, v. 5, p. 90.)

Record of capture of two specimens of *catocala unijuga* aboard a vessel on the way to Europe off the coast of Newfoundland. B: P. M. (3935)

Cricket's chirp and the temperature (The).

(Nature, 5 Jan. 1882, v. 25, p. 229, 5 cm.) (Sci. amer., 11 Mar. 1882, v. 46, p. 149, col. 3, 6 cm.)

Rule for estimating the temperature by the number of successive chirps of a cricket [*gryllus*]. G: D. (3936)

Dahl, Friedrich. Ueber den bau und die functionen des insectenbeines. Vorläufige mittheilung. (Zool. anzeiger, 21 Jan. 1884, jahrg. 7, p. 38-41.)

Arrangement of certain muscles of the legs of insects; mode of attachment of the foot of insects to smooth surfaces; brushes, combs, and other apparatus pertaining to the use of the legs of insects in cleaning themselves. G: D. (3937)

DeGrey, T., lord Walsingham. North American *tortricidae*. (Trans. Entom. soc. Lond., 1884, p. 121-147, pl. 4.)

List, with notes, of species of *tortricidae* sent the author by H. K. Morrison, including specimens from Arizona, Mexico, Florida, North Carolina, Wisconsin, and Montana; describes as new: *sciophila arizonana*, *oenecra? striata*, *o. distincta*, *platynota stultana*, *p. seminutana*, 7 spp. of *conchylis*, *pseudococonchylis* [n. g.] *laticapitana*, *aphelia? inquadrana*, *penthina impudens*, 5 spp. of *paedisca*, 3 spp. of *semasia*, and *grapholitha? duodecimstriata*, figuring some of these; re-describes and figures *oenecra irrorea*, and figures *paedisca giganteana*. G: D. (3938)

Dewitz, Herman. Ueber die fortbewegung der thiere an senkrechten, glatten flächen vermittelt eines secretes. (Archiv f. d. ges. physiol., 1884, v. 33, p. 440-481, pl. 7-9.)

Separate, with t-p. cover. Bonn, *Emil Strauss*, 1884, p. 440-481, pl. 7-9, 23.5 × 15.5, t 18 × 10.5.

Abstract, entitled "Wie klettern die insecten an glatten wänden?" (Entom. nachrichten, May 1884, jahrg. 10, p. 125-135.)

Abstract, entitled "Locomotion of animals over smooth vertical surfaces." (Journ. Roy. micros. soc., Oct. 1884, s. 2, v. 4, p. 716-718.)

The author states that animals climb vertical smooth surfaces either by means of a fluid which acts by capillarity or is adhesive, or by atmospheric pressure; among insects the climbing is accomplished generally by means of a fluid secreted by glands, often of the tarsus, but the males of *dytiscus* and the larvae of *blepharoceridae* have suckers. As is the case with certain mites, the tarsal suckers of *dytiscus* are only used to cling to the female during copulation. Outline of the history of the subject as pertaining to insects, followed by description of mode of observation of the tarsal hairs in living flies, and account of the structure of the tarsus and its glands in some insects. Use of secretions to aid locomotion by certain dipterous, coleopterous, hymenopterous and hemerobid larvae, by springing spiders and by certain mites. G: D. (3939)

Dewitz, Hermann. Ueber rudimentäre flügel bei den coleopteren. (Zool. anzeiger. 18 June 1883, jahrg. 6, p. 315-318.)

Separate. 4 p., 24 × 15, t 18 × 11.

The larvae and pupae of *niptus hololeucus*, a wingless beetle, have rudimentary hind wings, showing their descent from winged ancestors. G: D. (3040)

Eaton, Alfred Edwin. Did flowers exist during the carboniferous epoch? (Nature, 31 July 1879, v. 20, p. 315, 10 cm.)

Rev. and abstr., entitled "Der angebliche steinkohlenzeit-schmetterling." (Kosmos, Sept. 1879, v. 5, p. 461-462, 18 cm.)

Regards *bryeria* as an ephemeral of the same group as *fallingenia*, and consequently as not a flower-visiting insect. G: D. (3041)

Edwards, W: H: Description of a new species of *chrysophanus*. (Trans. Kansas acad. sci. for 1879-80, 1881, v. 7, p. 69-70.)

Separate. [Lawrence, Kans., 1881.] [1] p., 24 × 16.

Describes ♂ and ♀ imagos of *chrysophanus snowi* n. sp., from above timber line on Gray's Peak, Col.

B: P. M. (3042)

Edwards, W: H: Description of a new species of *melitaca* from Texas. (Can. entom., June 1879, v. 11, p. 117-118.)

Describes *melitaca fulvira* n. sp., from Tex., and Col.

G: D. (3043)

Edwards, W: H: Description of preparatory stages of *phyciodes nycteis*. (Can. entom., June 1879, v. 11, p. 101-105.)

Describes egg, different stages of the larva, and chrysalis of *phyciodes nycteis*, with notes upon the habits, hibernation, and food-plants of the larva.

G: D. (3044)

Edwards, W: H: Description of the preparatory stages of *coenonympha gemma*. (Can. entom., Feb. 1879, v. 11, p. 31-35, fig.)

Describes the egg, larva in different stages, and chrysalis of *coenonympha gemma*; figures the larva and its head, a d the pupa; discusses the number of molts of different butterfly larvae, the larva of *c. gemma* having only three molts.

G: D. (3045)

Edwards, W: H: Descriptions of certain species of diurnal lepidoptera found in the United States. (Trans. Amer. entom. soc., Oct. 1867, v. 1, p. 286-288, pl. 5.)

Describes *hesperia pilatka* ♂, from Florida, and *h. nortonii* ♂ ♀ and *h. osyka* ♂ ♀, both from Louisiana, all new species; re-describes and figures *linnetis prosperina* ♂; describes *lycaena violacea* ♀, with notes on its occurrence, and on the occurrence of *hesperia logan*, *h. nemoris* and *h. rurea*; *h. nemoris* = *h. samoset*; *h. rurea* = *h. metacomet*.

B: P. M. (3046)

Ekelberg, H. J. Om insektfångst ombord på fartyg från främmande land. (Entom. tidskr., 1880, v. 1, p. 101-103.)

Results of examination of vessels and cargoes arriving in Sweden from foreign lands; lists of insects found therein.

B: P. M. (3047)

Emerton, James H: New England spiders of the family *epiridae*. (Trans. Conn. acad. arts and sciences, Sep. 1884, v. 6, p. 295-342, pl. 33-40.)

Separate. [New Haven, Conn., Sep. 1884.] half-t-p. cover + p. 295-342, pl. 33-40, 24 × 15, t 17.5 × 10.4.

Rev. (Science record, 15 Sep. 1884, v. 2, p. 255-256, 5 cm.)

Bibliographical (14 titles) and anatomical notes on North American *epiridae*; the genera *uloborus* and *hyptiotes* transferred to the *ciniflonidae*; acknowledgments. Characters and classification of *epiridae*; descriptions and figures of 51 (6 *epira*, 3 *singa*, 2 *tetragnatha*, 1 *cyrtarachne* = 12 new) New England species, of 12 (*microepira*, *argyroepira* = 2 new) genera, with notes on localities of capture and on habits; most of the genera are characterized; the new generic name *cyrtarachne* substituted for *cyrlogaster* pre-occupied.

G: D.; B: P. M. (3048)

Entomological club of the American association for the advancement of science

— *Committee on nomenclature, 1875*. [Report, with discussion.] (Can. entom., 1876, v. 8, Sep., p. 179-180; Oct., p. 183-184.)

Rec., 1115.

Majority report of a committee appointed at Detroit meeting of Entomological club of A. A. S., 13 Aug. 1875, to collate and edit the views of leading North American entomologists on questions of entomological nomenclature; rules submitted by the committee, with marginal notes indicating unanimous or divided opinion upon them; provision for conservative action on these rules; discussion of the function of the committee.

B: P. M. (3049)

Entomological club of the American association for the advancement of science — *President, 1879* (Joseph Albert Lintner). Entomology in America. Address of president at the late meeting of the Entomological club of the A. A. S. (Amer. entom., 1880, v. 3, n. s., v. 1: Jan., p. 16-19; Feb., p. 30-34.)

Reprint of author's "Annual address" (Can. entom., Sep. 1879, v. 11, p. 163-175) [Rec., 3862]

B: P. M. (3050)

Entomological club of the American association for the advancement of science — *President, 1880* (S: Hubbard Scudder). Annual address before the Entomological club. . . (Amer. entom., Sep. 1880, v. 3, n. s., v. 1, p. 207-210, 162 cm.)

Annual address of retiring president of Entomological club of A. A. S., at Boston meeting, 24 Aug. 1880; brief historical notice of the study of entomology about Boston, Mass.; appeal to entomologists to study the comparative anatomy, embryology, post-embryological development, habits, structure of wings and structure of mouth-parts of insects. [See Rec., 2181.]

B: P. M. (3051)

Fay, H. T. On winter collecting. (Proc. Entom. soc. Philad., May 1862, v. 1, p. 194-198.)

List of more than 130 species of coleoptera collected near Columbus, O., during the winter months, with occasional remarks on the abundance and habitat of certain species.

B: P. M. (3052)

Fernald, C. H.: [Distribution of *tortricidae* in North America.] (Can. entom., Oct. 1879, v. 11, p. 194.)

Specimens of *retinia duplana* and *r. sylvestrana*, identical with the European forms, received from Oregon and Washington Territory; the species of *tortricidae* more abundant in the west than in the east of North America. *B: P. M.* (3953)

Fernald, C. H.: [Explanations regarding his work on the *tortricidae*.] (Can. entom., Nov. 1879, v. 11, p. 203.)

Statement of the author's progress in the study of *tortricidae*; specific larval characters of these insects; request for assistance. *B: P. M.* (3954)

Fernald, C. H.: A new tortricid. (Bull. Buffalo soc. nat. sci., Jan. 1882, v. 4, p. 53-54.)

Describes *eccopsis footiana* n. sp., from N. Y. and Penn. *B: P. M.* (3955)

Fernald, C. H.: [Notes on *tortrix nigridia*: condition of the types of North American *tortricidae*.] (Can. entom., Oct. 1879, v. 11, p. 195.)

Pine trees in Maine much injured by *tortrix nigridia*: parasites of these insects. Gradual destruction of the types of North American *tortricidae* by corrosion of pins; japanned pins free from corrosion. *B: P. M.* (3956)

Fischer, Ph. Notes on the larvae of some *sphingidae*. (Can. entom., Dec. 1883 [Feb. 1884], v. 15, p. 238.)

Notes on larvae of *hemaris tenuis*, *h. thysbe*, *sphinx chersis* and a *Idarapsa*. *G: D.* (3957)

Forbes, H. O. Sound-producing ants. Nature, 2 June 1881, v. 24, p. 101-102, 9 cm.)

A species of *polyrachis*, and another species of *formicidae* produce sounds, that of the latter species having a "singular synchronism of the movements." "The noise, resembling very heavily-falling rain, is caused by the insect striking the leaf by a series of spasmodic taps, both with its head and with the extremity of its abdomen, which it inflexes while so doing." Observations made in Sumatra. *G: D.* (3958)

Forbes, Stephen Alfred. *Bacterium* a parasite of the chinch bug. (Amer. nat., Oct. [28 Sep] 1882, v. 16) (RILEY, C. V. Entomology . . . [Oct. 1882]), p. 824-825.

Description of observations which indicate that the alimentary canal of the bodies of *blissus leucopterus* sometimes contains great numbers of bacteria resembling *bacterium termo*, which seem to occasion the death of great numbers of the older individuals of *blissus*. *B: P. M.* (3959)

Forbes, Stephen Alfred. The food-habits of thrushes. (Amer. entom., Jan. 1880, v. 3, n. s., v. 1, p. 12-13, 53 cm.)

Notice, [by C. V. Riley], entitled "The food-habits of thrushes." (*op. cit.*, p. 2-3, 11 cm.)

General account of percentages of insect constituents, especially *carabidae*, in the food of *turdidae* and *liotrictidae*; and *bibio albipennis* in the food of *turdus migratorius*; census of birds examined; description of the method of the investigation. *B: P. M.* (3960)

Forbes, Stephen Alfred. The food of the bluebird, *sialia sialis*, L. (Amer. entom., 1880, v. 3, n. s., v. 1: Sep., p. 215-218, 135 cm.; Oct. p. 231-234, 156 cm.)

Review, by author, entitled "Supplementary note on the food of the blue-bird." (Amer. nat., Jan. 1881 [31 Dec. 1880], v. 15) (RILEY, C. V. Entomology . . . [Jan. 1881]) p. 66-67.

Statement of percentages of the several classes of insect and plant constituents in food of *sialia sialis* in Illinois from February to July and in December, and for these months combined; list of genera or species of insects found in the stomach of this bird; estimate of economic importance of this bird, and comparison of it with that of *turdidae*. *B: P. M.* (3961)

Forbes, Stephen Alfred. Supplementary note on the food of the blue-bird. (Amer. nat., Jan. 1881 [31 Dec. 1880], v. 15) (RILEY, C. V. Entomology . . . [Jan. 1881]), p. 66-67.

Statement supplementary to that in author's "The food of the bluebird" . . . (Amer. entom., 1880, v. 3, n. s., v. 1: Sep., p. 215-218; Oct., p. 231-234 [Rec., 3961], giving the percentages of the different constituents of the food of *sialia sialis* in August and September, with a list of insects found in stomachs of this bird during these months, and a correction of the general table of percentages, which is here reprinted. *B: P. M.* (3962)

Fuchs, C.: Synopsis of the *lucanidae* of the U. S. (Bull. Brooklyn entom. soc., 1882, v. 5: Nov., p. 49-52, fig. 1-5; Dec., p. 57-60, fig. 6-9, 12-14; pl.)

Separate. Brooklyn, 1882. t.-p. cover + t.-p. + 8 p., 1 pl. 22 X 15, 16 X 10.2.

Dichotomic tables of genera and species of the *lucanidae* of United States, with lists of synonymy, descriptions of differential characters, and figures of antennae; the plate contains figures of imago of all the species, and of larva of *lucanus dama* and *ceruchus piceus* and pupa of *c. piceus* and *passalus cornutus*. *B: P. M.* (3963)

Fuller, Andrew S. An intelligent wasp. (Amer. entom., July 1880, v. 3, n. s., v. 1, p. 167-169, 71 cm., fig. 71.)

Observations on the habits of *stizus speciosus* in transporting and burying *cicada canicularis* as food for its young; figure of imago. *B: P. M.* (3964)

Fyles, T. W. *Sphinx eremitus*. (Can. entom., March 1879, v. 11, p. 59-60.)

Quotes Prof. F. H. Snow's description of the green larva of *sphinx eremitus*, as given in Strecker's "Butterflies and moths of North America" . . . [Rec., 3965]. Gives a description of sepia-colored larvae of the same species. *G: D.* (3966)

Gentry, T. G.: Life-histories of the birds of eastern Pennsylvania. v. 2. Salem, Naturalists' agency 1877. [7]+336 p., 20 X 12.5, t 15 X 9.

Copious list of substances which serve as the food of the several species of birds, comprising, *inter alia*, the names of insects. *B: P. M.* (3967)

Gerard, W. R. Notes on the eggs and larvae of an unknown dragon-fly. (Amer. entom., July 1880, v. 3, n. s., v. 1, p. 174-175, 60 cm., fig. 77-80.)

Description and figures of eggs, egg-mass and young larva of *Diplax* sp.; hatching and first stages of development of the larvae. B: P. M. (3967)

Giard, Alfred. De l'influence néfaste des prix de l'Académie. (Bull. scient. du Département. du nord, Aug.-Sept. 1878, s. 2, année 1, p. 214-219.)

Criticizes certain young French zoologists for neglecting to cite properly earlier naturalists, in the fear of lessening their own chances of winning prizes of the Academy; as an illustration of this neglect the author makes an extract, upon the subject of the balancers of diptera, from A. J. B. Robineau-Desvoidy's "Recherches sur l'organisation vertébrale des crustacés, des arachnides et des insectes" (Paris, 1828), stating that J. Künckel d'Herculis, and—Jousset de Bellesme, in late papers on diptera, have refrained from citing Robineau-Desvoidy's results upon the functions of the balancers. G: D. (3968)

Girard, Maurice. Note sur les bruches et en particulier, sur la bruche du haricot. Extrait du Journal de la Société centrale d'horticulture de France; 3e série, 1, 1879, p. 95-99. Paris, 1879. 4 p., 22 X 14, t 17 X 9.5. Rev. (L'abeille, 1879, v. 17; Nouv. et faits div., no. 24, p. 94.)

On *bruchidae*; especially on *bruchus obtectus*, and on means for destroying it. G: D. (3969)

Gissler, Carl Friedrich. Coleopterous larvae of *tenebrionidae* in general. (Bull. Brooklyn entom. soc., June 1878, [v. 1], no. 2, p. 11)

The larvae of *tenebrionidae* all traceable to scarcely three typical larval forms, here distinguished. B: P. M. (3970)

Gissler, Carl Friedrich. On coleopterous larvae of the family *tenebrionidae*. (Bull. Brooklyn entom. soc., Jul. 1878, [v. 1], no. 3, p. 18-19, fig. 4-5.)

Description of egg and larva of *Aeodes gigantea* and larva of *e. dentipes*; figure of larva and structural details of the former, and of pygidium and leg of the latter. B: P. M. (3971)

Gissler, Carl Friedrich. On coleopterous larvae of the family of *tenebrionidae*. (Bull. Brooklyn entom. soc., Mch. 1879, [v. 1], no. 11, p. 85-88, pl. [1].)

Anatomical and embryological notes on larvae of *tenebrionidae*; pygidial differences of genera; figures of mouth-parts, pygidia and antennae. B: P. M. (3972)

Gissler, Carl Friedrich. Die nordamerikanischen verwandten der spanischen fliege. (Deutsch-amer. apotheker-zeitung, 1880, jaarg. 1: 1 July, no. 8, p. 2-3, 45 cm.; 15 July, no. 9, p. 2-3, 35 cm.)

List of "153" species of North American *meloidae*, with indication of the more and most common species, with a view to ascertain the applicability of these species to pharmaceutical purposes. B: P. M. (3973)

Gissler, Carl Friedrich. Ueber den ursprung des schild-lack's. (Deutsch-amer. apotheker-zeitung, 1 Dec. 1880, jaarg. 1, no. 18, p. 2, 40 cm.)

Extract, in Germ. tr., from J. M. Stillman's "On the origin of the lac" (Amer. nat., Nov. [23 Oct.] 1880, v. 14, p. 782-783) [Rec., 2792, 3555]; notice of erroneous statements in encyclopædia concerning lac; formation of lac as an insect secretion. B: P. M. (3974)

Gray, Arthur F. A complete list of the scientific papers of Thomas Bland, F. G. S., from 1852 to 1883. Salem, 1884. t.-p. cover, 12 p., 24.5 X 15, t 16 X 9.8.

Notice. (Amer. nat., Oct. 1884, v. 18, p. 1074.)

List of 72 papers by Bland or by him jointly with W. G. Binney; most of the papers are upon mollusca, a few upon insects. G: D. (3975)

Greene, C. A. An essay on insects injurious to vegetation and how to get rid of them. . . . [Harrisburg, Pa., 1883 or 1884.] t.-p. cover, 12 p., 22 X 15, t 19 X 11.2.

[The title contains 163 words!] The first nine pages are devoted to a criticism of the modes of study of noxious insects by entomologists, and especially by the United States Entomological commission and the United States Department of agriculture; the last three pages contain advertisements of "omniopathy," a special mode of treatment by Dr. Greene. G: D. (3976)

Gregson, C. S. Natural history nomenclature. (Entomologist, April 1885, v. 18, p. 118-120.)

Numerous citations of technical names of animals derived from names of persons, as a defence of the use of such names in science. G: D. (3977)

Grote, A.; Radcliffe. [Capture of *audela acronyctoides*.] (Can. entom., Nov. 1879, v. 11, p. 204.)

A male of *audela acronyctoides* captured at light in New York in Aug. 1879; first occurrence of the species in New York. B: P. M. (3978)

Grote, A.; Radcliffe. Description of *zeugophora reinckei*. (N. A. entom., July 1879, v. 1, p. 5, pl. 1, fig. 6.)

Description and figure of imago of *zeugophora reinckei* n. sp., from *populus*. B: P. M. (3979)

Grote, A.; Radcliffe. [Distribution of *scoliopteryx libatrix*.] (Can. entom., Oct. 1879, v. 11, p. 195.)

Geographical distribution of *scoliopteryx libatrix*. B: P. M. (3980)

Grote, A.; Radcliffe. Illustration of microlepidoptera. (N. A. entom., Mch. 1880, v. 1, p. 67-68, pl. 5.)

Figures the neurination and head of *prorosea simalis*, the neurination of *melanomma auricinctaria*, the forewings of *oedis funalis*, *pempelia contatella*, *p. contatella* var. *quinquepunctella*, *crambus exesus*, *c. dissectus*, *c. oregonicus*, *tetralopha diluculella* and *epigraphia eruditella*, and the head of *propetus edonis*, with references to the descriptions of these species; *dakruma turbatella* = *pempelia (dakruma) grossulariae*. B: P. M. (3981)

Grote, A.: Radcliffe. [Melanism in *pseudohazis eglanterina*.] (Can. entom., Sep. 1879, v. 11, p. 175.)

Specimens of *pseudohazis eglanterina*, collected on top of Mt. Shasta, were almost entirely black above; this variation supposed to be due to climate.

B: P. M. (3982)

Grote, Augustus Radcliffe. On the moths collected by Prof. Snow in New Mexico. (Trans. Kans. acad. sci., 1881-1882. Topeka, 1883, v. 8, p. 45-57.)

Remarks on geographical distribution of lepidoptera; describes *alphyoides* (n. g.) *flavilinguis*, *tygocinucha* (n. g.) *junera*, *alexides* (n. g.) *aspera*, *agrotis territorialis*, *a. incrustata*, *ammocoenia distichoides*, *mamestra vittata*, *m. minima*, *homohadena epipaschia*, *copinamestra occidenta*, *trichorthosia* (n. g.) *parallela*, *celiptera bucelum*, *eltopia vitraria*, *eubya mexicana*, *phigalia lixaria*, *lychnosea* (n. g.) *aulataria*, *chryseideton avernalis* [5 n. gen., 17 n. sp.]; quotes other descriptions.

G: D. (3983)

Grote, A.: Radcliffe. A new *epigraphia*. (N. A. entom., Jan. 1880, v. 1, p. 53.)

Describes *epigraphia eruditella* n. sp., from Massachusetts.

B: P. M. (3984)

Grote, A.: Radcliffe. A new *eustrotia*. (N. A. entom., Mch. 1880, v. 1, p. 66-67.)

Describes *eustrotia parvimacla* n. sp., from Texas, comparing it with *e. concinnimacula*, of which it probably is a race.

B: P. M. (3985)

Grote, A.: Radcliffe. A new *eustrotia* and *thalpochares*. (N. A. entom., Dec. 1879, v. 1, p. 46-47.)

Describes *eustrotia dividua* n. sp., from Texas, and *thalpochares aetheria* n. sp., from Florida.

B: P. M. (3986)

Grote, A.: Radcliffe. A new *halesidota* collected by Professor Snow. (N. A. entom., Dec. 1879, v. 1, p. 46.)

Remarks on the value of the labors of F. H. Snow; describes *halesidota trigona* n. sp., from Colorado.

B: P. M. (3987)

Grote, A.: Radcliffe. A new *pinipestis*. (N. A. entom., Mch. 1880, v. 1, p. 67.)

Describes *pinipestis reniculella* n. sp., from north-eastern United States.

B: P. M. (3988)

Grote, A.: Radcliffe. New species of moths. (N. A. entom., May 1880, v. 1, p. 91-95.)

Describes *agrotis dolis*, *a. sublatis*, *hadena hulstii*, *gortyna serrata*, *apatele thoracica*, *aedis simulatilis* and *asopia planalis* from Colorado, *agrotis worthingtoni* from Indiana, *agrotis baileyana* from N. Y. and N. H., *agrotis infimalis* from California, and *pseudoglossa scobialis* from New York, all as new species; characters of *anytus sculptus*, now considered a species of *agrotis*; habits of *pseudoglossa lubricalis* and occurrence of this species in California.

B: P. M. (3989)

Grote, A.: Radcliffe. A new *tortrix*. (N. A. entom., Oct. 1879, v. 1, p. 29-30.)

Describes *tortrix (ptycholoma) dissitana* n. sp., from New York.

B: P. M. (3990)

Grote, A.: Radcliffe. New western *noctuidae*. (N. A. entom., 1879, v. 1: Nov., p. 38-39; Dec., p. 43-46.)

Describes *pyrrhia stilla* n. sp., and 10 new species of *agrotis*, from Colorado; remark on the characters of *agrotis verutlis*.

B: P. M. (3991)

Grote, A.: Radcliffe. New western *noctuidae*. (Trans. Kansas acad. sci., for 1879-80, 1881, v. 7, p. 63-69.)

Describes imago of *hadena discors* and *gortyna juvenilis* = 2 new species, and re-describes imago of *halesidota trigona*, 11 species of *agrotis*, *pyrrhia stilla* and *catocala pura* Hulst, from Idaho Springs, Col.

B: P. M. (3992)

Grote, A.: Radcliffe. [Note on *oiketicus abbotti*.] (Can. entom., Nov. 1879, v. 11, p. 201.)

Larva case of *oiketicus abbotti* (sp. non descr.) found on cotton plant; literary history of the species.

B: P. M. (3993)

Grote, A.: Radcliffe. Paris green. (N. A. entom., Sep. 1879, v. 1, p. 22.)

Opposition to the use of Paris green as an insecticide, by reason of its liability to injure domestic animals, including humans.

B: P. M. (3994)

Grote, A.: Radcliffe. Note on the North American genus *hemiteuca*. (Trans. Entom. soc. Lond., 1884; Proc., p. 12-13.)

Regards *euclophaeus tricolor* as belonging to the genus *hemiteuca*, but *argyragraes neuomegeni* as sufficiently different structurally from *hemiteuca* to be properly in another genus; notes upon the variability of *h. maia*.

G: D. (3995)

Grote, A.: Radcliffe. [Ravages of *nephopteryx zimmermani*.] (Can. entom., Oct. 1879, v. 11, p. 195.)

Ravages and geographical distribution of *nephopteryx zimmermani*; objections to the use of Paris green as an insecticide; opposing opinions.

B: P. M. (3996)

Grote, A.: Radcliffe. Three new *cochliopods*. (N. A. entom., Feb. 1880, v. 1, p. 60.)

Describes *monoleuca sulfurea* n. sp., from Florida, *limacodes flexuosa* and *L. caesoma*, both new species, from New York; synonymical note on *limacodes latomia*.

B: P. M. (3997)

Guillebeau, A. Ueber die nachtheile, welche der parasitismus einiger oestriden ihren wirthen bringt. (Mittheil. Naturforsch. gesells. Bern . . . 1881, 1882, heft 2; Sitzungsber., p. 7-11.)

Upon species of *gastrophilus* which are parasitic in the horse, and upon *hypoderma boris* which attacks cattle, with description of their normal habits as parasites and of the injuries which they sometimes do to their hosts.

G: D. (3998)

Haller, G. Die arten und gattungen der schweizer hydrachnidenfauna. (Mittheil. Naturforsch. gesells. Bern . . . 1881, 1882, heft 2; Abhandl., p. 18-83, 4 pl.)

The general remarks (p. 18-31) precede the systematic portion of this paper on Swiss *hydrachnidae*, and contain literature (11 titles); brief outline of the anatomy (mouth-parts, external glands and openings of the external covering, eyes); discusses the structure and uses of Claparède's "haftnäse," the development, and the geographical distribution of the *hydrachnidae*.
G: D. (3999)

Hayward, Roland. *Cicindela ancocisconensis*, Harr., in Vermont. (Journ. Bost. zool. soc., July 1882, v. 1, p. 38.)

Records capture of *cicindela ancocisconensis* at Underhill, Chittendon co., Vt.
G: D. (4000)

Hayward, Roland. Habits and transformations of *bolitotherus bifurcus*. (Journ. Bost. zool. soc., July 1882, v. 1, p. 35-36.)

Brief description of larva, pupa and imago of *bolitotherus bifurcus*; notes on habits in different stages.
G: D. (4001)

Hayward, Roland. *Selenophorus ellipticus* at Nantucket. (Journ. Bost. zool. soc., Jan. 1882, v. 1, p. 10.)

Records occurrence of *selenophorus ellipticus* at Nantucket, Mass.
G: D. (4002)

Hayward, Roland. Two rare *carabidae* from eastern Massachusetts. (Journ. Bost. zool. soc., July 1882, v. 1, p. 37-38.)

Records capture of *calosoma wilcoxi* and *badister notatus* in eastern Massachusetts.
G: D. (4003)

Henry, W: A. Poplar stem gall-lice fed on by squirrels. (Amer. entom., Aug. 1880, v. 3, n. s., v. 1, p. 205-206, 21 cm., fig. 110.)

Galls of *pemphigus populicaulis* on *populus monilifera*, at Ithaca, N. Y., opened by *sciurus hudsonius*, who removes the occupants; figure of galls, and insects of the *pemphigus*.
B: P. M. (4004)

Horn, G: H. *Harpalus caliginosus*. Fab. With details. (Bull. Brooklyn entom. soc., Feb. 1883, v. 5, p. 84, fig.)

Figure of under side of imago of *harpalus caliginosus*, with details of external anatomy numbered and named.
B: P. M. (4005)

Horn, G: H. Vertical vs. horizontal insect boxes. (Amer. nat., May [16 Apr.] 1881, v. 15, p. 491.)

Crit. rev. of a pamphlet by A. Preudhomme de Borre on the "best arrangement of boxes and cartons of collections of insects;" views of the reviewer as to the proper size, construction and arrangement of such boxes.
B: P. M. (4006)

Hudson, G: Vernon. Hermaphrodite lepidoptera. (Entomologist, June 1885, v. 18, p. 168-169.)

Describes a hermaphrodite of *eugonia angularia* and one of *plusia verticillata*; also a probable hermaphrodite of *vanessa gonerilla*.
G: D. (4007)

Karpelles, Ludwig. Die thierwelt im Leviticus, III buch Moses. (Verhandl. K.-k. zool.-bot. gesells. in Wien, 1885, v. 35; Abh., p. 257-266.)

Pages 202-204 give an explanation of the kinds of insects mentioned in the book of Leviticus, and the meaning and derivation of the Hebrew words used for them in the text of that book.
G: D. (4008)

Keyserling, Eugen. Neue spinnen aus Amerika. 6. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884 [1885], v. 34; Abhandl., p. 489-534, pl. 13.)

Describes 20 new species of American spiders of which 3 are made types of new genera (*zola*, *agobardus*, and *epiroides*).
G: D. (4009)

Killing the apple borer. (Springfield [Mass.] d. republican, 2 July 1880, p. 2-3, 8 cm.)

From *Golden rule*. Two remedies for "the apple borer."
G: D. (4010)

Kohl, Franz Friedrich. Die gattungen und arten der larriden autorum. 1. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884 [1885], v. 34; Abhandl., p. 171-268, pl. 8-9.)

Table of the genera of *larridae* (incl. *trypoxylon* and *nitela*), descriptions of some of the species, and a synonymical catalog of all the species, with notes on their habits and geographical distribution. [Continued under same title, 2. (*op. cit.*, p. 327-451) (Rec., 4012).]
G: D. (4011)

Kohl, Franz Friedrich. Die gattungen und arten der larriden autorum. 2. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884, [1885], v. 34; Abhandl., p. 327-454, pl. 11-12.)

Continuation of author's paper of the same title, 1. (*op. cit.*, p. 171-268) [Rec. 4011], on same subject.
G: D. (4012)

Kreithner, Eduard. Nachricht über massenhaftes auftreten des kohlweisslings in der nähe Wiens. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884, [1885], v. 34; Sitz.-ber., p. 27-28.)

Great numbers of *pietis brassicae* about Vienna, Austria; the damage they do to cruciferous plants, and how to reduce their numbers by destroying their eggs.
G: D. (4013)

Löw, Franz. Beiträge zur kenntniss der jugendstadien der psylliden. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884, [1885], v. 34; Abhandl., p. 143-152.)

Describes the larvae of *amblyrrhina cognata*, *psylla ulmi*, *trioza manra*, *t. scottii* and *t. remota*. Gives a catalog of all the species of *psyllidae* of which earlier stages have been described.
G: D. (4014)

Machleidt, G. Zwitterbildung eines tagfälers. (Jahreshefte d. Naturw. ver. f. d. fürstentum Lüneburg, 1883-1884, no. 9, p. 131, 1 pl.)

Colored figure with brief description of an apparent hermaphrodite of *epinephelus lycæon*.
G: D. (4015)

MacLeod, Jules. De l'hermaphroditisme de *trombidium* mâle.

Note, appended to author's "La structure de l'intestin antérieur des arachnides" (Bull. Acad. roy. de Belgique, 1884, s. 3, v. 8, p. 377-391) [Rec., 4019].

G: D. (4016)

MacLeod, Jules. Sur l'existence d'une glande coxale chez les phalangides.

Note, appended to author's "La structure de l'intestin antérieur des arachnides" (Bull. Acad. roy. de Belgique, 1884, s. 3, v. 8, p. 377-391) [Rec., 4019].

G: D. (4017)

MacLeod, Jules. Sur la présence d'une glande coxale chez les galéodes. (Bull. Acad. roy. de Belgique, 1884, s. 3, v. 8, p. 655-656.)

The author finds a coxal gland in *galéodes araneoides*, and describes its histological structure.

G: D. (4018)

MacLeod, Jules. La structure de l'intestin antérieur des arachnides. (Bull. Acad. roy. de Belgique, 1884, s. 3, v. 8, p. 377-391, 1 pl.)

Separate. [Bruxelles, 1884.] 20 p., 1 pl., 22 X 14.5, t 15 X 8.7.

Upon the anatomy of the mouth, mouth-parts, oesophagus and glands of the anterior portion of the digestive tract in arachnoidea, based upon comparative studies of acarina, araneida, phalangida, scorpionidea, and pseudoscorpionida. To this paper are appended two notes, one entitled, "Sur l'existence d'une glande coxale chez les phalangides" and the other, "De l'hermaphroditisme de *trombidium* mâle."

G: D. (4019)

Möschler, Heinrich Bruno. Die Nordamerika und Europa gemeinsam angehörenden lepidopteren. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884, [1885], v. 34: Abh., p. 273-320.)

Gives a list, with many notes on varieties and distribution, of 243 species of lepidoptera common to both Europe and North America. To this list Alois F. Rogenhofer contributes a "Zusatz" (p. 319, 320), in which 6 more species are added.

G: D. (4020)

Osborne, J. A. Parthenogenesis in a beetle. (Nature, 4 Sept. 1879, v. 20, p. 430, 15 cm.)

Notes parthenogenesis of *gastrophysa raphani*, probably the first case of that form of reproduction noticed among coleoptera.

G: D. (4021)

Osborne, J. A. Parthenogenesis in coleoptera. (Nature, 30 Sept. 1880, v. 22, p. 509-510, 40 cm.)

Notice. (Amer. nat., Dec. [25 Nov.] 1880, v. 14, p. 899.)

Reprint, entitled "Parthenogenesis in the coleoptera." (Entom. mo. mag., Nov. 1880, v. 17, p. 127-130.)

Abstract, entitled "Parthenogenesis bei käfern." (Entom. nachrichten, 15 Jan. 1881, jahrg. 7, p. 31-32.) [Rec., 3523.]

A few general notes on parthenogenesis of arthropods, followed by a statement of the results of experiments which prove that *gastrophysa raphani* can reproduce parthenogenetically.

G: D. (4022)

Osten Sacken, C: Robert. Berichtigungen und zusätze zum Verzeichnisse der entomologischen schriften von Camillo Rondani. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884, [1885], v. 34; Abhandl., p. 117-118.)

Additions to the author's "Verzeichniss der entomologischen schriften von Camillo Rondani" (op. cit., 1881, v. 31, p. 337-344) [Rec., 4026].

G: D. (4023)

Osten Sacken, C: Robert. Elenco delle pubblicazioni entomologiche del professor Camillo Rondani. (Bull. Soc. entom. ital., 1885, an. 17, p. 149-162.)

List of the 134 entomological papers or works by Camillo Rondani, extending from 1840 to 1880.

G: D. (4024)

Osten Sacken, C: Robert. Facts concerning the importation or non-importation of diptera into distant countries. (Trans. Entom. soc. Lond., 1884, p. 489-496.)

Discusses the extensive distribution of *crystalis tenax* and how it came into North America; asks why *sarcophaga carnaria* has not reached America, while so many other common European species are found in North America; discusses the mode of ingress of *psilopus fallens* into North America, of *culex* into the Sandwich Islands, and of *syrphus pyrastris* into the western United States and into Chili.

G: D. (4025)

Osten Sacken, C: Robert. Verzeichniss der entomologischen schriften von Camillo Rondani. Als nachtrag und fortsetzung zu dem betreffenden artikel in H. A. Hagen's Bibliotheca entomologica. (Verhandl. K.-k. zool.-bot. gesells. in Wien, 1881, v. 31; Abhandl., p. 337-344.)

List of Rondani's entomological papers in addition to and correction of that given by Hagen in his Bibliotheca entomologica [Rec. 336]. The present list carries the number of entomological papers up to 120. See also the author's "Berichtigungen und zusätze zum Verzeichnisse der entomologischen schriften von Camillo Rondani" (op. cit., 1881, v. 34; Abh., p. 117-118) [Rec. 4023].

G: D. (4026)

Osten Sacken, C: Robert. Verzeichniss der entomologischen schriften von Hermann Löw. Als nachtrag und fortsetzung des betreffenden artikels in H. A. Hagen's Bibliotheca entomologica. (Verhandl. K.-k. zool.-bot. gesells. in Wien, jahrg. 1884, [1885], v. 34; Abhandl., p. 455-464.)

List of H. Loew's papers, in addition to those enumerated by Hagen in his Bibliotheca entomologica [Rec., 336], bringing the number of Loew's papers up to 222.

G: D. (4027)

Patton, W: Hampton. Some notes on the classification and synonymy of fig-insects. (Trans. Entom. soc. Lond., 1884; Proc., p. 14-17.)

The author gives reasons why he cannot accept the view of Sidney Smith Saunders that the *agaonidae* belong in the *cyrtipidae*; gives the characters of the *pidae* and of the *chalcididae*, to the latter of which the author believes the family *agaonidae* belongs; characters defining the *agaonidae*; synonymy of some of Francis Walker's descriptions of fig-insects.

G: D. (4028)

Peal, S. E. Sound-producing ants. (Nature. 22 Sept. 1881, v. 24, p. 484, 8 cm.)

Describes synchronous tapping of species of ants, in Assam. *G: D.* (4029)

Peal, S. E. Sounds made by ants. (Nature. 21 Oct. 1880, v. 22, p. 583, 8 cm.)

Notes the sonification of two species of ants by means of scraping dry crisp leaves with the horny apex of the abdomen. *G: D.* (4030)

Poulton, E. B. Notes upon, or suggested by the colours, markings, and protective attitudes of certain lepidopterous larvae and pupae, and of a phytophagous hymenopterous larva. (Trans. Entom. soc. Lond., 1884, p. 27-60, pl. 1.)

Discusses the origin of the red markings observed on some larvae of *sphinx* and *smertiulus*, and their value in protecting these larvae; considers the origin of the white stripes in *smertiulus ocellatus* and the use of the remains of the subdorsal white stripe in the last larval stage; regards the replacement of the subdorsal by the oblique white stripes as comparatively recent in larvae of *s. ocellatus*; believes that the variation of the ground color in *s. ocellatus* is phytophagic; discusses the protection sometimes gained by the changes in color of larvae just before pupation; notes some peculiar cases of protective attitudes in larvae of *geomitridae* (especially of *ephyra* and *aspilates*); discusses the protective attitude of *notodonta ziczac* as an instance of simulated angularity; remarks upon protective coloration due to internal organs in the larva of *nematus curtispina*; classifies protection by resemblance to surrounding objects into special and general; discusses the significance of larval and pupal dimorphism, and phyletic parallelism in metamorphic species. *G: D.* (4031)

Rogenhofer, Alois Friedrich, see MÖCHLER, H. B. Die Nordamerika und Europa gemeinsam angehörenden lepidopteren [Rec., 4020].

Rondani, Camillo, see OSTEN SACKEN, C. R. Elenco delle pubblicazioni entomologiche . . . [Rec., 4024].

Rondani, Camillo, see OSTEN SACKEN, C. R., Verzeichniss der entomologischen schriften von Camillo Rondani . . . [Rec. 4026].

Saunders, W. The goldsmith beetle: *cotalpa lanigera*. (Can. entom., Feb. 1879, v. 11, p. 21-22, fig. 9-10.)

Popular account of *cotalpa lanigera*; its food-plants, oviposition and other habits; figures of larva and imago. *G: D.* (4032)

Schaitter, Ignaz. [Libellenzüge.] (Verhandl. K.-k. zool.-bot. gesells. in Wien. 1880, v. 30; Sitz.-ber., p. 40.)

Flights of *libellula depressa* and *l. quadrimaculata* in Austria. *G: D.* (4033)

Schaupp, Frank G. Biological notes on, and description of the larva of *calosoma calidum*. Fab. (Bull. Brooklyn entom. soc., Sep. 1882, v. 5, p. 33-34.)

Subject as in title. *B: P. M.* (4034)

Schaupp, Frank G. Collection notes. (Bull. Brooklyn entom. soc., Aug. 1882, v. 5, p. 26.)

Pomphopoea sayi, *limenitis arthemis*, and *l. ursula* unusually abundant at North Branch, Sullivan co., N. Y., in 1882. *B: P. M.* (4035)

Schaupp, Frank G. Description of the larva of *necrophorus tomentosus*, Web. (Bull. Brooklyn entom. soc., Nov.-Dec. 1881, v. 4, p. 37-38; Jul. 1882, v. 5, pl. 1, fig. 1.)

Description and figures of larva of *necrophorus tomentosus*. *B: P. M.* (4036)

Schaupp, Frank G. Description of the larva of *patrobis longicornis*. (Bull. Brooklyn entom. soc., Mch.-Apr. 1882, v. 4, p. 56; Jul. 1882, v. 5, pl. 1, fig. 2.)

Description and figures of the larva of *patrobis longicornis*. *B: P. M.* (4037)

Schaupp, Frank G. Description of the larva of *silpha americana*. Lin. (Bull. Brooklyn entom. soc., May 1882, v. 5, p. 2; July 1882, pl. 1, fig. 3.)

Description and figures of the larva of *silpha americana*. *B: P. M.* (4038)

Schaupp, Frank G. On the occurrence of *amphicoma*. (Bull. Brooklyn entom. soc., Feb. 1883, v. 5, p. 83.)

Extract from a letter from E. J. Ricksecker, describing the occurrence and actions of *amphicoma (dasydera) ursina* on sand dunes near San Francisco, Cal.; notes by author, on the occurrence of *a. (lichenanthe) lupina* on sand at Coney Island, N. Y. *B: P. M.* (4039)

Schaupp, Frank G. Remarks on some coleopterous pupae. (Bull. Brooklyn entom. soc., Jul. 1882, v. 5, p. 18; pl. 1, fig. 4-7.)

Descriptions and figures of pupae of *cicindela repanda*, *chlaenius laticollis*, *dicaelus dilatatus* and *galericita janus*. *B: P. M.* (4040)

Schletterer, August. Die hymenopteren-gattung *gasteruption* Latr., *foenus* aut. (Verhandl. K.-k. zool.-bot. gesells. in Wien. 1885, v. 35; Abh., p. 267-326, pl. 14.)

Gives a description of the genus *gasteruption* Latr. (= *foenus* Fabr.), a description of the European species complete synonymy, a description of the exotic forms in the collection of the imperial court at Vienna, a catalog of all the species, and a quotation in the original text of the descriptions of all the species unknown to the author. Of American species re-describes *g. occidentale* (ress. (Col.)), describes as new species *g. tenuicelle* (Mexico), quotes the original descriptions of *g. barnstoni* Westw. (Huds. Bay), *g. brasiliense* Blanch. (Brazil), *g. guildingii* Westw. (St. Vincent Isl.), *g. inartum* Cress. (Col.), *g. kirbyi* Westw. (Huds. Bay), *g. montanum* Cress. (Col.), *g. perplexum* Cress. (Col.), *g. ruficornis* Gay (Chili), *g. rufipectum* Westw. (St. Vincent Isl.), *g. tarsatorium* Say (Pa.) [and also Cresson's description (Mass.)]; catalogs *g. arca* Coup. [corr.] (Ottawa), and *g. irritator*, Harris (Mass.). *G: D.* (4041)

Schoch, Gustav. *Ephemerella ignita* Poda, eine paedogenetische eintagsfliege. (Mittheil. Schweiz. entom. gesells., Nov. 1884, v. 7, p. 48-50.)

The author, having found the abdomen of a nymph of *ephemerella ignita* filled with eggs, regards the species as paedogenetic. *G: D.* (4042)

Sharp, D: Revision of the species included in the genus *tropisternus*, fam. *hydrophilidae*. (Trans. Entom. soc. Lond., 1883, p. 91-117.)

Discussion of various anatomical characters used in distinguishing genera and species of *hydrophilidae*, and of the validity of the generic name *tropisternus*; of the 33 species, 6 are new, as follows: *t. proximus* (Cuba), *t. parananus* (Parana), *t. breviceps* (Brazil), *t. fulvifalpis* (Mexico), *t. robustus* (Ecuador), and *t. laucifer* (Columbia); creates a new genus, *pleurhonus*, for *t. obscurus* Sharp (Guatemala), and describes a new species, *p. sahbergi* (Brazil); regards *t. limbalis* LeC. a synonym of *t. dorsalis* Brullé; other notes on synonymy and doubtful species. *G: D.* (4043)

Smith, J: B. Coleopterological notes. (Bull. Brooklyn entom. soc., Aug. 1882, v. 5, p. 25-26.)

Mention of the names of numerous coleoptera found frequenting several species of plants respectively. *B: P. M.* (4044)

Smith, J: B. Collecting *noctuidae* in day time. (Bull. Brooklyn entom. soc., Feb. 1883, v. 5, p. 82.)

Many species of *noctuidae*, especially after midsummer, can be collected by day, and especially on *solidago*; list of some *noctuidae* and *zygaenidae* so found. *B: P. M.* (4045)

Smith, J: B. New *mordellidae* and notes. (Bull. Brooklyn entom. soc., Feb. 1883, v. 5, p. 80-81.)

Describes *mordellistena erratica* and *m. pratensis* from Florida, and *m. tarsalis* from Texas, new species, each from a single specimen; records *m. fusco-atra* from New Jersey and *m. splendens* from Pa., Ill. and Fla. *B: P. M.* (4046)

Snow, Francis Huntington. Additions to the list of Kansas coleoptera in 1881 and 1882. (Trans. Kans. acad. sci., 1881-1882, Topeka, 1883, v. 8, p. 58.)

Adds 49 species of coleoptera to those already known to be found in Kansas; total number of species recorded from Kansas is 1904. *G: D.* (4047)

Snow, Francis Huntington. List of lepidoptera, collected near Idaho Springs, Colorado, by the Kansas university scientific expedition for 1879. (Trans. Kansas acad. sci. for 1879-80, 1881, v. 7, p. 61-63.)

List of 168 lepidoptera collected from 26 July to 8 Sep. 1879, near Idaho Springs, Col. (about 2300 metres above sea-level), and of 12 collected at Gray's Peak, Col., (elevation about 4350 metres); the list includes *catocala relicta* and 40 species of *agrotis*. The new species are described in A: R. Grote's "New western *noctuidae*" (*op. cit.*, p. 63-69) [Rec., 392] and in W: H: Edwards' "Description of a new species of *chrysophanus*" (*op. cit.*, p. 69-70) [Rec., 3912]. *B: P. M.* (4048)

Snow, Francis Huntington. Lists of lepidoptera and coleoptera collected in New Mexico by the Kansas university scientific expeditions of 1881 and 1882. (Trans. Kans. acad. sci., 1881-1882, Topeka, 1883, v. 8, p. 35-45.)

List of 315 species of lepidoptera and 514 species of coleoptera. *G: D.* (4049)

Tepper, F: Collecting on the shores of Long Island Sound. (Bull. Brooklyn entom. soc., Apr. 1883, v. 5, p. 89-90.)

List of *noctuidae* collected near Glencove, L. I.; *pteris protodice* last taken here. *B: P. M.* (4050)

Tepper, F: Description of new moths. (Bull. Brooklyn entom. soc., Jan. 1883, v. 5, p. 65-67, pl.)

Describes *atlaeus cinctus* and *platysamia polyommata*, new species from southern Arizona, with photolithotypic figures of these species. *B: P. M.* (4051)

Tepper, F: Habitat of *melitaea colon* and *m. perdiccas*, W. H. Edw. (Bull. Brooklyn entom. soc., Feb. 1883, v. 5, p. 81.)

Statement of localities at which the species named were collected in Washington Territory, though stated in W: H: Edwards' "Description of new species of butterflyes" (Papilio, 26 April 1881, v. 1, p. 45, 46) to have been collected in Oregon. *B: P. M.* (4052)

Tyrrell, J. B. Suctoria. (Trans. Ottawa field-nat. club. 1883-1884 [Oct. 1884], v. 2, no. 1, p. 86-90.)

Resumé of the anatomy and life-history of fleas (*pulliidae*), with notes upon a few species. *G: D.* (4053)

Voges, Ernst. Das respirationssystem der scutigeryden. (Zool. anzeiger, 6 Feb. 1882, Jahrg. 5, p. 67-69.)

Anatomy of the respiratory system of *scutigera*. *G: D.* (4054)

Websdale, G. Rotheram. The death-watch and its sounds. (Entomologist, Oct. 1884, v. 17, p. 236-237.)

On sonification of *atropos pulsatorius* and *anobium tessellatum*. *G: D.* (4055)

Webster, Francis M. A singular ant "cow." (National scientific journ., 1 Aug. 1882, v. 2, p. 101, col. 2, 21 cm.)

Ants attend both larva and imago of *pubilia concava*, in order to obtain a fluid exuded by these homoptera. *G: D.* (4056)

Weymer, Gustav. Exotische lepidopteren. 2. (Entom. zeit. . . . Stettin, Jan.-Mar. 1884, v. 45, p. 7-28, pl. 1-2.)

Describes and figures 16 new species of *danaidae* and *heliconidae*, of which *leucothyris paula* is from Veragua, Central America, and the rest from South America; gives synonymical notes on 5 other species. *B: P. M.* (4057)

ENTOMOLOGICAL ITEMS.

THE PROCESS OF SKIN-CASTING IN A LEPIDOPTEROUS LARVA.—The following account of a larva casting its skin may be of interest, and may also throw some light on the curious phenomenon of "moulting," for in many works on entomology we are only told that "the skin breaks at the back near the head, and that the larva walks out of its skin after a due amount of twitching and wriggling." Whilst examining a looper caterpillar, about $\frac{1}{2}$ inch [1 cm.] long and very transparent, under the microscope, I was very much struck with a peculiar internal movement—each separate segment, commencing at the head, elongated within the outer skin whilst the next ones remained in their former state. Each segment in its turn behaved in this curious manner until the last was reached, when the motion was reversed and proceeded toward the head, when it was again reversed. I only saw this process of elongation accomplished three times, although it may have been going on for some time before I captured the caterpillar, which I found in a quiescent state. The whole proceeding appeared as if the larva was gliding within itself, segment after segment, the outer skin remaining stationary as if held by the other segments, whilst the particular one in motion freed itself within. After remaining motionless for a short interval, the skin near the head swelled and burst open at the back; then I became aware of the fact that the curious process of "moulting" was going on before my eyes. Presently out comes the head of the new caterpillar, pushing forward the old one; looking wonderfully clean with its ten shining black eyes on a cream coloured ground. After a short struggle the new, true legs, transparent fleshy limbs, very much resembling those of a newly-hatched spider, appear, pushing off and treading under foot the old ones. The outer skin must have suddenly contracted, and although I did not see the actual process of contracting, I conclude

such was the case, for on examining the latter segments, there I found the skin and the old true legs shrivelled up. The larva then, by a series of wild wriggles, endeavored to extricate its new prolegs (false legs), which in a short time it accomplished. Then all is clear, and the larva, which is quite exhausted, coils itself up and literally pants for breath. When it has "got its wind," it wanders off probably in search of the food which it has well earned. I have no doubt that such is the process with all larvae, although the internal movements of most, especially those having thick and opaque skins, cannot be so easily watched as the young and more transparent ones.—Edward Howgate (*The naturalist*, Nov. 1885, no. 124, p. 366).

PROGNOSTICATIONS OF WEATHER BY INSECTS.—The current number (No. 17) of *Die natur* contains an article by Herr Emmerig, of Lauingen, on German bees as storm warners. From numerous observations, the writer advances tentatively the theory that on the approach of thunderstorms, bees, otherwise gentle and harmless, become excited and exceedingly irritable, and will at once attack any one, even their usual attendant, approaching their hives. A succession of instances are given in which the barometer and hygrometer foretold a storm, the bees remaining quiet, and no storm occurred; or the instruments gave no intimation of a storm, but the bees for hours before were irritable, and the storm came. He concludes, therefore, that the conduct of bees is a reliable indication whether a storm is impending over a certain district or not, and that, whatever the appearances, if bees are still, one need not fear a storm. With regard to rain, merely, the barometer and hygrometer are safer guides than bees; not so, however, in the case of a thunderstorm. Finally, the writer trusts that his remarks on this subject may lead to further observation.—*Nature*, 23 April 1885, v. 31, p. 587.

In regard to the prognostications of weather by insects, the following passages from Kirby & Spence's "Introduction to entomology" may be added:—

"Huber says that he has ascertained by a great number of observations that electricity is singularly favourable to the secretion of the substance of which honey is formed by flowers; the bees never collect it in greater abundance, nor is the formation of wax ever more active, than when the wind is in the south, the air humid and warm, and a storm gathering."—v. 4, p. 141.

"But besides receiving notices from the atmosphere, of sounds, and of the approach or proximity of other insects, &c., the antennae are probably the organs by which insects can discover alterations in its state, and foretell by certain prognostics when a change of weather is approaching. Bees possess this faculty to an admirable degree. When engaged in their daily labours, if a shower is approaching, though we can discern no signs of it, they foresee it, and return suddenly to their hives. If they wander far from home, and do not return till late in the evening, it is a prognostic to be depended upon, that the following day will be fine; but if they remain near their habitations, and are seen frequently going and returning, although no other indication of wet should be discoverable, clouds will soon arise and rain come on. Ants also are observed to be excellently gifted in this respect: though they daily bring out their larvae to sun them, they are never overtaken by sudden showers.* Previously to rain, as you well know, numberless insects seek the house; then the *Stomoxys calcitrans*, leaving more ignoble prey, attacks us in our apartments, and interrupts our studies and meditations.† The

insects of prey also foresee the approach of wet weather, and the access of flies, &c., to places of shelter. Then the spiders issue from their lurking-places, and the ground-beetles in the evening run about our houses.

Passive antennae, which are usually furnished with a terminal or lateral bristle, and plumose and pectinated ones, seem calculated for the action of the *electric* and other fluids dispersed in the atmosphere, which in certain states and proportions may certainly indicate the approach of a tempest, or of showers, or a rainy season, and may so affect these organs as to enable the insect to make a sure prognostic of any approaching change; and we know of no other organ that is so likely to have this power. I say *electric* fluid, because when the atmosphere is in a highly electrified state, and a tempest is approaching, is the time when insects are usually most abundant in the air, especially towards the evening; and many species may then be taken, which are not at other times to be met with; but before the storm comes on, all disappear, and you will scarcely see a single individual upon the wing. This seems to indicate that insects are particularly excited by electricity.—But upon this head I wish to make no positive assertion, I only suggest the probability of the opinion.‡"—v. 4, p. 253-254.

Dr. H. A. Hagen, in his *Bibliotheca entomologica* [Rec., 3306], cites the following papers on this subject:—

*VORZEICHEN der witterung an einigen insecten. (Neues Wittenb. wochenblatt, 1810, p. 226-228.)

STROBEL, Pellegrino. Saggio di osservazioni fenologiche relative ai cimici dell'agro pavese e studii su la flora de essi prediletta. (Atti Soc. ital. sci. nat., 1861, v. 3, p. 181.) [not seen.]

* Lehmann, M. C. G. De antennis insectorum. Dissertatio posterior . . ., 1800, p. 61.

† K. & S., v. 1, p. 48, 110.

‡ See, for further arguments, Lehmann, *ubi supra*, cap. 6.

Nos. 132-134 were issued 25 Nov. 1886.

Nos. 103-104 were issued 22 Jan. 1887.

PSYCHE,

NATIONAL MUSEUM

A JOURNAL OF ENTOMOLOGY.

[Established in 1874.]

EDITED BY

B: PICKMAN MANN, *Washington, D. C.*; G: DIMMOCK, *Cambridge, Mass.*;

ALBERT J: COOK, *Lansing, Mich.*; STEPHEN ALFRED FORBES, *Champaign, Ill.*; JOSEPH ALBERT LINTNER, *Albany, N. Y.*;

FRANCIS HUNTINGTON SNOW, *Lawrence, Kansas*;

W: TRELEASE, *Madison, Wisc.*

Vol. 4. Nos. 138-140.

OCTOBER—DECEMBER 1885.

CONTENTS:

ADVERTISEMENTS	330
THE ENTOMOCECIDIA. INTRODUCTION— <i>Frank Karsch</i>	331-334
ON THE RELATIONS OF FUNGI TO GALLS AND TO LARVAE OF CECIDOMYIA LIVING IN GALLS— <i>Hermann August Hagen</i>	334
CLOSE OF VOLUME FOUR— <i>Benjamin Pickman Mann</i>	335
PROCEEDINGS OF SOCIETIES—CAMBRIDGE ENTOMOLOGICAL CLUB	335-338
BIBLIOGRAPHICAL RECORD OF CONTENTS OF VOLUME FOUR OF PSYCHE, No. 4058-4300	339-350**
ENTOMOLOGICAL ITEMS	351-354

PUBLISHED BY THE

CAMBRIDGE ENTOMOLOGICAL CLUB,

CAMBRIDGE, MASS., U. S. A.

YEARLY SUBSCRIPTIONS, \$2. VOLUME, \$5. MONTHLY NUMEROS, 20c

[Entered as second class mail matter.]

Psyche, A Journal of Entomology.

NOTES OF SUBSCRIPTION, ETC.

PAYABLE IN ADVANCE.

Subscriptions not discontinued are considered renewed.

Commencing with the numero for January 1888 the rate of subscription is as follows:—

Yearly subscription entitling the subscriber to one regular copy and, if he desires it, one copy printed on one side of thin paper (for pasting the titles of the bibliographical record on title-slips), postpaid, \$2.

Subscription to volume 5 (1888-1890), as above, postpaid, \$3.

The index will only be sent to subscribers to the whole volume.

Twenty-five extra copies, without change of form, to the author of any leading article, if ordered at the time of sending copy, Free.

Author's extras over twenty-five in number, under above mentioned conditions, each, 2c.

Separates, with changes of form—actual cost of such changes in addition to above rates.

Scientific publications desired in exchange.

ADVERTISING RATES, ETC.

TERMS CASH—STRICTLY IN ADVANCE.

Only thoroughly respectable advertisements will be allowed in PSYCHE and the advertising pages will be numbered consecutively with those of reading matter. The editors reserve the right to reject advertisements.

Subscribers to PSYCHE can advertise insects for exchange or desired for study, not for cash, free at the discretion of the editors.

Regular style of advertisements plain, at the following rates:—

	Outside Page.	Inside Pages.
Per line, first insertion,	\$0.10	\$0.08
Eighth page, first insertion, . . . . .	.75	.60
Quarter " " " "	1.25	1.00
Half " " " "	2.25	1.75
One " " " "	4.00	3.50

Each subsequent insertion one-half the above rates.

Address EDITORS OF PSYCHE,
Cambridge, Mass., U.S.A.

Subscriptions also received in Europe by

R. FRIEDLÄNDER & SOHN,
Carlstrasse 11, Berlin, N. W.

THIS PAPER may be found on file at Geo. P. Rowell & Co's Newspaper Advertising Bureau (10 Spruce St.), where advertising contracts may be made for it **IN NEW YORK.**

MANN'S REFERENCE INDEXES.

References to and transcripts or translations of the literature of ANY SUBJECT furnished. Correspondence fee, 50 cents. Explanatory circulars free.

B: PICKMAN MANN,
Washington, D. C.

COCCIDAE WANTED.

The undersigned is desirous of obtaining, by exchange or otherwise, specimens of as many species of the COCCIDAE as possible, for the purpose of making a study of the North American forms. Those found infesting cultivated plants especially desired. Living specimens preferred when they can be obtained.

J. HENRY COMSTOCK,
Department of Entomology,
The Cornell University,
Ithaca, N. Y.

LEPIDOPTERA.

Living cocoons, pupae and ova of American lepidoptera bought or exchanged for other species, by Monsieur ALFRED WAILLY, (Membre-Lauréat de la Société d'Acclimatation de France),

Tudor Villa, Tudor Road, Norbiton,
Kingston-on-Thames, England.

NORTH AMERICAN FERNS.

Check lists of the Ferns of North America north of Mexico, enumerating 31 genera, 132 species and 15 varieties, on one octavo page. Will be sent by mail on receipt of the price, 15 cents per dozen copies
S STEBBINS, Springfield, Mass.

ACKNOWLEDGMENTS.

Since the last publication of acknowledgments (PSYCHE, v. 4, p. 212), the following donations have been made to the Permanent Publication Fund of PSYCHE:—

F: Clarkson, New York, N. Y.	\$25.00
W: Endicott, jr., Boston, Mass.	10.00
W: H. Harrington, Ottawa, Ont.	2.00
A. A. Lawrence, Boston, Mass.	10.00
S: L. Parrish, New York, N. Y.	10.00
W: M. Spackman, New York, N. Y.	5.00
W. A. Wadsworth, Geneseo, N. Y.	25.00
C: E. Ware, Rindge, N. H.	20.00
Roger Wolcott, Boston, Mass.	10.00
Previously acknowledged	269.39

\$386.39

B: PICKMAN MANN,
Treasurer, C. E. C.

PSYCHE.

THE ENTOMOCECIDIA.

Introduction.

BY FERDINAND ANTON FRANZ KARSCH, BERLIN, GERMANY.

[Translated by B: Pickman Mann, from *Entomologische nachrichten*, July 1884, Jahrg. 10, p. 205-209.]

I propose to offer, under the above title, within the next few years, a list, arranged by families according to a zoological system, of the galls (cecidia) which are produced on plants by insects (entoma), so far as such a list will serve to fill up gaps now existing. The category "plant-galls" is to be taken in the widest sense of the word, i. e., it is to embrace all those modifications which lie outside of the normal methods of development of the plant, and which are presumed to be due to the influence of a definite insect in any stage whatever of its development, from the egg to the imago. Usually only those vegetal formations are designated by the term "galls," which, while they do lie outside of the normal structure of the plant under consideration, yet show forms so definite and so perfect in themselves that they might rather be spoken of as an ornament than as a pathological phenomenon of growth. Of this kind are the well-known puff-balls of our oaks, the bedeguars of our roses, and the spirally twisted petioles of our poplars. But a wider knowledge of such forms, and the observation that anomalies which are far less obvious, and therefore are usually overlooked by the laity,

are due to exactly the same formative impulses (such, for instance, as the crumpling of the leaves of trees by the suction of certain *aphididae*), make it necessary to broaden the category "galls," and now every creative reaction of a part of a plant against an irritation which affects it, whether proceeding from an animal or a plant, is conceived of as a gall-making activity, and the resultant structure (cecidium) is termed a *mycocecidium* if a fungus figures as the impulse of the pathological formation, and as a *zoocecidium* if it is due to an animal.

If a coleopterous larva devour the parenchyma of a leaf, or a caterpillar spin together the margins of the leaves in order to make itself a shelter and to prepare itself a closed storehouse for food, the inhabited part of the plant opposes no obstacle to the doings of the animal, and the "miners" are very well to be distinguished from the cecidozoa. Bladder-galls, on the contrary, arise in another way, when the parenchyma of the leaf increases instead of becoming less, and the affected place thickens; and cecidia arise when leaves of trees expand in a direction other than the usual one, solely because of the irrita-

tion resulting from the sucking action of an animal, without being cemented by threads. In this sense some of the insects included among the gall-makers (cecidozoa) by F. Rudow (Uebersicht der gallenbildungen, welche an *Tilia*, *Salix*, *Populus*, *Artemisia* vorkommen, nebst bemerkungen zu einigen anderen gallen: Zeitschr. für d. ges. naturwissenschaft., 1875, v. 46, p. 237-287) [p. 269] cannot be considered as such, but *Trachys minuta* Fabr. and *Phyllotoma microcephala* Klug must rather be designated as miners. The resinous galls* also, which are included among the galls by Haimhoffen, in his Beobachtungen über die menge und das vorkommen der pflanzengallen und ihre specielle vertheilung auf die verschiedenen pflanzengattungen und arten (Verh. K.-k. zool.-bot. ges. in Wien, 1858, v. 8, p. 285-294), cannot be placed there without a distinction, if their method of formation presumes no real reaction on the part of the plant against the attacks of the enemy. There belongs, for example, the "mannatihal," which, a saccharine secretion, serves as an abode and for the transformations of some coleopterous larvae, the *Larinus mellificus* Jeckel and *L. maculatus* Falderm., and which occurs not uncommonly in Persia, on species of *Echinops*.†

It is another matter, however, when such formations arise only accessorially, as for instance they are connected with

* Cf. Kirchner, Leop. Ant. Die harzgallen der nadelhölzer um Kaplitz. (Lotos, Jan. 1865, v. 6, p. 9-12.)

† Cf. Hanbury, Daniel. Note on two insect products from Persia. (Journ. proc. Linn. soc. Lond., 1859, v. 3, p. 173-185, fig.)

the swelling of the wood in the case of the effect of *Tortrix zebiana* Ratz. On the other hand, since the recently published exhaustive investigations of Graf zu Solms-Laubach and P. Mayer, it can no longer be questioned, as it has been repeatedly in the past, that the caprificators belong to the cecidozoa.

It has been asserted that the cecidozoa preferably or solely attack diseased plants or parts of plants; indeed Ratzeburg goes so far as to set up the view that *tenthredinidae* are purposed to clear away diseased vegetal matter. Every day observation teaches that little weight is to be attached to general statements of this kind; the branches of oaks and elms, while loaded with galls, show forth in autumn in the most luxuriant green!

The list which I have planned is not alone to comprise the palearctic entomoecidia and their producers, but is to take into consideration also those of the rest of the regions, so far as attainable. At the same time the number of plant-galls as yet made known, which are produced by exotic insects, from all the rest of the geographical regions, is a relatively very small one—with the single exception of some of those of the antarctic region, whose entomoecidia have already been partly described in numerous North American periodicals hard to get at.

By the gradual publication of a complete codex of entomoecidia I believe I shall partially supply the need of a codex of zoococidia in general, which need has long been greatly felt, and has

constantly become more pressing. The existence of such a need is sufficiently shown by the circumstance that single parts of this codex have already been worked out by illustrious men. Thus, in regard to insects, Julius elder von Bergenstamm and Paul Loew have compiled a "Synopsis cecidomyidarum," Wien, 1876. (Published by the authors. From Verh. K.-k. zool.-bot. ges. in Wein, 1876, v. 26, p. 1-104.)

Among all the animals (cecidozoa) which produce cecidia, the insects form decidedly by far the greater majority. Almost all the orders furnish at least one or another representative, and often from systematically very distant families. The number of species of cecidozoa among the lepidoptera, coleoptera and hemiptera is small; it is far greater among the hymenoptera and diptera; among the rest of the animals, gall-makers are found only among the minute *acarida*, among the microscopic *rotatoria* (living beings usually subordinated to the crustacea), and finally among the *nematoda*. Among the *acarida* it is exclusively the genus *Phytoptus* Duj. (which has been very imperfectly investigated as yet in regard to its species) which gives rise to plant-galls (phytoptocecidia, the *erinca*, *phylleriaceae*, *cephaloneae* of the old botanists) of the most manifold configuration of shape. The plant-galls of Europe, produced by *Phytoptus*, have been worked up rather exhaustively, especially by their most distinguished connoisseur, Friedrich Thomas, in Ohrdruf near Gotha, who has published the results of his investigations in nu-

merous works (namely, in the Zeitschrift f. d. ges. naturwiss... Giebel, and the Nova acta d. Kais. leop.-carol.-deutschen acad. der naturforscher) during a long series of years, and by several articles by Franz Loew in the Verh. K.-k. zool.-bot. ges. in Wien). Of the rotatoria solely *Notommata werneckii* Ehrenb. has been made known as a cecidozoon in algae, species of *Vaucheria*,* and the cecidozoa among the nematoda belong to some dozen species of the two genera of *anguillulidae*, *Tylenchus* Bastian and *Heterodera* Schmidt. Interesting material regarding these two genera of cecidozoa may be found compiled by Karl Mueller: Neue helminthoecidien und deren erzeuger (in Thiel's landwirthschaftliche jahrbücher, 1883, 50 p., 4 pl., and as a Berlin doctorate-dissertation).

A great part of the material with which we have to deal was arranged ten years ago in J. H. Kaltenbach's "Die pflanzenfeinde aus der klasse der insecten," Stuttgart, J. Hoffmann, 1874; 8+848 p. Yet this otherwise very useful handbook, besides being very incomplete in a cecidological regard, suffers in the lack of any reference to sources, which is however an indispensable requisite to a critical appreciation of the accumulated material.

In spite of the large number of facts already made known, the study of the entomocecidia and their producers still continues to offer a wide field for new

*cf. Ehrenberg. Notommata werneckii. (Mittheil. der Gesells. naturf. freunde zu Berlin, July 1836, p. 30-33.)

investigations, and it is not only of great importance from a purely entomological point of view, inasmuch as the rearing of galls yields insects which belong to the parasites and inquilines, which could not probably be obtained in any other way, but it is so also because it binds together inseparably two great

fields of human investigation, botany and entomology. But the study of plant-galls has moreover a deep practical interest in two other directions, in an industrial and agricultural regard. An all-sided consideration of the subject should not leave these sides of it unattended to.

ON THE RELATIONS OF FUNGI TO GALLS AND TO LARVAE OF *CECIDOMYIA* LIVING IN GALLS.

BY HERMANN AUGUST HAGEN, CAMBRIDGE, MASS.

[Reprint, with slight amendment, of an abstract with the same title, by Hermann August Hagen (Canadian entom., July 1885, v. 17, p. 136-137), of a review, by Friedrich August Wilhelm Thomas (Irmischia, 1885, v. 5, p. 4-), based on a record by Fritz Ludwig (Botan. centralblatt, v. 20, p. 356-) of W: Trelease's "Notes on the relations of two cecidomyians to fungi" (Psyche, Aug-Sep. 1884, v. 4, p. 195-200), Trelease's paper not having been seen by Thomas.]

Larvae of *Cecidomyia* living in the spore-layers of *uredineae* are also found in Thuringia, Germany. In fact the discovery of the community in the same layer of two otherwise very different parasites is at first somewhat wonderful and startling. The right explanation will be a double symbiosis of a phanerogamous plant and a fungus, and of a fungus and an entomozoon. Years ago I received from Gotha such larvae out of the rust-fungus of *Rosa*. A similar manner of living is known in Germany for *Diplosis coniophaga* Winnertz and for *D. caeomatis* Winn. Their larvae were found by F. Loew in the rust-fungus of several plants (cf. Verh. Zool.-bot. ges. Wien, 1874, p. 155-). I am able to add two new facts. I found larvae of *Cecidomyia* on *Vaccinium uliginosum* in the spore-layers of *Thecospora myrtillina* Karsten (*Melampsora vaccinii* Alb. et Schn.), on the Beerberg in the Thueringerwald. The other one was sent to me by Dr. E. Levier, from Florence,

Italy. The leaves of *Tanacetum balsamita* L. (Erba di Santa Maria) had, in the *Puccinia tanacetii balsamitae* D C., many small red larvae of *Cecidomyia*. I am not of opinion that this guard is of prominent advantage for the plant. The enormous numbers of the spores of the rust-fungus will scarcely be diminished by these larvae to any extent, that the guard may be considered to be a practical advantage for the plant.

The second point of interest in Mr. Trelease's paper is that the larvae open the way for the fungus in the plants. I may state as an analogous fact, that here the pustulae and pocks on the leaves of *pomaceae*, made by *Phytoptus*, are not rarely filled by fungi, especially by the carbonized ones. The last plant I received by the late Alex. Braun, in 1877, from Blankenburg, Harz, was a leaf of *Sorbus aucuparia*, with fungus immigrated in the galls of the mites.

PSYCHE.

CAMBRIDGE, MASS., OCT.—DEC. 1885.

Communications, exchanges and editors' copies should be addressed to EDITORS OF PSYCHE, Cambridge, Mass. Communications for publication in PSYCHE must be properly authenticated, and no anonymous articles will be published.

Editors and contributors are only responsible for the statements made in their own communications.

Works on subjects not related to entomology will not be reviewed in PSYCHE.

For rates of subscription and of advertising, see advertising columns.

CLOSE OF VOLUME FOUR.

For two years past, reasons personal to the Managing editor have prevented the giving of that attention to the issue of PSYCHE which otherwise should have been expected. The concluding numeros of volume four appear, therefore, two years in arrears. Care has been taken, however, that no fault of anachronism should be committed in preparing the numeros for publication.

The form of the Systematic index adopted in volume two, and more perfectly elaborated in volume three, is regarded as of such excellence in its features of general utility and extensibility, that it has been adhered to carefully in this volume. So far as seemed to be practicable, every subject treated of in this volume has been included in the Systematic index under its appropriate designation, with references to the paragraphs of the Bibliographical record.

The Alphabetic index, as in previous volumes, contains references to every technical name of a genus or species of animals mentioned by such name in the volume, with references to the pages.

The volume is committed to the custody of the subscribers and the entomological public with the sincere hope that it may be found of permanent value.

B: *Pickman Mann.*

PROCEEDINGS OF SOCIETIES.

CAMBRIDGE ENTOMOLOGICAL CLUB.

9 JAN. 1885.—The 107th meeting of the club was held at 61 Sacramento St., Cambridge, 9 Jan. 1885. In the absence of the president, Mr. R. Hayward was chosen chairman. On account of the lack of a quorum the business of the annual meeting could not be transacted, and consequently the reports of the officers were deferred until the next meeting.

Mrs. A. K. Dimmock showed specimens of a hymenopterous parasite, probably one of the pteromalids, from the eggs of *Smcrinthus excaecatus*; the egg from which the specimens shown had been reared contained over thirty of these minute parasites. [See PSYCHE, Apr.-June 1885, v. 4, p. 282.]

Dr. G: Dimmock exhibited his collection of North American *cicindelidae*, and made some remarks upon the species and their distribution.

13 FEB. 1885.—The 108th meeting was held at 19 Brattle St., Cambridge, 13 Feb. 1885, the president, Mr. S: H. Scudder, in the chair. The annual address of the retiring president was delivered. The annual reports of the secretary and of the treasurer were read, and the secretary made a special report upon the condition of the library. [Abstracts of these reports, except the last, are appended to the report of this meeting. The address of the retiring president is published in PSYCHE, Jan.-Mar. 1885, v. 4, p. 245-250.] The president's address gave rise to much discussion of fossil insects, participated in by all the persons present.

Dr. G: Dimmock stated that *Heterodon platyrhinus*, the so-called "hog-nose snake," eats *Caloptenus femur-rubrum*, fragments of these insects having been found abundant in the excrement of one of these snakes taken in northern Connecticut last fall. The popular name of this species of snake in western New England is "puff-adder" or "flat-headed adder."

Dr. G: Dimmock showed a box of fine

borings which had been sent to him from Springfield, Mass., with an inquiry as to what produced them. They had been found in a house, deposited in dark places beneath furniture, in large masses. Upon examination of the debris, empty cocoons and pupal skins were abundant, which under the microscope were readily seen to be those of some species of ant, probably *Formica pennsylvanica*, which has been known previously to attack woodwork of buildings.

Dr. G: Dimmock showed a specimen of *Cermatia* that had been taken in an office in Boston, Mass.

Abstract of Secretary's Report, 13 Feb. '85.
By G: Dimmock.

The present is the 107th meeting of the Club. Since the last annual (or 98th) meeting, held 12 Jan. 1884, four active members have been elected, seven have withdrawn from membership, and two have forfeited their membership by continuous neglect to pay the annual fees. The club has continued its policy of electing no new associate members. Mr. F. G. Sanborn, an associate member, has died during the year. An obituary notice of him was published in *PSYCHE*, Aug.-Sep. 1884, v. 4, p. 205. The number of active members is now twenty-seven, and the number of associate members forty-nine. During the year 1884 the club held nine meetings, with an average attendance of four persons. Valuable and interesting communications were presented at each meeting. The Club's publication, *PSYCHE*, has steadily gained favor, and the list of exchanges with scientific societies and valuable periodicals has increased, thus bringing the club prominently before the entomologists of the world. The wide distribution of the membership of the Club, while adding to its importance, has not been compatible with large personal attendance at the meetings. The advantages of larger attendance show the advisability of increasing the number of active members, who will be able to come to the meetings in person.

Abstract of Treasurer's Report, 13 Feb. '85.
By B: Pickman Mann.

Open accounts have been kept separately with each volume of *PSYCHE*, or the years to which each corresponds. The account for volume one shows a deficit of \$19.05; that for volume two, \$239.89; and that for the years 1880 to 1882, inclusive, a balance on hand of \$34.59. No further expenditures will be incurred on these accounts, and those for volumes one and two will be met as receipts come in from the sale of copies or from other sources. Expenditures and current receipts on account of volume four still continue. The estimated deficit on this account is at least \$245.00. Especial efforts have been made to determine what debts due to the Club, for subscriptions, may be considered good for collection, and the sending of *PSYCHE* has been discontinued to all persons unreasonably in arrears. The principal of the permanent publication fund amounts to \$270.39. [The Treasurer's report was duly audited and approved.]

13 MARCH 1885.—The 109th meeting was held at 61 Sacramento St., Cambridge, 13 March 1885. In the absence of the president, Mr. T. W. Harris was chosen chairman.

The secretary stated that Mr. J: G: Jack, of Chateaugay Basin, P. Q., Canada, had withdrawn from membership, by letter dated 2 March 1885.

Dr. G: Dimmock showed some microscopic slides to illustrate the structure of the different kinds of stigmata in insects.

10 APRIL 1885.—The 110th meeting was held at 19 Brattle St., Cambridge, 10 April 1885, the president, Mr. S: H. Scudder, in the chair.

Mr. R. Hayward spoke of a trip which he proposed to take to southern Colorado, in company with Mr. F: C. Bowditch, the coming summer.

Mr. S: H. Scudder called attention to certain peculiarities of the venation of the wings of fossil cockroaches, and made some comparisons of the tertiary neuroptera of Europe

and North America. This was followed by a general discussion of fossil insects.

8 MAY 1885.—The 111th meeting was held at 19 Brattle St., Cambridge, 8 May 1885, the president, Mr. S: H. Scudder, in the chair.

Mr. S: H. Scudder read some extracts concerning mosquitoes and their abundance, from notes which he had made in 1860 while travelling about Lake Winnipeg and upon the Saskatchewan River. Some discussion followed, upon mosquitoes and other dipterous pests of similar habits.

Mr. S: H. Scudder announced the death of Dr. Hendrik Weyenbergh, well known as a naturalist and entomological writer from Holland, who had chosen the Argentine Republic as a field of labor. He died while upon a visit to his native country.

Dr. G: Dimmock explained a method which he had devised for advantageously utilizing sale-catalogs of books in preparing subject bibliographies, thereby saving much writing.

12 JUNE 1885.—The 112th meeting was held at 19 Brattle St., Cambridge, 12 June 1885, the president, Mr. S: H. Scudder, in the chair.

Mr. R. Hayward read a paper upon the distribution of insects in the White Mountains of New Hampshire, in which he called attention to the existence of four tolerably distinct faunae in these mountains. The first which he called alpine, is restricted to the summits of the higher mountains; the second, which he termed sub-alpine, is confined to the neighborhood of the timber-line; the third occupies the greater part of the country below, and is the ordinary fauna of northern New England; while the fourth is confined to the immediate vicinity of the larger river-bottoms, and is essentially identical with that of eastern Massachusetts. Mr. Hayward's paper led to considerable discussion.

Dr. G: Dimmock described the life-history of *Sphaerularia bombi*, a nematod which is parasitic in humble-bees (*Bombus*), as it has been elucidated by Dufour, Lubbock,

Schneider, and Leuckart. Specimens of *S. bombi* were shown; these were taken 10 June 1885, in Cambridge, Mass., by Dr. Dimmock, who believed this to be the first record of their occurrence in America. [See *Amer. nat.*, Jan. 1886, v. 20, p. 73-75.] A brief discussion upon *Sphaerularia*, and upon other subjects, followed.

9 OCT. 1885.—The 113th meeting was held at 61 Sacramento St., Cambridge, 9 Oct. 1885, the president, Mr. S: H. Scudder, in the chair.

Mr. E. F. Ladd, of the N. Y. Experimental station at Geneva, N. Y., communicated, through Mr. B: P. Mann, some observations made by him in the fall of 1884, on the life-habits of *Gelechia cerealella*, which was found to have completely infested the collection of corn in the museum of the station. Hundreds of moths emerged daily, and it became necessary to burn much of the collection while the remainder was packed in boxes and treated to bisulphide of carbon [CS_2]. An examination seems to show that the larvae feed only upon the deposit of starchy matter in the kernel. Larvae were not found in the varieties of sweet corn, in which the starch is distributed throughout the kernel, but they were found, frequently two and occasionally three in a kernel, in the flint corn, in which the starch is deposited in a mass. In pairing, the moths remained together 75 minutes. One moth laid thirty-six eggs, in two patches of 17 and 19, which hatched in seven days, from 2 to 9 November. The eggs were at first milky white, showing an orange tint at the end of twenty-four hours, and gradually becoming deep orange at the end of thirty-six hours. They were laid, on the bottom of a dish, in threes, touching at the ends.

Dr. G: Dimmock described the method adopted by him in rearing *coccinellidae*, and gave a brief account of the life-history and habits of these insects.

Dr. G: Dimmock noted the excessive abundance of a species of *aphididae* on a few maples on North Avenue in Cambridge. So

abundant were these insects that, especially under one tree, the drops of their sugary secretion made the sidewalk beneath constantly appear as if there had just been a light shower. On account of this shower of sugary material the upper sides of the leaves of the trees had the appearance of having been varnished.

Mr. S: H. Scudder reviewed C: Brongniard's Fossil insects of the primary formations, and showed the proof-sheets of the first half of his contribution to Zittel's Handbook of paleontology. The portion, of which proofs were shown, treated of the myriopoda, the arachnida, and part of the insecta, and was abundantly illustrated.

13 Nov. 1885.—The 114th meeting was held at 61 Sacramento St., Cambridge, 13 Nov. 1885.

Dr. G: Dimmock exhibited a collection of bred *coccinellidae*, among which were many varieties bred from a single pair of *Coccinella novemnotata*.

Mr. R. Hayward showed a few specimens of several coleoptera collected by him in southwestern Colorado during the past summer. Among them were *Amphizoa insolens* and a specimen of *Nebria trifaria*. The *Nebria* showed a curious monstrosity, the tarsi of the right anterior leg being trifurcated. In all other respects it was a normal specimen.

Mr. F. S. Child spoke of a specimen of *Argynnis idalia* which he had taken in Barnstable co., Mass., exhibiting remarkable colorational variation. He also mentioned the occurrence, in the autumn of 1883, of *Euptoieta claudia* at Magnolia, Mass.

11 Dec. 1885.—The 115th meeting was held at 19 Brattle St., Cambridge, 11 Dec. 1885.

On motion of R. Hayward a vote of thanks was tendered unanimously to Mr. S: H. Scudder for the use of the office of *Science* for club meetings during the past two years.

Mr. S: H. Scudder reviewed a recently published paper by Prof. Felix Plateau, entitled "Recherches expérimentales sur la vision chez les insectes" (Bull. Acad. roy. Belgique, 1885, ser. 3, v. 10). The chief ob-

ject of Prof. Plateau's researches was to discover if insects could distinguish the shape of objects.

Mr. S: H. Scudder made some remarks upon the cockroaches (*blattariae*) of the mesozoic period, and exhibited six chromolithographic plates of New England butterflies. The plates gave rise to considerable discussion on different species of New England butterflies.

Mr. P. S. Abbot noted the capture of *Euptoieta claudia* and *Junonia coenia* at Old Orchard Beach, Maine, in 1882.

Mr. B: P. Mann communicated (through the secretary) two notes accompanied by specimens. The first was concerning a digger-wasp (*Stizus*) and a cicada (*Cicada*): "In regard to the cicada and wasp there is nothing new to say. They were caught in the house, the wasp bringing the cicada in its legs as *Stizus* is known to do. The cicada seemed to be dead when picked up from the floor where the wasp had dropped it upon finding itself hemmed in by the walls and window panes." The other communication was concerning a butterfly, *Eudamus tityrus*, and will be published in PSYCHE.

Dr. G: Dimmock showed a large larva of some species of *ocstridae* (? *Culexbra emasculator*), which had been sent to him by Mr. Leroy H. Sykes, of Suffield, Conn. This larva was taken by Mr. Sykes, about 20 Sept. 1884, from beneath the skin of a chip-squirrel (*Tamias striatus*) just at the right of the median ventral line, near the umbilicus. Mr. Sykes thinks the squirrel was a castrate.

Dr. G: Dimmock explained an apparatus by which he was enabled to rear insects in gases of different kinds or in determinate proportions of gases and air.

Dr. G: Dimmock described the way in which the red mites that were so abundant about Cambridge this year produced the fine, light colored lines upon leaves of clover, grass and other plants. Leaves which had been marked by these mites were shown.

Dr. G: Dimmock mentioned certain habits of *Corixa* and *Notonecta*.

BIBLIOGRAPHICAL RECORD OF CONTENTS OF VOLUME FOUR OF PSYCHE.

- Academy of natural sciences of Philadelphia.** (Psyche, Mch.-Apr. 1883, v. 4, p. 32, 17 cm.)
 Abstract of entomological communications made at meetings of Academy, etc., from 8 Aug. 1882 to 23 Jan. 1883, compiled from "Proceedings of the Philadelphia academy of sciences [25 Jul. 1882-6 Feb. 1883]" (Amer. nat., Apr. 1883, v. 17, p. 462-466). *B: P. M.* (4058)
- Advertisements.** (Psyche, 1883-1885, v. 4, p. 2, 22, 42, 62, 82, 102, 122, 142, 154, 160, 178, 194, 214, 238, 270, 302, 330.)
 For further record, see names of respective advertisers. *B: P. M.* (4059)
- American agriculturist.** (Psyche, 1884-1885, v. 4, p. 194, 214, 238, 270, 302, each 5 cm.)
 Advertisement. *B: P. M.* (4060)
- [**Anal appendages of lepidoptera.**] (Psyche, May-June 1883, v. 4, p. 59, 8 cm.)
 References to numerous accounts of the discovery of anal appendages in lepidoptera. *B: P. M.* (4061)
- Anatomy of *macrotoma plumbea*.** (Psyche, Oct.-Dec. 1885, v. 4, p. 354, 13 cm.)
 Translation, from *Entom. nachrichten*, Jul. 1885, v. 11, p. 221-222, of abstract of A. Sommer's "Ueber *macrotoma plumbea*. Beiträge zur anatomie der poduriden" (*Zeitschr. für wiss. zool.*, 1885, v. 41, p. 683-718); histology of egg and of ventral tube; frequent molting of imago; occurrence of parasites; synonymy. *B: P. M.* (4062)
- [**Anderson, Joseph, jr.**] Posture of newly emerged butterflies. (Psyche, Oct.-Dec. 1885, v. 4, p. 352, 7 cm.)
 Notice of Joseph Anderson, jr.'s "Habits of *vanesidae* on emergence" (*Entomologist*, Sept. 1885, v. 18, p. 241-242), and of other papers by him. *B: P. M.* (4063)
- Angus, James.** Protective change of color in a spider. (Psyche, Jan.-Feb. 1883, v. 4, p. 19-20, 7 cm.)
 Reprint from *American naturalist*, Dec. 1882, v. 16, p. 1010; a white spider, placed on a yellow flower, became yellow; capture of insects by such a spider. *B: P. M.* (4064)
- Aphis nectar and honey.** (Psyche, Apr.-June 1885, v. 4, p. 300, 10 cm.)
 Reprint of "[Nectar secretion from aphides]" (*Science*, 23 Jan. 1885, v. 5, p. 82); abundance and quality of nectar secreted by *aphididae*; production of honey from this nectar by *apis mellifica*. *B: P. M.* (4065)
- [**Apgar, Austin C.**] [Naphthalin vs. *anthrenus*.] (Psyche, Oct.-Dec. 1884, v. 4, p. 234, 5 cm.)
 Notice, extracted from *Science*, 21 Nov. 1884, v. 4, Bulletin, p. 5, of communication made by A. C. Apgar, 11 Nov. 1884, to Trenton natural history society; resistance of *anthrenus scrophulariae* to the effects of vapor of naphthalin. *B: P. M.* (4066)
- [**Aquatic coleoptera living in poisonous solutions.**] (Amer. nat., Aug. 1883, v. 17, p. 903-904.) (Psyche, Jul.-Aug. 1883, v. 4, p. 79, 7 cm.)
 Survival of aquatic coleoptera for long periods in aqueous solutions of curare and strychnine. *B: P. M.* (4067)
- [**Aubert, —, and Dubois, Raph.**] [Luminosity of *pyrophorus*.] (*Science*, 28 Nov. 1884, v. 4, p. 505.) (Psyche, Oct.-Dec. 1884, v. 4, p. 234, 4 cm.)
 Notice of Aubert and R. Dubois' "Sur les propriétés de la lumière des pyrophores" (*Compt.-rend. Acad. sci. [Paris]*, 15 Sep. 1884, v. 99, p. 477-479); character of spectrum of light emitted by *pyrophorus*. *B: P. M.* (4068)
- [**Audolent, P.**] Tenacity of life in *calliphora vomitoria*. (Psyche, Oct.-Dec. 1885, v. 4, p. 351, 4 cm.)
 Larvae of *calliphora vomitoria* survived for two days under water, and pupated there. *B: P. M.* (4069)
- [**Aurivillius, Christopher.**] Lycaenid larvae in ants' nests. (Psyche, Apr.-June 1885, v. 4, p. 299-300, 10 cm.)
 Notice translated from *Entomologisk tidskrift*, 1884, p. 227, of communication made by C. Aurivillius to Entomologisk förening i Stockholm, 1 Oct. 1884. *B: P. M.* (4070)
- Barnard, W; Stebbins.** Treatment processes against *phylloxera vitifoliae*. (Psyche, Mch. 1884, v. 3, p. 143-144, 65 cm.)
 Remarks upon the efficacy of the nether-insertion process devised by the writer as a means against *phylloxera vitifoliae* and other subterranean insects, and upon the use of petroleum emulsions, also devised by the writer, as a means against noxious insects in general. *B: P. M.* (4071)
- Barrett, C; Golding.** Effect of cyanide upon colour. (Psyche, Aug.-Sep. 1884, v. 4, p. 204, 9 cm.)
 Reprint of author's "Effect of cyanide upon colour" (*Entom. mo. mag.*, June 1884, v. 21, p. 23). *B: P. M.* (4072)

Biological society of Washington. (Psyche, Jan.-Feb. 1884, v. 4, p. 133-134, 39 cm.)

Partial abstract of communications made at meetings of Biological society of Washington, 14 Dec. and 28 Dec. 1883. B: P. M. (4073)

[**Books on spiders.**] (Science, 23 Mch. 1883, v. 1, p. 207.) (Psyche, Mch.-Apr. 1883, v. 4, p. 39, 2 cm.)

Announcement of forthcoming works on spiders by H: C. McCook. B: P. M. (4074)

Brauer, Friedrich. The larvae of *oestridae*. (Psyche, Jul.-Sep. 1885, v. 4, p. 305-310. 185 cm.)

Translation, by B: P. Mann, of portion of F. Brauer's "Monographie der oestridenten," Wien, 1863, p. 35-40, treating generally of the structural characters, molts and life-habits of larvae of *oestridae*, and of the affinities of the genera. B: P. M. (4075)

[**Brongniart, C.:**] Fossil *thysanura*. (Psyche, Oct.-Dec. 1885, v. 4, p. 353, 15 cm.)

Translation of C: Brongniart's "[*Dasyteptus lucasi*, sp. n. foss.]" (Bull. Soc. entom. France, 1885, Bull. d. séances, p. 101-102); description of fossil *thysanura* (*dasyteptus lucasi*) occurring in the carboniferous schists of Commeny. B: P. M. (4076)

Bullettino del naturalista collectore. (Psyche, 1884, v. 4, p. 142, 154, 166, 170, 194, each 3 cm.)

Advertisement. B: P. M. (4077)

Cambridge entomological club. (Psyche, Jan.-Feb. 1883, v. 4, p. 13-14, 59 cm.)

Minutes of annual and monthly meeting of Cambridge entomological club, 12 Jan. 1883, and of monthly meeting, 9 Feb. 1883 [by the secretary (G: Dimmock)]; election of officers for 1883; election of members; arrangements for publication of volume four of *Psyche*; abstract of communications made. B: P. M. (4078)

Cambridge entomological club. (Psyche, May-June 1883, v. 4, p. 54, 8 cm.)

Minutes of monthly meeting of Cambridge entomological club, 9 March 1883 [by the secretary (G: Dimmock)]; abstract of communications made. B: P. M. (4079)

Cambridge entomological club. (Psyche, Nov.-Dec. 1883, v. 4, p. 116, 10 cm.)

Minutes of monthly meetings of Cambridge entomological club, 13 Apr. 1883 [by the secretary (G: Dimmock)]; abstract of communications made. B: P. M. (4080)

Cambridge entomological club. (Psyche, Jan.-Feb. 1884, v. 4, p. 133, 20 cm.)

Minutes of monthly meeting of Cambridge entomological club, 11 May 1883 [by the secretary (G: Dimmock)]; abstract of communications made. B: P. M. (4081)

Cambridge entomological club. (Psyche, Mch. 1884, v. 4, p. 147, 14 cm.)

Minutes of monthly meeting of Cambridge entomological club, 8 June 1883 [by the secretary (G: Dimmock)]; abstract of communications made. B: P. M. (4082)

Cambridge entomological club. (Psyche, Apr. 1884, v. 4, p. 160, 27 cm.)

Minutes of monthly meeting of Cambridge entomological club, 12 Oct. and 9 Nov. and in part of monthly meeting, 14 Dec. 1883 [by the secretary (G: Dimmock)]; withdrawal of members; abstract of communications made. B: P. M. (4083)

Cambridge entomological club. (Psyche, May 1884, v. 4, p. 170, 27 cm.)

Minutes of monthly meeting of Cambridge entomological club, 14 Dec. 1883 (concluded), and in part of annual and monthly meeting, 11 Jan. 1884 [by the secretary (G: Dimmock)]; abstract of communications made; election of officers for 1884; election and withdrawal of members. B: P. M. (4084)

Cambridge entomological club. (Psyche, Jun.-Jul. 1884, v. 4, p. 186, 34 cm.)

Minutes of annual and monthly meeting of Cambridge entomological club, 11 Jan. 1884 (concluded), and of monthly meeting, 8 Feb. 1884 [by the secretary (G: Dimmock)]; abstract of annual reports for 1883, and of communications made; acceptance and withdrawal of members. B: P. M. (4085)

Cambridge entomological club. (Psyche, Oct.-Dec. 1884, v. 4, p. 224-226, 70 cm.)

Minutes of monthly meetings of Cambridge entomological club, March-June and Oct.-Dec. 1884 [by the secretary (G: Dimmock)]; withdrawals and death of members; abstract of communications made. B: P. M. (4086)

Cambridge entomological club. (Psyche, Oct.-Dec. 1885, v. 4, p. 335-338, 116 cm.)

Minutes of annual and monthly meeting of Cambridge entomological club, 5 Jan. 1885, and of monthly meetings, Feb.-June and Oct.-Dec. 1885 [by the secretary (G: Dimmock)]; abstract of secretary's (G: Dimmock) and treasurer's (B: P. Mann) reports for 1884, and of communications made; withdrawal of a member; vote of thanks to S: H. Scudder for the use of the office of *Science* for club meetings. B: P. M. (4087)

[**Carbon disulphide poisonous.**] (Psyche, Apr. 1884, v. 4, p. 163, 4 cm.)

Translation, from *Deutsch-amerikanische apotheker-zeitung*, 15 Feb. 1884, v. 4, p. 736, of statement that the continued breathing of the vapor of carbon disulphide [CS₂] produces mental derangement. B: P. M. (4088)

[**Carlet, Gaston.**] [Poison-glands of hymenoptera.] (Amer. nat., Dec. 1884, v. 18, p. 1270.) (Psyche, Oct.-Dec. 1884, v. 4, p. 235, 7 cm.)

Abstract of G. Carlet's "Sur le venin des hyménoptères" . . . (Compt.-rend. Acad. sci. [Paris], 23 June 1884, v. 98, p. 1550-1551) [Rec., 3685]. B: P. M. (4089)

[**Caterpillars in Sweden.**] (Nature, 5 Jul. 1883, v. 28, p. 234.) (Psyche, Jul.-Aug. 1883, v. 4, p. 79, 4 cm.)

Occurrence of unknown injurious lepidopterous larva in several parts of Sweden, in 1883. B: P. M. (4090)

Chambers, Vactor Tousey. The classification of the *tineidae*. (Psyche, Jul.-Aug. 1883, v. 4, p. 71-74, 109 cm.)

Comments upon remarks made in A. R. Grote's "A brief essay on classification of the heterocera" (Papilio, Feb. 1883, v. 3, p. 35-38); *anaphora* undoubtedly a tineid, even in a restricted sense, but differing more from many so-called tineids in a broad sense than from *noctuidae*; the so-called *tineidae* in a broad sense very heterogeneous, and equivalent to the union of many families recognized as distinct; indication of several diverse groups of genera. B: P. M. (4091)

Chevrolat's collection of coleoptera. (Psyche, Apr.-June 1885, v. 4, p. 297, 5 cm.)

Notice of offer for sale of A. Chevrolat's collection of coleoptera, and of some prices asked. B: P. M. (4092)

Chigoe (The) in Africa. (Amer. nat., June 1883, v. 17, p. 664.) (Psyche, May-June 1883, v. 4, p. 52, 6 cm.)

Pulex penetrans stated, in Burton and Cameron's "To the Gold coast for gold," to have been introduced and widely spread recently in western Africa; mention of some of the chief arthropodous plagues of that region B: P. M. (4093)

Comstock, J: H: *Coccidae* wanted. (Psyche, v. 4, 1883, p. 2, 22, 42, 62, 82, 102; 1884, v. 4, p. 122, 142, 154, 166, each 4 cm.) Advertisement. B: P. M. (4094)

[**Cook, Albert J:**] [Extra-floral nectar.] (Psyche, Oct.-Dec. 1884, v. 4, p. 234, 4 cm.)

Notice of paper read by A. J. Cook before Natural history society of the Michigan agricultural college, 12 Sep. 1884; contrast of taste of honey made from secretion due to ergot on grass and of that made from secretions of *aphididae*. B: P. M. (4095)

Coquillett, Daniel W: Systematic position of the genus *apiocera*. (Psyche, Jan.-Mch. 1885, v. 4, p. 243-244, 49 cm.)

Critical review of C. R. Osten Sacken's "On the genus *apiocera*" (Berliner entom. zeitschr., 1883, v. 27, p. 287-294); reasons for placing *apiocera* among the *therevidae* rather than among the *asilidae*; characters of *asilidae* and *therevidae* compared; probable variability of *apiocera harrispex*. B: P. M. (4096)

Dahl, Friedrich. Habits of spiders. (Psyche, Apr.-June 1885, v. 4, p. 300, 16 cm.)

Extract from partial translation, entitled "Contributions to the biology of spiders" (Ann. and mag. nat. hist., Jan. 1885, s. 5, v. 15, p. 70-72) [Rec., 3826], of author's "Beiträge zur biologie der spinnen" (Zool. Anzeiger, 3 Nov. 1884, v. 7, p. 591-595) [Rec., 3825]; notes on the repair of their webs by *Zilla x-notata* and other *aranema*, and on the exhibition of intelligence and instinct by *altus arcuatus*. B: P. M. (4097)

Data on annual addresses. (Psyche, Jan.-Mch. 1885, v. 4, p. 265, 9 cm.)

List of annual addresses of retiring presidents of Cambridge entomological club. B: P. M. (4098)

[**Davison, W:**] Birds nesting in hornets' nests. (Psyche, Oct.-Dec. 1885, v. 4, p. 351, 4 cm.)

Extract from W: Davison's "Birds breeding in ants' nests" (Nature, 12 Mch. 1885, v. 31, p. 438). B: P. M. (4099)

[**Davis, W: T:**] [Stridulation of a headless *conocephalus*.] (Science, 7 Nov. 1884, v. 4, p. 448, 4 cm.) (Psyche, Oct.-Dec. 1884, v. 4, p. 235, 6 cm.)

Notice of communication made by W: T. Davis to Natural science association of Staten Island, Oct. 1884. B: P. M. (4100)

Dimmock, Anna Katherina. The insects of *betula* in North America. (Psyche, 1885, v. 4: Jan.-Mch., p. 239-243; 142 cm.; Apr.-Jun., p. 271-286, 507 cm.)

List of 107 determined species of insects and of some doubtful ones found on *betula* in North America, with references to the original descriptions and to other important descriptions or accounts of the life-histories of these insects, and with authenticated lists of the other food-plants of the species cited; use of leaves of *betula alba* in rearing polyphagous insects. B: P. M. (4101)

Dimmock, Anna Katherina. Sexual attraction in *prionus*. (Psyche, Apr. 1884, v. 4, p. 159, 27 cm.)

Abstract, with remarks [by F. Katter], entitled, "Geschlechtliche anziehung bei coleopteren." (Entom. nachrichten, June 1884, v. 10, p. 183-186.)

Record of observations on the attraction of males of *prionus* by females, and of females by males. B: P. M. (4102)

Dimmock, G:, secretary, see CAMBRIDGE entomological club.

Dimmock, G: [*Blissus leucopterus*.] (Psyche, Nov.-Dec. 1883, v. 4, p. 119, 5 cm.)

Notice of J. A. Litner's Circular no. 1 of the Department of entomology of the New York state museum of natural history, Oct. 1883; occurrence of *blissus leucopterus* in New York and Massachusetts, in 1883. B: P. M. (4103)

Dimmock, G: [Book-notice.] (Psyche, May-June 1883, v. 4, p. 53-54, 9 cm.)

Notice of Proceedings of the Davenport academy of natural sciences, v. 3, pt. 3. B: P. M. (4104)

Dimmock, G: [Book notice.] (Psyche, May-June 1883, v. 4, p. 54, 3 cm.)

Notice of *Rovaraszi lapok*, a Hungarian entomological journal. B: P. M. (4105)

Dimmock, G: [Dollfus prize in insect anatomy.] (Psyche, May 1884, v. 4, p. 175, 7 cm.)

Notice of offer of prizes to subscribers to *Feuille des jeunes naturalistes* for illustrated anatomical work on the larva of a rhopaloceros lepidopteron. [For notice of award of prize, see G: Dimmock's note [of same title] (*op. cit.*, Oct.-Dec. 1884, p. 234-235) (Rec., 4107).] B: P. M. (4106)

Dimmock, G: [Dollfus prize in insect anatomy.] (Psyche, Oct.-Dec. 1884, v. 4, p. 234-235, 5 cm.)

Notice of award of prizes offered by A. Dollfus for work on the anatomy of a lepidopterous larva, and of publication of the prize essays in *Feuille des jeunes naturalistes* in 1884. B: P. M. (4107)

Dimmock, G: [Index to Ontario entomological reports.] (Psyche, Jul.-Aug. 1883, v. 4, p. 79, 6 cm.)

Crit. rev. of E. B. Reed's "General index to the thirteen annual reports of the Entomological society of the province of Ontario, 1870-1882," Toronto, 1883. B: P. M. (4108)

Dimmock, G: [Leuckart as an educator.] (Psyche, Mch. 1884, v. 4, p. 152.)

Notice of biographical sketch of Prof. R. Leuckart by O. P. Krancher in *Deutscher bienenfreund*, Jan. 1884. B: P. M. (4109)

[**Dimmock, G:**] Metamorphoses of arctic insects. (Psyche, Jan.-Mch. 1885, v. 4, p. 268, 32 cm.)

Translated extract from C. Aurivillius' "Das insektenleben in arktischen ländern" in A. E. Nordenskiöld's "Studien und forschungen . . . im hohen norden," Lpz., 1885; periods of time requisite for the development of *oeneis borea*, and presumably of *bombus* and other insects in high northern latitudes; absence of parasites of *bombus* in these regions. B: P. M. (4110)

Dimmock, G: [Müller-fund.] (Psyche, Jan.-Feb. 1884, v. 4, p. 139-140, 7 cm.)

Statement of plan and object of fund proposed to be raised in honor of Hermann Müller. B: P. M. (4111)

Dimmock, G: Necrology. (Psyche, Jan.-Mch. 1885, v. 4, p. 266, 15 cm.)

List of entomologists recently deceased, with dates of birth and death and with characterization of some of them. B: P. M. (4112)

Dimmock, G: New text-book of entomology (Psyche, Apr.-June 1885, v. 4, p. 299, 10 cm.)

Prospectus of "An elementary text-book of entomology," to be published in London, with plates by W. F. Kirby. B: P. M. (4113)

Dimmock, G: Notice to subscribers. (Psyche, Jan.-Feb. 1883, v. 4, p. 20, 6 cm.)

Notice of delay of completion of publication of volume three of PSYCHE. B: P. M. (4114)

Dimmock, G: [Obituary notice of Hermann Müller.] (Psyche, Sep.-Oct. 1883, v. 4, p. 100, 9 cm.)

Reference to number and value of Müller's writings. B: P. M. (4115)

Dimmock, G: [*Papilio cresphontes* in Massachusetts.] (Psyche, Sep.-Oct. 1883, v. 4, p. 99, 5 cm.)

Record of captures of *papilio cresphontes* and of a capture of *junonia coenia* in Massachusetts, in 1883. B: P. M. (4116)

Dimmock, G: [*Pieris spilleri* Spiller.] (Psyche, Apr. 1884, v. 4, p. 163-164, 5 cm.)

Reprint. (Sci. record. 15 July 1884, v. 2, p. 210, 6 cm.)

Notice of A. J. Spiller's "Description of a *piers* new to science. *Pieris spilleri*, mihi" (Entomologist, Mch. 1884, v. 17, p. 62-63), commenting upon author's egotism. B: P. M. (4117)

Dimmock, G: Salivary glands in bees. (Psyche, Sep.-Oct. 1883, v. 4, p. 87-89, 72 cm.)

Abstract of P. Schiemenz's "Ueber das herkommen des futtersaftes und die speicheldrüsen der biene" . . . (Zeitschr. f. wissensch. zool., Feb. 1883, v. 38, p. 71-135) [Rec., 3337]. B: P. M. (4118)

Dimmock, G: The scales of coleoptera. (Psyche, 1883, v. 4: Jan.-Feb., p. 3-11, fig. 1-3; Mch.-Apr., p. 23-27, fig. 4-7; May-Jun., p. 43-47, fig. 8-11; Jul.-Aug., p. 63-71.)

Advance abstract, by author, with same title. (Science, 23 March 1883, v. 1, p. 203, 11 cm.)

Abstract, by author, entitled, "Scales of coleoptera." (Science, 1 Feb. 1884, v. 3, p. 127-128, 8 fig., 38 cm.)

History and bibliography (45 titles) of knowledge of scales of insects, particularly of coleoptera; enumeration of orders of insects known to possess scales; special description and illustration of hairs and scales of *ciindela dorsalis*, *anthrenus scrophulariae*, *a. varius*, *hoplia coerulea*, *polyphylla variolosa*, *valgus squamiger*, *psiloptera drummondii*, *chalcoplepidius rubripennis*, *atans oculatus*, *clateridae* sp. incog., *pinus pruittii*, *elytus robiniae*, *entimus imperialis*; mention of scales of related species; general summary of families of scaled coleoptera, forms of scales, colorational effects produced by scales (with tabulation of such effects according to families), causes of coloration in scales, structure of scales, and methods of study of the subject. B: P. M. (4119)

[**Dipterous larvae in the human stomach.**] (Science, 23 Nov. 1883, v. 2, p. 697, 8 cm.)

(Psyche, Nov.-Dec. 1883, v. 4, p. 119, 11 cm.)

Notice of communication made by A. Laboulbène at meeting of Société entomologique de France. B: P. M. (4120)

Dipterous parasite of the rhinoceros. (Psyche, Oct.-Dec. 1885, v. 4, p. 351-352, 6 cm.)

Notice of F. Brauer's "Entomologische beiträge" (Verh. K.-k. zool.-bot. ges. Wien, 1884, v. 34, p. 209-271). B: P. M. (4121)

Distant, W: Lucas. London letter. (Psyche, Sep.-Oct. 1883, v. 4, p. 93-94, 41 cm.)

Statistics of species of insects enumerated and figured, and of new species and genera described in Godman and Salvin's "Biologia centrali-americana," prior to July 1883, according to the several sections of the orders treated; notice of studies of F. Leuthner on mandibular polymorphism of *odontolabidae*; list of works appearing on lepidopterous faunae of several countries and list of entomological collections being made in neotropical countries. B: P. M. (4122)

- Distant, W:** Lucas. London letter. (Psyche, Mch. 1884, v. 4, p. 147-148, 38 cm.)
- Notice of a collection of Japanese insects made by G: Lewis, of the intention of G: Semper to publish a work on the *lepidoptera rhopalocera* of the Philippine islands, of the forthcoming of a new edition of R. Trimen's "Rhopalocera Africae australis," of the occurrence of a succession of mild winters in England and the influence of such winters on the abundance of insects in the ensuing summers, of the pecuniary value of entomological literature in London, and of a collection of insects and other specimens made by E: Whymper in Ecuador; remarks on the sudden and plentiful occurrence of *rogadja crisia* in the Malay peninsula, where it was previously unknown. *B: P. M.* (4123)
- Dodge, C:** Richards. Townend Glover. (Psyche, Nov.-Dec. 1883, v. 4, p. 115-116, 43 cm.)
- Biographical notice of Townend Glover; description of his unpublished illustrated work on North American entomology. *B: P. M.* (4124)
- Dubois, Albert.** Preservation of insects. (Psyche, Jan.-Mch. 1885, v. 4, p. 266, 10 cm.)
- Translated extract from *Feuille de jeunes naturalistes*, Mch. 1885, v. 15, p. 71; directions for removing verdigris and grease from insects. *B: P. M.* (4125)
- Edwards, W: H:** On carrying hibernating larvae through the winter. (Can. entom., June 1885, v. 17, p. 113-114.) (Psyche, Oct.-Dec. 1885, v. 4, p. 353-354, 17 cm.)
- Successful results of artificial hibernation of several larvae of *rhopalocera*. *B: P. M.* (4126)
- Election of honorary members.** (Psyche, Apr.-June 1885, v. 4, p. 297, 4 cm.)
- Notice of election of honorary members of Société entomologique de France. *B: P. M.* (4127)
- Embryology of the silk-worm.** (Amer. nat., Apr. 1883, v. 17, p. 444.) (Psyche, Mch.-Apr. 1883, v. 4, p. 39, 4 cm.)
- Histology of annion and origin of malpighian vessels of *bombyx mori* studied by S. Salvatico, and rudiments of genital glands of *tinca crinella* observed by Balbiani. *B: P. M.* (4128)
- Entomological club of A. A. A. S.** (Psyche, Jan.-Mch. 1885, v. 4, p. 265, 8 cm.)
- Official announcement of meeting of Entomological club of American association for the advancement of science, to be held 25 Aug. 1885, at Ann Arbor, Mich. *B: P. M.* (4129)
- Entomological items.** (Psyche, Jan.-Feb. 1883, v. 4, p. 19-20, 39 cm.) *B: P. M.* (4130)
- Entomological items.** (Psyche, Mch.-Apr. 1883, v. 4, p. 39-40, 44 cm.) *B: P. M.* (4131)
- Entomological items.** (Psyche, May-June 1883, v. 4, p. 59, 34 cm.) *B: P. M.* (4132)
- Entomological items.** (Psyche, Jul.-Aug. 1883, v. 4, p. 79-80, 44 cm.) *B: P. M.* (4133)
- Entomological items.** (Psyche, Sep.-Oct. 1883, v. 4, p. 99-100, 44 cm.) *B: P. M.* (4134)
- Entomological items.** (Psyche, Nov.-Dec. 1883, v. 4, p. 119-120, 45 cm.) *B: P. M.* (4135)
- Entomological items.** (Psyche, Jan.-Feb. 1884, v. 4, p. 139-140, 44 cm.) *B: P. M.* (4136)
- Entomological items.** (Psyche, Mch. 1884, v. 4, p. 151-152, 44 cm.) *B: P. M.* (4137)
- Entomological items.** (Psyche, Apr. 1884, v. 4, p. 163-164, 45 cm.) *B: P. M.* (4138)
- Entomological items.** (Psyche, May 1884, v. 4, p. 175-176, 44 cm.) *B: P. M.* (4139)
- Entomological items.** (Psyche, Jun.-Jul. 1884, v. 4, p. 191-192, 43 cm.) *B: P. M.* (4140)
- Entomological items.** (Psyche, Aug.-Sep. 1884, v. 4, p. 211, 28 cm.) *B: P. M.* (4141)
- Entomological items.** (Psyche, Oct.-Dec. 1884, v. 4, p. 233-236, 133 cm.) *B: P. M.* (4142)
- Entomological items.** (Psyche, Jan.-Mch. 1885, v. 4, p. 265-268, 132 cm.) *B: P. M.* (4143)
- Entomological items.** (Psyche, Apr.-June 1885, v. 4, p. 297-300, 134 cm.) *B: P. M.* (4144)
- Entomological items.** (Psyche, Jul.-Sep. 1885, v. 4, p. 327-328, 64 cm.) *B: P. M.* (4145)
- Entomological items.** (Psyche, Oct.-Dec. 1885, v. 4, p. 351-354, 128 cm.) *B: P. M.* (4146)
- Entomological society of London.** (Psyche, Jul.-Aug. 1883, v. 4, p. 75-76, 22 cm.)
- Partial abstract (from *Entomologist's monthly magazine*) of reports of business transacted and communications made at meetings of Entomological society of London, 17 Jan.-2 May 1883. *B: P. M.* (4147)
- Entomological society of London.** (Psyche, Apr.-June 1885, v. 4, p. 297, 3 cm.)
- Royal charter granted to Entomological society of London, 20 July 1885. *B: P. M.* (4148)

Entomological society of London. (Psyche, Jul.-Sep. 1885, v. 4, p. 311-314, 125 cm.)

Partial abstract (from *Transactions of Entomological society of London*, 1883 and 1884) of communications made at meetings of Entomological society of London, 6 June 1883-3 Sep. 1884. B: P. M. (4149)

[**Entomological society of Washington.**] (Psyche, May 1884, v. 4, p. 175, 4 cm.)

List of officers of Entomological society of Washington, for 1884. B: P. M. (4150)

Entomology during the year 1883. (Psyche, Apr.-June 1885, v. 4, p. 299, 10 cm.)

Translation of "Entomologie während des jahres 1883" (Entom. nachrichten, June 1885, v. 11, p. 101). B: P. M. (4151)

Fernald, C: II: Tortricidae wanted. (Psyche, 1883, v. 4, p. 2, 22, 42, 62, 82, each 3 cm.)

Advertisement. B: P. M. (4152)

[**Final honors in entomology.**] (Psyche, Mch. 1884, v. 4, p. 151, 9 cm.)

Statement, from *The Cornell university register*, 1883-84, p. 111, of conditions under which "final honors" in entomology will be conferred upon graduates of The Cornell university. B: P. M. (4153)

Food-habits and vesicating power of cantharis. (Psyche, Apr.-June 1885, v. 4, p. 298, 7 cm.)

Notice of H. Beauregard's "Sur le mode de développement et d'action de la cantharide." *Compt. rend. Acad. sci.* [Paris], 8 June 1885, v. 100, p. 1472-1475." B: P. M. (4154)

Forbes, Stephen Alfred. On the life-histories and immature stages of three *eumolpini*. (Psyche, Jan.-Feb. 1884, v. 4, p. 123-130, 272 cm.; pl. 1, with 1 p. expl. of pl.)

Corrective note, by author, with like title . . . "Corrective note." (*op. cit.*, May 1884, p. 167-168, 34 cm.)

Describes larva and pupa of *colaspis brunnea, paria aterrima* and *scelodontia nebulosus* (misnamed *s. pubescens*); figures imago of the *paria* and *scelodontia*, pupa of the *scelodontia*, larva of the *colaspis*, head of imago of the *paria*, and larval and pupal characters of the three species; describes and contrasts the life-histories of these species, referring to previous accounts thereof. B: P. M. (4155)

Forbes, Stephen Alfred. On the life-histories and immature stages of three *eumolpini* [corr.]. Corrective note. (Psyche, May 1884, v. 4, p. 167-168, 34 cm.)

Corrects and explains erroneous designation of *scelodontia nebulosus* as *s. pubescens* in author's "On the life-histories and immature stages of three *eumolpini*" (*op. cit.*, Jan.-Feb. 1884, p. 123-130) [Rec., 4155]. B: P. M. (4156)

Fowler, W. W. Collecting coleoptera. (Psyche, Jan.-Feb. 1883, v. 4, p. 19, 5 cm.)

Extract from *Entomologist*, Oct. 1882, v. 15, p. 231-232; description of a method of collecting coleoptera, of which *staphylinidae*, especially *stenus*, are the commonest, especially in winter. B: P. M. (4157)

Friedländer, R. & sohn. [Natural science publications.] (Psyche, 1883-1884, v. 4, p. 102, 122, 142, 154, 166, 178, each 6 cm.)

Advertisement. B: P. M. (4158)

Grote as a composer. (Psyche, Apr.-June 1885, v. 4, p. 297, 4 cm.)

Notice of poems, an essay, and a musical composition by A: R. Grote. B: P. M. (4159)

Hagen, Hermann August. The first numero of Thomas Say's American entomology and two letters on the hessian fly hitherto not mentioned among his published papers. (Psyche, Mch. 1884, v. 4, p. 145-146, 54 cm.)

Bibliographical note describing T: Say's "American entomology" . . . v. 1, no. 1, Phil., 1817, corresponding to plates 1, 4, 7, 10, 14 and 18 of Say's work of same title, v. 1, Phil., 1821; notice of two publications by Say in *Memoirs of Philadelphia society for promoting agriculture*, 1818, v. 4, p. 224-226 [Rec., 3431], 230-237 [Rec., 3430]. B: P. M. (4160)

[**Hagen, Hermann August.**] [Hessian fly so called before the Revolution.] (Psyche, Apr. 1884, v. 4, p. 163, 4 cm.)

Notice of H. A. Hagen's "The occurrence of the hessian fly in North America before the Revolution" (*Science*, 11 Apr. 1884, v. 3, p. 432). B: P. M. (4161)

Hagen, Hermann August. On the relations of fungi to galls and to larvae of *eccidomyia* living in galls. (Psyche, Oct.-Dec. 1885, v. 4, p. 334, 28 cm.)

Reprint, with slight amendment, of H. A. Hagen's paper of same title in *Canadian entomologist*; statement of occurrence of several communities consisting of an insect and a fungus parasitic in a plant gall. B: P. M. (4162)

Hagen, Hermann August. The tarsal and antennal characters of *psocidae*. (Entom. mo. mag., June 1882, v. 19, p. 12-13.) (Psyche, May-June 1883, v. 4, p. 52, 23 cm.)

Young forms of *atropina* have two-jointed tarsi, the apical joint becoming divided in later life, the intermediate joints of the antennae increasing in number by division when the number of tarsal joints increases. B: P. M. (4163)

Hazlewood, Francis Tomlinson. Permanent mounting of tracheae of insects. (Psyche, Jan.-Mch. 1885, v. 4, p. 253, 10 cm.)

Description of new method of mounting soft parts of insects permanently for the microscope. B: P. M. (4164)

[**Hermaphroditic lepidoptera.**] (Psyche, Jul. 1884, v. 4, p. 192, 8 cm.)

Notice of G. Weymer's "Zwei lepidopteren-hermaphroditen von *apatura iris* L. und *nemeophila russula* L." (Jahresber. d. Naturw. ver. in Elberfeld, 1884, heft 6, p. 74-77), and of C. Cornelius' "Verzeichniss der käfer von Elberfeld und dessen nachbarschaft" . . . (*op. cit.*, p. 1-61). B: P. M. (4165)

[**Hinckley, Mary H.**] [Enemies of tadpoles.] (Psyche, Oct.-Dec. 1884, v. 4, p. 235, 5 cm.)

Partial notice of M. H. Hinckley's "Notes on the peeping frog . . ." (Mem. Bost. soc. nat. hist., May 1884, v. 3, no. 10); mention of insect and other enemies of larvae of *hyla pickeringii*. B: P. M. (4166)

Howard, Leland Ossian. Museum pests of service to the entomologist. (Psyche, Jan.-Feb. 1884, v. 4, p. 132, 12 cm.)

Delicate specimens of insects dissected better by *trogoderma tarsale* than by the student. B: P. M. (4167)

Howard, Leland Ossian. Notice of an omission from Leconte's edition of Thomas Say's writings. (Psyche, Aug.-Sep. 1884, v. 4, p. 206, 15 cm.)

Reprint of note by T. Say, from *Journal of the Academy of natural sciences, of Philadelphia*, Aug. 1817, v. 1, p. 63, supplementary to Say's "Some account of the insect known by the name of hessian fly . . ." (Journ. etc., July 1817, v. 1, p. 45-48), and not reprinted in J. L. Leconte's edition of Say's "Complete writings;" comments on Say's erroneous statement that *ceaphron destructor* sheds its wings after breeding; brachypterous individuals occur not uncommonly among *pteromalinae*. B: P. M. (4168)

Howgate, E. The process of skin-casting in a lepidopterous larva. (Naturalist, Nov. 1885, p. 366.) (Psyche, Jul.-Sep. 1885, v. 4, p. 327, 22 cm.)

Brief description of the manner in which a geometrid larva cast its skin. B: P. M. (4169)

Hubbard, H. Guernsey. Notes on the habits of *hypotrichia spissipes* Lec., with description of the females. (Psyche, Oct.-Dec. 1884, v. 4, p. 215-217, 78 cm., fig. 13.)

Description of method of flight and diurnal habits of male *hypotrichia spissipes*; description of female imago, with figure of antenna and front tibia and tarsus of male and of female; taxonomic relations of *hypotrichia*, *plectrodes* and *plecocomia*. B: P. M. (4170)

[**Hudson, G.** Vernon.] Pupal retreat of *charagia virescens*. (Psyche, Jan.-Mch. 1885, v. 4, p. 267, 23 cm.)

Extracts from G. V. Hudson's "Life-history of *charagia virescens*" (Entomologist, Feb. 1885, v. 18, p. 30-36). B: P. M. (4171)

Insects mistaking leaves for flowers. (Psyche, Apr.-June 1885, v. 4, p. 298, 9 cm.)

Extract from *Entom. mo. mag.*, May 1885, v. 21, p. 278, of a communication made by R. M. Christy and J. J. Weir to Entomological society of London, 1 April 1885. B: P. M. (4172)

Introduction of humble-bees into New Zealand. (Psyche, Apr.-June 1885, v. 4, p. 297, 4 cm.)

After repeated attempts, living *bombus* have been carried from England to New Zealand, to fertilize *trifolium pratense*. B: P. M. (4173)

Jack, J. G. A curious habit of *callosamia promethea*. (Psyche, May 1884, v. 4, p. 169, 26 cm.)

Observation on the method by which *callosamia promethea* gains access to long-petioled leaves as food. B: P. M. (4174)

[**Jones, E. D.**] Drinking habit of a moth. (Journ. Roy. micros. soc., Oct. 1884, s. 2, v. 4, p. 741.) (Psyche, Oct.-Dec. 1884, v. 4, p. 217, 16 cm.)

Abstract of a paper by E. D. Jones (Proc. Lit. and phil. soc. Liverpool, 1883, v. 37, p. 76-77); imago of *panthera pardalaria* observed to suck up water and pass it through the body in a continuous stream; structural adaptation of the moth to its surroundings. B: P. M. (4175)

[**Jordan, R. C. R.**] [Apterous female lepidoptera.] (Psyche, Apr. 1884, v. 4, p. 163, 5 cm.)

List, abstracted from R. C. R. Jordan's "On the European species of lepidoptera with apterous or subapterous females" (Entom. mo. mag., Mch. 1884, v. 20, p. 219-221), of European families of lepidoptera containing apterous or subapterous females. B: P. M. (4176)

Karsch, Ferdinand Anton Franz. The entomocecidia. Introduction. (Psyche, Oct.-Dec. 1885, v. 4, p. 331-334, 105 cm.)

Transl. by B: P. Mann, of F. A. F. Karsch's "Die entomocecidien" (Entom. nachrichten, Jul. 1884, v. 10, p. 205-209); definition of the nature of galls, list of orders of animals which produce galls, references to prominent monographs on certain classes of galls, and plan of formation of a comprehensive list of galls of insects. B: P. M. (4177)

[**Kent, W. Saville.**] Infusorial parasites of white ants. (Psyche, Apr.-June 1885, v. 4, p. 298, 8 cm.)

Notice of communication made by W. S. Kent to Royal society of Tasmania, 17 Nov. 1884, on infusoria found in *termitidae*. B: P. M. (4178)

Krancher, Oskar Paul. Want of symmetry among insects. (Psyche, Aug.-Sep. 1884, v. 4, p. 200-203, 91 cm., fig. 12.)

Remarks on the prevalent general symmetry of form and coloration in insects, and the rarity of perfect symmetry or of exact similarity of specimens of one species; remarks on varieties, gynandromorphs and cripples; description and figure of a symmetrical cripple of *aporia crataegi*; description of irregularities in cells of *apis mellifica*. B: P. M. (4179)

Krauss, W: Christopher. On the nervous system of the head of the larva of *corydalus cornutus* Linn. (Psyche, Jun.-Jul. 1884, v. 4, p. 179-184, 163 cm., pl. 2, with [1 p.] *expl. of pl.*)

Detailed illustrated description of the anatomy of the nervous system of the head of the larva of *corydalus cornutus*, extracted from a thesis presented to the faculty of the Cornell university for the baccalaureate in science. B: P. M. (4180)

Landerer, Xaver. [Locusts used as food.] (Psyche, Mch.-Apr. 1883, v. 4, p. 39, 5 cm.)

Translated extract from *Deutsch-amerikanische apotheker-zeitung*, 1 Mch. 1883. B: P. M. (4181)

Landerer, Xaver. [Manna.] (Psyche, Jun.-Jul. 1884, v. 4, p. 191-192, 8 cm.)

Translated extract from *Deutsch-amerikanische apotheker-zeitung*, 15 May 1882, v. 3, p. 134. B: P. M. (4182)

[**Landerer, Xaver.**] Upon a peculiar oriental locality for honey. (Psyche, Jan.-Mch. 1885, v. 4, p. 266-267, 19 cm.)

Translated extract from X. Landerer's "Mittheilungen aus dem orient" (*Deutsch-amer. apotheker-zeitung*, 15 Dec. 1882, v. 3, p. 582); an intoxicating, soporific honey obtained in Persia probably from flowers of *papaver*; use of this honey as medicine and otherwise, and use of opium in Persia. B: P. M. (4183)

Lange, C. F. Exchange of European and American coleoptera. (Psyche, Oct.-Dec. 1884, v. 4, p. 233, 3 cm.)

Advertisement. B: P. M. (4184)

[**Leaping ant.**] (Science, 14 Sep. 1883, v. 2, p. 386, 4 cm.) (Psyche, Sep.-Oct. 1883, v. 4, p. 99, 5 cm.)

Notice of communication by E. Lefèvre at meeting of Société entomologique de France, 11 July 1883. B: P. M. (4185)

[**Leconte, J:** Lawrence; obituary notice of.] (Psyche, Nov.-Dec. 1883, v. 4, p. 119, 10 cm.)

Obituary notice of J. Lawrence Leconte; explanatory note regarding C. V. Riley's "Tribute to the memory of John Lawrence Leconte" (*hoc op.*, p. 107-110) [*Rec.*, 4263]. B: P. M. (4186)

[**Leidy, Joseph.**] [Habits of *lasius interjectus*.] (Psyche, Jan.-Feb. 1883, v. 4, p. 19, 5 cm.)

Abundance of *lasius interjectus* near Philadelphia, Pa.; care of aphids and coccids by this ant. B: P. M. (4187)

[**Lendenfeld, R.**] [Muscular contraction in flight.] (Science, 19 Dec. 1884, v. 4, p. 562, 2 cm.) (Psyche, Oct.-Dec. 1884, v. 4, p. 234, 4 cm.)

Notice of paper read by Dr. R. Lendenfeld before Linnean society of New South Wales, 29 Oct. 1884; muscular contraction stated to occur in flight of insect. B: P. M. (4188)

Life of Dr. Dzierzon. (Psyche, Oct.-Dec. 1885, v. 4, p. 351, 5 cm.)

Notice of a biographical sketch of Johann Dzierzon by O. P. Krancher in *Deutscher bienenfreund*, Jan. 1885. B: P. M. (4189)

Linnean society of London. (Psyche, May-June 1883, v. 4, p. 54, 13 cm.)

Abstract (from *Zoologischer anzeiger*, 5 Mch. 1883, v. 6, p. 127-128) of communication made by J. M. Campbell, at meeting of Linnean society of London, 6 Feb. 1883, on pairing of *tegenaria guyonii*, with description of some glands on the abdominal sexual region of the male of this species. B: P. M. (4190)

Linnean society of London. (Psyche, Sep.-Oct. 1883, v. 4, p. 92-93, 33 cm.)

Partial abstract (from *Zoologischer anzeiger*) of communications made at meetings of Linnean society of London, 15 Feb.-7 June 1883. B: P. M. (4191)

Linnean society of London. (Psyche, Aug.-Sep. 1884, v. 4, p. 206, 11 cm.)

Partial abstract (from *Zoologischer anzeiger*, by J. Murie) of communications made at meetings of Linnean society of London, 20 Dec. 1883 and 17 Jan. 1884. B: P. M. (4192)

Linnean society of London. (Psyche, Jan.-Mch. 1885, v. 4, p. 254, 29 cm.)

Partial abstract (from *Zoologischer anzeiger*, by J. Murie) of communications made at meetings of Linnean society of London, 21 Feb.-20 Nov. 1884. B: P. M. (4193)

Linnean society of New South Wales. (Psyche, Jul.-Aug. 1883, v. 4, p. 76, 9 cm.)

Abstract (from *Zoologischer anzeiger*, 9 Jul. 1883, v. 6, p. 379) of communication made by W. Macleay at meeting of Linnean society of New South Wales, 25 Apr. 1883; account of ravages of a tineid moth in vegetable gardens at Sydney, N. S. W.; exhibition (by Stevens) of chrysalis of *danais* attached to leaf of *pelargonium*. B: P. M. (4194)

Linnean society of New South Wales. (Psyche, Apr.-Jun. 1885, v. 4, p. 287-288, 19 cm.)

Partial abstract (from *Zoologischer anzeiger*) of communications made at meetings of Linnean society of New South Wales, 29 Aug. 1883-31 Dec. 1884. B: P. M. (4195)

Lintner, Joseph Albert. Book notice. (Psyche, May-June 1883, v. 4, p. 53, 11 cm.)

Anticipatory notice of W. Saunders' "Insects injurious to fruits," *Phil.*, 1883; need, value and scope of the work. B: P. M. (4196)

Lintner, Joseph Albert. Captures of *fenisecca tarquinius* Fabr. (Psyche, Jul.-Aug. 1883, v. 4, p. 75, 14 cm.)

Record of several captures of *fenisecca tarquinius* in eastern New York. B: P. M. (4197)

Lintner, Joseph Albert. [Collection of "cut-worms."] (Psyche, Jul.-Aug. 1883, v. 4, p. 80, 10 cm.)

Notice of paper read by Mrs. Mary Treat before New Jersey state horticultural society, in January 1883; attraction of cut-worms to *phlox*, and their collection therefrom. *B: P. M.* (4108)

Lintner, Joseph Albert. On an egg-parasite of the currant saw-fly, *nematus ventricosus* (Psyche, May-June 1883, v. 4, p. 48-51, 128 cm.)

Observations made in 1869, 1867 and 1868, upon the food-habits and oviposition of *trichogramma pretiosa*, with reprint of comments by Asa Fitch thereon (12th ann. rept. ins. N. Y. for 1867) (Trans. N. Y. state agric. soc. for 1867, 1868, v. 27), p. 931-932; rediscovery of this parasite in 1882; attempt to scatter specimens over United States and Canada; other occurrences and known hosts of the insect; parasitism of *t. minuta* in eggs of *limenitis disippus*; oviposition of *nematus ventricosus*. *B: P. M.* (4199)

Lintner, Joseph Albert. A new sexual character in the pupae of some lepidoptera. (Psyche, Nov.-Dec. 1883, v. 4, p. 103-106, 133 cm.)

Mention of primary and secondary sexual characters hitherto observed in insect imagoes and pupae, and presumed characters discovered in pupae of *coscinia* and *ageriidae*. *B: P. M.* (4200)

Lintner, Joseph Albert. [*Platygaster* larva parasitic upon galls of *cecidomyia salicibatatus*.] (Psyche, Jul.-Aug. 1883, v. 4, p. 79, 8 cm.)

Notice of D: S. Kellicott's account, in *Bulletin of the Buffalo naturalists' field club*, Mch. 1883, of *platygaster* larva parasitic upon galls of *cecidomyia salicibatatus*. *B: P. M.* (4201)

Lintner, Joseph Albert. Rearing lepidoptera. (Psyche, May-June 1883, v. 4, p. 53, 14 cm.)

Notice of labors and success of S. L. Elliot in breeding and rearing lepidoptera, and carrying pupae through the winter. *B: P. M.* (4202)

[Löw, Franz.] Waxy secretions of psyllid larvae. (Psyche, Jul.-Sep. 1885, v. 4, p. 310, 9 cm.)

Translated extract from F. Löw's "Beiträge zur kenntnis der jugendstadien der psylliden" (Verh. K.-k. zool.-bot. gesells. in Wien, 1884, v. 34) [Rec., 4014]. *B: P. M.* (4203)

[Looss, —.] New solvent of chitin. (Psyche, Apr.-Jun. 1885, v. 4, p. 286, 19 cm.)

Abstract of —. Looss' "Neue lösungsmittel des chitins" (Zool. anzeiger, 1 June 1885, v. 8, p. 333-334). *B: P. M.* (4204)

[Lowne, B: Thompson.] [Compound vision of insects.] (Psyche, Oct.-Dec. 1884, v. 4, p. 233, 9 cm.)

Extract from report by J. Murie, in *Zoologischer anzeiger*, 3 March 1884, v. 7, p. 127, of meeting of Linnean society of London, 7 Feb. 1884. [Author's name given as B. J. Lowne.] *B: P. M.* (4205)

Lugger, O: Food-plants of beetles bred in Maryland. (Psyche, Aug.-Sep. 1884, v. 4, p. 203-204, 24 cm.)

List of 37 coleoptera and of the trees from the wood (in one case seed) of which they were respectively bred. *B: P. M.* (4206)

[Lugger, O:] [Parasites of *tiphia*.] (Science record, 15 Aug. 1884, v. 2, p. 232.) (Psyche, Aug.-Sep. 1884, v. 4, p. 211, 7 cm.)

Crit. rev., by C: V. Riley, entitled "Parasites of the larva of *lachnosterna fusca*." Psyche, Oct.-Dec. 1884, v. 4, p. 224, 9 cm.)

Hymenopterous parasites occurring in cocoons of *tiphia*, the larvae of the *tiphia* being infested by larvae of *rhipiphorus pectinatus* or *r. limbatus* and being themselves parasitic on larvae of *lachnosterna fusca*; the first mentioned parasites supposed to prey upon the *rhipiphorus*. *B: P. M.* (4207)

[Macleay, W:] [Helix-like egg-cases.] (Psyche, Oct.-Dec. 1884, v. 4, p. 235, 4 cm.)

Notice of communication made by W: Macleay to Linnean society of New South Wales, June 1884. *B: P. M.* (4208)

Macloskie, G: Gills of insect-larvae. (Psyche, Nov.-Dec. 1883, v. 4, p. 110-112, 68 cm.)

Nature of gills of insect-larvae defined; contrary to the view usually held regarding them, the tracheae therein terminate caecally and not in recurrent loop-, action of tracheae tidal. *B: P. M.* (4209)

Macloskie, G: Head of larval *musca*: preliminary note. (Psyche, Oct.-Dec. 1884, v. 4, p. 218-219, 44 cm.)

Description of structure of head in larva of *musca caesar*, homologizing the several parts with those of imago. *B: P. M.* (4210)

[Maeklin, F: W:] obituary notice of.] (Psyche, Mch.-Apr. 1883, v. 4, p. 39, 6 cm.)

Extract from *American naturalist*, Apr. 1883, v. 17, p. 424. *B: P. M.* (4211)

Mann, B: Pickman, treasurer. Acknowledgement of contributions. (Psyche, Aug.-Sep. 1884, v. 4, p. 211-212, 39 cm.)

B: P. M. (4212)

Mann, B: Pickman, treasurer. Acknowledgments. (Psyche, Oct.-Dec. 1885, v. 4, p. 330, 7 cm.)

Acknowledgment of contributions to permanent publication fund of PSYCHE. *B: P. M.* (4213)

Mann, B: Pickman, ed. Bibliographical record. (Psyche, 1883-1885, v. 4, p. 15-18, 33-38, 55-58, 77-78, 95-98, 117-118, 135-138, 149-150, 161-162, 171-174, 187-190, 207-210, 227-232, 255-264, 289-296, 315-326, 339-350, 350*-350**.)

List of publications on entomology, being no. 3101-4300 of the Bibliographical record of PSYCHE, containing exact titles and references to and brief analyses of each publication recorded, with occasional explanations of the method of record. *B: P. M.* (4214)

Mann, B: Pickman. The bibliography of entomology. Annual address of the retiring president of the Cambridge entomological club, 11 January 1884. (Psyche, Apr. 1884, v. 4, p. 155-159, 135 cm.)

7th annual address of retiring president of Cambridge entomological club; remarks upon the interest of the club in bibliographical work, upon the importance of bibliography, upon the scope of existing periodicals of zoological bibliography, upon the value of H. A. Hagen's "Bibliotheca entomologica" [Rec., 3309], and upon the Bibliographical record of PSYCHE.
B: P. M. (4215)

Mann, B: Pickman. [Biographical notice of W: C. Krauss.] (Psyche, Jun.-Jul. 1884, v. 4, p. 191, 7 cm.)

Notice of graduation of W: Christopher Krauss from The Cornell university, 19 June 1884; extension of welcome to philosophical entomologists. B: P. M. (4216)

Mann, B: Pickman. Close of volume four. (Psyche, Oct.-Dec. 1885, v. 4, p. 335, 11 cm.)

Valedictory address of B: P. Mann as managing editor of PSYCHE; explanation of the scope of the systematic and alphabetic indices of volume four.
B: P. M. (4217)

Mann, B: Pickman. Contribution to the knowledge of parasitic life in galls. (Psyche, Sep.-Oct. 1883, v. 4, p. 89-91, 88 cm.)

Engl. transl. of G. F. Möllers "Bidrag till kändedom om parasitlivet i galläpplen" . . . (Entom. tidskr., 1882, v. 3, p. 182-186) [Rec., 3397]; lists of insects other than the gall-makers raised from galls of several species of *cynipidae* in Sweden. B: P. M. (4218)

Mann, B: Pickman, transl. The double role of the sting of the honey-bee. (Psyche, Jan.-Mch. 1885, v. 4, p. 251-252, 66 cm.)

Translation, by B: P. Mann, of "Ueber eine doppelrolle des stachels der honigbiene" (Deutsch-amer. apotheker-zeitung, 15 Jan. 1885, v. 5, p. 664) [Rec., 3722].
B: P. M. (4219)

Mann, B: Pickman, secretary. [Entomological society of Washington.] (Psyche, Mch. 1884, v. 4, p. 151, 5 cm.)

Notice of preliminary organization of Entomological society of Washington, 29 Feb. 1884. B: P. M. (4220)

Mann, B: Pickman. *Eudamus tityrus* flying at night. (Psyche, Oct.-Dec. 1885, v. 4, p. 352, 10 cm.)

Communication made to Cambridge entomological club, 11 Dec. 1885; behavior of *eudamus tityrus* attracted to artificial light at night. B: P. M. (4221)

Mann, B: Pickman. False dates. (Psyche, Mch.-Apr. 1883, v. 4, p. 31-32, 45 cm.)

Comments on the value of a systematic statement of dates of issue of scientific periodicals, and the falsity as well as unreliability of such statements when made in connection with the issues dated; thesis illustrated by a table of announced and actual dates of issue of volumes 20 and 21 of *Proceedings of Boston society of natural history*. B: P. M. (4222)

Mann, B: Pickman. Food-plants of *pulvinaria innumerabilis*. (Psyche, Oct.-Dec. 1884, v. 4, p. 224, 20 cm.)

List of food-plants of *pulvinaria innumerabilis*, compiled from various authorities; type specimens deposited in Museum of comparative zoology, Cambridge, Mass. B: P. M. (4223)

Mann, B: Pickman. Francis Gregory Sanborn. (Psyche, Aug.-Sep. 1884, v. 4, p. 205, 26 cm.)

Obituary notice of Francis Gregory Sanborn.

B: P. M. (4224)

Mann, B: Pickman. Herbert Knowles Morrison. (Psyche, Apr.-Jun. 1885, v. 4, p. 287, 22 cm.)

Obituary notice of H. K. Morrison. B: P. M. (4225)

Mann, B: Pickman. Index to entomological literature. (Psyche, 1884-1885, v. 4, p. 214, 238, 270, 302, each 4 cm.)

Advertisement.

B: P. M. (4226)

Mann, B: Pickman. Index to entomological literature. (Psyche, Oct.-Dec. 1884, v. 4, p. 223, 27 cm.)

Remarks upon the economy of a division of labor by which special students may be spared the necessity of searching through miscellaneous literature for writings upon their specialties; statement of plan for such division of labor; solicitation of contribution of special reference lists to the pages of PSYCHE.

B: P. M. (4227)

Mann, B: Pickman. The influence of meteorological conditions on insect life. (Psyche, Sep.-Oct. 1883, v. 4, p. 83-87, 146 cm.)

Abstract of C: G. Barrett's paper of same title (Entom. mo. mag., June 1882, v. 19, p. 1-5) [Rec., 3859]; effect of severely cold winters in promoting the abundance of certain species of lepidoptera, and of wet weather in destroying other species. B: P. M. (4228)

Mann, B: Pickman and Dimmock, G: Introduction to the fourth volume. (Psyche, Jan.-Feb. 1883, v. 4, p. 12-13, 36 cm.)

Statement of the material and editorial conditions under which the publication of the fourth volume of PSYCHE is inaugurated. B: P. M. (4229)

Mann, B: Pickman. [References to galls and gall-insects.] (Psyche, Mch. 1884, v. 4, p. 147, 6 cm.)

Notice of publication in Bibliographical record of PSYCHE, of references to galls and gall-insects, and of reservation of references not ready for publication; offer to supply manuscript references in exchange for equivalent returns. B: P. M. (4230)

Mann, B: Pickman. Review. (Psyche, Jun.-Jul. 1884, v. 4, p. 185, 28 cm.)

Critical notice of J: H: Comstock's "(A fragment of a) Guide to practical work in elementary entomology" [Rec., 3508]; comments on the peculiar terms of anatomical description used in the work. B: P. M. (4231)

Mann, B: Pickman. Vactor Tousey Chambers. (Psyche, Sep.-Oct. 1883, v. 4, p. 94, 15 cm.)

Biographical notice of Vactor Tousey Chambers; list of his entomological writings recorded in PSYCHE. B: P. M. (4232)

Mann's reference indexes. (Psyche, Oct.-Dec. 1885, v. 4, p. 330, 2 cm.)

Advertisement. B: P. M. (4233)

[**Medicinal use of *blatta orientalis*.**] (Psyche, Nov.-Dec. 1883, v. 4, p. 119-120, 11 cm.)

Extract from abstract (in *Deutsch-amerikanische apotheker-zeitung*, 1 Apr. 1883, v. 4, p. 49) of paper by T. Bogomolow (in *St. Petersburg medicinische wochenschrift*). B: P. M. (4234)

Müller, Fritz. Butterflies as botanists. (Nature, 10 Jul. 1884, v. 30, p. 240.) (Psyche, June-Jul. 1884, v. 4, p. 191, 7 cm.)

The use of certain plants as food by lepidoptera revealed an appreciation of the true relationship of the genera before the same was recognized by authors.

B: P. M. (4235)

[**Müller, Hermann; memoir of.**] (Amer. nat., Aug. 1884, v. 18, p. 848.) (Psyche, Aug.-Sep. 1884, v. 4, p. 211, 3 cm.)

Notice of publication, by Ernst Krause, of memoir with portrait and list of writings of Hermann Müller.

B: P. M. (4236)

Munn & co. Patents. (Psyche, 1883-1885, v. 4, p. 102, 122, 142, 154, 166, 178, 194, each 4 cm; p. 302, 9 cm.)

Advertisements. B: P. M. (4237)

Munn & co. Scientific american. (Psyche, 1884-1885, v. 4, p. 214, 238, 270, each 8 cm.)

Advertisement. B: P. M. (4238)

Murtfeldt, Mary Esther. A butterfly attracted by lamp-light. (Psyche, Aug.-Sep. 1884, v. 4, p. 206, 7 cm.)

Narration of two instances of the attraction of *apatura lycaon* by lamp-light at night.

B: P. M. (4239)

Murtfeldt, Mary Esther. Sexual characters in the chrysalids of *grapta interrogatilis*. (Psyche, Jun.-Jul. 1884, v. 4, p. 184, 17 cm.)

Statement that pale and gilded chrysalids of *grapta interrogatilis* yielded female imagoes, while males were obtained from darker colored chrysalids without brilliant ornamentation.

B: P. M. (4240)

[**Necrology.**] (Psyche, Jun.-Jul. 1884, v. 4, p. 191, 4 cm.)

Obituary notices of J. C. Schiödte, Edwin Birchall and W: Prest.

B: P. M. (4241)

[**Necrology.**] (Psyche, Oct.-Dec. 1884, v. 4, p. 236, 13 cm.)

List of entomologists recently deceased, with dates of the birth and death and with characterization of some of them.

B: P. M. (4242)

[**New scientific journals.**] (Psyche, Mch. 1884, v. 4, p. 151, 13 cm.)

Notice of several ephemeral scientific periodicals recently begun, and condemnation of the waste of effort involved in such publications. B: P. M. (4243)

Notices to entomologists. (Psyche, May-June 1883, v. 4, p. 60, 10 cm.)

Call, by J. A. Lintner, of a meeting of entomologists to be held at Minneapolis, Minn., 15 Aug. 1883; and by B: P. Mann and G: Dimmock, of a special public meeting of Cambridge entomological club to be held at the same place, 14 Aug. 1883.

B: P. M. (4244)

[**Ord, W: M.**] Erosion of glass. (Psyche, Oct.-Dec. 1885, v. 4, p. 352, 8 cm.)

Abstract of W: M. Ord's "Erosion of glass" (Nature, 19 Feb. 1885, v. 31, p. 360); chemical explanation of erosion of glass by "mud" formed by *termilina*.

B: P. M. (4245)

Osborne, J: A. [Position of embryo in eggs of insects.] (Psyche, May 1884, v. 4, p. 175-176, 9 cm.)

Extract from J: A. Osborne's "Some further observations on the parthenogenesis of *zaraea fasciata*" . . . (Entom. mo. mag., Dec. 1883, v. 20, p. 145-148).

B: P. M. (4246)

Parasitic [corr.] nematods. (Psyche, Oct.-Dec. 1885, v. 4, p. 352-353, 10 cm.)

Notice of communication made by H. Gadeau de Kerville to Société entomologique de France, 9 Sep. 1885, and of O: Linstow's "Compendium der helminthologie" . . . Hannover, 1885 [Rec., 3119].

B: P. M. (4247)

[**Passerini, Napoleone.**] Observations on decapitated silkworm moths. (Psyche, Apr.-Jun. 1885, v. 4, p. 288, 17 cm.)

Abstract of N. Passerini's "Esperienze sulla decapitazione delle farfalle del baco da seta" (Bull. Soc. entom. ital., 31 Dec. 1884, v. 16, p. 285-286).

B: P. M. (4248)

Patton, W: Hampton. Sound-producing organs in *anomala*, *anthonomus*, and other coleoptera. (Psyche, Mch. 1884, v. 4, p. 146, 15 cm.)

Statement of occurrence of stridulating organs in several *scarabaedae* and *elateridae* and in *curculionidae*; description of location of these organs.

B: P. M. (4249)

[**Phylloxera in Silesia.**] (Sciencē, 21 Nov. 1884, v. 4, p. 481, 2 cm.) (Psyche, Oct.-Dec. 1884, v. 4, p. 233, 2 cm.)

Notice of appearance of *phylloxera vitifoliae* in Proskau, Silesia.

B: P. M. (4250)

[**Phylloxera precautions at Argentine custom-house.**] (Psyche, Jan.-Feb. 1884, v. 4, p. 139, 4 cm.)

Notice, translated from *El nacional*, 8 Sep. 1883, p. 1, col. 8, of prohibition of importation of grape-vines at Buenos Aires, to avoid danger of introduction of *phylloxera vitifoliae*.

B: P. M. (4251)

- [**Phytophagous carabidae.**] (Psyche, Oct.-Dec. 1884, v. 4, p. 234, 4 cm.)
 Notice of communications by A. C. Horner and T. H. Hart, in *Entomologist*, Oct. and Nov. 1884.
B: P. M. (4252)
- [**Poujade, Gustave Arthur.**] [Predominance of genital functions.] (Psyche, Oct.-Dec. 1884, v. 4, p. 236, 21 cm.)
 Translation of communication made by G. A. Poujade to Société entomologique de France, 23 July 1884; movements of genital organs in *brepfos*, *rhodocera rhamnii* and *Lucanus cervus* observed after these insects were otherwise dead.
B: P. M. (4253)
- [**Practical naturalist (The).**] (Psyche, Nov.-Dec. 1883, v. 4, p. 116, 6 cm.)
 Notice of *Practical naturalist*, no. 1-7, published by Ward and Riley at Bradford, England.
B: P. M. (4254)
- [**Preparation of duplicate coleoptera.**] (Psyche, Jan.-Feb. 1884, v. 4, p. 140, 6 cm.)
 Reprint from *Science record*, Nov. 1883, v. 2, p. 15-16; recipe for a solution, such as that used by J. B. Smith, in which to soak certain insects to render them not liable to break.
B: P. M. (4255)
- Preservation of honey.** (*Sci. amer.*, 18 Nov. 1882, [v. 61], n. s., v. 47, p. 324.) (Psyche, Jan.-Feb. 1883, v. 4, p. 19, 4 cm.)
 Presence of formic acid in crude honey, and effect of this acid in preventing fermentation. *B: P. M.* (4256)
- Preservation of insects.** (Psyche, Apr.-June 1885, v. 4, p. 298, 8 cm.)
 Translation of a paper in *Feuille des jeunes naturalistes*, Apr. 1885, v. 15, p. 81; method of use of solution of naphthalin in benzol to prepare hairless insects for the cabinet (by —, Jacobs); verdigris removed from pins by ammonia (by C. Zuber). *B: P. M.* (4257)
- Prize work on tactile organs.** (Psyche, Oct.-Dec. 1885, v. 4, p. 351, 2 cm.)
 Notice of grant, by Académie des sciences de France, to J. Chatin, of grand prize for a work on tactile organs of insects and crustacea. *B: P. M.* (4258)
- Proceedings of societies.** (Psyche, 1883-1885, v. 4, p. 13-14, 32, 54, 75-76, 92-93, 116, 133-134, 147, 160, 170, 186, 206, 224-226, 253-254, 287-288, 311-314, 335-338.)
 For further record, see names of respective societies.
B: P. M. (4259)
- Prognostications of weather by insects.** (Psyche, Jul.-Sep. 1885, v. 4, p. 327-328, 41 cm.)
 Notice, extracted from "[Bees as storm-warners]" (*Nature*, 23 Apr. 1885, v. 31, p. 587), of article by —, Emmerig (*Natur*, 1885, no. 17), on the behavior of *apis mellifica* as indicative of the approach of thunderstorms; extracts from and references to other articles on the subject. *B: P. M.* (4260)
- Riley, C: Valentine.** Galls and gall insects. (Psyche, 1883, v. 4, p. 2, 22, 42, 62, 82, each 3 cm.)
 Advertisement. *B: P. M.* (4261)
- Riley, C: Valentine.** Parasites of the larva of *lachnosterna fusca*. (Psyche, Oct.-Dec. 1884, v. 4, p. 224, 9 cm.)
 Crit. rev. of [O. Lugger's] "[Parasites of *tiphia*]" (Psyche, Aug.-Sep. 1884, v. 4, p. 211) [Rec. 4207]; *tiphia* larvae externally parasitic on larvae of *lachnosterna fusca*, beginning to feed as soon as hatched; eggs of *rhipiphorus* probably laid on flowers frequented by *tiphia*, the *triangulins* attaching themselves to the *tiphia* and carried by it to the nest. *B: P. M.* (4262)
- Riley, C: Valentine.** Tribute to the memory of John Lawrence Leconte. (Psyche, Nov.-Dec. 1883, v. 4, p. 107-110.)
 Separate. [Cambridge, Mass., Feb. 1884.] n. t.-p., p. 107-110, 25 X 18.
 Notice. (Psyche, *ut cit.*, p. 119.)
 Germ. tr., [by F. Katter], entitled, "Zum gedächtniss von John Lawrence Leconte." (*Entom. nachrichten*, June 1884, jahrg. 10, p. 183-186.)
 Biographical notice of J. L. Leconte; amount, character and importance of Leconte's work and writings; his personal character; his relations with G. H. Horn; disposition of his entomological collection. *B: P. M.* (4263)
- [**Ross, M. Louisa.**] South American insects for sale. (Psyche, Jan.-Mch. 1885, v. 4, p. 265, 5 cm.)
 Advertisement. *B: P. M.* (4264)
- R[ye], E: Caldwell.** Influence of color on insects. (Psyche, Nov.-Dec. 1883, v. 4, p. 114, 16 cm.)
 Extract from E. F. imThurn's account (*Timchri*, v. 1, pt. 2, p. 223) of a visit to Mt. Russell in Guiana; yellow butterflies attracted to yellow flowers, and blue *morpho* to decaying banana-skins, but red species not attracted to red fruit; butterflies entrapped under a basket. *B: P. M.* (4265)
- [**Saunders, Sidney Smith;** obituary notice of.] (*Nature*, 17 Apr. 1884, v. 29, p. 581.) (Psyche, May 1884, v. 4, p. 175, 4 cm.)
 Sir Sidney Smith Saunders, entomologist, b. June 1809, d. 15 April 1884; especial student of *stylopidae*.
B: P. M. (4266)
- [**Schulgin, M.**] [Imbedding material.] (Psyche, Jan.-Feb. 1883, v. 4, p. 19, 3 cm.)
 Notice of M. Schulgin's "Zur technik der histologie" (*Zool. anzeiger*, 8 Jan. 1883, v. 6, p. 21-22).
B: P. M. (4267)
- Scudder, S: Hubbard.** Early stages of butterflies wanted. (Psyche, 1883, v. 4, p. 2, 22, 42, 62, 82, 102, each 4 cm.)
 Advertisement; same as Rec., 3085. *B: P. M.* (4268)

Scudder, S: Hubbard. The geological history of myriopods and arachnids. . . (Psyche, Jan.-Mch. 1885, v. 4, p. 245-250. 204 cm.)

5th annual address of retiring president of Cambridge entomological club; morphology and phylogeny of the several suborders of myriopoda; occurrence and distribution of these suborders and of those of arachnida in the several geologic strata, with tables. [Certain errors in the tables are referred to by author in *Comptes-rendus Entom. soc. Belg.*, 6 March 1886, p. 63.]
B: P. M. (4269)

Scudder, S: Hubbard. Notes on *melittia cucurbitae* and a related species. (Psyche, Jul.-Sep. 1885, v. 4, p. 303-304, 66 cm.)

Description of larva of *melittia cucurbitae* and of larva presumed to be of a smaller species of *melittia*, both found in *cucurbitae* vines on Cape Cod, Mass.; comparison between life-habits of the two. B: P. M. (4270)

Serpin, —. [Making insect powder from tar.] (Psyche, Mch.-Apr. 1883, v. 4, p. 40, 6 cm.)

Translated extract from *Deutsch-amerikanische apotheker-zeitung*, 1 Mch. 1883. B: P. M. (4271)

Snow, Francis Huntington. Hominivorous habits of *lucilia macellaria*. "the screw-worm." (Psyche, Mch.-Apr. 1883, v. 4, p. 27-30, 127 cm.)

Crit. rev., by J. M. F. Bigot. (Bull. Soc. entom. France, 12 Sep. 1883, no. 17, p. 154-155.)
Notice, in S: W. Williston's "The screw-worm fly" . . . (Psyche, Nov.-Dec. 1883, v. 4, p. 112-114.)

Accounts, in part quoted from accounts given by S. D. Osborn, J. B. Britton and Joshua Richardson, of several cases in which larvae of *lucilia macellaria*, deposited by the parent fly in nostrils of men, caused death or severe illness; includes notes, by S: W. Williston, on the synonymy, relationship and geographical distribution of this fly. B: P. M. (4272)

Society meetings. (Psyche, 1883-1885, v. 4, p. 20, 40, 60, 80, 100, 120, 140, 152, 164, 176, 192, each 23 cm.)

List of dates of meetings of several entomological societies. B: P. M. (4273)

[**Sprague, Frank** Headley.] [Rare diurnal lepidoptera in Massachusetts.] (Psyche, Sep.-Oct. 1883, v. 4, p. 99-100, 8 cm.)

Record of captures of rare lepidoptera rhopalocera in Massachusetts, in 1883. B: P. M. (4274)

Staphylinidae of Buenos Aires. (Psyche, Jan.-Mch. 1885, v. 4, p. 265, 5 cm.)

Notice of F. L. Arribalzaga's "Estafílinos de Buenos Aires" (Boletín Acad. nac. sci. Córdoba, 1884, v. 7, p. 1-392). B: P. M. (4275)

Stebbins, Solomon. North American ferns. (Psyche, 1883, v. 4, p. 2, 22, 42, 62, 82, each 2 cm.)

Advertisement.

B: P. M. (4276)

Strecker, Herman. Abnormal specimens of *samia* and allies. (Psyche, Jul.-Sep. 1885, v. 4, p. 312-313, 11 cm.)

Crit. rev. of W. F. Kirby's "Abnormal specimen of the genus *samia*" (Trans. Entom. soc. Lond., 1884; Proc., p. 27); the specimen described by Kirby is a suffused aberration of *samia cecropia*; description of aberrant forms of *telega polyphemus*, *antheraea yamamai* and *brapaea luna*. B: P. M. (4277)

Structure and habits of *oedematophaga acgnalis*. (Psyche, Oct.-Dec. 1885, v. 4, p. 351, 6 cm.)

Notice of a part of E: Meyrick's "On the classification of Australian *pyralidae*" (Trans. Entom. soc. Lond., 1884, p. 61-80). B: P. M. (4278)

Structure of the eyes of diptera. (Psyche, Oct.-Dec. 1885, v. 4, p. 351, 6 cm.)

Transl. of notice, in *Entomologische nachrichten*, May 1885, v. 11, p. 144, of G. V. Ciaccio's "Figure dichiarative della minuta falsbrica degli occhi de' ditteri" (Mem. della R. acad. dell' Istituto di Bologna, 1885, s. 4, v. 6, fasc. 1: 28 p., 12 pl.) B: P. M. (4279)

[**Tincture of black ants for scurvy.**] (Psyche, May-June 1883, v. 4, p. 59, 6 cm.)

Abstract of note entitled "Ameisen gegen skorbut," in *Deutsch-amerikanische apotheker-zeitung*, 1 Apr. 1883, v. 4, p. 49. B: P. M. (4280)

Tomato-plants as repellants of insects. (Psyche, Oct.-Dec. 1885, v. 4, p. 353, 12 cm.)

Reprint of "[Tomatoes as a prophylactic against insects]" (Nature, 1 Jan. 1885, v. 31, p. 202); suggestion that the growing of *lycopersicon esculentum* would repel insects; comments on the inefficacy of the plant for such use. B: P. M. (4281)

[**Tömösváry, Ödön** (=Edmund).] [Luminosity of *geophilus*.] (Psyche, Oct.-Dec. 1884, v. 4, p. 235, 5 cm.)

Notice of article by Ö. Tömösváry in *Rozprawy łupok*, 1884, v. 1, p. 171. B: P. M. (4282)

Townsend, C: H: Tyler. Calosomas and *cicindelidae* wanted. (Psyche, 1884, v. 4, p. 178, 194, each 3 cm.)

Advertisement.

B: P. M. (4283)

Townsend, C: H: Tyler. Notes on some coleoptera taken in south Louisiana. (Psyche, Oct.-Dec. 1884, v. 4, p. 219-222, 123 cm.)

Sea-coast fauna of Louisiana considered a part of sub-tropical fauna of Mexico; notes on occurrence and habits of several coleoptera of this fauna, and especially on the fulmination of *brachynus tormentarius*, on the driving of terrestrial species into trees and upon stumps by floods, on the protection of species by their habits or coloration, on sexual selection in *desmocerus palliatus*, on variations of *rhodobaenus tredecimpunctatus*, and on the odor of the latter species. B: P. M. (4284)

[**Trap-door spider nests.**] (Psyche, May 1884, v. 4, p. 176, 5 cm.)

Reprint of ["*Cteniza* in California!"] (Science, 11 Apr. 1884, v. 3, p. 469). B: P. M. (4285)

[**Trelease, W:** Notes on the relations of two cecidomyians to fungi. (Psyche, Aug.-Sep. 1884, v. 4, p. 195-200, 168 cm.)

Rev., by F. A. W. Thomas. (Irmischia, 1885, v. 5, p. 4-)

Abstract of Thomas' review, by H. A. Hagen, entitled "On the relations of fungi to galls and to larvae of *cecidomyia* living in galls." (Can. entom., July 1885, v. 17, p. 136-137.) (Psyche, Oct.-Dec. 1885, v. 4, p. 334-)

Remarks on the occurrence of larvae of *cecidomyia* in sori of several named *urediniae*, and on the food-habits of some other species of *cecidomyia*; descriptions of *rhytisma asteris*, *r. solidaginis*, and *r. bifrons* (=? *r. asteris*), on leaves of *aster* and *solidago*, the loci of these fungi being inhabited by larvae and described as the galls of *cecidomyia carbonifera*; fruit of the *rhytisma* unknown; interdependence of the fungi and insects. B: P. M. (4286)

[**Trimerous silphidae.** (Psyche, Apr.-June 1885, v. 4, p. 297-298, 5 cm.)

Notice of D: Sharp's "Descriptions of two new coleoptera sent by M. de Lacerda from Bahia" (Compt.-rend. Soc. entom. Belg., 7 Feb. 1885, p. 21-24). B: P. M. (4287)

[**Trogoderma tarsale** as a museum pest.] (Psyche, Mch.-Apr. 1883, v. 4, p. 39, 3 cm.)

Extract from [C: V. Riley's] "*Trogoderma tarsale* as a museum pest" (Amer. nat., Feb. 1883, v. 17, p. 199). B: P. M. (4288)

[**Types of lepidoptera transferred to Cambridge.** (Entom. amer., June 1885, v. 1, p. 54.) (Psyche, Apr.-June 1885, v. 4, p. 297, 4 cm.)

Notice of transfer of the collection of lepidoptera of the Peabody museum to the Museum of comparative zoology; the collection contains types by A. S. Packard, jr., and H. K. Morrison. B: P. M. (4289)

[**Wailly, Alfred.** Lepidoptera. (Psyche, 1883, v. 4, p. 2, 22, 42, 62, 82, each 3 cm.) Advertisement. B: P. M. (4290)

[**Walker, James J.**] [Pitcairn island insects.] (Psyche, Apr. 1884, v. 4, p. 164, 7 cm.)

Notes, extracted from J. J. Walker's "Entomological collecting on a voyage in the Pacific" (Entom. mo. mag., Mch. 1884, v. 20, p. 222-225), on the fauna of Pitcairn island. B: P. M. (4291)

[**Walker, James J.**] [Scavenger beetles.] (Psyche, Oct.-Dec. 1884, v. 4, p. 234, 4 cm.)

Notice of J. J. Walker's "Notes on *dermestes vulpinus* and other beetles in Sheppey" (Entom. mo. mag., Dec. 1884, v. 21, p. 161). B: P. M. (4292)

[**Waterhouse, C: O.**] Specimens faded by exposure to light. (Amer. nat., Jan. 1885, v. 19, p. 80.) (Psyche, Apr.-June 1885, v. 4, p. 297, 5 cm.)

Notice of communication made by C: O. Waterhouse to Entomological society of London, 2 July 1884; change of color produced in phytophagous coleoptera by long exposure to light. B: P. M. (4293)

[**What is involved in the production of a kilogram of honey.** (Psyche, Apr.-June 1885, v. 4, p. 299, 12 cm.)

Translated extract from *Deutscher bienenfreund*, Feb. 1885, v. 21, p. 50, with comments thereon by A. J. Cook and another; statistics of number of flowers of *trifolium* required to yield one kilogram of honey, and of amount of honey produced in one season. B: P. M. (4294)

[**Williston, S: Wendell.** Collection and preservation of diptera. (Psyche, Jan.-Feb. 1884, v. 4, p. 130-132, 57 cm.)

Directions for hunting, capturing, killing and preserving diptera for the cabinet. B: P. M. (4295)

[**Williston, S: Wendell.** Protective secretions of species of *elodes*. (Psyche, May 1884, v. 4, p. 168-169, 32 cm.)

Statement of the possession and method of defensive use of a mephitic secretion by certain species of *elodes*; habits of the beetles. B: P. M. (4296)

[**Williston, S: Wendell.** The screw-worm fly, *comptosomyia macellaria*. (Psyche, Nov.-Dec. 1883, v. 4, p. 112-114, 70 cm.)

Notice of F. H. Snow's "Hemivivorous habits of *lucilia macellaria*" (Psyche, Mch. Apr. 1883, v. 4, p. 27-30 [Rev., 427]. Ent. rev., 11. M. F. Bigot's criticism on Snow's paper; abstract of observations recorded by E. L. Attilabizca. Anal. Soc. ent. argent. (11), v. 10, p. 88-89; on habits and synonymy of *comptosomyia macellaria*. B: P. M. (4297)

[**Wood-Mason, James.**] [Tea insects of Assam.] (Science, 31 Oct. 1883, v. 4, p. 426, 7 cm.) (Psyche, Oct.-Dec. 1884, v. 4, p. 235-236, 10 cm.)

Notice of report made by J. Wood-Mason on insects injuring tea in Assam; habits and ravages of the principal two insect enemies of this plant. B: P. M. (4298)

[**Zoological society of London.** (Psyche, Jul.-Aug. 1883, v. 4, p. 76, 12 cm.)

Partial abstract (from *Zoologischer anzeiger*, 1883, v. 6) of communications made at meetings of Zoological society of London, 19 Dec. 1882 and 5 June 1883. B: P. M. (4299)

[**Zoological society of London.** (Psyche, Jan.-Mch. 1885, v. 4, p. 253-254, 18 cm.)

Partial abstract (from *Zoologischer anzeiger*) of minutes of meetings of Zoological society of London, 19 June 1883-1 Apr. 1884. B: P. M. (4300)

ENTOMOLOGICAL ITEMS.

APICAL APPLICATION OF APIS. "Sir John Lubbock says bees are not sympathetic. It may be stated, accordingly, that the warmth of their reception doesn't come from the heart."

PRIZE WORK ON TACTILE ORGANS. The French academy, on 21 Dec. 1885, granted the grand prize for anatomical and physiological research to Dr. Joannes Chatin, for his work (not yet published) on the tactile organs of insects and crustacea.

TENACITY OF LIFE IN CALLIPHORA VOMITORIA.—At the meeting of the Société entomologique de France, 8 July 1885, as reported in its Bulletin, Mr. Paul Audolent remarked that he had lately had an opportunity of proving the vital power of larvae of *Calliphora vomitoria*. Many of these larvae, which he had given as food to tritons, remained alive two days at the bottom of the water, and in fact pupated there. He had collected these pupae to see if they would reach the perfect state.

BIRDS NESTING IN HORNETS' NESTS.—In a letter to *Nature*, 12 March 1885, v. 31, p. 438, on birds nesting in ants' nests, Mr. W. Davison says of *Halcyon chloris*, a species of kingfisher, which also nests in ants' nests:

At Mergui, in South Tenasserim, I found a nest of *H. chloris* in a hornets' nest, and although I saw the birds repeatedly enter the hole they had made in the hornets' nest the hornets did not seem to mind it, but they resented in a very decided manner my attempt to interfere with the nest.

LIFE OF DR. DZIERZON.—Dr. Oskar Krancher contributes to the *Deutscher bienenfreund* for January 1885, an account of the life of Dr. Johann Dzierzon, well-known for his contributions both to the theory of bee-life and to practical apiculture. Dr. Dzierzon, or as he was commonly designated, Pastor Dzierzon, was born 16 Jan. 1811, in Lowkowitz, near Kreuzburg, Upper Silesia. Shortly after finishing his studies at Breslau,

he became, in 1835, pastor in Karlsmarkt, near Brieg, in Silesia, where he remained until lately, having just returned to live in the town where he was born.

STRUCTURE OF EYES OF DIPTERA. Professor C. V. Ciaccio, of Bologna, published in the last volume (ser. 4, v. 6, fasc. 1) of the "Memorie della R. accademia dell' Istituto di Bologna" a series of excellent illustrations of the minute structure of the eye of diptera. The paper, published under the title of "Figure dichiarative della minuta fabbrica degli occhi de' ditteri," consists of twelve large plates with explanatory text (28 pages), and gives microscopical details (enlargement from 190 to 410) of eyes of *hippoboscidae*, *oestridae*, *syrphidae*, *muscidae*, *empidae*, *leptidae*, *asilidae*, *bombylidae*, *tabanidae*, *chironomidae*, *tipulidae* and *pulicidae*.—*Entom. nachrichten*, May 1885, jahrg. 11, p. 144.

STRUCTURE AND HABITS OF OEDEMATOPHAGA AEGUSALIS. E: MEYRICK (Trans. Entom. soc. Lond., 1884, p. 73-74) makes a new genus, *Oedematophaga*, for *Pyralis aegusalis* Walk., "correcting" the specific name *aegalis*. *O. aegusalis* is a curious insect, having as one of its generic characters "Anterior femora in male with an expansible tuft of hairs," a character recalling a peculiarity of certain species of *Catocala*. The larvae feed gregariously "in large, very irregularly spherical, rough galls, three or four inches in diameter, on the branches of a phyllodineous *Acaëa*," . . . "the larva eats galleries through the substance of the galls, ejecting a good deal of the excrement from holes in the surface.

DIPTEROUS PARASITE OF THE RHINOCEROS.—Dr. Friedrich Brauer describes and figures in the Verhandlungen der zoologischen botanischen gesellschaft in Wien (1884, v. 34, p. 269-271, pl. 10) the larva of a new genus and species of *oestridae* from the stomach of *Rhinoceros sumatrensis*. The larva differs strikingly from that of *Gastrophilus* in having the arcades of the posterior stigmata forming on each side three bands,

curving in zigzag, and not three concentric semicircles, from which peculiarity the author has given the insect the generic name *Gyrostigma*. The entire larva, the mouth-parts, and posterior stigmata of *G. sumatrensis*, the new species in question, are figured.

POSTURE OF NEWLY EMERGED BUTTERFLIES.—Mr. Joseph Anderson called attention, several years ago, in the *Entomologist*, to "a singular habit of *Apatura iris* upon emerging from the puparium,—to wit, its clinging to the empty case with the head uppermost for five or six hours, and then reversing the position (still keeping hold of the chrysalis) and remaining with head down and wings upward for a similar time." Since that time Mr. Anderson has learned from Mr. F. N. Pierce, of Liverpool, that *Vanessa polychloros* has a similar habit, except that it leaves the pupal case and clings to a branch. In a note in the *Entomologist* for September 1885 (v. 18, p. 241-242), Mr. Anderson asks the reason for this curious habit of two butterflies, which thus differ in habit from *Vanessa io*, *V. urticae*, *V. cardui*, and *Erebia medea*.

EROSION OF GLASS.—Under this title William M. Ord communicates to *Nature*, 19 Feb. 1885, v. 31, p. 360, the results of some experiments upon the erosion of glass by alkalis in connection with colloid substances. These experiments were undertaken with especial reference to the question of how "white-ant mud" was capable of eroding glass. Mr. Ord thinks that "the white-ant mud must consist of a mixture of some colloid with carbonate of lime or some other salt capable of taking spherical form." In conclusion he adds, as a result of his experiments, "It suffices, at the moment, to indicate that the surface of a glass slide may be eroded in a way to suggest the action of an acid, such as hydrofluoric acid, when no free acid is present; and that erosion may occur when the glass is brought in contact with alkaline fluid, a colloid, and crystalline substances capable of

assuming, in the presence of a colloid, spheroidal form."

EUDAMUS TITYRUS FLYING AT NIGHT.—On the evening of 5 Aug. 1885, at 9 h. 30 m., I removed a mosquito netting from a window near which I was sitting, to close the window for the night, when a butterfly flew in. It fluttered very little in the room, and supposing it to be a moth I paid no particular attention to it at the moment. About ten minutes later, however, happening to approach the gas chandelier, I saw the butterfly suspended to one of the screws holding a glass globe around one of the gas-jets. It was stationary, but frequently uncoiled its tongue so that only the tip remained between the palpi, and then slightly coiled and uncoiled it so as to rub the tip between the palpi. It would suddenly coil the tongue up completely, and then soon resume the former motion. Upon my attempting to capture it, after watching it some time, it uncoiled the tongue so as to free the tip completely from the palpi, and then beat against the globe as a moth would to get at the flame. Finally it got inside the globe and scorched its wings and fell to the floor, but fluttered frantically when I tried to pick it up. It proved to be *Eudamus tityrus*, and is sent herewith.—*B. Pickman Mann*, at meeting of C. E. C., 11 Dec. 1885.

PARASITES NEMATODS.—M. Henri Gadeau de Kerville, at the meeting of the Société entomologique de France, 9 Sept. 1885, reported the finding of three species of nematods in arthropods, which are interesting additions to the lists of arthropods in which parasitic vermes have been found. The species of nematods were determined by A. Villot, of Grenoble, as follows: *Gordius emarginatus* Villot, of which the determination is doubtful because the caudal extremity of the specimen was partly hidden in the digestive tube of a *Lithobius forficatus*, its host, from which M. Villot did not wish to completely extract the worm; *Mermis acuminata* Siebold, from a larva of *Ypsipetes sordidata* Fab.; and

Mermis nigrescens Dujardin, of which a young individual was taken from a larva of *Hybernia defoliaria* L. *Gordius* has not been known hitherto as a parasite of a myriopod.

In this connection attention is called to a work on these parasites, which seems to be little known in America. This is Linstow's Compendium der helminthologie . . . 1878 [Rec., 3119], in which one is able readily to trace the literature of most species of parasitic worms if either the name of the host, whether vertebrate or invertebrate, or that of the parasite is known.

TOMATO-PLANTS AS REPELLANTS OF INSECTS.—According to the *Colonial mail*, a statement comes from the Cape Colony which is deserving the attention of botanists. It is alleged that insects shun the land on which tomatoes are grown; and the cultivation of the *Lycopersicum esculentum* is accordingly recommended in all cases where it is possible to grow it—under fruit trees, for instance, since the tomato will thrive in the shade of other trees, which few other plants will do—for the sake of the virtues attributed to it as prophylactic against the inroads of insect pests. It would be interesting to know whether the tomato has been observed to exercise any such effect upon insects elsewhere—in Canada, for instance, where the fruit is so popular—or whether it is only in warmer climates, like that of the Cape, that its peculiar powers are brought into play.—*Nature*, 1 Jan. 1885, v. 31, p. 202.

It may be sufficient to state that the use of tomato leaves as repellants of insects was recommended in France and in the United States at least as long ago as the year 1846, but that experiments properly made have shown the inefficacy of the remedy. The roots, stems, leaves and fruits of this plant are eaten by numerous species of insects. There is no reason to suppose that the Cape Colonists are any less ready than their northern relatives to jump to the conclusion, on insufficient grounds, that because a plant has

certain qualities noxious to man, it is therefore also noxious to insects.

FOSSIL THYSANURA.—At the meeting of the Société entomologique de France, 27 May 1885, as reported in its Bulletin, Mr. C. Brongnart made the following communication:

"Claus places the thysanura among the orthoptera; they are generally considered to be the primordial type of insects. No one has recorded them from the paleozoic strata.

"Nevertheless they existed as early as the coal period, for forty-five specimens have been found in the schists of Commeny. It is difficult to see the number of joints of the tarsi, palpi and antennae, but these organs are distinguishable on many specimens. The body is cylindrical, slender at the posterior part, and ends in a multiarticulate filament as long as the body. The antennae and tarsi are thickish. The head appears quite broad. The prothorax is very short, and the mesothorax and metathorax are equal in length and much longer than the prothorax. The abdomen has ten segments, equal among themselves; the terminal one, which bears a multiarticulate filament, is a trifle the longest. There seemed to me to be abdominal laminations upon one of the specimens, as there are in *Machilis*. The whole animal (antennae, feet, thorax, abdomen) is clothed with very thick and very short hairs. The body, including the abdominal filament, varies in length between 15 and 22 mm.

"This insect resembles morphologically *Lepisma* and *Machilis*; it differs from them by many characters, but principally in the presence of a single abdominal filament in the fossil form.

"I designate this ancestor of the living thysanura under the name of *Dasyleptus (dasys leptos) lucasi*, dedicating it to Mr. Hippolyte Lucas, of the Natural history museum of Paris."

ON CARRYING HIBERNATING LARVAE THROUGH THE WINTER.—I have sometimes so carried larvae in ice boxes, or in ice

houses, or in snow banks, by aid of friends in the northern states mostly, but last fall I heard of a large room called a "cooler" at the Sanitarium at Clifton Springs, New York, in which meat and vegetables are kept, the temperature averaging 40° F. all the year, and my application for a little space was kindly received. In October, I sent on two boxes by express, in which were a large number of larvae, some of them very rare. Of these were *Argynnis halcyone*, just from egg; *Salyrus charon*, also just out of egg. These small larvae were in paper pill boxes, inside tin. There were also a few larvae of *Chionobas chryxus*, *Hip. ridingsii*, *Colias alexandra*, *Phyciodes picta*, in stages from second to fourth; and several *Melitaea rubicunda*, past third moult from Vancouver's Island, and [*M.*] *phaeton* at same stage. Early in March I received the larvae per express. On opening the box nearly every one of the young larvae first named were alive, and in a few moments were moving. The larger part of *rubicunda* and *phaeton* were in good condition. One *alexandra* out of two was healthy, and one *picta* out of three. The *chryxus*, past third molt (one), and the *ridingsii*, past first (one), were dead. On the whole, there was scarcely any loss from the four months seclusion. The *Chionobas*, I am disposed to think, died in transit to me, from rolling about in its box, as it was stout and healthy looking when I received it. Probably all the satyrid larvae would have done better if they had not been allowed to feed in the fall, but had on hatching been subjected to the cold. I had no plants ready for these larvae on their arrival except grass, and on this I placed part of the *charon*, who very soon began to eat along the edges of the leaves. The remainder of all species I put on ice, or under rocks in the woods, to

stay till I could force food-plants for them.—*W: H: Edwards* (Can. entom., June 1885, v. 17, p. 113-114).

ANATOMY OF *MACROTOMA PLUMBEA*.—“Ueber *Macrotoma plumbea*. Beiträge zur anatomie der poduriden” is the title of a 46-page inaugural dissertation, by Albert Sommer, from the Göttingen university, also published, with a plate, in the *Zeitschrift für wissenschaftliche zoologie*. The author studied carefully the histological structure of the ventral tube with its pocket-formed, evaginable lobes for attachment of the insects to objects beneath them, and finds that unicellular glands furnish the tube with the secretion necessary for attachment, and make it a remarkably good adhering organ that enables the little animal to move on vertical smooth surfaces. The egg is formed, by the union of yolk-substance, from an aggregate of cells at first of uniform shape which have their origin in the germarium; a germinal vesicle is lacking; a condition which calls to mind the eggs of viviparous dipterous larvae studied by Ganin. The observation is interesting that even the adult insects still molt every two or three weeks. In molting the old hairs are stripped from the new layer of skin; the scales, on the other hand, are shed without connection with the new ones. A gregarinid occurs as an almost constant parasite in the chylific ventricle; outside the digestive tract occur pseudonavicellae, cysticercae similar to those described by Stein from the digestive tract of *Tenebrio molitor*, and nematods rolled up spirally. It would have been better to have replaced the name *Macrotoma*, used in the *cerambycidae* since 1832, by *Tomocerus* Nicolet 1841.—*Entom. nachrichten*, July 1885, jahrg. 11, p. 221-222.

Nos. 135-137 were issued 21 Feb. 1886.



SYSTEMATIC INDEX TO PSYCHE, VOL. 4.

(According to the Dewey decimal system.)

By BENJAMIN PICKMAN MANN.

[Copyright, 1889 by B. Pickman Mann.]

O. GENERAL.

01. BIBLIOGRAPHY.

Importance, 4215, 4227. Principles, 3306. Dates, 4222. Use of catalogs, 4087.

011. General bibliographies, 4233.

012. Bibliography of special authors [see also **018. Author catalogs**], 3270, 4098.

Binney, 3975. Bland, T., 3975. Kiesenwetter, 3166. Leuckart, 4109. Löw, H., 4027. McCook, 4074. Rondani, 4023-4024, 4026. Say, 4160. Yersin, 3291 *w*.

014. Bibliography of special forms.

Anonymous [omitting those from 3162 to 3211, and from 4058 to 4300], 3102, 3126, 3144, (3359), 3361, 3492-3493, 3517, 3523, 3529, 3722 (4219), 3758, 3766, 3836, 3875-3876, 4010.

Indices. Linstow's Compend. d. helminthologie, 3119. Mann's Index to entom. liter., 4226-4227. Mann's Ref. indexes, 4233. Repts. State entom. Mo., 3290. 2d rept. U. S. entom. comm., 3291 *x*.

016. Bibliography of special subjects (see also **011**).

016, 5. Science, 4141.

016, 579. Collecting, 3772.

016, 59. Zoology, 4215.

016, 591, 1. Physiology. Locomotion, 3939. Luminosity, 3589.

016, 591, 2. Pathology. Parasites, 3364, 3569.

016, 591, 3. Embryology. Adolescent states, 3145, 3290.

016, 591, 5. Biology, 3416, 3536. Entomocecidia, 3416, 4177, 4230. Migrations, 3291 *d*. Oviposition, 3520.

016, 591, 6. Economic zoology. Orchard pests, 3752.

016, 591, 7. Anatomy: of glands, 3734; of olfactory organs, 3872; of anal appendages, 4061; of scales, 4119; of lampyridae, 3589.

016, 591, 8. Histology: of brain, 3291 *l*; of dorsal vessel, 3729; of hexapoda, 3291 *k*.

016, 591, 9. Fauna: of Europe, 3145, 3999, 4141; of North America, 3270, 3723, 3948.

016, 595. Entomology, 3316, 3651-3658, 4214 (4215), 4226-4227.

016, 595, 1. Vermes, 3119, 3569.

016, 595, 4. Arachnida. Demodex, 3823. Hydrachnidae, 3999. Theridiidae, 3723. *Idiosoma*, 3948. Solpugidae, 4104.

016, 595, 7. Hecapoda, 3300-3303, 3306, 4023-4024, 4026-4027, 4101. Acridiodes, 3291 *d, s*, 3487. *Cavellia*, 4140. *Idiosoma*, 3999, 3790, 3792, 3793, 3926. *Cheops*, 4141. *Idiosoma*, 3999, 3790, 3520, 3536. *Crambus*, 3334. *Idiosoma*, 3999, 3793, 3901.

016, 91. Geography. Cassel, 4141.

018. Author catalogs (see also **012**), 3145.

Abbot, P. S., 4087. Ackermann, (4141). Adolph, 3101. Albrecht, 3186. Allen, G., 3190. Anderson, J., jr., 3103-3104, 3675-3676, 3885, 4063. Anderson, T. J., 3591. André, E., (4139), 4149. Andrews, 3592-3593. Angus, 4299. Angus, 4064. Anthony, 3595-3596. Apgar, A. C., 4066. Arms, J. M., (4142). Aruhart, 3597. Arribalzaga, (4275). Ashmead, 3105-3116, 3598-3600, 3886. Aubert, (4068). Audouin, 4069. Aurivillius, 4070, (4110). Austin, E. P., 3601-3603, (4098). Austin, R. M., 3604. Axon, 3505.

Bachmann, 3235. Bacon, G. W., 3190. Bacon, W. D., 3605. Bailey, J. S., 3606, 3887. Baird, 3160. Balbiani, 3788. Balding, A., 4141. Balding, G., 3607, 3677. Barbier, 3608. Barbour, 3609. Bargagli, 3610. Barlow, J. G., 3402. Barlow, T., 3611. Barnard, G., 3888. Barnard, W. S., 3506, 3612-3620, 3628, 4071, 4073. Barnes, H., 3414. Barrett, 3236, 3503, 3621, 3889 (4228), 4072. Barricelli, (4141). Bassett, 3354-3356, 3357 (3416, 3501), 3622-3623, 3890. Bassnett, 3670. Bates, H. W., 3624. Beauregard, (4154). Beijerinck, 3891. Belling, 3625. Bell, J. T., 3237, 3892. Bennett, 4191. Berg, 3238, 3626-3627, (4156). Bergroth, 3239. Berlese, 3893. Bertholet, 3240. Bertkau, 3678. Bessey, 3679 (3754). Bethune, 3241, 3628. Bettany, 3894. Bieler, 3242, 3292. Biggs-Withers, (3765). Bigot, (4297). Billups, 4147, 4149. Biró, 3895. Blanchard, F., 3896. Blaney, 3629. Boden, 3293. Bogomolow, (4234). Boisduval, 3842. Borgmann, 3294-3295. Bourne, 3877. Bowditch, 3630. Bowles, W., 3291 *u*. Brandt, 3358. Brauer, 1855 (3455), 3631, 3897 (4141), 4075, (4121). Breitenbach, 3898. Brewer, 3781. Briant, 4193. Briggs, 3680. Brinton, 3165. Britton, 4272. Brongniart, 3681, 4076, (4087). Brown, 3720. Brown, (4134). Brunner von Wat-

tenwyl, 3632. Brush, 3633. Buckler, 3456, 3634-3635. Buckton, 3636, (4083). Buel, 3899. Burgess-3274, (4061), (4098). Burton, (4093). Bush, A. L., 3284. Bush, I., 3637. Butler, 3225, 3243-3245, 3638, 4149, 4299. Butlerow, 3285. Buzek, 4143.

Cambridge, 3172, 3286, 4299. Camerano, 3682. Cameron, —, (4093). Cameron, P., 3457, 3639-3640, 3900-3901. Campbell, G. D., 3902. Campbell, F. M., 1193. Campbell, J. M., 4190, 4192. Candèze, 3641-3642, 3683. de Candolle, A., 3190. Carlet, 3429, 3684, 3685 (4089). Carrington, 3171, 3174, 3190, 3192-3193, 3196, 3204, 3643, 3933. Carus, 3190. Caramber, 3297, 3686-3687, 3903-3913, 4091. Champignon, 3458, 4149. Chapin, 3705. Chapman, A. W., 3688. Chapman, I., 3689. Chatin, 3789. Cheshire, 4149. Child, 4087. Cholodkowsky, 3690. Chun, 3190. Chretien, 3914. Christy, 3645, 4172, 4191, 4193. Ciaccio, (4279). Claparède, (3999). Clark, (4139). Clarke, 3915. Claypole, 3359. Clemens, 3691-3699, (3910), 3916. Clement, 3162. Clements, 3917. Clifford, 3918. Cobbold, 4191. Cockercell, 3919-3920. Coleman, 3921-3923. Collier, 3360=3507. Comber, 3924. Comstock, J. H., 3247, 3358 (4231), 3628, 3700-3714, (3763), 3925, 4094. Cook, 3926-3927, 4095, 4294. Cooke, E., 3298, 3928. Cooke, M., 3705. Cooper, 3929. Cope, 3930. Coquillet, 3212, 3719, 4096. Corbett, 3299. Cornelius, (4165). Corning, 3931. Couper, 3932. Coverdale, 3933. Cox, E. W., 3934. Cramer, A. W. P., 3935 (4132). Cresson, 3790-3822. Cressy, 3569. Crotch, 3213. Csokor, 3823.

Dahl, 3824-3826, 3937, 4097. von Dalla Torre, 3900-3903, 3906. Danielson, 3716. Darwin, C., 2377 (3680), 2378 (3720, 3725), 2369 (3749-3744). Davis, W. T., 4100. Davison, 4099. Deane, 4142. DeGarmo, 3827. DeGrey, (3259), 3332, 3938, 4193. Delpiu, 3562. Delugin, 4139. Dewitz, 3828, 3939-3940. Dimmock, A. K., 4087, 4101 (4083), 4102. Dimmock, G., 2985 (3675, 3677), 4078-4087, 4103-4118, 4119 (4079), 4136, 4229, 4244. Distant, 4122-4123, 4149. Dixon, 4272. Dobson, 3304-3305. Dodge, C. R., 4124. Dohrn, C. A., 3170, 3182. Dollfus, 4138. Donckier de Donceel, (4142). Dorfmeister, 3829. Doubleday, E., (3850). Douglas, 3509 (3514). Druce, 3830, 4299-4300. Dubois, A., 4125. Dubois, R., (4068). Du Bose, 3831. Dury, 3203, 3270, 3832. Dwight, 3833. Dyer, 3190.

Eaton, A. E., 3459, 3834, 3941, (4086), 4191. Edes, 3835. Edwards, H., 3190, 3215-3218, 3248-3251, 3255-3256, 3646. Edwards, W. H., 3214 (4052). 3252-3254, 3257-3258, 3274, 3647-3649, 3688, 3837-3861, 3942-3946, 4048, (4081), 4126. Eckelberg, 3947. Elwes, 4149. Emerton, 3723, 3948. Emmerig, 4260. Enock, 4149.

F., J., 3194. Farn, 3622. Fauvel, 3363, 3651-3658. Fay, H. T., 3952. Felissis-Rollin, 3168. Fernald, C. H., 3219, 3259, 3953-3956, (4139), 4152. Fischer, E., (4073). Fischer, P., 3957. Fitch, A., (3219), (3910), (4199). Fitch, E. A., 3364-3365, 4149. Fletcher, J., 3724 (3728). Fletcher, J. E., 3460. Flower, 3181. Foerste, 3551 (3564), 4078, 4081. Forbes, H. O., 3958. Forbes, S. A., 3407, 3747, 3959-3962, 4155-4156. Foster, 3187. Fournie, 3190. Fournier, 3725. Fowler, 3366, (4130), 4157. French, 3220, 3260-3263, 3367, 3863-3864. Frenzel, 3510. Frey, 3368. Friedlander, 4158. Frost, 3369. Fuchs, 3963. Fuller, 3964. Fyles, 3726 (3759), 3727 (3724), 3728, (3761), 3965.

Gadeau de Kerville, (4247). Gangee, 3187. Gardner, 3370 (3423). Geikie, 3190. Gentry, 3966. Gerard, 3967. Gerber, 3406. Gestro, 4143. Giard, 3968. Gibbs, 3371. Girard, 3163, 3969. Giraud, 3372. Gissler, 3553, 3970-3974. Glover, (3570). Goding, 3865-3866. Godman, (4122), 4299-4300. Goodale, 3562. Goossens, 3461. Gosse, (4082). Gould, J. S., 3716. Graef, 3432. Grassi, (4138). Gray, A., 3190, 3373-3376, 2410 (3741). Gray, A. F., 3975. Greene, 3976. Gregson, 3977. Griffith, 3187. Grote, 3221-3225, 3264-3267, (3332), 3639 (3594), 3867-3868, 3978-3997, 4048, (4091), 4149, (4159). Guillebeau, 3869, 3998. Gundlach, 3268.

Hagen, 3226, 3306 (3300-3303, 4026-4027, 4215), 3378 (3412, 3424), 3462, 3480, 3728, 4084, 4086, (4133), 4160-4163. Hatleman, 3511. Haller, 3999. Harding, 3379-3380. Harrington, W. H., 3660-3661, (4136). Hart, C. H., 3165. Hart, T. H., (4252). Hayward, 4000-4003, 4081-4083, 4086. Hazlewood, 4164. Heatt, 3899. Hellins, 3383-3385. Henking, (4078). Henry, 4004. Hinkley, 4166. Hinkley, 4086. Hitchings, 4149. Hoffmeister, 3386. Horn, 3117, 3387, 3463, 3870, 4005-4006, 4058. Horner, (4252). Howard, L. O., 3310, 3332, 3336, 3348, 4167-4168. Howgate, 4169. Hubbard, E. S., 3569. Hubbard, H. G., 3291 n, 4170. Hudson, 4007, 4171. Hutton, 4134. Huxley, 3190.

Jack, 4078, 4174. Jacobs, (4139), (4257). Jaeggi, 3183. Jaworowski, 3388, 3729. Jenkyns, 3389-3390. Johnson, S. W., 3716. Jones, E. D., 4175. Jones, E. H., 3391-3392. Jones, W., (4136). Jordan, 4176. Jousset de Bellesme, 3393-3395.

Kane, 3464. Karpelles, 4008. Karsch, 4177. Kellicott, 3269, 3465, (4201). Kent, 4178. de Kerchove de Denterghem, 3466. Keyserling, 3733-3733, 4009. Kingsley, 3871, 4142. Kirby, W., (3241). Kirby, W. F., 3274, (4113), 4149, (4277). Klemensiewicz, 3734. Kliver, (4086). Kohl, 4011-4012. Kraatz, 3166. Krancher, O. P., 4179, (4189). Kraepelin, 3467, 3872. Krause, (4236). Krauss, 4180. Kreithner, 4013. Kriechbaumer, 3873. Krukenberg, 3468. Künckel d'Herclais, 3735, 3874. Künstler, 3736.

Laboulbène, 3372, 3737, (4120). Ladd, 4087. La Munyon, 3469-3470. Landerer, 4181-4183. Landwehr, 3878. Lange, 4184. Lankester, 3471, 3877, 4300. La Salle, 3879. Layet, (4138). Leconte, 3118, 3512, 2888 (3892), (4168). Lefèvre, (4185). Leidy, 3513, (4187). Lendenfeld, 4188. LeRoy, 3190. Leuthner, 4300. Lewis, G., 4149. Lichtenstein, 3472. Lintner, 3120-3121, 3271-3272, 3473-3474, 3594, 3628, 3650, 3663, 3862, 3950, (4103), 4196-4202, 4244. Linstow, 3119 (4247). Llewellyn, 3475. Locard, 3168. Lockwood, 3122. Looss, 4204. Löw, F., 4014, 4203. Lowne, 3880, 4205. Lubbock, 3434-3438, (4146). Luhsinger, 3869. de Lucietis, 3291 n. Ludwig, 3476. Lugger, 4206, 4207 (4262). Lyman, J. B., (3570).

Mabile, 3164. McCook, 3477, 3894, 4058. McDonald, 3478. McLachlan, (3317), 3479-3483, 3514, 3515 (3509), 3738 (3419=3760), (4074), (4140), 4149. Macleay, 4194, 4208. MacLeod, 3881, 4016-4019. Macloskie, (4141), 4209-4210. McMurrick, (4141). McRae, 3484-3486. Macleiddt, 4015. Maggiorani, 3190. Mann, B. P., 3291 s, 3487, 4075, 4078, (4084), (4086), 4087, (4098), 4136, 4142, 4177, 4212-4233, 4244. Mantegazza, 3190. Mark (4098). March, 3291 n. Martin, L. J., (4141). Martini, 3488.

Marx, 3123. Maskell, (4144). Maus, 3227. Mead, 3124. Meade, 3516. Meehan, 4058. Méglin, 3768. Meinert, 3489. Melchert, 3490. Meldola, 4149. Mellichamp, 3322. Melvill, 3491. Meyrick, (4278). Michael, 4192. Mik, 3396 (3404-3405). Milizia, 3291 *u.* Minà-Palumbo, (4142). Minot, 3291 *k.* (4141). Möller, 3397 (4218). Möscher, 3494-3498, 4020. Moffat, 3127-3130. Mojsisovics, 3131. Mole-schott, 3190. Morris, J. G., 3132 (3125). Morrison, 656 (4061). Moseley, 3133, 3206, 3664. Muellenhoff, 3739. Müller, F., 3443, 4444 (3519), 3740, 4149, 4235. Müller, H., 3134, 3439-3440, 3552, 3562, 3564, 3741-3744. Müller, W., 3745. Munn, 4237-4238. Murie, 4192-4193, 4205. Murray, W., 3135. Murtfeldt, 3499, 4239-4240. Myer, 3291 *c.* Myers, 3136.

Neumoenen, 3228-3229, 3273, 3287. Nordenskiöld, (4110). Norton, J., (4142). Nusbaum, 3509. Ollivi, 4149. O. d., 4245. Ormerod, 3441, 4149. Osborn, H., 3746-3756, (4104). Osborn, S. D., 4272. Osborne, 3518, (3523), 3757, 4021, 4022 (3723), 4246. Ostu Saken, 3398-3401, 3408, 3443, 3519-3520, (3622), 4023-4027, (4096), (4142). Packard, 3137-3139, 3291, 3338 (3344), 3442, 3521, 3665-3666, (3910). Palmer, 4195. Parfitt, 3522. Pascoe, 4149. Passerini, 4248. Pasteur, 3362. Patton, 3444, 4028, 4149, 4249. Peach, 3524 (4080). Peal, 4029-4030. Peck, C. H., 4141. Peringuey, 4147. Peters, (4136). Petiver, (3226). Pierce, 3525. Pike, 3526. Plateau, F., (4087). Plowright, 3527. Poisson, 3528. Porter, (4135). Poujade, 4253. Poulton, 4031. Pseud'homme de Borre, (4096). Proost, 3190. Pütt, (4198).

Quatrefages, 3190. Ragusa, 3140-3141. Ramsay, 4195. Ratte, 4195. Rauwenhoff, 3190. Reed, 3142, 3663, (4108). von Reizenstein, 3143. Reuter, 3445. Ribeaucourt, 3539. Richardson, 4272. Ricksecker, 4039. Riggs, 3716. Riley, —, (4254). Riley, C. V., (3267), 3288, 3290-3291, 3307-3336, 3339-3354, 3402-3404, 3409-3429, 3446-3454, 3501, 3516, 3531-3544, 3545 (3506), 3536 (3520), 3547-3550, 3554, 3570-3584, 3612, 3667 (3594), 3668 (3647), 3670, 3705, 3748, 3754, 3759-3761, 3770, 3885, 3882, 4073, (4135), (4141), 4143, 4149, 4186, 4261-4263, (4288). Robineau-Desvoidy, (3968). Rogenhofer, 4020. Rolfe, 4193. Romanes, 3190. Ross, 4264. Roth, A. W., 3537. Roth, H. L., 4193. Rüst, 3538. Rupertsberger, 3145. Rye, 4265.

Sallé, 3173. Salvin, (4122), 4299-4300. Sandahl, 3211. Sang, 3539. Saunders, E., 3502. Saunders, S. S., 4149. Saunders, W., 3146-3150, 3540, 3628, 3726, 4032, (4196). DE SAUSSURE, 3291 *u.* Say, 3430-3431, 3899, (4160), (4168). Schaafhausen, 3190. Schaitter, 4033. Schaaup, 4034-4040, (4186). Schiemenz, 3337 (4118). Schilde, 3151, 3762. Schletterer, 4041. Schmeideknecht, 3766. Schneck, 3426. Schneider, A., (4133). Schneider, F. E. R., 3230. Schoch, 4042. Schönfeldt, 3153. Schofield, 4139. Schræder, 3231. Schulgin, 4267. Schwarz, 3309. Scott, 4083. Screven, 3336 (3348). Scudder, 3274 (3258), 3275-3277, 3291 *g.*, 3541-3542, 3628, 3710, 3763, 3951, 4078-4083, 4085-4087, (4098), (4142), 4268-4270. Sedgwick, 3569. Serpin, 4271. Sharp, 4043, 4147, 4149, (4287). Shimer, 3553, 3554 (3584). Sicard, 3190. Siewiers, C. G., 3543, (4061). Simmonds, 3152. Skinner, 4058. Smith, Emily A., (3219), 3663, 3669 (3594), 3670. Smith, F., (3812).

3815-3817). Smith, J. B., 4044-4046. Smith, S. I., 3716. Smith, T. B., (4155). Snow, 3965, 4047-4049, 4272 (4297), 3092 (4288). Sograff, 3764. ZU SOLMS-LAUBACH, (4131). Sommer, (4062). South, 3765. Spångberg, 3195, 3278-3281. Speyer, 3154, 3274, 3277. Spiller, (4117). Spofford, 3291 *u.* Sprague, F. H., 4274. Sprague, I., 3562. Stainton, 3210, (4133). Stanley, 3544. Stebbins, S., 4276. Stein, 3155. Stevens, 4194. Stevenson, W. G., (4142). Stillman, 3555 (3974). Strecker, 2733 (3124), 3156, 399 (3965), 4277. Stretch, 3282, (4061). Sufrian, 3671. Syme, 3545.

Tallant, 3157. Tasker, 3556. Taylor, T., 4073. Tepper, F., 3432, 4050-4052. Tepper, J. G. O., 4191. Thaxter, 4078. Thomas, C., 3291. Thomas, F. A. W., 4162. Thomson, 3190. IM THURN, (4263). Tilghman, 3557. Todd, 3158-3159, 3558. Tommasi, 3190. Tömösváry, 4282. Townsend, 3559, 3672, 4283-4284. Treat, 3340, 3560-3561. Trelease, 3289, 3551, 1794 (3552), 3562-3564, 3673, 4078, 4286 (4162). Tribolet, 3184. Trimen, 3767 (4123). Troop, 3565. Trouessart, 3768. Trouvelot, 3674. Tyrrell, 4053.

Verrill, 3566-3569. Vogel, (4256). Voges, 4034. Wailly, 4149, 4290. Walker, J. J., 4291-4292. Wallace, 2362 (3742). Walsh, 3349-3353, 3452-3454, 3546-3550, 3553-3554, 3570-3584, 3769-3770, 3882. Ward, (4254). Warder, 3308. Waterhouse, 4293. Watson, 3585. Websdale, 4055. Webster, F. M., 3586, 3771, 4056. Weidinger, 3161. Weir, 3772-3776, 4172, 4191. Weismann, 3587 (3437). Westhoff, 3777. Westwood, 4149. Wetherby, 3659 (3594), 3663. Weyenbergh, 3778. Weyner, 4057, (4165). White, W. W., 3716. Whitney, 3588. von Wielowiejski, 3589. Wilkinson, C., 3503. Wilkinson, C. S., 4195. Williams, 3190. Williston, 3232-3233, 3779-3784, 4272, 4293-4297. Wilson, O. S., 3785. Witlaczil, 3504, 3590. Wood-Mason, 4149, 4298, 4300. Worthington, 3234, 3439, 3786, 3883. Wright, W. T., 3787. VAN DER WULP, 3405.

Zacharias, 3190. Zeiller, 3884. Zuber, (4257).
025. Library administration. Books for sale, 3651-3658, 4139, 4158. Books wanted, 4142. Prices of books, 4123.

04. POLYGRAPHY.

Extracts, notices and reviews. (*See references in parentheses under authors, periodicals, and society publications.*)

06. GENERAL SOCIETIES.

Académie de France, 3968. Peabody museum, 4289. Royal society of Tasmania, 4178.

1. PHILOSOPHY.

124. Teleology. Beauty, 3924.

17. ETHICS.

174. Professional ethics, 3968.
178. Temperance, 4183.

2. RELIGION.**220,859. Bible zoology.** Leviticus, 4008.**3. SOCIOLOGY.****32. POLITICAL SCIENCE.****325. Immigration,** 3291 c.**34. LAW.****343. Criminal law.** In Great Britain, 3359.**347. Private law treatises.** U. S. postal laws, 3925.**35. ADMINISTRATION.**

Administrative measures against agricultural pests, 3291 c, 3359, 3466, 3641-3642, 4251.

353. United States institutions. U. S. Department of agriculture, 3710, 3976, (4130), (4136), 4143. U. S. Entom. comm., 3290 (3288), 3291 (3536), (3307), 3976. U. S. National museum, 3160, 3710.**353,9. State institutions.**
353,974,7 *New York.* N. Y. State mus. nat. hist., (4103).353,977,3 *Illinois.* Ill. State lab. nat. hist., 3407.**37. EDUCATION.****370,6. Societies.** Mass. teachers' assoc., 442.**378. Colleges and universities.** Cornell univ., 3508, 4153.**38. COMMERCE.****389. Metrology,** 3509, 3514-3515.**4. PHILOLOGY.****47. Latin.** Celts, 3728, 3761.**492, 4. Hebrew.** Names of animals, 4008.**496. African languages.** Niyanja Muta Nzige, 3544.**5. NATURAL SCIENCE.****504. Lectures,** 3438, 4158.**505. Periodicals,** 4243.**505, 4. European.** Bull. del nat. collectore, 4077. Feuille d. jeunes nat., 4106-4107. *Natura*, 4132. *Pract. nat.*, 4254.**505, 7. North American.** *Kansas City rev.*, 4135. *Nat. can.*, 4136. *Sci. rec.*, 4142.**506. Societies.****506, 42. British,** 4134, 4138, 4141.**506, 43. German,** 3739, 4134, 4141.**506, 44. French,** 4131, 4258.**506, 47. Russian,** 4133.**506, 7. North American,** 3121, 3535, 4141, 4199.**506, 71. British American,** 3661, 4132.**506, 73. United States,** 4142.**506, 744. Massachusetts,** 4132, 4134, 4138, 4222.**506, 747. New York,** 3316, 4100, 4131.**506, 748. Pennsylvania,** 4058, 4187.**506, 749. New Jersey,** 4066.**506, 774. Michigan,** 4095.**506, 777. Iowa,** 4104.**506, 944. New South Wales,** 4142, 4194.**507. Education.** Prizes, 4134, 4258.**Museums.** In *Sueden*, 4130.**Schools.** In *Connecticut*, 4132. In *Kansas*, 4048.**52. ASTRONOMY.****529. Chronology.** Almanacs, 3651-3658.**53. PHYSICS.****535. Optics.** Coloration of scales, 4119.**54. CHEMISTRY.****542. Experimental.** Solvent of chitin, 4204.**543. Analysis,** 3360=3507. Composition of blood of insects, 3468; of coloring matter of cocoons, 3383; of galls of cynips, 3341.**544. Qualitative analysis.** Spectrum of light of pyrophorus, 4068.**546. Inorganic chemistry.** Hydrogen phosphate, 3393-3394.**547. Organic chemistry.** Effect of formic acid (CH_2O_2) on honey, 3722 (4219), 3739, 4256; of "mud" of termitina on glass, 4245; of potassic cyanide (KCN) on color, 3305, 3683, 4072. Naphthalin (C_{10}H_8) 4073.**55. GEOLOGY.****551, 5. Meteorology.** Winds, 3835. Climate, 4123.**551, 7. Stratigraphical geology.** *Distribution of fossils*, 3521, 3542, 4269. Palaeozoic, 4086. Mesozoic, 4087.**551, 74. Devonian,** 3524, 4080.**551, 75. Carboniferous,** 3275, 3526, 3541, 3681, 3941, 4076, 4085.**551, 78. Tertiary,** 3276, 3542, 4083, 4195. Amber, 4083.**56. PALEONTOLOGY.**For stratigraphical distribution of fossils, see **551, 7.]****560, 9. Geographical distribution of fossils,** 4085-4086.**560, 941. Scotland,** 3524, 4080.**560, 942. England,** 3541.**560, 944. France,** 4076.**560, 977, 3. Illinois,** 3275, 3526.**560, 978, 7. Wyoming,** 3276.**560, 978, 8. Colorado,** 3276, 3542, 4083.**560, 994. Australia,** 4195.**561. Fossil plants,** 3941.**565. Fossil articulata,** 4086.**565, 1. VERMES,** 4269.**565, 4. ARACHNIDA,** 4269. *Anthracomartus*, 1085.

565.6. MYRIPODA, 3524 (4050), 4269.
565.7. HEXAPODA, 3541, 3834, 4083, 4087.
 Eotblattina, 3275. Dictyonera, 3681. Termitina,
 3542. Ephemera, 4195. "Neuroptera," 3276. Sia-
 lidae, 3521.

57. BIOLOGY.

570.1. Philosophy of biology. Biological problems, 3425. Rules of nomenclature, 3271, 3363, 3919, 3949, 3977.

570.6. Societies of biology.

PROCEEDINGS: Biol. soc. Wash., 4073; Linn. soc. Lond., 4190-4193, 4205; Linn. soc. New South Wales, 4188, 4194-4195, 4208.

570.7. Education in biology. OBSERVING, 3693, 3932, 3939, 3960. *Describing*, 3509, 3514-3515.

575. Evolution, 3439.

575.1. Heredity. Atavism, 3690. *Phyletic parallelism*, 4031.

575.2. Variation [see also **581.15** and **591.15**]. *Origin of types of coloration*, 3437, 3587, 3762, 4031.

575.3. Environment [see also **591.155** and **591.57**]. *Adaptation to surroundings*, 3437, 3439, 4175.

575.4. Natural selection. *Correspondence of structure with habits*, 3583, 3686.

575.5. Sexual selection, 3825, 4284. *Adaptations of sexual structure to varying conditions*, 3532. *Adaptations of structure to sexual purposes*, 3534.

575.6. Development. *Social development*, 3436.

575.7. Degeneration. *Rudimentary organs*, 3040.

575.8. Origin of species. *Ancestry*, 3257, 3471, 3837, 3970, 4269. *Criteria of genera and species*, 3387, 3444, 3766, 3790, 3837. "Darwinism," 3190. *Final causes of transmutation*, 3587.

576. Origin of life. *Mechanical conception of nature*, 3587.

577. Properties of living matter.

577.1. Chemical properties of living matter. *Action of re-agents on blood*, 3468.

577.4. Conditions of vital action. Luminosity, 3393-3394.

578. Microscopy.

578.6. Preparation and mounting, 3235, 3640, 4078, 4081, 4084, 4149, 4164. *Materials*, 4267. *Staining*, 4078.

579. Collecting and preserving [objects of natural history]. Galls, 3354. Hexapoda, 3651-3658. Diptera, 3396 (3404), 3405, 4295. *Plan of formation of collections*, 3710.

ACQUIRING. *Exchanges*, 4184. *Price-lists*, 4123. *Requests for specimens*. Galls, 3354, 3415, 4261. Oniscoda, 4138. Odonata, 4136. Coccidae, 4094. Coleoptera, 4139, 4143, 4283. Lepidoptera, 4130, 4143, 4152, 4268, 4290. *Specimens for sale*, 3318, 4078, 4264.

APPARATUS, 3488, 3538, 3756, 3956, 4006.

Goods for sale, 4139.

ARRANGING, 3294, 4006.

COLLECTING, 3543, 3601-3602, 3663, 3693, 4130, 4157.

Alluring. By baits, 3538, 3606. By light, 3978. By fruit, 3888. By "sugar," 3606, 3883.

Hunting. On flowers, 3643, 4045.

Killing, 3237, 3636.

Trapping, 3538.

PREPARING, 3543, 3933, 4255. *Denuding wings*, 3916. *Dissecting*, 3131, 4167. *Pinning*, 3490.

PRESERVING, 3480, 4125, 4257.

Attacks of museum pests, 3772, 4167, 4288.

Drying specimens, 3640.

Pestifuges, 3406. Carbon disulphide, 3758. Naphthalin, 3298, 3556, 3774, 3928, 3931, 4073.

Preventatives of mold. Carbolic acid, 3305.

Retention of colors, 4293.

REARING. Coleoptera, 3608, 4087. Diptera, 3618. Lepidoptera, 3236, 3475, 3693, 3695, 3785, 4101, 4126, 4202. *In gases*, 4086-4087.

TRANSPORTING, 3490.

58. BOTANY.

581. PHYSIOLOGICAL BOTANY.

581.1. VEGETAL PHYSIOLOGY.

581.14. Secretion and excretion, 3563, 4095, 4183.

581.15. Variation. *Mimicry*, 3527. *Poly-morphism*, 3563.

581.16. Generation. *Fertilization*, 2410 (3741), 2369 (3743-3744).

581.18. Sensory functions. *Irritability*, 3537.

581.2. VEGETAL HEXIOLOGY: WELFARE AND ILLS.

581.22-581.24. Welfare of plants.

Caprification, 4131.

Dissemination. By insects, 3527.

Pollination, 3289, 3373, 3376, 3434 (3438), 3437. *Aquilegia*, 3673. *Oxalis*, 3563. *Trifolium*, 4173. *Cassia*, 3558. *Pastinaca*, 3551, 3564. *Primula*, 3680. *Apocynum*, 3476. *Solanum*, 3558. *Orchidaceae*, 2378 (3720, 3725). *Amaryllis*, 3565. *Symplocarpus*, 1794 (3552, 3562). *Gramineae*, 3545.

581.28. Injuries by plants, 3609. *Phyto-eccecidia*, 4177.

581.29. Injuries by animals, 3307, 3309, 3325, 3333, 3628, 3865-3866, 3927, 3961, 4086-4087, 4101, 4206, 4223. *Orchards*, 3547, 3752, 4196.

Nuphar, 3247. *Cruciferae*, 4013, 4194. *Capparidaceae*, 3322. *Viola*, 4219. *Thea*, 4298. *Gossypium*,

3307, 3614, 3835, 3993. *Urena*, 3333. *Aristotelia*,

4171. *Pelargonium*, 4086. *Citrus*, 3105, 3109, 3112, 3116, 3599-3600. *Vitis*, 3573, 3593. *Trifolium*, 3309, 3325-3326, 3473. *Phaseolus*, 3969. *Rosaceae*, 4162.

Prunus, 3113, 3254, 4179. *Fragaria*, 4142, 4155. *Rosa*, 3499. *Pyrus*, 3313, 3546, 4179. *Crataegus*,

3136, 4179. *Liquidambar*, 4174. *Leptospermum*,

4171. *Oenothera*, 3465. *Cucurbita*, 4270. *Silphium*,

3221. *Tanacetum*, 4162. *Vaccinium*, 4162. *Olea*,

4171. *Fraxinus*, 3746. *Asclepias*, 3580, 3628. *Nico-*

tiana, 3718. *Scrophularia*, 4080. *Veronica*, 4219.

Catalpa, 3308. *Chenopodium*, 3348. *Rumex*, 3446. *Aristolochia*, 3668. *Elaeagnus*, 4172. *Santalum*,

4144. *Celtis*, 4239. *Ficus*, 4028. *Maclura*, 3329.

Platanus, 3695. *Carya*, 3269. *Betula*, 4101 (4083).

Quercus, 3328, 3669, 3707, 3737, 4142. *Populus*,

3259, 3297, 3887, 3979. *Yucca*, 3378. *Pontederia*

3143. *Oryza*, 3319, 3327, 3330-3332, 3335-3336, 3348. *Triticum*, 3609. *Sorghum*, 3347. *Zea*, 3307, 3310, 3321, 3346, 3747, 3771, 3882. *Pinus*, 3111, 3623, 3755-3756, 3763, 3956, 4086. *Abies*, 3240. *Fungi*, 3516, 3527, 4162. *Polyporus*, 4101.

Zoococcidia, 3342-3343, 3349-3354, 3398-3399, 3403, 3425, 3769, 4177, 4193. *Tilia*, 3451. *Pelargonium*, 3340. *Vitis*, 3352-3353, 3409, 3451-3453, 3769. *Acer*, 3421. *Negundo*, 3753. *Amorpha*, 3339. *Acacia*, 3478. *Rosaceae*, 3421-3422, 3427, 3429, 3448-3449. *Rubus*, 3352, 3447. *Rosa*, 4218. *Eucalyptus*, 3419, 3738, 3760. *Compositae*, 3408, 3437, 3450. *Solidago*, 3400-3401, 3414, 3446, 3698. *Artemisia*, 3417, 3450. *Hieracium*, 4218. *Fraxinus*, 3753. *Ulmus*, 3753. *Celtis*, 3353, 3727-3728, 3761. *Juglans*, 4141. *Carya*, 3353. *Cupuliferae*, 3427. *Quercus*, 3106-3107, 3411, 3416, 3420, 3425-3426, 3454, 3501, 3575. *Fagus*, 3927. *Salix*, 3428, 4218. *Populus*, 4004. *Pinus*, 3413. *Cupressus*, 3411. *Vaucheria*, 4177.

Phytophthora (*Erinea*, *Phylleriaceae*, *Cephaloneae*), 4141, 4177.

581.3. VEGETAL EMBRYOLOGY.

Immature forms. *Entomophthora* (*Tarichium*), 3679.

581.4. VEGETAL MORPHOLOGY.

Galls, 3342.

581.5. VEGETAL BIOLOGY.

581.53. Food-habits.

Capture of animals for food, *Sarracenia*, 3375. *Drosera*, 3375, 3537, 4141. *Dionaea*, 3374, 3537.

Parasitism. *Uredo*, 3609. *Entomophthora*, 3679, 3748, 3754. *Appendicularia*, 4141. *Bacterium*, 3959.

581.54. Seasons.

Gramineae, 3545. *Proterandry and proterogyny*. *Umbelliferae*, 3551, 3564. *Amaryllis*, 3565.

581.57. Means of self-preservation.

Nectar, 3437 (3438).

581.59. Other relations to the surrounding world.

Attractiveness to insects, 4172. *Darlingtonia*, 3604. *Bixa*, 4265. *Pelargonium*, 4194. *Vitis*, 3637. *Prunus*, 4295. *Rubus*, 4295. *Oenothera*, 3465, 4156. *Cornus*, 4078, 4295. *Sambucus*, 3637, 4284. *Solidago*, 4045. *Ambrosia*, 3637, 4234. *Tanacetum*, 4234. *Centaurea*, 3895. *Phlox*, 4198. *Bignonia*, 4265. *Elaeagnus*, 4172. *Betula*, 4172. *Alnus*, 4149, 4197. *Salix*, 3643, 4078. *Populus*, 4284. *Musa*, 4265. *Hyppoxys*, 3381. *Pinus*, 3284. *Thuja*, 3637.

Capture of animals [for Capture as food, see 581.53]. *Mentzelia*, 3528. *Apocynum*, 3476. *By leaves*, 3537. *Pinus*, 4170.

Mutual relations of plants and animals, 3351, 3353, 3427, 3440, 3742. *Fungi*, 4162, 4286.

Modifying influence of plants upon insects. *Lamium*, 3439.

581.6. ECONOMIC BOTANY.

581.63. Direct usefulness. As food. *Cypripedium*, 4182. *For honey* *Papaver*, 4183. *Trifolium*, 4294. *For manna*. *Eucalyptus*, 4191. *Echinops*, 4177. *Myrica*, 4182. *For opium*. *Papaver*, 4183.

581.64. Usefulness in arts and commerce. *As insectipells*. *Lycopersicum*, 4281. *As timber*. *Catalpa*, 3308.

581.7. VEGETAL ANATOMY.

Brachyphyllum, 3884.

581.73. Anatomy of leaves. *Convallaria*, 4119.

581.76. Anatomy of flowers. 3289. *Ano-cynum*, 3476.

581.79. Anatomy of other structures. *Galls*, 3342, 3349-3353. *Hairs*. *Mentzelia*, 3528.

581.9. GEOGRAPHICAL DISTRIBUTION.

Celtis, 3724, 3728.

Special Botany.

[Under 582-589, no reference is made by name to the genera already referred to under 581.]

582. PHANEROGAMIA.

4101, 4206, 4223, 4286.

583. DICOTYLEDONAE.

583.111. *Ranunculaceae*, 3673.

583.113. *Nymphaeaceae*, 3247.

583.121. *Sarraceniaceae*, 3375, 3604.

583.122. *Papaveraceae*, 4183.

583.123. *Cruciferae*, 4013, 4194.

583.131. *Capparidaceae*, 3322.

583.135. *Violaceae*, 4219.

583.138. *Bixaceae*, 4265.

583.166. *Ternstroemiaceae*, 4298.

583.17. *Malvaceae*, 3307, 3333, 3614, 3835, 3993.

583.19. *Tiliaceae*, 3451, 4171.

583.223. *Geraniaceae*, 3340, 3563, 4086, 4194.

583.23. *Rutaceae*, 3105, 3109, 3112, 3116, 3599-3600.

583.279. *Ampelidaceae* (*Vitaceae*), 3352-3353, 3409, 3451-3453, 3573, 3593, 3637, 3769.

583.281. *Sapindaceae*, 3753.

583.32. *Leguminosae*, 3309, 3325-3326, 3339, 3473, 3558, 3969, 4086-4087, 4173, 4294.

583.37. *Rosaceae*, 3113, 3136, 3254, 3313, 3352, 3421-3422, 3427, 3429, 3447-3449, 3499, 3546, 4142, 4155, 4162, 4179, 4218, 4295.

583.393. *Droseraceae*, 3374-3375, 3537, 4141.

583.394. *Hamamelidaceae*, 4174.

583.42. *Myrtaceae*, 3419, 3738, 3760, 4171, 4191.

583.445. *Onagraceae*, 3465, 4156.

583.453. *Loasaceae*, 3528.

- 583,461. Cucurbitaceae, 4270.
 583,481. Umbelliferae, 3551, 3564.
 583,497. Cornaceae, 4078, 4295.
 583,51. Caprifoliaceae, 3687, 4284.
 585,55. Compositae, 3221, 3400-3401, 3404
 3408, 3414, 3417, 3427, 3440, 3450, 3687, 3698, 3899
 4045, 4162, 4177, 4218, 4284, 4295.
 583,61. Vacciniaceae, 4162.
 583,67. Primulaceae, 3680.
 583,71. Oleaceae, 3746, 3753, 4171.
 583,72. Apocynaceae, 3476.
 583,73. Asclepiadaceae, 3580, 3628.
 583,74. Polemoniaceae, 4198.
 583,79. Solanaceae, 3558, 3718, 4235, 4281.
 583,81. Scrophulariaceae, 4080, 4219.
 583,84. Bignoniaceae, 3308, 4265.
 583,89. Labiatae, 3439.
 583,914. Chenopodiaceae, 3348.
 583,917. Polygonaceae, 3446.
 583,924. Aristolochiaceae, 3668.
 583,935. Elaeagnaceae, 4172.
 583,943. Santalaceae, 4144.
 583,951. Euphorbiaceae, 4235.
 583,962. Urticaceae, 3329, 3553, 3721, 3727-3728,
 3753, 3761, 4028.
 583,971. Platanaceae, 3695.
 583,973. Juglandaceae, 3269, 3353, 4141.
 583,974. Myricaceae, 4182.
 583,976. Cupuliferae, 3104-3107, 3328, 3341,
 3416, 3420, 3425-3426, 3454, 3501, 3575, 3669, 3707,
 3737, 3927, 4101 (4083), 4142, 4149, 4172, 4197
 583,981. Salicaceae, 3269, 3297, 3428, 3643,
 3887, 3979, 4004, 4078, 4218, 4284.

584. MONOCOTYLEDONAE.

- 584,15. Orchidaceae, 2378 (3720, 3725).
 584,21. Scitamineae, 4265.
 584,25. Amaryllidaceae, 3381, 3565.

[END OF SPECIAL BOTANY.]

59. ZOOLOGY.

- 590.3. Dictionaries of zoology. *Vernacular names*, 4008. *Heterodon*, 4087.
 590.6. Societies of zoology.
 590,642. *British*, 4299-4300.
 590,643. *German*, 4138.
 590,674. *Massachusetts*, 4137.
 590.7. Education in zoology.
 MUSEUMS. Mus. comp. zool., 4223, 4289. Zool. mus. Copenhagen, 4131.
 PRIZES, 3968.
 590.9. History of zoology. Bible animals, 4008.
 591. PHYSIOLOGICAL ZOOLOGY.
 Bibliography of entomology, 3300-3303, 3306.
 591.1. ANIMAL PHYSIOLOGY.
 591,11. Circulation. *Plusia*, 4130. *Apis*, 3634.
 591,12. Respiration, 3535. Larvae, 4209. Coleoptera, 3603, 4066. *Catalpa*, 3745.

- 581,32. Liliaceae, 3378, 4119.
 581,34. Pontederiaceae, 3143.
 581,64. Araceae, 1794 (3552, 3562).
 581,84. Cyperaceae, 4182.
 581,9. Gramineae, 3307, 3310, 3319, 3321, 3327, 3330-3332, 3335-3336, 3346-3348, 3545, 3609, 3747, 3771, 3882.

585. GYMNOSPERMAE.

- 585.2. Coniferae, 3111, 3240, 3284, 3411, 3413, 3624, 3687, 3755-3756, 3769, 3884, 3956, 4086, 4101, 4170, 4206.

586. CRYPTOGAMIA.

587. PTERIDOPHYTA.

- 587.3. Filicinae, 4276.

589. THALLOPHYTA.

589.2. UNGI.

- 3516, 3527, 4162, 4286.
 589.22. Basidiomycetes.
 589,222. *Hymenomyces*, 4101.
 589,225. *Uredineae*, 3609.
 589,229. *Entomophthoraceae*, 3679, 3748, 3754.
 589,23. Ascomycetes, 4141.

589.3. ALGAE.

4177.

589.7. PROTOPHYTA.

589.95. Schizomycetes, 3959.

- 591,13. Nutrition. *Tenebrio*, 3510. *Culex* 4082. *Telea*, 3674. *Apis*, 4193.
 591,139. *Fasting*. *Araneina*, 4136. *Lepidoptera*, 3379.
 591,14. Secretion and excretion. *Attacus*, 4081.
 591,142. *Constructive secretion*. *Adhesive*, 3122, 3721, 3939. *Cocoon-varnish*, 3383. *Lac*, 2974. *Wax*, 3410, 4203.
 591,143. *Digestive secretion*. *Salivary*, 3337, 4118.
 591,144. *Attractive, defensive, and offensive secretion*. *Attractive*, 4056. *Nectar*, 4065. *Odoriferous*, 3127, 3579, 4284. *Defensive*, 3930.
 591,145. *Poisonous secretion*. *Lepidoptera*, 3461. *Hymenoptera*, 3685, 3722 (4219), 3739, 4089.
Gall-forming, 3349, 3425.
Urticating. *Lepidoptera*, 3607, 3675-3677, 3765, 3918, 3920.
 591,146. *Sexual secretion*. *Odoriferous*, 3678, 3740.
 591,147. *Protective secretion*. *Eleodes*, 4296. *Lepidoptera*, 3574, 3624, 3772. *Hymenoptera*, 3901.
 591,148. *Erection*.
 591,149. *Other secretions and excretions*. *Coloring matter*, 3383. *Luminous matter*, 3393-3394. *Ure*

591.15. Variation. Hexapoda, 3234, 4179. Coleoptera, 3387, 4087, 4284. Apiocera, 4036. Lepidoptera, 3216, 3257, 3776, 3837, 3839-3860, 3995, 4020, 4299.

591.151. Polymorphic variation. Cecidozoa, 3349. Larvæ, 3587. Hexapoda, 4031. Rhynchota, 3571, 3577. Odontolabidae, 4122, 4300. Blepharoceridae, 3443, 4444 (3519). Lepidoptera, 3845. Hymenoptera, 3403, 3891, 4168.

591.152. Geographic variation.

591.153. Heterophagic variation. Coleoptera, 3628, 4149. Smerinthus, 4031. Isosoma, 3770.

591.154. Polygenetic variation. Hexapoda, 3882. Lepidoptera, 3829.

591.155. Mimetic variation. 3574, 3624. Larvæ, 4031. Hexapoda, 3437. Coleoptera, 4284. Lepidoptera, 3465, 3902, 4149.

591.156. Sexual variation. Arachnida, 3 25. Hexapoda, 4200. Acanthococcus, 3472. Boletotherus, 4083. Blepharoceridae, 3443. Lepidoptera, 3579, 3597, 4240. Hymenoptera, 3583, 3901.

591.157. Colorational variation. Araneina, 4064. Coleoptera, 4284. Cicindela, 3559, 3644, 3671-3672. Lepidoptera, 3762. Rhodophora, 3463. Bombycidae, 3921, 3982, 4149. Sphingidae, 3587, 3965, 4085. Papilio, 3858, 4149. Vanessa, 3390. Argynnis, 4087. Hymenoptera, 3901.

591.158. Hybrids.

591.159. Monstrosities [see also **591.167.** Hermaphrodites]. Coleoptera, 3153, 3251, 4087. Lepidoptera, 3141, 3151, 3380, 3391, 3525, 4179, 4277.

591.16. Generation.

591.161. Alogenesis.

591.162. Parthenogenesis. Arthropoda, 4022. Gastrophysa, 3518, 3523, 4021-4022. Lepidoptera, 3585, 3620, 4191. Hymenoptera, 3155, 3457, 3460, 3639, 3901, 4246.

591.163. Metagenesis. Ephemerella, 4042. Aphididae, 3323. Cynips, 3403, 3416.

591.167. Hermaphroditism. Trombidium, 4016, 4019. Hexapoda, 4179. Lepidoptera, 3140, 3227, 3371, 3392, 3787, 3861, 4007, 4015, 4165. Macropis, 4149.

591.18. Nervous functions and sensations. Articulata, 3291 *v.* Hexapoda, 4191. Formicidae, 3435-3436.

Color-sense. Apidae, 3434.

Hearing. Arachnida, 3824.

Sight. Arthropoda, 3880. Hexapoda, 4087, 4205. Forficula, 4085. Coleoptera, 3366, 3369. Telea, 3674.

591.19. Other functions.

LONGEVITY [see also **591.139.** Fasting], 3345. Calliphora, 4069. Lepidoptera, 3123, 3345, 3648. Formicidae, 3435.

LUMINOSITY. Geophilus, 4282. Fulgoridae, 4149. Lampyridae, 3393-3394, 3589. Pyrophorus, 4068.

MOVEMENT. Activity. Hymenoptera, 3434, 3439.

Climbing. 3122. **Flight.** 3395, 4188. Acridiidae, 3291 *j.* **Leaping.** Hexapoda, 3828. Formicidae, 4185. **Locomotion.** 3320, 3939. Sphingidae, 4193.

Muscular contraction. 4188. **Function of halteres.** Diptera, 3968. **Function of legs.** Hexapoda, 3937.

SLEEP. Hymenoptera, 3835.

SONIFICATION. Atropos, 3611, 4055. Conocéphalus, 4100. Anobium, 4055. Acherontia, 3664. Formicidae, 3958, 4029-4030.

STINGING. Apis, 4219.

STRENGTH. Hexapoda, 3574.

591.2. ANIMAL HENOLOGY: WELFARE AND ILLS.

591.21. Effects of external conditions.

Exclusion of air. Telea, 3674. **Parasitism.** 3345. **Temperature.** Lepidoptera, 3674, 3773, 3829, 3914. **Weather.** Hexapoda, 4123, 4223. Acridiidae, 3291 *f.* Bombyx, 3441.

591.22. Welfare of animals.

Dissemination. Bombus, 4173.

Exemption from parasitism. Bombus, 4110.

591.25. Ills of animals. [For Means against animals, see **579, 632,** etc.]

591.26. Diseases. Cicada, 3577.

591.27. Injuries by chemical and physical agencies.

Injuries by chemical agencies. 3468. **Poisons.** 3859, 4067. Chloroform [CHCl₃], 3237. Naphthalin [C₁₀H₈], 4073. Potassium cyanide [KCN], 3636.

Injuries by physical agencies. Drought, 3314.

591.28. Injuries by plants.

CAPTURE [see also **581.53.** Capture for food] 3374-3375, 3528, 3537, 3604.

PARASITISM. *By fungi.* Caloptenus, 3679, 3748, 3754. Drosophila, 4141. Lepidoptera, 3362. *By bacteria.* Blissus, 3571, 3959.

POISONING. *By pyrethrum.* Plusia, 4130.

591.29. Injuries by animals [see also **591, 53.** Food-habits of animals].

PARASITISM. 3345, 3379. Cecidozoa, 3349, 3397, 4201, 4218. Domestic animals, 3566-3569, 3749.

Hexapoda, 3372, 3583. Macrotona, 4062. Rhynchota, 3105, 3110, 3761. Coleoptera, 3413, 4207, 4262. Diptera, 3115-3116, 4086. Lepidoptera, 3334, 3450, 3956. Hymenoptera, 3107, 3422, 3448, 4207.

Internal parasites. 3119. Domestic animals, 3569. Brochymena, 3886. Coleoptera, 3384, 3820, 3897, 4141. Asphondylia, 3398. Lepidoptera, 3262, 3338, 3516, 3614, 3674. Hymenoptera, 3107, 3427, 3667, 3815, 4110.

Intestinal parasites. Periplaneta, 3736. Termitidae, 4178. Bombus, 4133. Rhinoceros, 4121. Equus, 3998.

Cuticular parasites. Mammalia, 3823, 3998, 4086-4087.

External parasites. 3778. Araneina, 3283, 3364. Lepidoptera, 3293. Ovis, 3312.

External feeders. Rhynchota, 3328, 3706, 3726 3728, 4149.

Guests. Diastrophus, 3427.

Egg-parasites. Microcentrum, 3598. Smerinthus, 4087. Limenitis, 4199. Nematus, 4199.

Secondary parasitism. 3345.

PURSUIT. Lumbrius, 4149. Hexapoda, 3960-3962. Odonata, 3158-3159. Acridiidae, 3291 *i, m, n.* Coccidae, 3599. Phylloxeridae, 3759, 4004. Aphididae, 3113. Erythronera, 3546. Cicada, 3577, 4087. Blissus, 3571. Coleoptera, 3309, 3578. Lepidoptera, 3332, 3582, 3674, 4149. Pieridae, 3574, 3617, 4133. Formicidae, 3435. Apis, 3838. Hyla, 4166.

591.3. ANIMAL HENOLOGY AND DEVELOPMENT.

Chrysalis. 3736. Arthropoda, 3871. Chilopoda, 3764. Caloptenus, 3137. Tenebrionidae, 3372. Tinea, 3686. Bombyx, 4128.

Rate of growth. Telea, 3674.
Retardation of development, 3345. Hexapoda, 3536.
 Epicauta, 3291 n. Saturnia, 3485. Sphinx, 3486.
 Ichneumonidae, 3484.

591.31. Spermatogenesis.

591.32. Oogenesis. Geophilidae, 3788.

591.33. Segmentation. Gelechia, 4087.

591.34. Embryogenesis, 4246. *Malpighian tube,* 3690, 3789. *Ovaries,* 3388. *Ducts of sexual glands,* 3500.

591.37. Metamorphosis.

[Arachnida.] Phytoptidae, 3753. Demodex, 3823. Tyroglyphus, 3599.
 Hexapoda, 3290 f, 3578.
 [Neuroptera.] Corydalus, 3506, 3521, 3531-3535, 3550.

[Rhynchota.] Acanthococcus, 3472. Chermes, 3755-3756. Psyllidae, 3727, 4014. Cicada, 3577.

[Coleoptera.] Phytonomus, 3309. Doryphora, 3466, 3578. Diabrotica, 3747. Eucrada, 3630. Chaullignathus, 3291 n.

[Diptera.] Drosophila, 3714. Bombyliidae, 3536. Blepharoceridae, 3455. Simulium, 3618. Pulicidae, 4053. Cecidomyia, 3454, 3666, 3689. Diplosis, 3399.

[Lepidoptera.] Platyptilia, 3539. Lithocolletis, 3909. Carcopasa, 3922. Crambus, 3334. Heliothis, 3307, 3549, 3882. Anomis, 3333, 3835. Aletia, 3570, 3835. Telea, 3674. Arctia, 3922. Aegeria, 3922. Sphinx, 3308. Philamelus, 3596. Papilio, 3647, 3668. Thecla, 3254. Grapta, 3859. Phyciodes, 3944. Coenonympha, 3945.

[Hymenoptera.] Cynipis, 3454. Polysphincta, 3364. Eggs. Tyroglyphus, 3737. Sialis, 3521. Belostoma, 3532-3534, 3550. Coraebus, 3737. Mallophora, 3291 n. Lepidoptera, 3461. Oeta, 3288. Crambus, 3311. Aletia, 3333. Orgyia, 3616. Pamphila, 3688.

Eggs and larvae. Diplax, 3967. Chaulliodes, 3535. Chrysomphalus, 3600. Phytonomus, 3325. Eleodes, 3971. Coscinoptera, 3615. Crioceris, 3548. Papilio, 3635. Selandria, 3746.

Larvae.

Hexapoda, 3939.

[Rhynchota.] Pubilia, 4056. Belostoma, 3531.

[Coleoptera.] Rhodobaenus, 3310. Rhynchophorus, 3310. Lissorhoptrus, 3348. Chalepus, 3331. Tenebrionidae, 3970, 3972. Phyllotreta, 3554, 3584. Prionidae, 3572. Agrilus, 3352, 3447. Alaus, 3147. Cotalpa, 4032. Lucanus, 3147, 3963. Silpha, 4038. Necrophorus, 4036. Patrobus, 4037. Calosoma, 4034.
 [Diptera.] Ephydra, 3781. Piophilina, 3560. Oestrus, 3917. Hirmonera, 3897. Cecidomyiidae, 3454. Cecidomyia, 3349, 3398, 3409, 3411, 3474.

Lepidoptera, 3212, 4031. Tinea, 3686, 3691, 3693-3694. Nepticula, 3695. Lithocolletis, 3904, 3906. Walshia, 3339. Batrachedra, 3698. Gelechia, 3450. Choreutes, 3221. Anaeglis, 3112. Tortricidae, 3954. Euryptichia, 3343. Melanippe, 3391. Cymatophora, 3261. Noctua, 3431. Rhodophora, 3465. Telesilla, 3719. Crambodes, 3719. Adipsophanes, 3719. Arzama, 3247. Clisiocampa, 3282. Callosamia, 3540. Attacus, 3592. Orgyia, 3217, 3385, 3921. Arctia, 3261. Spingidae, 3537. Sphinx, 3329, 3957, 3965. Smerinthus, 3143, 3151. Eudamus, 3688. Apatura, 3856.

[Hymenoptera.] Nematus, 3350, 4031. Euura, 3350. Cynipidae, 3454. Rhodites, 3422. Apanteles, 3345.

Larvae and pupae.

Coleoptera, 3145. Sphenophorus, 3310. Boletotherus, 4001. Prionus, 3572. Ceruchus, 3963. Elodes, 3625. Pomatinus, 3625. Parnus, 3625. Coccinellidae, 3704.

[Diptera.] Leucopis, 3759. Drosophila, 3711. Trypeta, 3700. Pipiza, 3547. Systoechus, 3291 n. Tridiotis, 3291 n. Sciara, 3709. Cecidomyia, 3428. Diplosis, 3726, 3759.

[Lepidoptera.] Bedellia, 3695. Penthina, 3499. Retinia, 3763. Chilo, 3332. Dakruma, 3706. Pempelia, 3346. Cataclysta, 3745. Noctuidae, 3245. Catocala, 3269. Aletia, 3614. Leucania, 3582. Hydroecia, 3634. Cossus, 3887. Ceratocampa, 3579. Notodontia, 3149. Nola, 3347. Aegeria, 3148. Philamelus, 3150. Pamphila, 3688. Pieris, 3322. Limentis, 3574. Grapta, 3860. Danais, 3580.
 [Hymenoptera.] Tenthredinidae, 3901. Diastrophus, 3427.

Pupae. Passalus, 3963. Elmis, 3625. Carabidae, 4040. Cicindela, 4040. Danais, 3449.

Molting. Ephemerina, 3317. Oestridae, 4075. Geometridae, 4169. Orgyia, 3385.

Hypermetamorphosis, 3557. Acarina, 4192.

Pupation. Lepidoptera, 3757, 4194.

Emergence. Lepidoptera, 3101, 3104, 3135.

591.4. ANIMAL MORPHOLOGY; HOMOLOGY.

Arthropoda, 3471, 4269. Coccinae, 3708. *Number of legs.* Peripatus, 3133.

NERVOUS SYSTEM. Diptera, 3735. Hymenoptera, 3358.

INTEGUMENT AND DERMOSKELETON. Chalcididae, 4149. *Head.* Musca, 4210. *Eyes.* Arthropoda, 3880.

591.5. ANIMAL BIOLOGY.

Habits and behavior; life-histories.

[Vermes.] Sphaerularia, 4087.

Arachnida, 3825. Phytoptidae, 3750, 3753. Demodex, 3823. Araneina, 3517, 3561, 4097. Theridiidae, 3723. Epeiridae, 3948. Buthus, 4082.

[Onychophora.] Peripatus, 3133.

Myriopoda, 3930.

Hexapoda, 3359, 3573, 3716, 3927.

[Orthoptera.] Caloptenus, 3291 n. Anabrus, 3291 i. Myrmecophila, 4081.

[Pseudoneuroptera.] Embiidae, 4300. Ephemeridae, 4191.

[Neuroptera.] Corydalus, 3511, 3521, 3531-3534, 3550. Trichoptera, 3480, 3915.

[Rhynchota.] Pediculus, 3631. Rhizococcus, 4144. Acanthococcus, 3472. Lecanium, 3670. Chrysomphalus, 3600. Phylloxera, 3769. Chermes, 3755-3756. Schizoneura, 3547. Fulgoridae, 4149. Aphrophoridae, 4195. Cicada, 3577. Cimex, 3631. Phymata, 3926. Blissus, 3571.

Coleoptera, 3145, 4284. Sphenophorus, 3310, 3321. Lissorhoptrus, 3335, 3348. Phytonomus, 3309, 3325. Podapion, 3413. Boletotherus, 4001. Eleodes, 4296. Bruchus, 3833, 3969. Phyllotreta, 3554, 3584. Diabrotica, 3747. Doryphora, 3466. Eumolpini, 4155-4156. Crioceris, 3548. Oberea, 3450. Xylotrechus, 3136. Prionus, 3572. Chalepus, 3331. Cotalpa, 4032. Hypotrachia, 4170. Amphicoma, 3896. Ozognathus, 3501. Chaullignathus, 3291 n.

Buprestidae, 3352. Alaus, 4078. Coccinellidae, 3704. Pausus, 4147. Aleochara, 3619. Calosoma, 4034.

Diptera, 3631. Drosophila, 3711, 3714. Comptosia, 4297. Tachina, 3614. Oestridae, 3917, 4075. Bombyliidae, 3291 *n.*, 3536. Culex, 4087. Simulium, 3618. Pulicidae, 4053. Sciara, 3709. Cecidomyia, 3473-3474, 3665-3666, 3689.

Lepidoptera, 3629, 3691, 3694. Tineina, 3698. Lithocolletis, 3904-3910. Gracilaria, 3913. Gelechia, 3450. Depressaria, 3692. Choreutes, 3221. Penthina, 3499. Eudemis, 3573. Retinia, 3763. Crambus, 3334. Chilo, 3332. Dakruma, 3706. Pempelia, 3346. Anaeglis, 3112. Oedematophaga, 4278. Pseudoglossa, 3989. Heliolithis, 3307, 3549, 3832. Aletia, 3570, 3614. Anomis, 3333. Leucania, 3532. Laphygma, 3330. Cossus, 3387. Clisiocampa, 3282. Ceratocampa, 3579. Callosamia, 3540. Attacus, 3592. Telea, 3674. Nola, 3347. Melittia, 4270. Sphinx, 3308. Philampelus, 3596. Papilio, 3129. Parnassius, 4149. Apatura, 3104. Grapta, 3680. Phycodes, 3944. Argynnis, 3258, 3845. Heliconidae, 3624.

Hymenoptera, 3583, 3901. Selandria, 3746. Cynipidae, 3355. Trichogramma, 4199. Pirene, 3450. Icosoma, 3770. Telenomus, 3886. Microgaster, 3450. Hemiteles, 3450. Formicidae, 3435-3436 (3438), 4058. Formica, 4193. Lasius, 4187. Atta, 3477, 3894. Pogonomyrmex, 3102. Larridae, 4011-4012. Osmia, 3817. Bombus, 3821. Apis, 3285.

591.51. Instinct—Reason. Hexapoda, 3662. Lepidoptera, 3826, 4235. Formicidae, 3934. Stizus, 3964.

Cleanliness. Hexapoda, 3937.

Fallibility. Hexapoda, 4172. Coleoptera, 3366, 3369. Dytiscus, 3478.

Methodicity. Hexapoda, 3645.

Pugnacity. Ceratocampa, 4139. Apidae, 4146. Aves, 4149.

Stratagems. Hexapoda, 3683.

591.52. Abode. Tarentula, 3123. Hexapoda, 3583. Phryganeidae, 3915. Phymata, 3617. Ptinus, 3610. Bucculatrix, 3612. Taenioecampa, 3365. Nonagraia, 4078. Aves, 4099.

Galls. 3349-3354, 3415-3420, 3425-3427, 3454, 3738, 4177, 4230. Acarina, 3340, 3421, 3451. Hexapoda, 3403. Dactylosphaera, 3769. Psyllidae, 3724, 3727-3728, 3761. Enchophyllum, 3410. Apioninae, 3413. Diptera, 3400, 3408. Trypeta, 3401. Acinia, 3450. Sciara, 3709. Cecidomyia, 3398-3399, 3401, 3409, 3411, 3414, 3428, 3451-3454. Lepidoptera, 3418. Walshia, 3339. Gelechia, 3446. Euryptichia, 3401, 3408. Cochylys, 3450. Cynipidae, 3355. Rhodites, 3422, 3429, 3448-3449. Cynips, 3341, 3357, 3416, 3425, 3501.

Habitats. Vermes, 3361. Buprestidae, 3602. Diptera, 4120. Lepidoptera, 3760. Bucculatrix, 3687. Lycaenidae, 4070. Danais, 4194. Hymenoptera, 4142.

Aquaticity. Cataclysta, 3745. Arzama, 3247.

Halophilic. Ephydra, 3781.

Inguilines. 3349-3351, 3415. Lepidoptera, 3760. Cynipidae, 3454. Aulax, 3427.

Nidification. Araneina, 3517, 3561. Cteniza, 4285. Tegenaria, 4192. Hexapoda, 4195. Lepidoptera, 4086. Anaphe, 4193. Camponotus, 3240. Pelopoeus, 3536, 4149, 4193. Trypoxylon, 3536. Contopus, 4053.

Architecture. Formicidae, 4078. Atta, 3477. Apis, 4179.

Cocoons. Micaria, 4140. Cionus, 4080. Sciara, 3709. Lepidoptera, 3383, 4078. Bombycidae, 3667. Orgyia, 3616. Eunomia, 4149. Braconidae, 3345.

Egg-cases. Hexapoda, 4149, 4208.

Larva-cases. 4195. Coccinoptera, 3615. Oiketicus, 3993.

Mines. Lepidoptera, 3691, 3693, 3695. *Pupal retreats.* Charagia, 4171.

591.53. Food-habits, 3687, 4166.

Vermes, 3119.

[Arachnida.] Acarina, 4086-4087, 4192. Tyroglyphus, 3599. Oribates, 3110. Araneina, 4064. Diapontia, 4136.

Hexapoda, 3113, 3527, 3604, 3645, 4101, 4191.

[Thysanura.] Podura, 3340. Campeoda, 3613.

[Orthoptera.] Forficula, 4085. Locustidae, 4147. Gryllus, 3771.

[Pseudoneuroptera.] Breyeria, 3941. Libellula, 3834.

[Neuroptera.] Chrysopa, 3571. Rhynchota, 3752, 3769, 3898. Kermes, 3328. Pulvinaria, 4086, 4223. Phylloxera [Dactylosphaera], 3637. Aphididae, 3323, 3547, 3835. Lachnus, 3111. Phymata, 3617. Anthocoris, 3571.

Coleoptera, 3319, 3586, 4044, 4149, 4206. Hylesinus, 3309. Pissodes, 3623. Phytonomus, 3325-3326. Otiorynchus, 4142. Cantharis, 4154. Epicauta, 3771. Diabrotica, 3771. Doryphora, 3628. Gastrophysa, 3446. Coccinoptera, 3615. Zengoptera, 3979. Spalacopsis, 3348. Hippopsis, 3348. Purpuricenus, 3630. Chalepus, 3335. Ozognathus, 3416, 3501. Coraebus, 3737. Zogoderma, 4167. Coccinellidae, 3571. Carabidae, 4252.

Diptera, 4121. Trypeta, 3700. Cyrtoneura, 3516. Hemerodromia, 3546. Bombyliidae, 3520, 3680. Hirmoneura, 4141. Asilidae, 3153, 3420. Simulium, 4133. Pulicidae, 3293, 3778. Cecidomyia, 3319, 3428, 3609, 4286.

Lepidoptera, 3706, 4078, 4142, 4235, 4265. Bucculatrix, 3687. Cemiostoma, 3297. Batrachedra, 3698. Euclemensia, 3328. Gelechia, 4087. Prodoxus, 3378. Tortricidae, 3499. Retinia, 3702. Argyrolepis, 3669. Chilo, 3327. Dakruma, 3701. Panthera, 4175. Noctuidae, 3606, 4198. Catocala, 3269. Heliolithis, 3307, 3389. Arzama, 3247. Gortyna, 3882. Ceratocampa, 4149. Callosamia, 4174. Oiketicus, 3993. Alypia, 3593. Sphinx, 3329. Smerinthus, 3143. Hesperidae, 3688. Papilio, 3668. Gonerytix, 3680. Pieris, 3322, 3491. Lycaenidae, 3628. Thecla, 3254. Melitaea, 3386. Danais, 3580.

[Hymenoptera.] Dolerus, 3313. Cynipidae, 3427. Chalcididae, 3291 *n.* Ichneumonidae, 3379. Formicidae, 4056. Pelopoeus, 4193. Stizus, 3964, 4087. Larra, 3291 *n.* Halictus, 3522. Andrena, 3680. Anthophora, 3680. Apis, 3879.

[Vertebrata.] Heterodon, 4087. Aves, 3832, 3960, 3966. Hydrochelidon, 3159. Ortyx, 3571. Phasianus, 4138. Sialia, 3961-3962. Sciurus, 4004.

Parasitism, 3345, 3349, 3372, 3397, 3422, 3445, 3450, 3566-3569, 3576, 3749, 4207, 4218, 4262. Infusoria, 4178. Gregarina, 3736. Vermes, 3119. Nematoda, 4086, 4247. Sphaerularia, 4133. Seus, 3107. Trichodectes, 3312. Hormia, 3667. Leucopis, 3759. Cyrtoneura, 3516. Lucilia, 4272. Oestridae, 3998, 4086-4087, 4139. Bombyliidae, 3291 *n.*

Hirmonera, 3897. Diplosis, 3726, 3728, 3759. Lepidoptera, 4149. Dakruma, 3706. Hymenoptera, 3338. Pteromalus, 3115. Spalangia, 3115-3116. Coccophagus, 3105. Antigaster, 3598. Callimome, 3398. Eurytoma, 3427. Platygaster, 4201. Telenomus, 3886. Anisopelma, 3820. Ichneumonidae, 3334. Ophion, 3674. Polysphincta, 3364. Acrodactyla, 3286. Phaogenes, 3262. Coelioxys, 3315.

591.54. Phaeoleta.

Sensory. Cecidozoa, 3351. Hexapoda, 3442, 3835. Corydalus, 3506. Coleoptera, 3952. Asphondylia, 3399. Cecidomyia, 3929. Microlepidoptera, 3693. Papilio, 3135. Fenisea, 4197. Lycaena, 3845. Vanessa, 3503. Diastrophus, 3427.

Abundance. Gordius, 3291 n. Trombidium, 3291 n. Hexapoda, 3663. Polymitarcs, 3317. Aphididae, 4087. Blissus, 3402. Saperda, 3128. Cupes, 3142. Coccinellidae, 3581. Chlorops, 3134. Lepidoptera, 3154, 3299, 3464. Pieris, 4013. Terias, 3157.

Daily habits. Lepidoptera, 4045. Eudamus, 4221. *Hibernation.* Larvae, 4126. Buprestidae, 3630. Bucculatrix, 3612. Walshia, 3339. Plathypena, 3324. Limenitis, 3574. Argynnis, 3258.

Seasonal migration. Acridioidea, 3291 d. Termitina, 4191. Aphididae, 3323.

Number of generations in the year [Goneuty]. Tineina, 3910. Bombycidae, 3659. Vanessa, 3503. Brenthia, 3274, 3277.

Periodicity. Hexapoda, 3571, 4110. Cicada, 3577. Notodonta, 3304.

Proterandry and proterogyny. Lepidoptera, 3845. *Comparative abundance of sexes.* Xenos, 3601. Hymenoptera, 4082.

591.55. Social habits.

Myrmecophila. 4187. Aphididae, 3437. Publilia, 4056. Lycaenidae, 4070. *Slavery.* 3435.

Swarms [see also 59154, 5919]. Atropos, 4056. Libellula, 3161, 4033. Melolontha, 3777. Atherix, 4149. Papilio, 3668. Callidryas, 4139. Danais, 3130, 3580.

591.56. Breeding habits.

Attraction of sexes. Prionus, 4102. Saturnia, 3485. Heliconia, 3252.

Copulation. Acarina, 3939. Tegenaria, 4190. Hexapoda, 3534. Dytiscus, 3939.

Opposition. Sialis, 3521. Corydalus, 3506, 3535. Bombyliidae, 3520. Mallophora, 3291 n. Cecidomyia, 3430, 3557. Gelechia, 4087. Crambus, 3311. Noctuidae, 3430. Argynnis, 4058. Nematus, 4199. Biorhiza, 3891.

Care of young. Hexapoda, 3583. Hymenoptera, 3439.

591.57. Means of protection.

Protective habits. Hexapoda, 3465, 3770, 4284. *Protective mimicry [see also 591155].* 3767, 4149. *Protective coloration [see also 591157].* Hexapoda, 3437, 4031.

Protective secretions and excretions [see also 591144]. Faeces, 3578. Lac, 3555.

Immunity from enemies. Lepidoptera, 3620, 3624. *Stinging.* Apis, 4219.

591.59. Other biological relations.

Behavior towards colors. Hexapoda, 3924, 4191. Lepidoptera, 3339, 4265.

Behavior towards light. Hexapoda, 3295. Lepidoptera, 3370, 3423, 4239.

Behavior towards odors. Aphididae, 3585.

Behavior towards weather. Hexapoda, 3295, 3571, 4260. Lepidoptera, 3389. Floods. Coleoptera, 4284. *Temperature.* Gryllus, 3936. Winds. Aletia, 3831.

Natural limitations of abundance. 3573, 3578.

RELATIONS WITH PLANTS.

Mutual relations of animals and plants. Cecidozoa, 3351, 3353. Hexapoda, 3742. Cynipidae, 3427. Apis, 3440. Fungi. Hexapoda, 4285. Cecidomyia, 4162.

Pollination of plants by animals. Hexapoda, 3289, 3476, 3564. Hymenoptera, 3440, 3553, 3563.

Modifying influence of animals upon plants. Hexapoda, 3439.

STATISTICS. Doryphora, 3466.

Number of genera and species. Hydrobiini, 3118.

591.6. ECONOMIC ZOOLOGY.

Passer, 4137. *Economic entomology.* 3716.

591.609. *History.* 3146, 3407.

591.61. Usefulness of animals. Oribates, 3110. Hexapoda, 3109. Corydalus, 3535. Coccophagus, 3105. Leucania, 3582. Aves, 3960-3962.

591.62. Usefulness in nature. *As plant-pollinators.* Andrena, 3630. *As natural checks.* 3350. Formicidae, 4058. Aves, 3715. *As disseminators.* Coleoptera, 3369. *As scavengers.* Coleoptera, 4292.

591.63. Direct usefulness.

As food. 3896. Hexapoda, 3152, 3544. Acridiidae, 4181. Diptera, 3781. Honey, 4183. Aphididae, 4095. Manna, 4182, 4191.

As medicine. Blatta, 4234. Meloidae, 3578, 3973, 4154. Doryphora, 3529. Formicidae, 3633, 4280.

591.64. Usefulness in arts and commerce. *For lac,* 3555, 3703. *For wax,* 3707.

591.65. Noxiousness of animals.

591.66. Direct noxiousness.

As carriers of contagion. Diptera, 3544. *As hosts of parasites.* Diptera, 4138. *As parasites.* 3566-3567, 3569, 3576. Diptera, 3361, 3505, 4120. Lucilia, 4272. Dermatobia, 4139. Phthiriasis, 3631. Acarus, 4133.

As pests, 3544.

As poisonous animals. Doryphora, 3578. Stingers. Cicada, 3577. Sphinx, 3578. Urticators. Lepidoptera, 3461.

As terrors. Ceratocampa, 3579.

591.67. Noxiousness by injuring inanimate objects. Formica, 4087. Glass. Termitina, 4245. Grain. Tinea, 3430.

591.68. Noxiousness by injuring living plants [see also 58129 and 59153]. 3578, 3976, 4298. Acridioidea, 3291 b, i, m, 3487. Pachytylus, 3291 n. Rhynchota, 3752. Chloroneura, 3546. Cicada, 3577. Blissus, 3402, 3571. Sphenophorus, 3310, 3321. Lissorhoptrus, 3335, 3348. Phytomonus, 3309. Phyllotreta, 3554, 3584. Saperda, 3399. Chalepus, 3331, 3335. Lachnosterna, 3876. Agrilus, 3447. Drosophila, 3714. Trypeta, 3700. Sciara, 3709. Cecidomyia, 3474. Lepidoptera, 4090. Tineina, 4194. Eudemis, 3573. Tortrix, 3956. Crambus, 3334. Chilo, 3332. Pempelia, 3346. Nephopterix, 3996. Anisopterix, 3616. Noctuidae, 3718. Heliothis, 3382. Aletia, 3614. Leucania, 3532. Attacus, 3592. Orgyia, 3616, 3646.

Nola, 3347. Sphinx, 3308. Macrosila, 3718. Alypia, 3593. Dolerus, 3313. Isosoma, 3770.

CECIDIZOEA, 3417, 3419-3420, 3426, 3454, 3738. Acarina, 3421, 3451. Psyllo, 3724, 3727. Pachypsylla, 3728. Trypeta [Acinia], 3450. Sciara, 3709. Cecidomyia, 3409, 3411, 3414, 3428, 3451-3454. Gelechia, 3446. Cochylys, 3450. Rhodites, 3422, 3429, 3448-3449. Diastrophus, 3427. Cynips, 3416, 3501.

591.69. Noxiousness by injuring living animals [see also **591.29** and **591.53**], 3715. Trichodectes, 3312. Phymata, 3926. Diptera, 3544. Oestridae, 3998, 4149. Simulium, 4131.

591.7. ANIMAL ANATOMY.

Anatomical nomenclature, 3508, 3684, 4231.

Anatomy, 3131. Arthropoda, 3871. Limulus, 4300. Acarina, 3560. Demodex, 3823. Hydrachnidiae, 3999. Araneina, 3561. Theridiidae, 3723. Epeiridae, 3948. Scorpio, 4300. Scolopendrella, 3139. Hexapoda, 4179. Macrotoma, 4062. Caloptenus, 3508. Anabrus, 3291 *l.* Psocidae, 4163. Embiidae, 4300. Corydalus, 3511, 3513, 3521, 3551-3533. Trichoptera, 3480. Cerococcus, 3707. Aphididae, 3504, 3590. Tenebrionidae, 3972. Eleodes, 3971. Coscinoptera, 3615. Melolontha, 3131. Hypotrachia, 4170. Hydrophilidae, 4043. Harpalus, 4005. Piophila, 3560. Oestridae, 4075. Pulicidae, 4053. Lepidoptera, 3981, 4106-4107. Oedematophaga, 4278. Hymenoptera, 3583, 3901. Grotea, 3805. Pompilidae, 3818. Apidae, 3796. Apis, 3337.

Organs of doubtful nature. Acridiidae, 3632.

591.71. Anatomy of circulatory organs.

591.72. Anatomy of respiratory organs. Arachnida, 3881. Myriopoda, 3377. Scutigera, 4054. Corydalus, 3534-3535. Drosophila, 3711, 3714. Trypeta, 3700. Cataclysta, 3745. *Air-sacs*. Acridiidae, 3291 *j.* *Gills*. Larvae, 4209. *Stigmata*. Hexapoda, 4087. Elater, 4147.

591.73. Anatomy of nutritive organs. Tenebrio, 3510. Apis, 3337.

INTESTINE. Araneina, 4019. *Excrement*. Sphinx, 4086.

MOUTH-PARTS. Gamasidae, 3292. Hexapoda, 3242, 3467, 3631. Diptera, 3489. Bombyliidae, 3536. Blepharoceridae, 3443. Tineina, 3686. Pempelia, 3346. Apis, 4149. *Breast-bone*. Cecidomyia, 3411. *Mandibles*. Odontolabidae, 4122. *Palpi*. Microlepidoptera, 3697-3698. *Tongue*. Apis, 4193.

591.74. Anatomy of secretory and excretory organs.

GLANDS. Hexapoda, 3734, 4083. *Coxal*. Phalangidae, 4017, 4019. Galeodes, 4018. *Tarsal*. Hexapoda, 3939. *Tibial*. Herialus, 3678.

591.742. CONSTRUCTIVE. *Silk glands*. Telea, 3674.

591.743. DIGESTIVE. *Salivary glands*. Apidae, 3337, 4118.

591.744. ATTRACTIVE, DEFENSIVE AND OFFENSIVE. *Foramina repugnatoria*. Glomeris, 3721. *Oloriferous organs*. Herialus, 3678. *Osmateria*. Papilio, 4058.

591.745. POISONOUS. Hymenoptera, 3685.

591.746. GENERATIVE. Tegenaria, 4190.

591.748. EXCRETORY. *Malpighian vessels*. Tinea, 3690.

591.76. Anatomy of generatory organs. *Genitalia*. Coraebus, 3737. Lepidoptera, 4082. Prodoxidae, 3462. *Ovaries*. Hexapoda, 3388. *Oriduct*. Coccinae, 3708.

591.77. Anatomy of motory organs.

LEGS. Hexapoda, 3937. Tineina, 3686. *Tarsi*. Hexapoda, 3939.

MUSCLES. Apis, 3684.

STRIDLING ORGANS. Coleoptera, 4249.

WINGS. Diptera, 3101. Attacus, 4084. Urocerus, 3791. *Neuration*. Blattariae, 4087. Psocina, 3279. Chloroneura, 3546. Anthrax, 3779. Lepidoptera, 3697-3698. Pompilidae, 3818. Nomada, 3816. Coelioxoides, 3796. *Rudimentary wings*. Niptus, 3940. *Aptera*. Lepidoptera, 4176.

591.78. Anatomy of sense organs and nervous system. Corydalus, 4180. Hymenoptera, 3358. *Antennae*. Pempelia, 3346. *Auditory hairs*. Arachnida, 3824. *Brain*. Caloptenus, 3137-3138, 3291 *l.* *Eyes*. Arthropoda, 3850. *Olfactory organs*. Arthropoda, 3872. Apis, 3337. *Tactile organs*. Arthropoda, 4258.

591.79. Anatomy of integument and dermoskeleton. *Luminous organs*. Lampyridae, 3589. *Segmental organs*. Odonata, 4084. *Son-orific organs*. Sphingidae, 3308.

HEAD. Musca, 4210. Blepharocera, 3455.

THORAX.

ABDOMEN. Acarina, 3737.

APPENDAGES. *Anal appendages*. Panorpidae, 3483. Lepidoptera, 4061. *Evaginable organs*. Acherontia, 3597. *Hairs*. Coleoptera, 3682. Bombycidae, 3918. Hymenoptera, 3502. *Scales*. Coleoptera, 4119. Lepidoptera, 3250. *Spines*. Lepidoptera, 3461.

591.8. ANIMAL HISTOLOGY.

Invertebrata, 3869. Hexapoda, 3291 *k.* Macrotoma, 4062.

591.81. Histology of circulatory organs. *Dorsal vessel*. Hexapoda, 3729.

591.82. Histology of respiratory organs. Arachnida, 3881.

591.84. Histology of secretory and excretory organs. *Coxal glands*. Galeodes, 4018. *Salivary glands*. Apidae, 3337. *Genital glands*. Hexapoda, 3500. Tinea, 4128. *Malpighian tube*. Arthropoda, 3789.

591.87. Histology of motory organs. *Rectal muscles*. Lepidoptera, 4086.

591.88. Histology of sense organs and nervous system. *Brain*, 3261 *l.* *Eyes*. Arthropoda, 3877. Diptera, 4279.

591.89. Histology of integument and dermoskeleton. *Scales*. Coleoptera, 4119.

591.9. GEOGRAPHICAL DISTRIBUTION.

Potato-pests, 3578. Epeiridae, 3948. Anabrus, 3291 *l.* Odonata, 3239. Chrysomphalus, 3600. Coleoptera, 3309, 3331. Prionus, 3572. Helota, 4149. Tropisternus, 4043. Amphizoza, 4058. Trypeta, 3700. Lucilia, 4272. Blepharoceridae, 3519. Cecidomyia, 3473, 3666. Lepidoptera, 3983, 4020, 4122. Deuterocopus, 4149. Tortricidae, 3953. Nephopteryx, 3996. Scoliopteryx, 3980. Sphinx,

3308, 3329. *Papilio*, 3663, 3923. *Parnassius*, 4149. *Lycæna*, 3844. *Nymphalidae*, 3848. *Grapta*, 3860. *Satyrus*, 3837. *Hymenoptera*, 3901. *Cynipidae*, 3622. *Gasteruption*, 4041. *Pelopoeus*, 4193. *Larriidae*, 4011-4012. *Cosmopolitan species*. *Hexapoda*, 4149. *Limits of faunal regions*, 3775, 4122.

Habitat. *Acridiidae*, 3291 *d, g*. *Blissus*, 4103. *Coleoptera*, 3586. *Hydrobiini*, 3118. *Eristalis*, 3232. *Cecidomyia*, 3929. *Catocala*, 3935, 4132. *Melitæa*, 4052.

Immigration [introduction or spread of species]. *Hexapoda*, 3947. *Phylloxera*, 4142. *Doryphora*, 3713. *Diptera*, 4025. *Pulex*, 4093. *Danaus*, 4149.

Migration: Flights [see also 59155]. *Hexapoda*, 3296. *Acridiidae*, 3291 *d, e, f, h*. *Pachytylus*, 3291 *u*. *Odonata*, 4193. *Libellula*, 3878, 4140. *Pieris*, 3126, 3322.

FAUNAE,

3291 *s*, 3487, 4140.

591.94. Fauna of Europe, 3145, 3309, 3325, 3430-3431, 3444, 3455, 3473, 3480, 3610, 4020, 4176. Iceland, 3370. Sweden, 3279, 3397, 4090, 4218. Finland, 3279. Russia, 4140. Germany, 3134, 3161, 3878, 4141-4142, 4165, 4250. Great Britain, 3541, 3621, 3639, 3901, 4130. Scotland, 3457, 3644. England, 3299, 3464, 3581, 4292. Wales, 3503. France, 3450, 3902, 4082. Spain, 3291 *u*. Switzerland, 3999. Austria, 4013, 4033. Sicily, 3140 4142.

591.95. Fauna of Asia. Assam, 4029, 4298. Ceylon, 4299. Farther India, 3445, 3958, 4029, 4123, 4191. China, 3445.

591.96. Fauna of Africa, 3259, 3544, 4093, 4147. Madagascar, 4299. Natal, 4193. Caffraria, 4299. Niger, 4300.

591.97. Fauna of North America [in general, nearly all the paragraphs], 3118, 3280, 3283, 3356, 3413, 3494-3498, 3623, 3626-3627, 3638, 3649, 3730-3733, 3780, 3732-3784, 3793, 3796-3799, 3801-3803, 3805-3806, 3812-3813, 3822, 3837, 3840-3844, 3848-3854, 3858, 3904-3913, 3938, 3948, 3953, 3973, 4009, 4020, 4025, 4101, 4122.

British America, 3241. Labrador, 3696. Hudson's Bay, 3775. Ontario, 3120, 3130, 3142, 3660-3661, 4136. Manitoba, 3713, 4193.

United States, 3278-3279, 3281, 3291 *r*, 3309, 3323, 3387, 3463, 3548, 3696, 3846, 3855, 3868, 3930, 3946, 3955, 3963, 3983-3989, 4046.

Eastern United States, 3311, 3596, 3723, 4087. Maine, 3956. New Hampshire, 3588, 3629. Ver-

mont, 4000. Massachusetts, 3225, 3381, 3595, 3809, 3896, 3915, 3984, 4002-4003, 4081, 4103, 4116, 4220, 4274. Rhode Island, 4139. Connecticut, 3232, 3623, 3923. New York, 3249, 3272, 3309, 3325-3326, 3506, 3613, 3616, 3619, 3646, 3833, 3859, 3978, 3990, 3997, 4004, 4035, 4039, 4050, 4083, 4103, 4142, 4197. New Jersey, 3929. Pennsylvania, 3966. Maryland, 4206. District of Columbia, 3249, 4081. West Virginia, 3809, 3845. Kentucky, 3481. Ohio, 3127, 3157, 3222, 3270, 3313, 3414, 3952. Illinois, 3220, 3263, 3312, 3426, 3669, 3864, 3883, 4140. Michigan, 3927, 4142. Lake Superior, 3512. Wisconsin, 3669. Minnesota, 3317. Iowa, 3386, 3865-3866. Missouri, 3290, 3402, 3582.

Western United States, 3291 *g*. Kansas, 3232, 4047, 4272. Nebraska, 3588. Colorado, 3228, 3792, 3795, 3807, 3903. 3942-3943, 3987, 3991-3992, 4048, 4087. Montana, 3857.

Pacific States, 3215-3217, 3249, 3265. Idaho, 3291 *r*. Washington Territory, 3223, 3232, 4052. Oregon, 3214, 3248, 3287, 3483. California, 3214, 3248, 3291 *m, n*, 3483, 3781, 3794, 3804, 3847, 3879, 3982, 4039, 4285, 4299. Nevada, 3781. Utah, 3291 *r*, 3417. Arizona, 3229, 3248, 3255, 3273, 3844, 4051. New Mexico, 3264, 3291 *g*, 3791, 3983, 4049.

Texas, 3102, 3156, 3220, 3249, 3291 *t*, 3477, 3808, 3811, 3838, 3894, 3943, 3985-3986, 4272. Indian Territory, 3291 *t*. Arkansas, 4131. Louisiana, 4284. Alabama, 4136. Georgia, 3220, 3659. South Carolina, 3126, 3322. Florida, 3106-3109, 3111-3116, 3225, 3249, 3252-3253, 3272, 3433, 3492, 3598, 3600, 3688, 3847, 3856, 3867, 3986, 3997.

West Indies, 3133. Cuba, 3268, 3810, 3819. Dominican, 4299.

Mexico, 3278, 3280-3281, 3445, 3790, 3800, 3900, 4284. Lower California, 3248, 3804.

Central America, 3459. Guatemala, 3458. Veragua, 4057. Panama, 3830.

591.98. Fauna of South America, 3281, 4057. New Granada, 3445. Ecuador, 4123, 4299. Guiana, 3133, 3494-3498, 4265. Brazil, 3624, 3745, 3765, 3835, 3898. Uruguay, 4136. Argentine Republic, 3238, 3626-3627, 4275. Chili, 4025.

591.99. Fauna of Oceania, etc. Australia, 3419, 3738, 4191, 4193, 4195. New Caledonia, 4195. New Zealand, 4134, 4144, 4173, 4299.

Sandwich Islands, 4025. Tahiti, 3281. Pitcairn I., 4291.

Arctic regions, 4110.

Special Zoology.

593. PROTOZOA; RADIATA.

593.15. Infusoria, 4178.

593.19. Gregarinidae. Sporozoa, 3736.

594. MOLLUSCA.

594.1. Lamellibranchiata. *Mytilus*, 3122.

595. ARTICULATA.

595.01. Philosophy of entomology. Difficulties, 3790. Importance, 3350, 3716. Need of large series of specimens, 3337. Problems, 3132. Significance of characters, 3759; of eggs, 3461.

595.03. Dictionaries [see also 570.3].
NOMENCLATORS. Vernacular names, 3431, 3570, 3579, 3667.

ORISMOLOGY, 3508. Eyes, 3877. Muscles, 3684. Wings, 3916.

595.04. Essays, 3650, 3716. Miscellanea, 4130-4146. Notices, 3862. [*For Elementary and popular writings, see 595.07.*]

595.05. Periodicals, 3873.

595.05A. EUROPEAN, 3651-3658. Annuaire entom., 3651-3658. Entom. tidskr., 3873. Rovaraszati lapok, 4105. Rovartani lapok, 4112, 4282.

595.057. NORTH AMERICAN. Papilio, 4136. Psyche, 4078, 4114, 4140, 4217, 4227, 4229.

595.06. Societies. [*See also 506, 5706, 5906*], 4273.

595.06A. EUROPEAN, 3651-3658. Entom. för. i Stockholm, 4070. Entom. soc. Lond., 4142, 4147-4149, 4172, 4293. Lancashire and Cheshire entom. soc., 4131. Northern entom. soc., 4131. Iris, 4142. Soc. entom. France, 4120, 4127, 4132, 4138, 4185, 4253.

595.067. NORTH AMERICAN, 4078, 4244, 4273. A. A. A. S.—Entom. subsect., 3125, 3132, 3252, 3258. Amer. entom. soc., 3792, 3796-3798, 3801-3802. Brooklyn entom. soc., 3285. Cambr. entom. club, 4078-4087, 4098, 4134, 4136, 4212-4213, 4215, 4221, 4269. Entom. club A. A. A. S., 3594, 3650, 3670, 3862, 3949-3951, 4129. Entom. soc. Ontar., 3146, 4108. Entom. soc. Wash., 4150, 4220. Rhode Island entom. soc., 4139.

595.07. Education [*see also 507, 5707, 5907*]. Elementary information, 3144, 3147-3150, 3296. Entomological ignorance, 3324, 3431, 3578. Exhibitions, 4135. Expeditions, 4122. Methods of study, 3508, 3932, 3951, 3976. Museums, 3710, 4289. Prizes, 4106-4106. Schools, 4153.

595.09. History [*see also 016, 595*], 3132, 3146, 3650, 3862, 3950-3951, 4149, 4151.

Demodex, 3823. Neuroptera, 3591. Prosopistoma, 3479, 3482. Blissus, 3402, 3571. Phytonomus, 3309. Diptera, 3489. Bombyliidae, 3536. Cecidomyia, 3669, 3473, 3689, 4161. Tortricidae, 3954, 3956. Aletia, 3570.

595.1. VERMES,

3119, 3566, 3569, 4177.

595.15. NEMATODA,

4086, 4247.

Sphaerulariidae. Sphaerularia, 4087, 4133, 4191. Simondsia, 4191.

Strongylidae, 4147.

Gordiidae. Gordius, 3291.

595.19. ANNELIDA.

Lumbricidae. Lumbricus, 4149.

Nereidae. "Geophilus proavus," 4269.

595.2. ARTHROPODA,

[*see also 595.3-595.7*], 3471, 3544, 3571-3872, 2959.

595.3. CRUSTACEA.

4269.

595.34. COPEPODA.

Cyclopidae. Cyclops, 4201.

595.37. ISOPODA.

3880. Oniscoda, 4138.

595.38. DECAPODA.

Potamophilus, 4209.

595.39. POECILOPODA.

Limulidae. Limulus, 3471, 3877, 3881, 4300.

595.4. ARACHNIDA,

3471, 3767, 4019. Fossil, 4086.

595.41. STELECHPODA.

Linguatulidae. Pentastoma, 3566, 3569.

595.42. ACARIDA,

3421, 3568-3569, 3893, 4192.

595.421.2. Phytoptidae, 3753. Phytoptus, 4177.

595.421.4. Demodicidae. Demodex, 3823.

595.421.6. Sarcoptidae, 3749, 3768. Acarus, 3109, 3421, 3560, 3576, 4138.

595.422. Tyroglyphidae, 4192. Typhlodromus, 3109. Tyroglyphus, 3599, 3737.

595.423. Gamasidae, 3292. Sejus, 3107.

595.424. Oribatidae. Oribates, 3110.

595.425. Ixodidae, 3749. Ixodes, 4119.

595.428. Hydrachnidae, 3999. Hydrachna, 3560.

595.429. Trombidiidae, 3705. Trombidium, 3291, 4016, 4019, 4078.

595.43. ARANEIDA,

3236, 3364, 3517, 3561, 3730-3733, 3828, 4064, 4074 4097, 4299.—Aranea, 4269.

595.431. SALTIGRADAЕ.

Attidae, 4009. Salticus, 4119. Attus, 4097.

595.432. CITIGRADAЕ.

Lycosidae. Dolomedes, 4166. Tarentula, 3123.—Diapontia, 4186.

595.433. LATERIGRADAЕ.

Thomisidae, 3732.

595.434. TERRITELANIAE.

Theraphosidae, 4285.

595.436. TUBITELARIAE.

Drassidae. Micaria, 4140. Clubiona, 4119.

Agalenidae. Tegenaria, 4190, 4192.

595,437. RETITELARIAE.

Theridiidae, 3723. Theridium [Theridion], 4119.

595,438. ORBITELARIAE.

Epeiridae, 3948. Zilla, 4097. Epeira, 4058, 4119.—Arachnoura, 4299. Epeiroides, 4009.

595,45. PHALANGIDA.

Phalangiidae, 4017, 4019. Phalangium, 3561.

595,46. SCORPIONIDA.

Scorpionidae. Scorpio, 3877, 4300.
Androctonidae. Buthus, 4082.

595,47. ANTHRACOMARTI.

Architarbidae. Anthracomartus, 4085-4086.

595,48. PEDIPALPI,

4089.

595,49. SOLIFUGAE.

Solpugidae, 4104. Galeodes, 4018.

595,5. ONYCHOPHORA.

Peripatidae. Peripatus, 3133, 4269.

595,6. MYRIOPODA,

4269.

595,61. ARCHIPOLYPODA,

3524 (4080).

595,64. DIPLOPODA.

Glomeridae. Glomeris, 3721.
Iulidae, 3930. Iulus, 3789.
Polizonidae, 3930.

595,67. CHILOPODA.

3377.

Geophilidae. Geophilus, 3764, 3788, 4282.
Lithobiidae. Lithobius, 4247, 4282.
Scutigerae. Scutigera, 4054.

595,69. SYMPHYLA.

Scolopendrellidae. Scolopendrella, 3139.

595,7. HEXAPODA,

[in general, nearly all the paragraphs], 3290, 3295, 3372, 3395, 3403, 3415, 3419, 3425, 3430, 3437, 3458, 3468, 3490, 3492, 3500, 3568, 3571, 3604, 3645, 3651-3658, 3767, 3828, 3937, 4101, 4119, 4205, 4209, 4228, 4257, 4286. — Archaeoptilus, 3541. Brodia, 3541. Lithosialis, 3541.

595,71. THYSANURA,

3139, 3377, 4076.

595,712. **Poduridae**. Podura, 3340, 4119. Degeeria, 3613. Choreutes, 3221. Tomocerus (Macrotoma), 4062.

595,716. **Campodeidae**. Campodea, 3613.

595,718. **Lepismatidae**, 4076, 4119.

595,72. ORTHOPTERA.

595,722. FORFICULOIDEA.

Forficulidae. Forficula, 4085.

595,724. BLATTODEA.

Blattinidae. Etoblattina, 3275.
Periplanetidae. Blatta, 3500, 3872, 3934, 4178, 4234. Periplaneta, 3736.

595,725. MANTODEA.

Mantidae. Mantis, 4149.

595,726. PHASMODEA.

Phasmidae. Dictyoneura, 3681. Titanophasma, 4079.

595,727. ACRIDIODEA.

3291, 3487.

Truxalidae. Stenobothrus, 3872.
Acridiidae, 3632, 4181. Pezotettix, 3470. Caloptenus, 3137-3138, 3296, 3470, 3508, 3679, 3748, 3754, 4231, 4259.

595,728. LOCUSTODEA.

Phyllophoridae. Microcentrum, 3598.
Conocephalidae. Conocephalus, 4100.
Decticidae. Anabrus, 3291.
Rhaphidophoridae. Hemideina, 4171.

595,729. GRYLLODEA.

Gryllidae, 3291*v.* Gryllotalpa, 3789, 3884, 4178. Gryllus, 3771, 3936. Myrmecophila, 4081. Oecanthus, 4134.

595,73. PSEUDONEUROPTERA,

3276, 3591.

595,731. ANOPLURA.

Mallophaga, 3568, 3576, 3749. Goniocotes, 3500. Lipeurus, 3500. Trichodectes, 3312.

595,732. PHYSOPODA.

Thripidae. Thrips, 4286.

595,733. CORRODENTIA.

595,734. **Termitina**, 3542, 4178, 4191, 4245. Termes, 3544.

595,736. **Psocina**, 3279, 4163. Atropos, 3611, 4055, 4086.

595,738. AMPHIBIOTICA.

595,738.1. **Ephemerina**, 3459, 3479. *Prosopistoma*, 3482, 4209. *Ephemerella*, 4042. *Ephemer*a, 4195, 4209. *Polymitarcy*s, 3317. *Oligoneura*, 3317. *Palingenia*, 3941. — *Breyeria*, 3941.

595,739. *ODONATA*, 3239, 4136.

595,739.1. **Libellulina**, 3834. *Diplax*, 3967. *Libellula*, 3158, 3161, 3878, 4033, 4140, 4209. *Pantala*, 4149.

595,739.8. **Agrionina**. *Pyrrhosoma*, 4141.

595,74. NEUROPTERA.

595,740.3. **DICTIONARIES**. *Indices*. *Trichoptera*, 3480.

595,741. PLANIPENNIA.

595,742. **Sialina**, 3506, 3521, 3535, 4083. *Corydalus*, 3360, 3507, 3511, 3513, 3531-3535, 3550, 3667, 4140, 4153, 4180, 4200, 4216.

595,744. **Heemerobina**. *Dilar*, 3481. *Chrysopa*, 3571, 3872.

595,746. **Panorpin**a, 3483. *Panorpa*, 4200. *Bittacus*, 3843.

595,748. TRICHOPTERA.

3480.

Hydropsychidae, 3915.

595,75. RHYNCHOTA.

3752.

595,751. PARASITA.

595,751.4. **Pediculidae**, 3568, 3576, 3749. *Phthirus*, 4119. *Pediculus*, 3631.

595,752. HOMOPTERA.

3553.

595,753.2. **Coccidae**, 3472, 3599, 3670, 3705, 3707, 3769, 4094. *Coccinea*, 3708. *Dorthesia*, 3410. *Rhizococcus*, 4144. *Carteria*, 3703. *Kermes*, 3328. *Lecaninae*. *Lecanium*, 3105, 3109, 3594, 3670. *Pulvinaria*, 3706, 4086, 4223. *Diapinae*. *Aspidiotus* (*Chrysomphalus*), 3110, 3600, 3927.

595,753.4. **Aleurodidae**. *Aleyrodes*, 4199.

595,753.6. **Phylloxeridae** [*Dactylosphaeridae*], 3553. *Chermesinae*. *Phylloxera* [*Dactylosphaera*, *Viteus*, *Pemphigus*], 3637, 3724, 3726-3728, 3759, 3761, 3769, 4071, 4081, 4200, 4250-4251. *Chermes*, 3755-3756. *Pemphiginae*, 3323. *Hormaphis* [*Hammamelistes*], 3769. *Pemphigus* [*Glyphina*], 3349, 3927, 4004; [*Eriosoma*, *Schizoneura*], 3547, 4071.

595,753.7. **Aphididae**, 3113, 3323, 3349, 3435, 3504, 3547, 3590, 3769, 3885, 4065, 4095, 4177, 4259. *Lachninae*. *Lachnus*, 3111. *Aphidinae*, 4119. *Aphis*, 3113, 4065.

595,753.9. **Psyllidae**, 3728, 3761, 4014, 4203. *Psylla*, 3724, 3727, 3836.

595,754.2. **Tettigonidae**, 3280. *Jassininae*, 3546. *Jassus*, 3278. *Tettigoninae*. *Gypona*, 3281.

595,754.4. **Membracidae**. *Publilia*, 4056. *Enchophyllum*, 3410.

595,754.5. **Cercopidae**, 4195.

595,754.7. **Fulgoridae**. *Flata*, 4149.

595,754.9. **Cicadidae**, 3238. *Cicada*, 3431, 3577, 3903, 3927, 3964, 4259.

595,755. HETEROPTERA.

595,756.2. **Corisidae**. *Corixa*, 4086, 4259.

595,756.3. **Notonectidae**. *Notonecta*, 3467, 4086, 4119, 4259.

595,756.5. **Belostomatidae**. *Belostoma*, 3531-3534, 3550.

595,757.4. **Hydrometridae**. *Hydrometra*, 4119.

595,757.8. **Reduviidae**, 3576.

595,758.1. **Phymatidae**. *Phymata*, 3617, 3926.

595,758.42. **Acanthiidae** [*Cimicidae*] 3568. *Acanthia*, 3576. *Cimex*, 3631.

595,758.44. **Anthocoridae**. *Anthocoris*, 3571. 595,758.7. **Lygaeidae**. *Blissus* [*Micropus*], 3402, 3571, 3865, 3959, 4103, 4122.

595,758.8. **Berytidae**. *Berytus*, 4160.

595,759.2. **Pentatomidae**, 3445. *Nezara*, 4149. *Brochymena*, 3886.

595,76. COLEOPTERA.

3145, 3318, 3366, 3369, 3372, 3413, 3512, 3538, 3543, 3578, 3586, 3603, 3610, 3682, 3952, 4044, 4047, 4049, 4067, 4092, 4119, 4130, 4136, 4143, 4157, 4165, 4206, 4255, 4284.

595,761. RHYNCHOPHORA.

3118, 3213.

595,761.15. **Anthribidae**, 4142.

595,761.21. **Scolytidae**. *Scolytinae*. *Hylesinus*, 3309. *Scolytus*, 3546. *Tomicus*, 4291.

595,761.31. **Calandridae**. *Calandrinae*, 3310. *Sphenophorus*, 3321, 3716. *Rhodobaeus*, 4284.

595,761.51. **Curculionidae**, 4218, 4249. *Curculioninae*. *Centrinus*, 3319. *Madarus*, 3352. *Baridius*, 3352, 3578. *Chalcodermus*, 4284. *Conotrachelus*, 3442. *Cionus*, 4080. *Anthonomus*, 3350, 4249. *Lissorhoptrus*, 3335, 3348. *Larinus*, 4177. *Eudocius*, 4284. *Pisodes*, 3623. *Phytonomus*, 3309, 3325-3326. *Apioninae*, 3413.

595,761.71. **Otiorynchidae**. *Otiorynchus*, 4142.

STREPSIPTERA.

595,762.11. **Stylopidae**, 3601.

COLEOPTERA GENUINA.

3213.

595,763.13. **Rhipiphoridae**. *Rhipiphorus*, 4207, 4262.

595,763.21. **Meloidae**, 3667, 3973. *Lyttinae*, 3578. *Cantharis*, 4154. *Pomphopoea*, 4035. *Epicauta*, 3291, 3771. *Sitaris*, 3437. *Nemognatha*, 4160.

595,763.27. **Anthicidae**, 4160.

595,763.31. **Mordellidae**, 4046.

595,763.63. **Lagriidae**. *Statira*, 4211.

595,763.7. **Tenebrionidae**, 3970-3972. *Strongylum*, 4211. *Boletotherus* [*Bolitotherus*], 4001, 4083. *Alphitobius*, 4292. *Tenebrio*, 3510, 4062. *Eleodes*, 3971, 4296.

595,765.1. **Bruchidae**, 3969. *Bruchus*, 3716, 3833, 4206.

595,765,2. **Chrysomelidae**, 4155-4156. Phyl-
lotreta, 3554, 3584. Epitrix, 3578. Haltica, 3554,
3584. Diabrotica, 3747, 3771. Phyllobrotica, 3442.
Doryphora, 3359, 3466, 3529, 3578, 3628, 3641-3642,
3713, 3865, 3927, 4081. Plagiocera, 4284. Gastro-
physa, 3446, 3518, 3523, 4021-4022, 4246. Colaspis,
4155. Graphops [Scelodonta], 4155-4156. Paria,
4155. Coscinoptera, 3615. Crioceris, 3548. Lema,
3578, 3716. Zeugophora, 3979. Donacia, 4139.

595,765,3. **Cerambycidae**, 4206, 4284. Oberea,
3450. Saperda, 3128, 3899. Spalacopsis, 3319, 3335,
3348. Hippopsis, 3348. Strangalia, 3872. Xylo-
trechus, 3136. Purpuricenus, 3630. *Prioninae*, 3572.
Prionus, 3153, 4102.

595,766,2. **Scarabaeidae**, 4170, 4249. Scarabaeus
[Dynastes], 4160. Chalepus, 3319, 3331, 3335.
Cyclocephala, 3331. Cotalpa, 4032. Polyphylla,
4102. Melolontha, 3131, 3777, 3872. Lachnosterna
[Phyllophaga], 3865, 3876, 4207, 4262. Rhizotrogus,
3897, 4141. Amphicoma, 3896, 4039. Dasydera,
4059. Trox, 4249. Geotrupes, 4160. Onthophagus,
4086.

595,766,9. **Lucanidae**, 3963. Odontolabidae,
4122. Lucanus, 3147, 3534, 4085, 4253.

595,767,19. **Cupesidae**, Cupes, 3142.

595,767,2. **Ptinidae**, 3820. Anobium, 4055.
Ozognathus, 3416, 3501. Eucrada, 3630. Ptinus,
3610. Niptus, 3940.

595,767,31. **Cleridae**, Corynetes [Necrobia],
4292.

595,767,35. **Malachiidae**, 3734.

595,767,4. **Lampyridae**, 3589. Chaulignathus,
3291, 4284. Lampyrus, 3393-3394.

595,767,51. **Buprestidae**, 3352, 3602, 3630, 4206.
Trachys, 4177. Coraebus, 3737. Agrilus, 3447.
Acmaeodera, 3381. Chrysobothris, 4234. Dicerca,
4284.

595,767,6. **Elateridae**, 4249. Pyrophorus,
4068. Corymbites, 4206. Elater, 4147. Alaus,
3147, 3892, 4078. Tharops, 4206.

595,767,8. **Rhipiceridae**, Sandalus, 4206.

595,767,9,1. **Dasyllidae**, 3625.

595,768,13. **Parnidae**, 3625.

595,768,33. **Dermestidae**, 4119. Anthrenus,
4066, 4289. Trogoderma, 4167, 4288. Dermestes,
4292.

595,768,47. **Colydiidae**, 3463.

595,768,51. **Erotyliidae**, Helota, 4149.

595,768,55. **Coccinellidae**, 3571, 3581, 3704,
3712, 4259.

595,768,69. **Pausidae**, Pausus, 4147.

595,768,71. **Staphylinidae**, 4157, 4275. Ocy-
pus, 4149. Aleochara, 3619.

595,768,85. **Silphidae**, 4287. Silpha, 4038.
Necrophorus, 4036.

595,768,95. **Hydrophilidae**, 3117, 3366, 3369,
4043. Hydrophilus, 3595.

595,769,1. **Gyrinidae**, 3603. Gyrinus, 3384.

595,769,2. **Dytiscidae**, 3608. Cybister, 4149.
Dytiscus, 3478, 3939.

595,769,4. **Amphizoidae**. Amphizoa, 4058,
4259.

595,769,5. **Carabidae**, 3960, 4003, 4040, 4252,
4284. Selenophorus, 4002. Harpalus, 4005.
Chlaenius, 4081. Patrobus, 4037. Nebria, 4087,
4259. Leistus, 3231. Calosoma, 3127, 4034, 4283.
Carabus, 3789, 4149.

595,769,9. **Cicindelidae**, 4259, 4283, 4284.
Cicindela, 3387, 3559, 3644, 3671-3672, 4000, 4040,
4119, 4160.

595,77. DIPTERA.

3101, 3489, 3735, 3738, 3760, 4120, 4121, 4138,
4279, 4295.

595,771,1. **Hippoboscidae**, 3568, 4279. Melo-
phagus, 4075.

595,771,3. **Agromyzidae**, Leucopis, 3759.

595,771,4. **Oscinidae**, Chlorops, 3134.

595,771,6. **Drosophilidae**, Drosophila, 3711-
3712, 3714, 4141.

595,771,7. **Ephydrinidae**, Ephydra, 3781.

595,771,9. **Piophilidae**, Piophila, 3560.

595,772,2. **Trypetidae**, 3450. Trypeta, 3400-
3401, 3408, 3700, 3712.

595,773,1. **Anthomyiidae**, Homalomyia, 4097.

595,773,3. **Muscidae**, 3476, 4279, 4297. Cyrtoneura
[Curtoneura], 3516, 4120. Musca, 3872, 4210.
Calliphora, 4069, 4081. Stomoxys, 3631, 4260.
Glossina, 3631.

595,773,4. **Sarcophagidae**, Sarcophaga, 4025,
4119.

595,773,6. **Tachinidae**, Tachina, 3614. Exo-
rista, 3582. Morinia, 4101.

595,773,9. **Oestridae**, 3568, 4075, 4121, 4259,
4279. Dermatobia, 3566, 4139. Cuterebra, 4086.
Oestrus, 3576, 3917. Hypoderma, 3998, 4149. Gas-
trophilus, 3569, 3998.

595,774,2. **Conopidae**, 3233, 3784.

595,774,7. **Syrphidae**, 3115, 3476, 3489, 3780,
3782-3783, 4279. Eristalis, 3232, 4025. Syrphus,
3116, 4025. Pipiza, 3547. Nausigaster, 3782.

595,775,2. **Dolichopodidae**, Psilopus, 4025.

595,775,5. **Empidae**, 4279. Hemerodromia,
3546.

595,775,9. **Therevidae**, 4096.

595,776,2. **Bombyliidae**, 3291, 3520, 3536,
4279. Ploas, 4119. Bombylius, 3680. Anthrax,
3779.

595,776,4. **Nemestrinidae**, Hirmoneura, 3897,
4141.

595,776,5. **Mydidae**, Apiocera, 4096.

595,776,6. **Asilidae**, 3782-3783, 4096, 4279.
Asilus, 3158, 3420, 3631. Promachus, 3420. Mallo-
phora, 3291.

595,777,1. **Leptidae**, 4279. Atherix, 4149.

595,777,3. **Tabanidae**, 3588, 3631, 4279. Tab-
anus, 3467, 3872, 4119.

595,778,2. **Tipulidae**, 4279.

595,778,6. **Psychodidae**, Phlebotomus, 3631.

595,778,8. **Chironomidae**, 4279. Tanytus,
4086. Chironomus, 3388, 3729, 4086, 4097.

595,778,9. **Culicidae**, Culex, 3544, 3631, 4025,
4082, 4086, 4119.

595,779,1. **Blepharoceridae**, 3443, 3455, 3519,
3939.

595,779,2. **Bibionidae**, Bibio, 3960.

595,779,3. **Simuliidae**, Simulium, 3618, 3631,
4086, 4131, 4133.

595,779,4. **Pulicidae**, 3568, 3631, 3778, 4053,
4279. Sarcopsylla, 3544. Pulex, 3242, 3293, 3576,
3737, 4085, 4093.

595,779,5. **Mycetophilidae**, Sciara, 3709.

595,779,9. **Cecidomyiidae**, 3349, 3454. Lasioptera, 3401, 3408. Asphondylia, 3398-3400. Cecidomyia, 3314, 3319, 3349, 3353, 3398-3400, 3409, 3411, 3414, 3428, 3430-3431, 3451-3454, 3473-3474, 3557, 3605, 3609, 3665-3666, 3689, 3716, 3743, 3929, 4161-4162, 4168, 4201, 4218, 4286. Diplosis, 3726, 3728, 3759, 4162.

595.78. LEPIDOPTERA,

3103, 3140, 3230, 3299, 3383, 3456, 3464, 3494-3498, 3525, 3545, 3578, 3648, 3760, 3776, 3785, 3888-3889, 3902, 3933, 3983, 4020, 4048-4049, 4061, 4082, 4090, 4130, 4142-4143, 4119, 4176, 4200, 4202, 4235, 4265, 4289, 4299-4300.—Anaphe, 4193. Minallo, 3626.

595,780,3. DICTIONARIES OF LEPIDOPTERA. Catalogs, 3283.

595,781. HETEROCERA,

3121, 3370, 3626-3627, 3916.

595,781,1. ALUCITINA.

595,781,15. **Pterophoridae**, 3259, 3621.—Deuterocepis, 4149. Platyptilia, 3539.

595,781,2. TINEINA, 3686, 3691-3699, 3910, 3916, 4091.

595,781,3. **Lyonetidae**. Bucculatrix, 3612, 3687. Cemistoma, 3297, 3911, 4232. Phyllocnistis, 3911. Lyoneta, 3912.

595,781,4. **Lithocolletidae**. Parectopa, 3913. Leucanthiza, 3911. Lithocolletis, 3656, 3904-3910.

595,781,5. **Elachistidae**. Tischeria, 3911. Heliodines, 4091. Walshia, 3339, 3418. Laverna, 3912. Batrachedra, 3350.

595,781,7. **Gracilariidae**, 3913. Gracilaria, 3698.

595,781,9. **Glyphipterygidae**. Aspidisca, 3122, 3693, 3912. Phigalia, 3983.

595,782,1. **Oecophoridae**, 3293.

595,782,3. **Gelechiidae**, 3694. Euclimensia, 3328. Anacampsis, 3905. Gelechia, 3446, 3450, 4091, 4259. Epigraphia, 3981, 3984.

595,782,6. **Hyponomeutidae**. Oeta, 3288.

595,782,7. **Prodoxidae**, 3378, 3412, 3424, 3462. Pronuba, 4200.

595,782,8. **Tineidae**, 3259. Tinea, 3430, 3690, 4128, 4160. Tineola, 3690.

595,782,9. **Choreutidae**. Choreutes, 3221.

595,783,1. TORTRICINA, 3696-3698.

595,783,2. **Tortricidae**, 3236, 3259, 3499, 3938, 3953-3954, 3956, 4152. *Grapholithinae*, 3288. Carpocapsa, 3442, 3922, 3927. Grapholitha, 4218. Euryptychia, 3343, 3401, 3408, 3418. Penthina, 3499, 3573. Eecopsis, 3259, 3955. Exartema, 3259. Eudemis, 3573. Retinia, 3702, 3763, 3953, 4078. *Co[n]chylinae*. *Co[n]chylis*, 3450. *Tortricinae*, 3219. Leptoris, 3698. Tortrix, 3288, 3956, 3990, 4177, 4218. Argyrolepia, 3594, 3669. Croesia [*Ptycholoma*], 3990. Lozotaenia [*Cacoecia*], 3219.

595,783,4. **Crambidae**, 3327. Diphyryx, 3332. Propexis, 3981. Crambus, 3311, 3334, 3696, 3719, 3981.

595,783,5. **Phycidae**, 3267. Dakrma, 3701, 3706, 3981. Pempelia, 3288, 3346, 3981. Pinipestis, 3988. Nephopteryx, 3996.—*Catastega*, 3693.

595,783,7. PYRALIDINA.

595,783,9. **Pyraliidae**, 3738, 3981, 3989, 4278. Cataclysta, 3745. Chrysendeton, 3983. Cindaphia, 3627. Pionea, 3865. Botis, 3264.—*Acentropus*, 4176. *Anaeglis*, 3112.

595,784. GEOMETRINA.

595,784,7. **Phalaenidae** [*Geometridae*], 3222, 3246, 3283, 4031. *Larentinae*. *Emplocia*, 3264. *Eupithecia*, 3212. *Ypsipetes*, 4247. *Melanippe*, 3391. *Lobophora*, 4228. *Fidoninae*, 3249. *Aspilates*, 3228, 4031. *Caterva*, 3212. *Abraxas*, 4179. *Panthera*, 4175. *Caberinae*. *Deilinia*, 3222. *Acidalinae*. *Ephyra*, 4031. *Boarminea*. *Anisopteryx*, 3865. *Hybernia*, 4163, 4247. *Eubrya*, 3983. *Biston*, 4165. *Tephrosia*, 3475. *Cymatophora*, 3261. *Bombycia*, 3265. *Ennominae*. *Eltopia*, 3983. *Azelina*, 3249. *Eugonia*, 4007.

595,785. NOCTUINA.

595,786,7. **Noctuidae**, 3245, 3264-3265, 3283, 3430, 3626, 3628, 3663, 3864, 3883, 3991-3992, 4045, 4048, 4050, 4091. *Hyperinae*. *Platyhypena*, 3324. *Pseudaglossa*, 3989. *Torocampinae*. *Celiptera*, 3983. *Phoberia*, 3324. *Synedoida*, 3249. *Catocalinae*, 3249. *Catocala*, 3212, 3220, 3263, 3269, 3367, 3846, 3867, 3935, 3992, 4048, 4132, 4278. *Noctophalaenidae*. *Brephos*, 4253. *Eustrotinae*, 3623, 3986. *Spragueia*, 3225. *Gyros* [*Oribates*], 3249. *Eustrotia* [*Erastralia*], 3985. *Chamyris*, 3212. *Heliothinae*, 3264-3265. *Xanthothrix*, 3248. *Pyrria*, 3991-3992. *Heliothis*, 3212, 3307, 3389, 3549, 3628, 3864, 3882. *Rhodophora*, 3465. *Chloridea*, 3626. *Anarta*, 3585. *Plusiinae*. *Plusia*, 3154, 3248, 3266, 3288, 3606, 3626, 4007, 4119, 4130. *Deva*, 3224. [*Hyabrostola*], 3734. *Diastema*, 3497. *Telesilla*, 3719. *Anominae*, 3288, 3333, 3570, 3835. *Aletia*, 3324, 3516, 3614, 3831, 4199. *Nolaphaninae*. *Adipsophanes*, 3719. *Cucullinae*, 3734. *Cucullia*, 3606. *Orthosiinae*. *Xylina*, 3266. *Scoliopteryx*, 3212, 3980. *Trichorthosia*, 3983. *Orthosia*, 3864. *Taeniocampinae*. *Taenioampa*, 3365. *Nonagriinae*, 3247. *Leucania*, 3582, 3734, 3865. *Nonagria*, 4078. *Hadeninae*, 3223-3224, 3983. *Gortyna*, 3288, 3578, 3882, 3989, 3992, 4071. *Hydroecia*, 3634. *Euplexia*, 4061. *Prodenia*, 3266. *Laphygma*, 3266, 3330. *Polia*, 3865. *Hadena*, 3265, 3266, 3992. *Aplecta*, 3734. *Noctuinae*, 3983, 3989. *Ulochaena*, 4176. *Noctua*, 3570, 3431, 4091. *Agrotis*, 3265-3266, 3991-3992, 4048, 4061. *Bombycoidea*. *Chytonix*, 3225. *Bryophila*, 3734. *Apateia*, 3212, 3989. *Acronycta*, 3266, 4165. *Audela*, 3978. *Dicopinae*. *Dicopsis*, 3225, 3864. *Bombyciae falsae*. *Thyatira*, 3265.

595,787. BOMBYCINA.

595,787,2. **Bombycidae**, 3283, 3667, 3675, 3677, 3918, 4149. *Hepialinae*, 4200. *Hepialus*, 3216, 3678. *Cossus*, 3887. *Xystus*, 3244. *Lachneinae*. *Clisiocampa*, 3244, 3282, 3895. *Odonotes*, 3787. *Lasio-campa*, 4107. *Cnethocampa*, 3461, 3765. *Gloveria*, 3248. *Quadrina*, 3264. *Ceratocampinae*, 3264, 3995. *Dryocampa*, 3927. *Ceratocampa*, 3579, 4139. *Citheronia*, 3579, 3659, 4274. *Hyperchiria*, 3627. *Pseudohazis*, 3244, 3982. *Euleucophaeus*, 3248, 3255. *Hemileuca*, 3244, 3273. *Euc[h]ronia*, 4096. *Atacinae*, 3659, 4081, 4277. *Endromis*, 4179. *Saturnia*, 3227, 3244, 3485, 3861. *Aglia*, 4179. *Attacus*, 3592, 4051, 4084. [*Platysamia*], 4172. [*Callosamia*], 3540, 4174; [*Tropaea*], 4232; [*Telea*], 3674. *Bombycinae*. *Bombyx*, 3441, 3765, 4128. *Ptilodontinae*. *Harpysia*.

3734. *Notodonta*, 3149, 3304, 4031. *Psychiinae*. *Oeceticus* [*Oeceticus*], 3626, 3993. *Thyridopteryx*, 3249, 3699. *Phryganidia*, 3244. *Cochlidimue*. *Limacodes*, 3997. *Eulimacodes*, 3244, 3495. *Monoleuca*, 3997. *Enuclea*, 3260. *Dasychirinae*, 3734. *Porthesia*, 3918, 3920. *Ocneria*, 4179. *Orgyia*, 3217, 3385, 3392, 3616, 3620, 3646, 3921. *Liparis*, 3461, 3607, 3676, 3765. *Arctiinae*, 3215, 3244, 3638. *Alexicles*, 3983. *Halisidota*, 3264, 3987, 3992. *Leucarcia*, 4061. *Antarctia*, 3287. *Nemophila*, 4165. *Arctia*, 3261, 3863, 3922, 4165, 4179. *Callimorpha*, 4061. *Lithosiniinae*. *Deiopeia*, 4228. *Nola*, 3265, 3347.—*Charagia*, 4171.

595,788. SPHINGINA.

595,788.1. **Glaucoipididae**. *Eunomia*, 4149.

595,788.2. **Zygaenidae**, 3256, 3283, 4045. *Zygaeninae*, 3244. *Anatolmis*, 3249. *Pygoctenucha*, 3983. *Penthetria*, 3256. *Castniinae*, 3264. *Alypia*, 3593. *Alypiodes*, 3983.

595,788.4. **Thyridae**. *Dysodia*, 3694.

595,788.5. **Aegeriidae**, 3251, 3283, 3830, 4200. *Aegeria*, 3148, 3262, 3922. *Trochilium*, 3155. *Melitita*, 4270.

595,788.6. **Sphingidae**, 3243, 3283, 3437, 3587, 3830, 3845, 3957, 4193. *Sphingini*. *Hyloicus*, 3229. *Sphinx*, 3229, 3249, 3308, 3329, 3486, 3578, 3627, 3699, 3927, 3957, 3965, 4031, 4086, 4291. *Macrosila*, 3718. *Smerinthini*. *Smerinthus*, 3143, 3151, 4031, 4119, 4179, 4259. *Acherontia*, 3597, 3664. *Choerocampini*. *Darapsa*, 3957. *Choerocampa*, 3830, 4291. *Philampelus*, 3150, 3596. *Macroglossini*. *Thyreus*, 4085, 4200. *Hemaris*, 3957.

595,789. RHOPALOCERA.

3628, 3283-3284, 3379, 3775, 3827, 3844-3845, 3914, 4123, 4126, 4274.

595,789.1. **Hesperiidae**, 3214, 3851, 3854-3855, 4200. *Nisoniades*, 3271-3272. *Syrichthus*, 3844. *Hesperia*, 3838, 3840, 3842-3844, 3847-3848, 3853, 3946. *Pamphila*, 3253, 3688, 3848. *Erycides*, 3433. *Eudamus*, 3120, 3272, 3338, 3433, 3688, 4221, 4259.

595,789.2. **Papilionidae**. *Papilioninae*, 3734, 4149. *Papilio*, 3129, 3135, 3141, 3226, 3338, 3382, 3635, 3647, 3668, 3740, 3772, 3789, 3844-3845, 3854, 3858, 3861, 3923, 4058, 4083, 4116, 4142, 4160, 4165, 4172, 4179. *Parnassius*, 3841, 3849, 3853. *Pierinae*, 3574. *Anthoc[h]aris*, 3214, 3218, 3841, 3852, 3854-3855. *Colias*, 3432, 3840-3841, 3844, 3853, 4228. *Gonepteryx*, 3680, 4072. *Rhodocera*, 3140, 4253. *Callidryas*, 4139. *Pieris*, 3126, 3257, 3322, 3338, 3491, 3617, 3842, 3851-3853, 3865, 4013, 4050, 4117, 4119, 4133. *Terias*, 3157. *Aporia*, 3734, 4179.

595,789.3. **Lycanidae**, 3218, 3848-3849, 3851-3855, 3628, 4070, 4119. *Theclinae*. *Thecla*, 3254, 3338, 3840, 3858. *Lycaninae*. *Fenisea*, 4197. *Chrysophanus*, 3853-3855, 3942, 4048. *Lycana*, 3371, 3841-3845, 3946, 3983, 4191.

595,789.4. **Lemoniidae**. *Lemoniinae* [*Erycininae*], 3624. *Lemonias*, 3351, 4081. *Charis*, 3854.

595,789.6. **Nymphalidae**, 3757, 4200. *Nymphalinae*. *Apaturini*. *Amathusia*, 4119. *Agrias*, 4299. *Apatura*, 3104, 3856, 4063, 4165, 4239.

Limenitini. *Limenitis*, 3124, 3338, 3380, 3574, 3839, 3845, 3849, 3946, 4035, 4078, 4165, 4199. *Vanessini*, 4063. *Timetes*, 3847, 3850. *Junonia*, 4116, 4259. *Vanessa*, 3154, 3338, 3390, 3503, 3734, 3773, 3829, 3872, 4007, 4078, 4107, 4149, 4165, 4179, 4228. *Pyrameis*, 3296, 3338. *Grapta*, 3338, 3849, 3852-3853, 3859-3860, 4240. *Argynniini*, 3842, 3851. *Phyciodes*, 3854-3855, 3944. *Melitaea*, 3214, 3218, 3338, 3386, 3734, 3841, 3843, 3850, 3852, 3858, 3943, 4052, 4165, 4179. *Brenthis*, 3274, 3277. *Argynnis*, 3258, 3274, 3734, 3845, 3848-3853, 3855, 4058, 4119, 4165, 4179, 4259. *Euptoieta*, 3382, 4259. *Heliconiinae*, 3624, 4057. *Heliconia*, 3252. *Morphininae*. *Morpho*, 4265. *Satyrinae*, 3734. *Coenonympha*, 3218, 3852, 3854, 3945. *Epinephele*, 4015. *Satyrus*, 3837, 3843, 3851. *Chionobas*, 3838, 3841, 3848, 3851. *Oeneis*, 4110. *Erebia*, 3855, 3857, 4063. *Euptychia*, 3854.—*Ragadia*, 4123. *Danainae*, 3574, 3772, 4057, 4235. *Danais*, 3130, 3296, 3449, 3580, 4061, 4119, 4149, 4194.

595,79. HYMENOPTERA.

3358, 3372, 3434, 3583, 3819, 3895, 4089, 4101, 4142. *Terebrantia*, 3790. *Phytophaga*, 3901. *Entomophaga*, 3790. *Mellifera*, 3502.

595,791.1. **Tenthredinidae**, 3155, 3439, 3457, 3460, 3639, 3900, 4177. *Umbicininae*. *Zaraea*, 4246. *Hylotominae*. *Hylotoma*, 3155. *Tenthredininae*. 3457. *Eura*, 3350. *Nematus*, 3350-3351, 3460, 4031, 4199, 4218. *Dolerus*, 3313. *Hemichroa*, 3460. *Eriocampa*, 3460. *Phyllotoma*, 3460, 4177. *Selandria*, 3746, 3865. *Tenthredo*, 3901.

595,791.8. **Uroceridae**. *Urocerus*, 3791. *Sirex*, 3872, 3901.

595,792.2. **Cynipidae**, 3349, 3356-3357, 3397, 3416, 3439, 3454, 3501, 3622, 3890, 3900, 4028, 4218. *Penides*, 3351. *Cynipinae*. *Rhodites*, 3422, 3429, 3448-3449. *Diastrophus*, 3355, 3427. *Antistrophus*, 3351, 3427. *Cynips*, 3106-3107, 3341, 3349, 3351, 3355, 3357, 3403, 3416, 3425-3427, 3454, 3501, 3575, 3901, 4182. *Spathogaster*, 3107. *Biorhiza*, 3891. *Neuroterus*, 4193. *Figitinae*. *Figites*, 4218.

595,792.8. **Evaniidae**, 3801, 3810, 4041. *Aulacus*, 3798.

595,792.9. **Trigonulidae**, 3809.

595,793.1. **Ichneumonidae**, 3262, 3338, 3379, 3384, 3439, 3484, 3792, 3800, 3802, 3805, 3810. *Ichneumoninae*, 3790. *Ichneumon*, 3801. *Phaogenes*, 3262. *Ischnus*, 3801. *Acrodactyla*, 3286. *Cryptus*, 3583. *Ort[h]opelma*, 4218. *Hemiteles*, 3450. *Ophion*, 3674. *Campoplex*, 4218. *Limneria*, 4218. *Pimplinae*, 3799. *Arotes*, 3806. *Rhyssa*, 4082. *Ephialtes*, 3450. *Pimpla*, 3450, 4218. *Polysphincta*, 3364.

595,794. **Braconidae**, 3338, 3344-3345. *Anisopelma*, 3820. *Aleiodes*, 3813. *Davisania*, 3469. *Apanteles*, 4167. *Microplitis*, 3345. *Microgaster*, 3450.

595,795. **Chalcididae**, 3114-3115, 3338, 3770, 3810-3811, 3822, 4028, 4149, 4218. *Agaoxinae*, 4028. *Smicra*, 3108. *Eurytoma*, 3427, 3450. *Callimome*, 3398. *Antigaster*, 3598. *Coccophagus*, 3105. *Aphelinus*, 3109, 3598. *Pirene*, 3450. *Spalangia*, 3116. *Pteromalinae*, 4168. *Pteromalus*, 3116, 3334. *Trichogramma*, 4199.

- 595,796,1. **Proctotrupidae**, 3810, 3886. Cera-
phron, 4168. Teleas, 4134. Telenomus, 3886.
Scelio [Caloptenobia], 3291. Platygaster, 4201.
595,796,9. **Chrysididae**, 3811.
595,797,1. **Formicidae**, 3435 (3438), 3436,
3810-3811, 3934, 3958, 4029, 4058, 4078, 4185. Cam-
ponotus, 3240. Polyrachis, 3958. Formica, 3872,
4193, 4259. Lasius, 4070, 4187, 4219.
595,797,2. **Poneridae**. Ponerá, 4185.
595,797,3. **Attidae**. Atta, 3477, 3894. Phei-
dole, 4219.
595,797,4. **Myrmicidae**. Pogonomyrmex,
3102, 3436.
595,797,5. **Mutillidae**. Mutilla, 3804.
595,797,6. **Scoliidae**, 3791. Tiphia, 4207, 4262.
595,797,7. **Pompilidae**, 3818. Pompilus, 3333,
3439.
595,797,8. **Sphegidae**, 3439. Coleoptera, 3791.
Pelopoeus, 3536, 4149, 4193.
595,797,93. **Larridae**, 4011-4012. Larra, 3291.
595,797,98. **Bembecidae**. Stizus, 3964, 4259.
595,798,1. **Nyssonidae**. Gorytes, 3791.
595,798,4. **Trypoxylonidae**. Trypoxylon,
3439, 3536, 4011.
595,798,7. **Masaridae**. Masaris, 3794-3795,
3807-3808.
595,798,8. **Eumenidae**, 3791. Eumenes, 3583.
Odynerus, 3819.
595,798,9. **Vespidae**, 3792. Polistes, 3583,
3791. Vespa, 3237, 3583, 3610, 3872.
595,799,3. **Andrenidae**, 4118. Colletes, 4154.
Halictus, 3522, 3563. Augochlora, 3563. Nomia,
3791. Andrena, 3502, 3680, 3791. Macropis, 3444,
4149.
595,799,8. **Apidae**, 3563, 3791-3793, 3796-3797,
3803, 3815, 3821, 4118, 4195. Nomada, 3816. Coeli-
oxys, 502. Osmia, 3817. Megachile, 3819. An-
thophora, 3680, 3814. Apathus, 3812. Bombus,
3337, 3439, 3467, 3502, 3558, 3667, 3766, 3812, 3872,
4110, 4119, 4133, 4173, 4259. Melipona, 4219, 4287,
Apis, 3285, 3337, 3439-3440, 3476, 3684, 3722, 3789,
3898, 4065, 4146, 4149, 4179, 4260.

597. ICHTHYOPSIDA.

- 597.8.** ANURA. Hyla, 4166.
597.9. URODELA. Amblystoma, 3587.

598. SAUROPSIDA.**598.1. REPTILIA.**

- 598.12.** OPHIDIA. Heterodon, 4259.

598.2. AVES.

- 3395, 3966, 4149.
Laridae. Hydrochelidon, 3159.
Tetraonidae. Ortyx, 3571. Phasianus, 4138.
Falconidae. Buteo, 3832.
Strigidae, 3832. Strix, 3778.
Alcedinidae. Halcyon, 4099.
Tyrannidae. Contopus, 4058.
Fringillidae. Passer, 4137.
Saxicollidae. Sialia, 3961-3962.
Turdidae, 3960.
598,206. **Societies of ornithology.**
UNDERTAKINGS. American ornithologists' union,
4137.

599. MAMMALIA,

- 3778, 4075.
Sciuridae. Tamias, 4086, 4259. Sciurus, 4004.
Rhinocerotidae. Rhinoceros, 4121.
Equidae. Epus, 3998.
Suidae. Sus, 3823.
Cavicornia. Bos, 3998. Ovis, 3312.

[END OF SPECIAL ZOOLOGY.]

6. USEFUL ARTS.

- 605. Periodicals.** Scientific american, 4238.
606. Societies.
EXHIBITIONS. World's industrial and cotton cen-
tennial exposition, 4136.
608. Patents, 4237.

61. MEDICINE.

- 615. Materia medica and therapeutics**
[see also **59163**]. Omnipathy, 3976. Scurvy,
3633, 4280.
616. Human pathology. Parasites. Dip-
tera, 3361, 4120. Poisoning. Carbon disulphide,
4088.
619. Veterinary medicine. Parasites.
3568-3569.

63. AGRICULTURE.

- 630.5. Periodicals.** American agriculturist,
4060.
630.6. Societies. Connecticut board of agri-
culture, 3715-3718. New Jersey state horticultural
society, 4198.
632. Agricultural pests and hindrances,
3291 c.
MEANS AGAINST INJURIOUS ANIMALS. Animals
injurious to fowl, 3715. Apple borer, 4010. Parasites
of domestic animals, 3568-3569, 3749. Tobacco
insects, 3718.
Hexapoda, 3507=3360, 3705, 3716, 3718, 3751, 3865-
3866, 3927, 3976, 3994, 3996, 4071, 4073, 4271, 4281.
Acrididae, 3291 o. Pachytylus, 3291 u. Caloptenus,
3291 c. Dermatodectes, 3717. Coccidae, 3670, 3705.
Chrysomphalus, 3600. Phylloxera, 4071, 4078, 4251.
Chermes, 3755-3756. Schizoneura, 3547. Aphidi-

dae, 3113. Blissus, 3402, 3571. Phytonomus, 3309. Lyttinae, 3578. Bruchus, 3969. Doryphora, 3559, 3466, 3578, 3641-3642. Crioceris, 3548. Prionus, 3572. Chalepus, 3331. Agrilus, 3447. Drosophila, 3711, 3714. Trypeta, 3700. Cecidomyia, 3605, 3666, 3689, 3929. Eudemis, 3573. Crambus, 3334. Chilo, 3332. Pempelia, 3346. Noctuidae, 4198. Heliothis, 3549, 3882. Notodonta, 3149. Orgyia, 3646. Sphinx, 3308. Pieris, 4013. Selandria, 3746. Isosoma, 3770.

Administrative measures [see also 35].

Insecticide animals [see also 59164]. Parasites, 4199. Formicidae, 4058.

Insecticide apparatus, 3614. Nether insertion apparatus, 4071, 4073.

Insecticide plants [see also 58164]. Lycopersicum, 4281.

Insecticide substances [see also Poisons], 3705, 3716, 3751. Carbolic acid, 3670. Kerosene, 3670. Naphthalin, 4073. Petroleum emulsion, 4071.

Insectipills, Tar, 4271.

Poisons. London purple, 3360 = 3507. Paris green, 3994, 3996.

633. Field crops. Cotton, 3835.

634. Orchards and vineyards. Ficus, 4131.

634.9. Forestry. Catalpa, 3308.

635. Kitchen gardens. Asparagus, 3548.

636. Domestic animals. Poultry, 3715.

638. Insecticulture.

ARICULTURE, 3544.

Usage, 3875, 4065, 4095, 4183. *Preservation*, 3722, 3739, 4236. *Production*, 4065. *Sources*, 4183. *Attacal*, 3875. Ergot, 4095. Aphididae, 4095. *Societies*, 4241.

Manuals of apiculture, 3530.

SERICULTURE, 4131. Attacus, 3592. Telea, 3674.

Variety of silk-insects, 3592, 3674.

64. DOMESTIC ECONOMY.

MEANS AGAINST HOUSE INSECTS. Termes, 3544.

641. Cookery. Acrididae, 4181. Diptera, 3781.

65. COMMERCE.

659. Advertising, 4059.

66. CHEMICAL TECHNOLOGY.

661. Production of chemicals. Insect powder, 4271.

667. Bleaching, dyeing, &c. Cochineal, 4086. Galls of cynips, 3341.

67. MANUFACTURES.

671. Metal manufacture. Casts of insects, 3493.

7. FINE ARTS.

75. PAINTING.

Illustrations of insects, 4080-4081.

76. ENGRAVING.

Insects, 4086. Lepidoptera, 4087.

9. HISTORY.

91. GEOGRAPHY AND TRAVELS.

915.5. Persia, 4183.

916. Africa, 3544.

917. North America, 3570.

92. BIOGRAPHY.

924. Philologists, 4136.

925. Scientists. Entomologists, 3132, 3145, 3651-3658, 3862, 4112, 4143, 4214, 4241-4242.

Aaron, 4136. Allen, 4139. André, 4138. Angus, 4122. Arkwright, 4149. Arribalzaga, 4297. Ayres, 4134.

Babbington, 4147. Bailey, 4134. Balbiani, 4128. Balfour, 3187. Barnes, 4085. Beale, 4084-4085. Bedel, 4132. Bellfrage, 3188, 4085. Berce, 3162. Blackburn, 3171. Blackwall, 3172. Blake, 3774. Blomefield, 4147. Boisduval, 3163. Boll, 3368. Bowditch, 4086-4087. Buckler, 4137-4138. Burgess, 4084.

Carrington, C., 3857. Chadourne, 4083. Chambers, 4085, 4232. Champion, 4122. de Chaudoir, 3173. Carke, 4078. Clemens, 3916. Colvin, 4197. Cooke, B., 4131. Coquillett, 3221, 4137. Cornalia, 3189. Cowan, 4299.

Dammer, 4130. Darwin, C. R., 3190, 3762. De Grey, 3327, 3332, 4091, 4147. Devereaux, 4084-4085. Dimmock, G., 4078, 4084-4085. Dollfus, 4106-4107. Dunning, 4147. Dzierzon, 4189.

Eaton, C. C., 4078, 4084. Edwards, H., 4136, 4202. Edwards, W. H., 3914. Elliot, 4202.

Fernald, 3954, 4130. Fish, 4130. Fitch, E. A., 4147. Fletcher, 4132. Foerste, 4078. Forbes, S. A., 4078. Forbes, W. A., 4133, 4300.

Garneys, 3174. Géhin, 3363. Giebel, 3175. Glover, 4085, 4124, 4134. Goossens, 4136. Graef, 4197. Gray, J., 3176. Grote, 3327, 3332, 3606, 4159. Grut, 4147. Guinée, 3164, 3916. Gurlt, 3191.

Hagen, 3412, 3424, 4104, 4136. Haldeman, 3132, 3165. Harrington, 4078, 4132. Harris, 4084, 4086-4087. Harvey, T. S., 4085. Hayes, 4131. Haydon, 3775. Hayward, 4078, 4080, 4082-4083, 4086-4087. Hazlewood, 4086. Heer, 4083. Hensel, 3177. Henshaw, 4078-4079. Hey, 3192. Horo, 4263. Howard, L. O., 4130, 4199. Hubbard, 4199.

Jack, 4084-4085, 4087. Jenkins, 4132. Jobson, 3193. Jousset de Bellesme, 3968, 4131.

Kiesenwetter, 3166. Kirby, 4147. Kirschbaum, 3167. Koch, 3178. Krauss, 4180, 4216. Künckel d'Heuland, 3968.

Laboulbène, 3734. Labrey, 3194. Lacoë, 4085. Leconte, J. E., 4080-4081. Leconte, J. L., 3870,

4085-4086, 4142, 4186, 4263. Leuckart, 4109. Leuthner, 4122. Lichtenstein, 3323. Lintner, 4078. Logan, 3857. Lubbock, 3762. Lütken, 4131.

McLachlan, 3482. Macloskie, 4078. Maeklin, 4211. Malm, 3195, 4130. Mann, 4078, 4084-4085, 4130. Mark, 4078, 4086, 4134. Matthews, 4078, 4083. Mégnin, 4147. Melsheimer, F. E., 4086. Meske, 4197. Metschnikoff, 4130. Mniszech, 3179. Morris, J. G., 3603. Morrison, 3214, 3938, 4225. Moss, 3196. Müller, F., 4149. Müller, H., 4085, 4111, 4115, 4236. Mulsant, 3168. Mylius, 4256.

Nikolai, 4138. Norman, 3197.

Ougspurger, 3169.

Packard, 3291*q*, v, 3667, 4149. Patton, W.; 4134. Peck, 4197. Pergande, 4087. Peters, 4132. Pritchard, 3198. Putnam, 3180, 3250, 4104. Putzeys, 3199.

Reinhardt, 3200, 4131. Riley, C. V., 3415, 4138, 4140, 4186, 4199. Rolleston, 3181. Romanis, 4191. Rosenhauer, 3182. Rothenbach, 3183. DE Rouge-ment, 3184. Russell, 3929.

Salensky, 4130. Salvatico, 4128. Sanborn, 4086-4087, 4132, 4137, 4139, 4224. Sanders, J. E., 4104. Saunders, E., 4147. Saunders, S. S., 4147, 4266. Savage, 4078, 4086. Schmidt, F., 3201. Schmidt-Goebel, 3202. Scudder, 4078, 4081, 4083-4087.

Semper, 4123. Shimer, 3571. von Siebold, 4142. Siewers, 3203. Sinclair, 3204. Smith, J. B., 4255. Smith, S. I., 3716, 3718. Snellen van Vollenhoven, 3170. Snow, 3983, 3987, 4078. Spence, 4147. Spiller, 4147. Storer, 4195. Stuxberg, 4130. Sumichrast, 3790. Stykes, 4086-4087.

Tarriel, 3205. Thomas, C., 3402. Thompson, 3206. Thwaites, 4207. DE Tinseau, 3208. Treat, 4198. Troschel, 3209. Tyrrell, 4132.

Wales, 3210. Wales, 4254. Waterhouse, 4147. Webster, C. E., 4086. Weismann, 3762, 4142. Welwitsch, 4149. Westring, 3211. Westwood, 4147. 4163. Weyenbergh, 4087. Whitman, 3185. Whymper, 4123. Wittfeld, 3252, 4078.

Yersin, 3291, v.

Zaddach, 3186. Zeller, 4133. Zimmerman, 4078. Zimmermann, 4986.

Lists of scientists, 3145, 3651-3658, 3862.

Notices of private collections of insects. Chevrolat, 4092. Leconte, J. L., 4263. Lewis, 4123. Morrison, 4289. Packard, 4289. Riley, C. V., 3160. Snow, 3264. Trabandt, 3318. Whymper, 4123. Wittfeld, 4078.

926. Economists.

State entomologists. Connecticut, 3716, 3718.

[7248 references to 3607 topics.]

PAGING OF THE BIBLIOGRAPHICAL RECORD OF PSYCHE, VOL. 4.

RECORD Nos.	PAGE Nos.	RECORD Nos.	PAGE Nos.	RECORD Nos.	PAGE Nos.	RECORD Nos.	PAGE Nos.
3101-3111	15	3379-3394	137	3662-3674	232	3940-3952	319
3112-3126	16	3395-3405	138	3675-3683	255	3953-3966	320
3127-3144	17	3406-3416	149	3684-3694	256	3967-3981	321
3145-3161	18	3417-3433	150	3695-3704	257	3982-3998	322
3162-3171	33	3434-3440	161	3705-3714	258	3999-4015	323
3172-3186	34	3441-3454	162	3715-3725	259	4016-4028	324
3187-3190	35	3455-3463	171	3726-3734	260	4029-4041	325
3191-3200	36	3464-3476	172	3735-3747	261	4042-4057	326
3201-3218	37	3477-3489	173	3748-3761	262	4058-4072	339
3219-3234	38	3490-3504	174	3762-3774	263	4073-4090	340
3235-3243	55	3505-3513	187	3775-3787	264	4091-4106	341
3244-3250	56	3514-3523	188	3788-3794	289	4107-4122	342
3251-3270	57	3529-3538	189	3795-3806	290	4123-4148	343
3271-3282	58	3539-3550	190	3807-3818	291	4149-4164	344
3283-3291	77	3551-3560	207	3819-3831	292	4165-4179	345
3292-3302	95	3561-3570	208	3832-3845	293	4180-4197	346
3303-3310	96	3571-3580	209	3846-3858	294	4198-4214	347
3311-3327	97	3581-3590	210	3859-3871	295	4215-4231	348
3328-3337	98	3591-3600	227	3872-3884	296	4232-4251	349
3338-3345	117	3601-3618	228	3885-3896	315	4252-4268	350
3346-3353	118	3619-3630	229	3897-3909	316	4269-4284	350*
3354-3362	135	3631-3647	230	3910-3926	317	4285-4300	350**
3363-3378	136	3648-3661	231	3927-3939	318		

[Bind this page (377) so that it can be unfolded to be read when the volume is closed.]

ALPHABETICAL INDEX TO PSYCHE, VOL. 4.

By BENJAMIN PICKMAN MANN.

[Copyright, 1889, by B. Pickman Mann.]

Heavy figures refer to articles in the body of the journal, italic figures to advertisements, plain figures to Bibliographical record (by pages). Genera of animals not belonging to arthropoda are indicated by brackets in which the divisions to which the animals belong are indicated. For genera of plants, and higher groups of animals and plants, see the Systematic index.

- Abraxas grossulariata**, 201.
Acanthia lectularia, 209.
Acanthococcus aceris, 172.
Acanthoderes morrisii, 204.
quadrigibbus, 222.
Acarus, 163. *aceris-cramena*, 150. *canna-mellifera*, 207. *contagiosus*, 207. *domesticus*, 207. *gloverii*, 15. *lacteus*, 207. *megarrhina*, 207. *muscida*, 207. *roseae*, 207. *scabiei*, 209.
Acentropus niveus, 163.
Acherontia atropos, 227, 232.
Acinia solidaginis, 162.
Acmæodera culta, 137.
Acoenites rupinsulensis, 290.
Acontia venusta, 229.
Acroductia degener, 77.
Acronycta lepusculina, 57.
menyanthidis, 192. *populi*, 57.
Actias luna, 231 (v. *Attacus l. et Tropæa l.*).
Adela, 257.
Adelocera lepidoptera, 25.
Adenophlebia, 171.
Adipsophanes miscellus, 259.
Adyroma, 174.
Aedis simulatilis, 322. *funalis*, 321.
Aegeria acerni, 18. *albicornis*, 56. *aurata*, 56. *aureola*, 56. *bolli*, 56. *brunneipennis*, 56. *consimilis*, 56. *corni*, 56. *corusca*, 56. *cucurbitæ*, 317 (*Melirtia c.*). *decipiens*, 56. *emphytiiformis*, 56. *eupatorii*, 56. *exitiosa*, 106. *flava*, 56. *geliformis*, 56. *giliae*, 56. *hemizoniæ*, 56. *hylo-tomiformis*, 56. *hyperici*, 56. *imitata*, 56. *imperfecta*, 56. *impropria*, 56. *infirma*, 56. *in-sitata*, 56. *koebelæi*, 56. *lupini*, 56. *madariæ*, 56. *mimuli*, 56. *morula*, 56. *neglecta*, 56. *nicotianaæ*, 56. *novarocensis*, 56. *odyn-eriformis*, 56. *opalescens*, 56. *perplexa*, 56. *pleciæformis*, 56. *proxima*, 56. *pyralidiformis*, 56. *pyramidalis*, 56. *refulgens*, 56. *rubrofascia*, 56. *subpygalto-mis*, 56. *saxifragæ*, 56. *sene-cioides*, 56. *sexfasciata*, 56. *syriugæ*, 57. *tipuliformis*, 106. *verecunda*, 56. *washingtonia*, 56.
Agapostemon obscurata, 292.
Agenia, 291. *bombycina*, 210.
Aglia tau, 201.
Agobardus, 323.
Agrias, 76.
Agrius lecontei, 203. *poli-tus*, 203. *rufo-llis*, 118, 162.
Agrotis, 322, 326. *baileyana*, 322. *clandestina*, 57. *clodiana*, 57. *cochrani*, 57. *dohs*, 322. *havilæ*, 57. *infimutis*, 322. *in-veniusta*, 322. *messoria*, 57. *plecta*, 59. *repentis*, 57. *scandens*, 57. *sculptus*, 322. *sublati-s*, 322. *terrealis*, 322. *vernilis*, 322. *worthingtoni*, 322.
Alaus, 25, 26, 44, 63, 70, 315. *gorgops*, 315. *myops*, 26. *oculatus*, 14, 18, 26, 43, 44, 64, 342.
Albana, 56. *artemisiae*, 56. *coloradensis*, 56. *montana*, 56. *resplendens*, 56. *rileyana*, 56. *rutilans*, 56. *tanacetii*, 56. *torva*, 56. *vancouverensis*, 56.
Aleidamea, 291. *truncata*, 290.
Aleiodes, 291.
Aleochara anthomyiæ, 229.
Aletia argillacea, 51, 77, 97, 188, 228, 293. *xylina*, 98, 208, 292 (v. *Anomis x.*).
Alexicles, 322. *aspera*, 322.
Aleyrodes, 51.
Alimera, 174.
Alphitobius piccus, 234.
Alypia octomaculata, 227.
ridingsii, 56. *sacramenti*, 56.
Alypiodes, 322. *flavilinguis*, 322.
Amathusia horsfieldii, 3.
Amabela, 174.
Amblymerus crassicornis, 90.
pedunculi, 90.
Amblyrrhina cognata, 323.
Amblystoma [amph.], 210.
Ammonoia distichoides, 322.
Amnophila pictipennis, 210.
Ampelophaga versicolor, 55.
Amphicomia lupina, 325. *ursi-na*, 325. *vulpina*, 315.
Amphidasys betularia, 271. *cognataria*, 271.
Amphizoia, 32. *insolens*, 338.
Amphodia, 174.
Anabus, 78. *haldemani*, 78. *purpurascens*, 78. *simplex*, 78.
Anacamptis robinella, 256, 316.
Anæglis demissalis, 16.
Anagoga pulveraria, 272.
Anaphe, 254.
Anaphora, 71-73, 341.
Anarta myrtilii, 210.
Anatolmis fulgens, 56.
Anceryx edwardsii, 55.
Anchylopera, 257. *fragariae*, 77.
Andrena, 88, 174. *gwynana*, 255. *mellea*, 289.
Andricus curvator, 91. *inflator*, 91. *ramuli*, 91.
Andronicus, 291. *cylindricus*, 291.
Anesychia, 257.
Anisopelma lycti, 292. *mini-ma*, 292. *utilis*, 292.
Anisopteryx vernata, 295.
Anisota senatoria, 275 (v. *Dryocampa s.*).
Anobium tessellatum, 326.
Anomala, 146, 349.
Anomis, 293. *erosa*, 98. *xyli-na*, 77, 208 (v. *Aletia x.*).
Antarctia proba, 37. *punctata*, 37, 77. *rubra*, 77.
Anthæraea yamamai, 313, 350.
Anthicus bicolor, 146. *monodon*, 146.
Anthidium, 88, 290, 291. *at-rifrons*, 289. *occidentale*, 289.
Anthracaris ausonoides, 293. *coloradensis*, 37. *hyantis*, 294. *morrisoni*, 37. *olympia*, 294. *reakirtii*, 294.
Anthocomus eque-tris, 206.

- Anthocoris insidiosus, 209.
 Anthonomus, **146**, 349. sycophanta, 118.
 Anthophora, **88**, 290, 291. acervorum, 259.
 Anthracomartus, **186**, **225**.
 Anthrax, 188, 264.
 Athrenus, **6**, **297**. serophilularia, **8-9**, **64**, **234**, 339, 342. varius, **8**, **9**, 342. verbasci, **9**.
 Antigaster mirabilis, 227, 263.
 Antilope [mamm.], 310.
 Antiora, 174.
 Antistrophus, 118, 150. lygodesmiae-pisum, 118.
 Anytus sculptus, 322.
 Apanteles, 117. acronyctae, 117. aletiae, 117, **132**. cacociae, 117. carduicola, 117. casianus, 117. congregatus, 117. flavivinctus, 117. hemileucaea, 117. limentid s. 117. lunatus, 117. megathymi, 117. palcaeritae, 117. pieridivora, 117. politus, 117. rufocoxalis, 117. scitulus, 117. smerinthi, 117. theclae, 117.
 Apatela americana, **274**. brumosa, 37, **274**. dactylina, **274**. occidentalis, **274**. spinigera, **274**. thoeica, 322. vulpina, **274**. xyliniformis, **274**.
 Apathus, 291, 292. ashtoni, 290. californicus, 290. elatus, 292.
 Apatura alicia, 294. celtis, 294. iris, 15, **192**, 345, 352. lycaon, **206**, 349.
 Aphelia inquadana, 318.
 Aphelinus, 227. aspidioticola, 15. mytilaspidis, 227.
 Aplus, 15, **19**, **300**. aceris, **5**. betulae-colens, **240**. prunicolens, 16.
 Aphonus, **216**.
 Aphrastus taeniatus, **283**.
 Aphrophora, **288**.
 Apiocera, **243-244**, 341. harsupex, **244**, 341.
 Apis, **88**, 161, 172, 256, 289, 351. griseicollis, 292. mellifica, **87-89**, 98, 161, 259, 316, 339, 345, 350.
 Aplecta nebulosa, 260.
 Aporia crataegi, **202**, 260, 345.
 Aporus fasciatus, 291.
 Arachnoura scorpionides, **76**.
 Aranea, **249**.
 Arbinia, 174.
 Archaeoptilus, 190. ingens, 190.
 Archidesmus, 188. macnicoli, **116**, 188.
 Arctia, **201**. achaja, 37, 56. barda, 37. caja, **192**, **201**. decorata, 57. dodgei, 230. intercorrupta, 37. intermedia, 56. sabella, 317 (v. Spilosoma l.). ochracea, 56. ochreatea, 230. rectilinea, 295. rhoda, 230.
 Arctinia, 174.
 Aretrea, 290.
 Argynnis, **104**, **201**, 260. astarte, 294. atlantis, **99**, 294. behrensii, 294. bellona, 57 (v. Brenthis b.). bischoffii, 294. cybele, **32**. diana, 293. epithore, 293. halcyone, **354**. helena, 294. hesperis, 293. india, **66**, **338**. myrina, 57, 58. nevadensis, 294. nokomis, 294. selene, **192**.
 Argyrauges neumogeni, 322.
 Argyresthia goedartella, **241**.
 Argyropeira, 319.
 Argyrolepis quercifoliata, 38, 227, 232.
 Argyromiges pseudaciella, 256.
 Arhopalus fulminans, 204.
 Arotes, 290. venustus, 290. vicinus, 290.
 Arphia frigida, 78.
 Arzama diffusa, 56. melanopyga, 56. vulnifica, 56.
 Aulus, 18, 173, 230. missouriensis, 150.
 Asopia planalis, 322.
 Asphondylia, 138. monacha, 138. rudbeckiae-conspicua, 138.
 Aspidiotus conchiformis, 318. gloverii, 15.
 Aspidisca, **72**, 256, 317. ella, 317. saiciella, 16.
 Aspilates, 325. gausaria, 38. viridiinfaria, 38.
 Aspongopus nigroaeneus, 162.
 Asthenopus, 171.
 Asylda, 174.
 Atalophrabia, 171.
 Atherix ibis, **311**.
 Athysanus abietis, **240**. fenestratus, **240**. minor, **240**. variabilis, **240**.
 Atropis divinatoria [-us], **52**, **226**. oleagina, **52**. pulsatorius, 228, 326. succinea, **52**.
 Atta fervens, 173, 315.
 Attaeus cecropia, **170**, **240**, **276** (v. Samia c.). cinctus, 326. cynthia, 227. luna, **133**, **278** (v. Actias l. et Tropaea l.). polyphemus, **277**, **278**, **282** (v. Telea p.). promethea, **276**, **277** (v. Callosamia p. et Saturnia p.).
 Attagenus pello, **9**.
 Attus arcuatus, **300**, 341.
 Audela acronyctoides, 321.
 Augochlora pura, 208.
 Aulacodes, 291.
 Aulacus, 290.
 Aulax brandti, **91**. foveiger, **91**. glechonae, **91**. sylvestris, 150.
 Aulonium, 171.
 Azelina morrisonaria, 56.
 Azilia, 260.
 Badister notatus, 323.
 Jaëthis, 171.
 Balaninus villosus, **90**.
 Baridius sesostris, 118. trinotatus, 209.
 Bathyphantes, 259.
 Batrachedra, 257. salicipomella, 118, 257.
 Bavilia, 174.
 Bedellia somulmentella, 257. staintonella, 257.
 Bellamira scalaris, **283**.
 Belostoma grande, 189, 190.
 Bembeccia sequoiae, 56. superba, 56.
 Bembex argentifrons, 292. armata, 292. fasciata, 210.
 Berostus, 16.
 Berytus spinosus, **146**.
 Bes-ula, 57. luxa, 57.
 Bibio albipennis, 320.
 Biorhiza aptera, 315.
 Biston stratarius, **192**.
 Bittacus chlorostigma, 173.
 Blastus, 171.
 Blatta, 296, **298**. orientalis, **119**, 174, 318, 349.
 Blechroma, 174.
 Blepharocera fasciata, 171.
 Blissus leucopterus, **93**, **119**, 138, 209, 295, 320, 341.
 Bolitotherus bifurcus, **160**, **284**, 323.
 Polyphantes, 259.
 Bombus, **70**, **79**, **87-88**, 98, 161, 174, 207, 232, 263, 291, 292, 296, 297, **337**, 342, 345. borealis, 290. centralis, 290. consimilis, 290. impatiens, 292. nidulans, 292. pensylvanicus, 292. separatus, 292. terrestris, 172. virginicus, 292.
 Bombycia semicircularis, 57.
 Bombylius, 188, 189. medius, 255.
 Bombyx mori, 162, 343. rubi, 263.
 Bos [mamm.], **310**.
 Bothriodes, 171.
 Botis toralis, 57. volupialis, 57.
 Brachiloma, 256.
 Brachynus tormentarius, **220**, 350.*
 Bradynotes opimus, 78.
 Brenthis bellona, 53 (v. Argynnis b.).
 Brepheos, 236, 350. infans, 273. parthenias, 273.
 Breyeria, 319.
 Brochymena arborea, 315.
 Brodia, 190. prisotincta, 190.
 Bruchus fabae, 293. minus, 204. obsoletus, 259. obtectus, 321. varicornis, 293.
 Bruchophila, 260.
 Bubo virginianus [aves], 293.

- Bucculatrix, **74**, **243**, 256.
 ambrosiacella, 256. pomifoliella,
 223, 256. thuiella, 256. trifasci-
 ella, 257.
 Buphara, 174.
 Buprestis apricans, 203.
 Buteo linearis [aves], 293.
 Buthus occitanus, 147.
 Bythoscopus seminudus, 241.
 Cacoecia cerasivorana, **38**, **242**.
 rosaceana, **242**.
 Caecilius, **52**.
 Caelotes juvenilis, 260.
 Calaphis betulella, **240**.
 Callibaëtis, 171.
 Callidryas cubule, **175**.
 Callinome advena, 138.
 Callimorpha interruptomargi-
 nata, **59**.
 Calliomesa, 257.
 Calliopsis, 290. edwardsii, 290.
 lateralis, 290.
 Calliphora vomitoria, **134**,
 339, 351.
 Callip'erus betulae-colens, **240**.
 Callithomia, 229.
 Calloides nobilis, **204**.
 Callosamia promethea, **169**,
 190, 345 (v. Atticus p. et Satur-
 nia p.).
 Caloptenobia ovivora, 78.
 Caloptenus, 78. differentialis,
 255, 262. femurrubram, **185**,
 187, **240**, **335**. italicus, 78.
 sanguinocephalus, 172. spretus,
 17, 78, 95.
 Calosoma, *178*, *194*, 221, 350.*
 calidum, *178*, *194*, 325. inquisi-
 tor, *178*, *194*. scrutator, 17. wil-
 coxi, 323.
 Cammula atrox, 78. pellucida,
 78. tricarinata, 78.
 Campodea fragilis, 228.
 Camponotus, 55.
 Campoplex, 117. pieridicola,
 117.
 Campsurus, 171.
 Campylona, 174.
 Campylus denticornis, **284**.
 Canis azaræ [mamm.], 264.
 gracilis, 264.
 Cantharis, **298**, 344. vesica-
 toria, **298**.
 Capra [mamm.], **310**.
 Carabus, **239**. auratus, **314**.
 violaceus, **234**.
 Carhala, 162.
 Carineta platensis, 55.
 Carineta 56. fraxini, 56.
 minuta, 56. ruficornis, 56. san-
 borni, 56.
 Carpocapsa pomonella, 162,
284, 317, 318.
 Carteria, 257. lacca, 257.
 larrea, 257. mexicana, 257.
 Castianeira, 260.
 Cataclysta, 261. pyropalis, 261.
 Catastega, 256.
 Caterva catenaria, 37.
 Catocala, **273**, 294, 295, **351**.
 amatrrix, 57. coccinata, 37. cur-
 vata, 136. emilia, 56. evelina, 57.
 debilis, 57. fraxini, **273**. hinda,
 57. innubens, 57. lachrymosa,
 57. miranda, 56. pura, 322.
 relicta, **273**, 326. robinsonii,
 136. sappho, 38. sinuosa, 295.
 unijuga, **59**, 318. zelicæ, 57.
 Cautethia, 55. noctuiformis,
 55.
 Cavia leucopyga [mamm.], 264.
 Cecidomyia, 149, 172, **334**, 344,
 350.* anthophila, 133. bicolor,
196. carbonifera, 149, **196**,
198, **199**, **200**, 350.* caryae-
 nucicola, 138. cerasi-serotina, 138.
 cupressi-ananassa, 149. destructor,
 97, 150, **196**, **206**, 207, 228,
 232, 256, 318. fasci, **90**. legu-
 minicola, 172. longicornis, **90**.
 oryzae, 97. quercus-majalis, 138.
 quercus-pillulae, 162. quercus-
 symmetrica, 162. salicis-batata,
79, **347**. salicis-brassicoides, 118.
 salicis-siliqua, 150. salicis-strobi-
 loides, 118. sambuci-umbelicola,
 138. tiliae-citrina, 138. trifolii,
 172. trifici, **196**, 259. viticola,
 162. vitis-coryloides, 118. vitis-
 lituus, 118. vitis-pomum, 118,
 162. vitis-viticola, 118, 149.
 Cecidostiba collaris, **90**. rugi-
 frons, **90**. truncata, **90**.
 Celiptera bucetum, 322.
 Cemiostoma, **72**, **74**, **94**, 317.
 albella, **74**, 95. laburnella, **74**.
 Centrinus concinnus, 97.
 Centris, 290. armillatus, 292.
 Centrodora decolorata, **204**.
 Centronopus calcareatus, **284**.
 Cephalomyia, **309-310**.
 Cephenomyia, **305-307**, **309**-
310.
 Ceraphron destructor, **206**,
 345.
 Ceratina, 290, 291. dupla, 208.
 Ceratinella, 259.
 Ceratinia, **191**.
 Ceratinopsis, 259.
 Ceratocampa imperialis, **175**,
314. regalis, 209 (v. Citheronia
 r.).
 Ceratomia amyntor, **281**.
 quadricornis, **281**.
 Ceratophyllus isidori, 264.
 rufulus, 264.
 Ceratosoma, 289.
 Cerrococcus, 258. quercus, 258.
 Ceropales, 291. rufiventris,
 210.
 Ceruchus piceus, 320.
 Cervus [mamm.], **310**. rufus,
 264.
 Cetonia iuda, **215**.
 Chadaca missionum, 229.
 Chalcatrithia, 16.
 Chalcis, 292.
 Chalcoedermus aeneus, **222**.
 Chalcolepidius, **25-26**, **63**,
69. rubripennis, **25**, 342.
 Chalcolepis, **25**.
 Chalepus, 98. trachypygus,
 97, 98.
 Chamyris cerintha, 37.
 Chaotia, 291.
 Charadra deridens, **274**.
 propinquilinea, **274**.
 Charagia virescens, **267**, 345.
 Charis nemesis, 294.
 Charmodia, 174.
 Chauiodes, 187, 189.
 Chauiodus, 256.
 Chauliognathus marginatus,
221. pennsylvanicus, 78.
 Chelostoma, 291. californicum,
 290.
 Chermes pini-corticis, 262.
 Chilo oryzaeellus, 97, 98.
 Chilocorus cacti, 257.
 Chionobas chryxus, 293, 354.
 semidea, 117. stretchii, 294.
 taygete, 294.
 Chironomus, 137, **225**, 260.
 plumosus, **225**. tendens, **300**.
 Chlaenius fuscicornis, **220**.
 laticollis, **220**, 325. tomentosus,
133.
 Chlamys plicata, **283**.
 Chloridea molochitina, 229.
 Chlorion coeruleum, 210.
 Chloroneura, 190. abnormis,
 190. malefica, 190. maligna,
 190.
 Chlorops nasuta, 17.
 Chloerocampa crotus, **164**.
 golmani, 292. tersa, 55.
 Choreutes silphiella, 38.
 Choroterpes, 171.
 Chryseudeton avernalis, 322.
 Chrysobothris azurea, **203**.
 femorata, **221**.
 Chrysomphalus ficus, 227.
 Chrysopa, 296. plorabunda,
 209.
 Chrysomyia caerulescens, **114**.
 decora, **114**. Pherminieri, **114**.
 plaei, **114**. tibialis, **114**.
 Chrysophanus, 326. cupreus,
 294. hermes, 294. ianthe, 294.
 sirius, 294. snowi, 319. virginia-
 ensis, 294.
 Chrysops cuclux, 210. cursim,
 210. nigribimbo, 210.
 Chytonix sensilis, 38.
 Cicada, **338**. canicularis, 320.
 septendecim, 150, 209, 316, 318.
 tredecim, 209.
 Cicindela, 137, **220**. anco-
 ciconensis, 323. campestris, 230,
 232. decemnotata, **146**. dorsa-
 lis, **6-8**, **64**, **69**, 342. formosa,

- Dermatodectes ovij. 259.
 Dermestes lardarius, **9**, vulpinus, 234, 350.
 Derotettix mendosensis, 55.
 Desmocerus palliatus, **221**, 350.*
 Deuterocopus, **313**.
 Deva palligera, 38. purpurigera, 38.
 Diabrotica fossata, 263. longicornis, 261, 263.
 Diaperis hydni, **284**.
 Diapontia kochii, **139**.
 Diastema, 174.
 Dia-trophus, 150. nebulosus, 150. potentillae, 135.
 Dicaelus dilatatus, 325.
 Dicerca obscura, **221**. pugionata, **203**.
 Dichelonycha elongatula, **285**.
 Di-ctroa, **88**.
 Dicopis depilis, 38. ~~38~~.
 Dietyna sedentaria, 299. volucris, 260. volupis, 293.
 Dietyoneura goldenbergi, 225.
 Dilar americanus, 173.
 Dilophus, 173.
 Diphyryx, 97, 98. prolata, 97, 98.
 Diplax, 321.
 Diplax concavata, **334**. concipha, **334**. crassator, 260, 263. resinicola, 18.
 Diplostyla, 259.
 Diremia, **191**.
 Dirphla caisa, 229.
 Discolia lecontei, 289. flavo-costalis, 289.
 Disparipes bombi, 206.
 Distenia undata, **204**.
 Ditona, 171.
 Ditula, 257.
 Dolerus unicolor, 97.
 Dolichopus, 173.
 Dolomedes sexpunctatus, **235**.
 Donacia, **175**.
 Doritis apollo, 260. mnemosyne, 260.
 Dormadicus, **206**.
 Dorthesia celastri, 149. viburii, 149.
 Doryphora decemlineata, **134**, 135, 172, 189, 209, 229, 230, 258, 295, 318. juncta, 172, 209.
 Drassus perfida, 208.
 Drepana, **278**.
 Drosophila amoena, 258. ampelophila, 258. nigricornis, **211**.
 Dryocampa senatoria, 318 (v. Anisota s.).
 Dryopteris, **278**.
 Dularius brevilineus, **203**.
 Dysodia margaritana, 256.
 Dysphaga tenuipes, **204**.
 Dytiscus, 318. marginalis, 173.
 Ebaeus thoracicus, 260.
 Ecopsis, 57. footiana, 320.
 permundana, **242**. zelleriana, **242**.
 Edessa fuscicornis, 162.
 Eiphosoma, 291.
 Elachista, 257.
 Elaphidion unicolor, **204**.
 Elassoneuria, 171.
 Elater, **75**. nigricollis, **285**.
 protervus, **284**.
 Elis xantiana, 289. zonaria, 289.
 Elmis aeneus, 229. volkmari, 229.
 Eleodes, **168-169**. 350.*
 acuta, 168. dentipes, 321. excavata, **168**. gigantea, 321. hispidilabris, **168**. longicollis, **168**. obsoleta, **168**. saturalis, **168**. tricostata, **168-169**.
 Ellophia vitraria, 322.
 Elloles coarctatus, 229. serri-cornis, 229.
 Empis, 173
 Emplocia cephalaria, 57. fer-vefactaria, 57.
 Empoa, 190. albicans, 190.
 Empoasca, 190. con-obrina, 190. obtusa, 190. viridescens, 190.
 Enechopa binotata, **241**.
 Enechophyllum binotatum, 149.
 Encyrtus, 117. montinus, 117. turni, 117.
 Endophtoeus, 171.
 Endromis versicolor, **201**.
 Endropia armataria, **240**, **272**.
 Endrosia fenestrella, 95.
 Enicostoma, 256.
 Entelon, 117. antiopae, 117.
 Entimus, **67**. imperialis, **5**, **45-47**, 342.
 Epeira, **32**, **66**, 208, 319. baltimorensis, 260. cavatica, 260. diadema, 208. fasciata, 208. filices, 208. praetrepida, 260. prasinus, 208. punctillata, 260.
 Epeiroides, 323.
 Epeolus, 290, 291. bifasciatus, 290. mercatus, 290.
 Ephemera, **110**, **288**
 Ephemera ignita, 326.
 Ephialtes, 162, 290.
 Ephydra, 173. californica, 264.
 Ephyra, 325. pendulinaria, **272**.
 Epicauta marginata, 209. pennsylvanica, 203, 263. vittata, 78, 209.
 Epigraphia eruditella, 321, 322.
 Epimecis wiltii, 290.
 Epinephela lycaon, 323.
 Epirhyssa, 291.
 Epitrix cucumeris, **209**.
 Erastria nubilus, 229.
 Erax, **244**, 264.
 Erebia callias, 294. haydenii, 294. medea, 352. rhodia, 294.
 Eresia cincta, 293. punctata, 294.
 Erigone, 259.
 Eriocampa ovata, 171.
 Eriosele, 174.
 Eriosoma, 190. lanigera, 190 (v. Schizoneura l.). pyri, 190. tessellata, **240**.
 Eristalis, 173. tenax, 39, 324.
 Erycides okeechobee, 150.
 Erythroneura, 190. australis, 190. octonotata, 190. ziczac, 190.
 Etoblattina mazona, 58.
 Eulybia mexicanaria, 322.
 Euceraotomyia, 264.
 Euchaetes collaris, 56.
 Euechronia maia, **225** (v. Hemileuca m.). monitor, 57. paenulata, 57.
 Euclemensia bassettella, 98.
 Eucrada humeralis, 229.
 Eudamus, **104**. electra, 16. nevada, 58. oberon, 150. proteus, 58, 256. tityrus, 117, **338**, 348, **352**.
 Eudemis botrana, 209.
 Eudonimus mannerheimii, **221**.
 Eudoliche, 174.
 Eudryas, 57.
 Eugonia alniaria, **272**. angularia, 323. magnaria, **272-273**.
 Euhagena, 56. nebraskae, 56.
 Euleucophaeus neumogeni, 56.
 Eumoris, 56. tricolor, 322.
 Eulimacodes, 174. scapha, 56 (v. Limacodes s.).
 Eulophopteryx, 174.
 Eulophus, 117. saundersii, 117. semideae, 117. theclae, 117.
 Eumenes fraterna, 210.
 Eumomia eagus, **312**.
 Eupelmus azureus, **90**. urozonus, **90**.
 Euphoria inda, **215**.
 Eupithecia interruptofasciata, 37.
 Euplexia lucipara, **59**.
 Euprepia opulenta, 37.
 Euproietia claudia, **99**, 137, **338**.
 Euptychia rubricata, 294.
 Eurymachus, 260.
 Euryopsis, 259.
 Euryptychia, 257. saligneana, 77, 117, 138, 149, 150, 257.
 Eurytoma, **91**, 263. appendigaster, **89**. bolteri, 162. diastrophii, 150. intermedia, **90**. pubicornis, **91**. salicis, **91**. vagabunda, 16.
 Euschiropterus, 57.
 Euspilapteryx, 317.
 Eustrotia concinnimacula, 322.

- dividua*, 322. *parvinnacula*, 322.
Entelus, **91**. *collaris*, **90**.
heterotomus, **90**. *tibialis*, **91**.
Eutermes meadii, 190. *fossarum*, 190.
Eura orbitalis, 118. *salicis-gemma*, 118. *salicis-ovum*, 118.
Euxoga, 174.
Euxorides, 290. *americanus*, 290.
Exapate, **73**.
Exartema, 57, 257.
Exochoideis, 289.
Exochus, 289, 290.
Exomalopsis, 290. *similis*, 292.
Exorista militaris, 210.
Felis concolor [mamm.], 264.
Feniseca tarquinius, **75**, **99**, 346.
Ferrea, 291.
Figites anthomyiarum, **90**.
Filaria sanguinis-hominis [verm.], **225**.
Filistata capitata, 260. *hibernalis*, 260.
Flata, **314**.
Foenus, 290, 325.
Forficula auricularia, **186**.
Formica, **14**, 296. *fusca*, **32**.
pennsylvanica, **336**. *rufinigra*, **254**. *sanguinea*, **32**.
Gabyra, 174.
Galeodes araneoides, **324**.
Galerita janus, 325.
Gasterophilus (v. *Gastrophilus*) *equi*, 208.
Gasteruption, 325. *area*, 325. *barnstoni*, 325. *brasilienae*, 325. *guldinigi*, 325. *irritator*, 325. *incertum*, 325. *kirbyi*, 325. *montanus* [-um], 325. *occidentale*, 325. *perplexum*, 325. *ruficornis*, 325. *rufipectum*, 325. *tarsatorium*, 325. *tenuicollis*, 325.
Gastropacha americana, **274**.
† *raphani* [*Gastrophysa* r.], 183.
Gastrophilus [scr. *Gasterophilus*, q. v.], **305-310**, 322, **351**.
Gastrophysa cyanea, 162. *raphani*, **176**, 188, 324.
Gastrus, 173.
Gelechia, **72-73**, 256. *cerealella*, **337**. *flavocostella*, 256. *gallae-solidaginis*, 162.
Geophilus, 263, 350.* *carphophagus*, 289. *foveolatus*, **235**. *longicornis*, 289. *proavus*, **248**.
Geotrupes, **216**. *titrus*, **145**.
Geralinura carbonaria, **226**.
Glaucopteryx caesiata, 56.
Glomeris, 259.
Glossina, 230.
Gloveria arizonensis, 56.
Glyphina ulmicola, 118.
Glyphipteryx, 256.
Glypta, 290.
Gnaphaeta, 56. *continua*, 57.
- hopferi*, 56. *vermiculata*, 56, 57.
Gomphocerus shastanus, 78.
Gonepteryx cleopatra, **204**.
rhamni, **204**, 253.
Goniocotes hologarter, 174.
Goniocetena pallida, **283**.
Gonioppa, 174.
Gonuris, 174.
Gordius, 78, **225**, **353**.
emarginatus, **352**.
Gortyna immanis, **144**. *juvenilis*, 322. *nebris*, 77. *nitela*, 77, 209, 296. *serrata*, 322.
Gorytes propinquus, 289. *tricolor*, 289.
Gorytodes personaria, 56.
Gracilaria, **72**, 256, 257, 317. *desmodifoliella*, 257. *12-lineella*, 317. *eupatoriella*, 317. *plantaginiselis*, 317. *violacella*, 257.
Gracillaria [scr. *Gracilaria*, q. v.].
Gracilia minuta, **204**, **283**.
Grammonota, 239.
Grapholitha duodecimstriata, 318. *puncticostana*, **90**.
Graphops curtispenis, **167**.
marcassita, **167**. *pubescens*, **167**. (v. *Scelodonta* p.).
Grapta, **104**, 294. *angelica*, 295. *e-album*, 295. *e-aureum*, 295. *comma*, 295. *dryas*, 294, 295. *fabricii*, 295. *faunus*, **99**, 294, 295. *interrogationis*, 117, **184**, 295, 349. *marsyas*, 294. *oreas*, 294. *satyrus*, 294. *silenus*, 294. *umbrosa*, 295. *zephyrus*, 294.
Grotea, 290. *anguina*, 290.
Gryllotalpa, 289, 296, **298**.
Gryllus, 263, 318.
Gypona, 58.
Gyrinus natator, 137.
Gyros, 56. *opiparus*, 56. *versutus*, 56.
Gyrostigma, **352**. *sumatrensis*, **352**.
Habrocytus, **91**. *bedeguaris*, **91**. *caprae*, **91**.
Habrophlebia, 171.
Habrostola, 260.
Hadena arctica, 38. *cinefacta*, 57. *cymosa*, 38. *discors*, 322. *hulstii*, 322. *inordinata*, 38. *semilunata*, 38.
Halcyon chloris [aves], **351**.
Halidicta ingens, 37. *labacula*, 57. *trigona*, 322.
Halictus, 208. *cylindricus*, 188.
Haltica striolata, 207, 210.
Hamadryas, 257.
Hamamelistes cornu, 263.
Harpalus caliginosus, 323.
Harpyia vinula, 260.
Hectopsylla testudo, 264.
Heliconia charitonia, 56.
- Heliodines*, **72**.
Heliobis armigera, 96, 137, 190, 229, 296. *illinoensis*, 295.
luteifinctus, 37.
Helopeltis, 36.
Helota, **313**.
Hemaris cynoglossum, 55. *tennis*, 320. *thysbe*, 320.
Hemerodromia superstitiosa, 190.
Hemichroa rufa, 171.
Hemideina, **267**.
Hemileuca, **313**, 322. *dido*, 58. *juno*, 58. *maia*, 322 (v. *Euchronia* m.). *nevadensis*, 56. *tricolor*, 322. *vavapai*, 58.
Hemiteles, 137. *eressonii*, 162.
Hemipalus, 37, **106**. *anceps*, 37. *hecta*, 255. *inutilis*, 37. *rectus*, 37.
Heriades, 290, 291. *denticulatum*, 290.
Hesperia, 293. *dacotah*, 294. *eos*, 294. *eufala*, 294. *hayhurstii*, 294. *corus*, 294. *logan*, 319. *maculata*, 293. *melane*, 294. *metacomet*, 319. *mingo*, 293. *minima*, 294. *napa*, 293. *nemorini*, 293, 319. *nortonii*, 319. *omaha*, 293. *ophis*, 294. *osyka*, 319. *ottoe*, 293. *pilatka*, 319. *ricara*, 293. *rurea*, 319. *samoset*, 319. *tamenund*, 294. *valis*, 294. *viator*, 293. *waco*, 293. *wakulla*, 294. *yrka*, 293.
Heterodera [verm.], **333**.
Heterodon platyrhinus [rept.], **335**.
Heteropterus arene, 294. *procris*, 294.
Heteomis cinerea, **204**.
Hipparchia ridingsii, **354** (v. *Satyrus* r.).
Hippodamia ambigua, 257. *convergens*, 257. *maculata*, 299.
Hippopsis lemniscata, 118, **204**.
Hirmonera obscura, 211, 316.
Hodotermes coloradensis, 190.
Holcocera, 256.
Homalomyia canicularis, **300**.
Homoeoneuria, 171. *salviniae*, 171.
Homohadena epipsechia, 322.
Homopsycha, **314**.
Homosefia, 256.
Hoplia, **9**, **23**, **46**, **67**, **70**. *cocculica*, **9-11**, **23**, 342. *modesta*, **23**. *trifasciata*, **66**.
Hoplismenus, 289. *thoracicus*, 290.
Hoplocephala bicornis, **284**.
Hornaphis hamamelidis, 263.
Hornia, 232.
Hybernia defoliaria, **353**.
leucophaearia, **192**.
Hybroma, 256. *servulella*, 256.
Hydrachna geographica, 207.

- globum, 207. puteus, 207.
 Hydrobius, 16.
 Hydrochelidon lariformis [aves], 18.
 Hydroecia nictitans, 230.
 Hydrometra paludum, **66**.
 Hydrophilus triangularis, 227.
 Hydropsyche, 317.
 Hyla pickeringii [batr.], **235**, 345.
 Hylaenus, **88**.
 Hylesinus trifolii, 96.
 Hyloicus dollii, 38.
 Hylotoma rosa, 18.
 Hyperchiria io, **275** (v. Saturnia f.). lama, 229. varia, **275**.
 Hyperetes tessellatus, **52**.
 Hyphantria textor, **280**.
 Hypoderma, **305**, **307-310**.
 diana, **308**. bovis, **314**, 322.
 Hypotrichia, **215**, **217**, 345.
 spissipes, **215**, **216**, 345.
 Hypotites, 319.
 Ichneumon, 117, 289, 290. hunterae, 117. tharotis, 117.
 Incurvaria mediostriatella, 257.
 Inocellia, **160**.
 Ips fasciatus, 285. sanguinolentus, **285**.
 Ischnus, 290.
 Isosoma hordei, 263.
 Ithomis, 229.
 Ithomia, **191**.
 Iulus, **248**, 289.
 Ixodes testudinis, **64**.
 Jassus, 58. borealis, 58. flaviceps, 58. fuscipennis, 58. gratiozus, 58. melanotus, 58. pustulatus, 58.
 Jolia, 171.
 Joppa, 289.
 Julopis cretacea, **248**.
 Junonia coenia, **99**, **338**, 342.
 lavinia, **99**.
 Kampeccaris forfarenensis, **116**, 188.
 Kermes galliformis, 98.
 Labena, 290. apicalis, 290. grillator, 290.
 Laccobius, 16.
 Lachnosterna, **215**. fusca, **211**, **224**, 296, 347, 350 (v. Phyllophaga f.).
 Lachnus australi, 15.
 Lacon leprosus, **25**.
 Lagynopteryx valdiviana, 229.
 Lampronota, 290.
 Lampyrus, 137. noctiluca, 210. splendida, 210.
 Laphria, 264.
 Laphygma frugiperda, 57, 98.
 Larinus maculatus, **332**. melificus, **332**.
 Larra tarsata, 78.
 Larrada luteipennis, 292.
 Larunda, 56. solituda, 56.
 Laconotus, 171.
 Lasiocampa potatoria, **235**.
 Lasioptera soli laevis, 138, 149.
 Lasius interjectus, **19**, 346. niger, **252**, **300**.
 Laverna, 317. cephalanthiella, 317.
 Lecanium acericorticis, 227, 232. hesperidum, 15. phyllococcus, 15.
 Leistus rufomarginatus, 38.
 Lema trilineata, 209, 259.
 Lemnias nais, **133**. palmerii, 294.
 Lepasta, 174.
 Lepisma, **5**, **353**.
 Leptartia lena, 56.
 Leptis, 173.
 Leptophlebia, 171.
 Leptoris, 257.
 Leptura abdominalis, **221**. cordifera, **204**. emarginata, **204**. zebra, **204**.
 Lestomyia, 264.
 Leucania hispanica, 260. nongrioides, 260. straminea, 260. unipuncta (unipunctata †), 210, 295.
 Leucanthiza saundersella, 317.
 Leucartia aerea, **59**.
 Leucoma salicis, 260.
 Leucopis phylloxerae, 262.
 Leucospis, 292.
 Leucothyris paula, 326.
 Libellula, 18, **111**, 293. depressa, 325. quadrimaculata, 18, **191**, 296, 325. rufa, **191**.
 Lichnanthe lupina, 325.
 Ligionia, 174.
 Ligyris, **146**.
 Limacodes caesonica, 322. flexuosa, 322. latomia, 322. scapha **279** (v. Eulimacodes s.).
 Limentis, 209. arthemis, **14**, **99**, **282**, 325. disippus, **14**, **51**, 117, 209, 347. eros, 16. eululia, 294. floridensis, 16. proserpina, **99**, 293, 319. sibylla (sibilla †), 137, **192**. ursula, 293, 325.
 Limmeria chrysostricta, **91**.
 Limbobia, 173.
 Limnocharis, 16.
 Limonius, **146**.
 Limulus, 172, **253**, 296.
 Linosta, 174.
 Linyphia, 259.
 Lioceranoidea, 260. unicolor, 260.
 Liopasia, 174.
 Liparis, 171, 255. auriflua, 263. chrysorrhoea, 228 (v. Porthezia ch.). detrita, 260. dispar, 260. rubea, 260.
 Lipeurus bacillus, 174.
 Lissorhoptrus simplex, 98, 118.
 Lithobius forficatus, **235**, 352.
 Lithocolletis, **72**, **74**, **243**.
 256, 316, 317. aesculi-sella, 316. ambrosiaeella, 316. bethuneella, 316. caryae-albella, 316. celtifoliella, 316. celtisella, 316. cincinnatiella, 316. clemensella, 316. coryliella (corylisella), 316. guttifinitella, 256, 316. nonfasciella, 316. ornatella, 316. ostryaella, 316. tiliaella, 316. tri-taeniella, 316. ulmella, 316. virginella, 316.
 Lithobialis bronngartii, 190.
 Lophophora viretata, **87**.
 Lomatia, 188.
 Lonchaea polita, **241**.
 Lophocarenum, 259.
 Lophomma, 259.
 Lophomonas [inf.], **298**.
 Lozogramma tripunctaria, 56.
 Lozotaenia, 257. cerasivora, 38. musculana, **242**.
 Lucanus cervus, **236**, 350. dana, 18, **186**, 320. elaphus, 189.
 Lucilia hominivorax, **29**, **114**. hominivorus, **29**. macellaria, **27-30**, **350**, ***350*** (v. Musca m.).
 Lycaena, 293, 294. alce, 294. alexis, 136. amica, 293. ardea, 294. argus, **300**. behrii, 294. daunia, 294. echo, 293. fea, 294. fulla, 294. glaucum, 294. gyas, 294. helios, 294. icarus, **92**. kodiak, 294. lucia, 293. lycea, 293. 294. mertila, 293. mintha, 294. neglecta, 293, 294. oculus, 294. pembina, 294. pseudargiolus, 293. rustica, 293. scudderii, 294. shasta, 294. speciosa. 37. viaca, 294. violacea, 293, 319.
 Lychnosea, 322. aularia, 322.
 Lycogaster. 291. costalis, 291. gundlachi, 291.
 Lycomorpha constans, 57. desertus, 57.
 Lycosa gyrophora, 208. noctes, 208. violaceus, 208.
 Lyctus striatus, 292.
 Lygranthoecia spraguei, 57.
 Lyonetia, **74**, 256. saccatella, 317. speculella, 256.
 Lysana, 174.
 Machilis, **5**, **353**.
 Macrobasia murina, 209. unicolor, 209.
 Macroductylus subspinosus, **285**.
 Macropis, 162. ciliata, 162. labiata, **312**. patellata, 162.
 Macroscila carolina, 259 (v. Sphinx c.).
 Macrotera, 290.
 Macrotona, **354**. plumbea, 339, **354**.
 Madarus ampelopsidos, 118.
 Malachius, 260.
 Mallophora, 264. orcina, 78.
 Mallota posticata, **241**.

- Mamestra legitima*, 38. *lilacina*, 38. *liquida*, 38. *minula*, 322. *vittula*, 322.
Mantis, 313. *carolina*, 281.
Marmara, 256. *sulicella*, 256.
Masaris edwardsii, 289. *marginalis* 291. *occidentalis*, 291. *texasus*, 291. *vespiformis*, 290. *vespoides*, 290. 291. *zonalis*, 291.
Mastogonius subcyaneus, 203.
Mecas inornata, 222.
Mechanites, 191.
Megachile, 88, 290, 291. *armaticeps*, 292. *curta*, 292. *tibialis*, 292.
Megacilissa nigrescens, 292.
Megastigmus, 91. *dorsalis*, 90.
Megatoma serra, 9.
Melanippe montana, 137.
Melanomma auricinctaria, 321.
Melanoplus atlantis, 78. *cinereus*, 78. *devastator*, 78. *packardii*, 78.
Melanotus, 284. *communis*, 284. *parumpunctatus*, 284.
Melecta, 88, 290.
Melicleptria honesta, 57.
Melinaea, 229.
Melipona, 251. *scutellaris*, 298.
Melissodes, 290. *menuchus*, 289. *mimicus*, 292.
Melitaea, 201, 260, 294. *ancia*, 37, 294. *arachne*, 294. *athalia*, 192. *baroni*, 37. *colon*, 37, 326. *chalcodon*, 294.
Melitaea twinellei, 37. *fulvia*, 319. *marcia*, 294. *pallida*, 293. *perdiccas*, 37, 326. *phaeton*, 137, 354. *phaon*, 293. *picta*, 293. *quino*, 37. *rubicunda*, 37, 354. *sterope*, 294. *texasana*, 293. *tharos*, 117. *thekla*, 294. *vesta*, 294. *wheeleri*, 37.
Melittia, 350.* *cucurbitae*, 303-304. 350* (v. *Aegeria c.*).
Melolontha, 236. *vulgaris*, 17, 264.
Melophagus, 173, 308.
Meniscus, 290.
Mentzelia ornata, 188.
Meraca ltha contracta, 284.
Merapioidus, 264.
Meristhus lepidotus, 25.
Mermis, 225. *acuminata*, 352. *nigrescens*, 353.
Merodon barbatus, 241.
Mesembrina, 173.
Mesoleptus, 289, 290.
Mesostenus, 290.
Meta argyra, 260.
Metrocampa margaritata, 56. *perlata*, 56.
Miastor, 173.
Micaria limnicumae, 191.
Micratæus fulviventris, 229.
Micropeira, 319.
Microcentrum retinerve, 227.
Microgaster, 117, 162. *atalantæ*, 117. *carinata*, 117. *carduicola*, 117. *gelechiæ*, 117, 162. *lunatus*, 117. *pieridis*, 117.
Microneta, 259.
Micropitris, 117. *ceratomiæ*, 117. *gortynæ*, 117.
Micropus leucopterus, 209.
Mimallo cordubensis, 229.
Mimetus, 259.
Mindora, 174.
Misumena importuna, 260.
Molorchus bimaculatus, 204.
Monedula insularis, 292.
Monocrepidius lepidus, 25.
Monoleuca sulfurea, 322.
Monumetha, 291.
Mordellistena erratica, 326. *fuscio-atra*, 326. *pratensis*, 326. *splendens*, 326. *tarsalis*, 326.
Morinia, 285.
Morpho, 114, 350.
Moschus [mamm.], 310.
Musca, 29, 173, 218, 296. *caesar*, 218, 347. *domestica*, 113. *macellaria*, 114 (v. *Lucilia m.*).
Mutilla, 290.
Mygale hentzii, 176.
Mygymia, 291.
Myopa, 173.
Myrmecophila, 133. *pergandi*, 133.
Myrmica lineolata, 14.
Mytilus edulis [moll.], 16.
Napeogenes, 229.
Nasua socialis [mamm.], 264.
Nausigaster, 264.
Nebria trifaria, 338.
Necrobia rufipes, 234.
Necrophorus tom ntosus, 325.
Nematus, 89. *curtispina*, 171, 325. *mendicus*, 118. *pavidus*, 171. *pentandrae*, 91. *quercicola*, 118. *salicis-pomum*, 118. *ventricosus*, 48-51, 347. *viduatus*, 91.
Nemophila russula, 192, 345.
Neoclytus erythrocephalus, 221.
Nemognatha immaculata, 146.
Neophrida, 174.
Nephopteryx zimmermani, 322.
Nepitula, 72, 74, 256, 257. *bifasciella*, 256. *fuscotiella*, 256. *platanella*, 256, 257. *saginella*, 257.
Neuroterus, 254.
Nezara virides, 312.
Niptus hololeucus, 319.
Nisoniades, 58. 104. *icelus*, 58. *juvenalis*, 58. *naevius*, 58. *petronius*, 58. *propertius*, 58. *somnus*, 58.
Nitela, 323.
Noctua, 72, 150. *xylina*, 208 (v. *Aletia x.*)
Nota fuscula, 57. *sorghiiella*, 118.
Nomada, 290, 291. *bisignata*, 208.
Nomia apacha, 289. *nortoni*, 289.
Nonagria, 14.
Nonnus, 240.
Notocyphus, 291.
Notodonta concinna, 18, 279.
dictæa, 96, 279. *ziczac*, 325.
Notommata werneckii [rot.], 333.
Notonecta, 225, 338. *glauca*, 66, 172.
Notoxus bicolor, 146. *monodon*, 146.
Nudaria, 314.
Nycteribia, 173.
Nyctobates pensylvanica, 284.
Oberea, 162.
Ochsenheimeria, 73.
Ocnaria dispar, 291.
Ocypus olens, 314.
Odonestria potatoria, 264.
Odontomerus, 290.
Odynerus cingulatus, 292. *cabensis*, 292. *dejectus*, 292. *rufinodus*, 289. *tois*, 283.
Oecanthus, 99.
Oeceticus platensis, 229.
Oecophora pseudopretella, 95.
Oedematophaga, 351. *ægusalis*, 350,* 351.
Oedicophalus, 289.
Oedipola atrox, 78. *obliterata*, 78. *pellucida*, 78.
Oeme rigida, 204.
Oeneis bore, 268, 342.
Oenectra distincta, 318. *irre rea*, 318. *sianta*, 318.
Oenosanda noctuiformis, 55.
Oestromyia, 309.
Oestrus, 309, 310. *homini*, 209. *leporinus*, 310. *ovis*, 317.
Oet. compta, 77.
Ogrysis genoveva, 300.
Oiketicus abbotti, 322.
Oligarces, 173.
Oligoneura rhenana, 97.
Olix fulvicrus, 90. *gallarum*, 90, 91.
Oncocnemis, 38. *aqualis*, 38. *chandleri*, 38. *major*, 38.
Oncomyia, 264. *baroni*, 264. *modesta*, 264.
Onthophagus nuchicornis, 225.
Operophtera boreata, 243.
Ophion, 117. *macrurum*, 232, 277. *tityri*, 117.
Opostega, 74, 256. *albugoleiella*, 256.
Orgyia antiqua, 37, 137, 228,

229. *badia*, 47. *cana*, 37. *fasciata*, 260. *gonostigma*, 260. *gulososa*, 37. *leucostigma*, 230, **280**, 317. *nova*, 37. *pubibunda*, 137. *vetusta*, 47.
- Oribates*, 56. *aspidioli*, 15. *opiparus*, 56. *versutus*, 56.
- Ormyrus castri*, **90**.
- Ornix*, 256.
- Orthosia instabilis*, **273**. *signata*, 295.
- Orthosoma cylindricum*, 209.
- Ortopelma*, **91**. *luteolator*, **91**.
- Oryx virginiana* [aves], 209.
- Oryctes*, **216**.
- Osiris*, 290.
- Osmia*, **88**, 203, 290, 291.
- Otiorynchus ligneus*, **233**.
- Oxylaemus*, 171.
- Oxymorpha*, 90.
- Ozognathus cornutus*, 149, 174.
- Pachygnatha tristriata*, 260.
- Pachypsylla*, 262. *celtidis-mamma*, 260, 262. *celtidis-venusta*, 262. *venusta*, 262.
- Pachypus*, **217**.
- Pachytylus migratorius*, 78.
- Paedisca*, 318. *giganteana*, 318. *similiana*, **241**. *solicitana*, **241**. *transmissana*, **241**.
- Palingenia*, 319.
- Palipes*, **249**.
- Pallostoma*, 188. *torrentium*, 188.
- Pamphila accius*, 256. *arpa*, 56, 256. *attalus*, 294. *brettus*, 256. *delaware*, 256. *diaco*, 294. *leonardus*, 56. *licinus*, 294. *maculata*, 256. *mardon*, 37. *palatka*, 256. *phyleus*, 256. *rurea*, 294. *siris*, 37. *straton*, 56. *vena*, 294.
- Panorpa*, **103**.
- Panoropes oregonensis*, 173.
- Pantala flavescens*, **312**.
- Panthera pardalaria*, 217, 345.
- Panurgus*, 290. *nevadensis*, 290.
- Papilio*, **32**, 117, 289. *asterias*, 117, 260, 295, **298**. *bairdii*, 294. *creosphontes*, 17, **99**, 137, 317, 342. *damon*, 294. *eclipsis*, 38. *glauca*, **233**, 294. *gravi*, 261. *machaon*, 17, **192**, **201**, 230, 260. *pannon*, 263. *philenor*, **145**, **160**, 230, 232. *podalirius*, 260. *polydamas*, **312**. *turnus*, 117, 233, 283, 293, 294.
- Paraphia subatmaria*, **272**.
- Parapompilus naomi*, 291.
- Paroctopa*, 317. *robinella*, 256.
- Paria aeterrima*, **123**, **126-130**, 344.
- Parnassius*, **313**. *behrii*, 294. *sayii*, 293. *smintheus*, 294.
- Parnus auriculatus*, 229.
- Parotermes*, 190. *foedinae*, 190. *hagenii*, 190. *insignis*, 190.
- Passalus cornutus*, 320.
- Passer domesticus* [aves], **151**.
- Patrobus longicornis*, 2.
- Pauropus*, **245**.
- Paussus*, **75**.
- Pediculus*, 230. *cervicalis*, 209. *humanus*, 209. *pubis*, 209.
- Pelecoecera*, 261.
- Pelopoeus*, 189, **254**. *architectus*, **313**. *laetus*, **254**. *lunatus*, 210.
- Pempelia contatella*, 321. *grosulariae*, 77, 321. *lignosella*, 118. *quinquepunctella*, 321.
- Pemphigus*, 190, 318. *populiculus*, 323. *pyri*, 190. *rhois*, 118. *ulmifusus*, 118. *vagabundus*, 118. *vitifoliae*, 207.
- Pentastoma constrictum*, 208. *denticulatum*, 208. *settenii*, 208. *taenioides*, 208.
- Penthetria*, 57. *majuscula*, 57. *parvula*, 57.
- Penthina albeolana*, **242**. *capreana*, **242**. *cyanana*, 174. *dimidiana*, **242**. *impudens*, 318. *vitivorana*, 77, 209.
- Pepsis*, 291. *formosa*, 210.
- Perdita*, 290. *albipennis*, 289. *zonalis*, 290.
- Peripatus*, 17, **245**.
- Periplaneta americana*, 261.
- Petalopoda*, 58.
- Petaserpes*, 318. *rosalbus*, 318.
- Pezomachus*, 137.
- Pezotettix borckii*, 78. *flavoannulatus*, 172. *pacificus*, 78.
- Phaeogenes ater*, 57.
- Phalangites*, **249**.
- Phalangium*, 208.
- Phaneroptera curvicauda*, **240**.
- Phedusia*, 174.
- Phcidole providens*, **252**.
- Phellopsis obcordata*, **284**.
- Pheosia rimosa*, **279**.
- Phiditia*, 174.
- Phigalia lixaria*, 322.
- Philampelus*, 227. *achemon*, 55. *satellitica*, 18.
- Phileremus*, 290. *productus*, 290.
- Phillydrus*, 16.
- Philodromus lentiginosus*, 260.
- Philothermus*, 171.
- Phlebotomus*, 230.
- Phloeonemus*, 171.
- Phoberia atomaris*, 97.
- Phobetron pitheciun*, **280**.
- Pholcomma*, 259.
- Phryganea*, **288**.
- Phryganidea californica*, 56.
- Phthirius inguinalis*, 5.
- Phyciodes canace*, 294. *camillus*, 294. *emissa*, 294. *nycteis*, 319. *orseis*, 294. *picta*, **354**.
- Phygadeuon*, 290.
- Phyllobrotica vittata*, 162.
- Phyllocnistis*, **72-74**, 256, 317. *ampelopsicella*, 317. *liriodendronella*, 256. *vitifoliella*, 317.
- Phyllophaga fusca*, 295 (v. *Lachnosterna* f.).
- Phyllophorus testudinatus*, 5.
- Phyllotoma microcephala*, **332**. *vagans*, 171.
- Phyllotreta nemorum*, 210. *striolata*, 207, 210.
- Phylloxera*, **104**, **144**, **233**. *caryae-globuli*, 263. *caryae-emen*, 207, 264. *vastatrix*, 259, 260, 262. *vitifoliae*, **133-134**, **139**, **143**, 207, 230, 260, 262, 263, 339, 349.
- Phymata erosa*, 228, 317.
- Phytodietus*, 290.
- Phytonomus*, 96, 97. *punctatus*, 96, 97.
- Phytoptus*, **333**, **334**. *pyri*, 262. *quadripes*, 262.
- Pieris*, **163**. *brassicae*, 323. *brioniae*, 57. *calyce*, 294. *crataegi*, 174. *hulda*, 294. *menapia*, **79**. *monuste*, 16, 97. *nasturtii*, 293. *protodice*, 326. *rapae*, **66**, 117, 223, 295. *spilleri*, **163**, 342. *vernalis*, 293. *virginiensis*, 294.
- Pilemia*, 174.
- Pimpla*, **91**, 162, 290. *brevicornis*, **91**. *inanis*, **90**, **91**. *mandibularis*, **91**. *vesicularia*, **91**. *Pinipestis reniculella*, 322.
- Pionea rimosalis*, 255.
- Piophilha casei*, 207.
- Pipiza radicum*, 190.
- Pirates biguttatus*, 209.
- Pirene*, 162.
- Pissodes strobi*, 229.
- Placonia*, 174.
- Plagiodera scripta*, **222**.
- Plagidis floscularia*, 38.
- Planiceps*, 291.
- Plathypena scabra*, 97.
- Platygaster*, **70**, 347.
- Platynota stultana*, 318. *semiustana*, 318.
- Platypteryx*, **278**. *bilineata*, **278**. *lucertula*, **278**.
- Platysamia columbia*, **298**. *nokomis*, **298**. *polyommata*, 326.
- Platyptilia bertrami*, 190, 229. *dichrodactyla*, 190.
- Platytermus*, **91**. *fasciculatus*, **90-91**. *simplex*, **90**.
- Plectrocnemia*, 317.
- Plectrodes*, **217**, 345.
- Pleocoma*, **217**, 345.
- Pleurhomus*, 326. *obscurus*, 326. *sahlbergi*, 326.
- Ploas*, 5.
- Plusia*, **69**, 223. *bonaerensis*, 229. *brassicae*, **19**, 57, 77. *celsu*, 56. *gamma*, 18. *ni*, 57, 77. *verticillata*, 323.

- Podapion, 149. gallicola, 149.
 Podura, **5**, 117.
 Poecilosoma pulveratum, 171.
 Pogonomyrinx barbatus, 15, 161.
 Polia, 295. illepada, 295.
 Polistes flavus, 289. navajoe, 289. rubiginosus, 210.
 Polymitarceus alba, 97.
 Polyphylla, **146**. variolosa, **23**, **159**, 342.
 Polyrachis, 320.
 Polysphincta, 290. tuberosa, 136.
 Pomatinus substriatus, 229.
 Pomphopoea sayi, 325.
 Pompilus, 117, 161, 291.
 Poner, **99**.
 Porthesia auritua, 260. chryso-rhœa, 317 (v. Liparis ch.). similis, 317.
 Potamophilus, **111**.
 Priocnemis, 291.
 Prionus, **159**, 341. imbricornis, 209. insularis, 18. latifrons, 209.
 Proarna montevidensis, 55. uruguayensis, 55.
 Proctacanthus, 264.
 Prodenia autumnalis, 57.
 Prodoxus, 171. decipiens, 136, 149, 150.
 Promachus, 264. bastardii, 150. vertebratus, 150.
 Pronos, 260.
 Pronuba, 171. yucasella, **105**, 136, 149, 150.
 Propexus edonis, 321.
 Prorasea similis, 321.
 Prosopistoma, 111. punctifrons, 173.
 Pryteria, 174.
 Pseudaglossa lubricalis, 322. scobialis, 322.
 Pseudapistosia, 174.
 Pseudeuceron, 174.
 Pseudoconchylis, 318. latipapitana, 318.
 Pseudodyras, 174.
 Pseudohazis eglanterina, 56, 322.
 Psiloptera drummondii, **24**, **63**, 342.
 Psilopus pallens, 324.
 Psinidia wallula, 78.
 Psithyrus, **88**.
 Psoloptera meisteri, 229.
 Psylla, 293. celtis-grandis, 262. celtidis-namma, 259, 260. nlni, **310**, 323. venusta, 260.
 Pterochilus lewisii, 289.
 Pterogon clarkiae, 55.
 Pteromalus, 117, 137. puparum, 117. quadrimaculatae, 16.
 Pterophorus monodactylus, 229.
 Pterostichus melanarius, **234**.
 Ptinus fur, 228. rutilus, **43**, **44**, 342.
 Ptosima gibbicollis, **203**.
 Psycholoma, 257. dissitana, 322. persicana, 38.
 Pytelus, **288**.
 Pubilia concava, 326.
 Pulex, 55. cavicola, 264. concoloris, 264. irritans, 95, **186**, 209. nasuae, 264. obscurus, 341. penetrans, **52**, 209, 261, 341. testudo, 264.
 Pulvinaria innumerabilis, **224**, **226**, 258, 348.
 Purpuricenus axillaris, **204**. humeralis, **204**, 229.
 Pycnomerus, 171.
 Pygostenucha, 322. funerea, 322.
 Pyralis aegalis, **351**. aegusalis, **351**.
 Pyrameis atalanta, 117. cardui, 95, 117. huntera, 117.
 Pyrgus, **104**. philetas, 37.
 Pyrophorus, 339.
 Pyrrhosoma minium, **211**.
 Pyrrhia stilla, 322.
 Pyrrhotaenia achillae, 56. eremocarpi, 56. fragariae, 56. helianthi, 56. meadii, 56. orthocarpi, 56. polygoni, 56. tepperi, 56. texana, 56.
 Pyrsonympha [infus.], **298**.
 Quadrina, 57. diazoma, 57.
 Ragadia crisia, **148**, 343.
 Raphidia, **160**.
 Reduvius personatus, 209.
 Retinia, **14**, 263. duplana, 320. frustrana, 257, 263. rigidana, 257. sylvestrana, 320.
 Rheumaptera hastata, **243**.
 Rhiogia, 173.
 Rhinoceros [mamm.], **310**. sumatrensis, **351**.
 Rhipiphorus, **224**, 350. limbatus, **211**, 347. pectinatus, **211**, 347.
 Rhizococcus fossor, **297**.
 Rhizotrogus solstitialis, **211**, 316.
 Rhodites, 162. bicolor, 150. rosae, **91**, 150. radicum, 162.
 Rhodobaenus tredecimpunctatus, 96, **222**, 350.*
 Rhodocera cleopatra, 17. rhamnii, **236**, 350.
 Rhododipsa miniana, 57.
 Rhodophora florida, 172.
 Rhoenanthus, 171.
 Rhopalodes argentina, 229.
 Rhopalosoma, 291.
 Rhynchophorus zimmermanni, 96.
 Rhyssa, 290. atrata, **147**. humida, **286**.
 Sabulodes dositheata, 56.
 Saliicus, **5**, **64**.
 Samia californica, **314**. cean-
- othi, **314**. cecropia, 231, **312**, **313**, **314**, 350* (v. Attacus c.)-gloveri, **314**.
 Sandalus petrophya, **203**.
 Saperda bivittata, 316. fayi, 17. scalaris, **44**.
 Sapholytus conatus, **91**.
 Sarcophaga carnaria, **4**, 324.
 Sarcopsylla penetrans, 190.
 Saturnia carpiui, 38, 173. io, 231 (v. Hyperichiria i.). mendo-cino, 56. pavonia, 38. promethea, 295.
 Satyrus alope, 293. ariane, 293. boopis, 293. charon, **354**. gabbii, 294. nephele, 293. pegala, 293. ridingsii, 293 (v. Hipparchia r.).
 Scaeva, 173.
 Scarabaeus tityus, **145**.
 Scelio famelicus, 78.
 Scelodonta nebulosa, **123**, **126**, **128-130**, **167-168**, 344. pubescens, **167-168**, 344.
 Schizoneura lanigera, **144**, 190. pyri, 190.
 Schizopyga frigida, 290.
 Sciaphila arizonana, 318.
 Sciapteron cupressi, 56. graetii, 56. scepsiformis, 56. syringae, 56.
 Sciara, 258. ocellaris, 258. titicola, 258.
 Sciurus hudsonius [mamm.], 323.
 Sclerostoma syngamus [verm.], **75**.
 Scolia nobilitata, 289. consors, 289. flavocostalis, 289. flavosignata, 289. lecontei, 289. regina, 289. ridingsii, 289.
 Scoliopteryx libatrix, 37, 321.
 Scolopendrella, 17.
 Scolytus pyri, 190.
 Scops asio [aves], 293.
 Scorpio, **253**, 296.
 Scotocryptus, 297. meliponae, 297, 298. obscurus, 297, 298.
 Scutigera, 326.
 Segestria, 208.
 Segestrioides, 260.
 Sejus cynipidis, 15.
 Selandria barda, 261. rubi, 295.
 Selenophorus ellipticus, 323.
 Selenops insularis, 260.
 Semasia, 318.
 Semiotellus chalcidiphagus, 263.
 Senia, 174.
 Sericoris, 257. urticana, **241**.
 Sialia sialis [aves], 320.
 Sialis, 188.
 Silpha americana, 325.
 Simonsia paradoxa [verm.], **93**.
 Simulium, **39**, **79**, 173, 228, 230. reptans, **225**.

- Singa, 319.
 Singamia, 174.
 Sirex, 296, 316.
 Sitaris, 161.
 Smerinthus, 17, **69**, **282**, 325,
335. cablei, 17. excaecatus,
277, **282**. geminatus, **282**.
 ocellatus, 325. ophthalmicus, 55.
 populi, 18, **201**.
 Smicra, 292. gigantea, 15.
 Smodicum cucujiforme, **203**.
 Smyra, 174.
 Solenobia, 256. walshella, 256.
 Sosylus, 171.
 Spalacopsis suffusa, 97, 98, 118.
 Spalangia quadrimaculatae, 16.
 syrphi, 16.
 Spaniophlebia, 171.
 Spathegaster baccaram, **90**.
 quercus-laurifoliae, 15.
 Spasation famelicus, 78.
 Sphaerularia bombi [verm.],
79, **93**, **337**.
 Sphenophorus, 96, 97. robustus,
 96, 97, 259. sculptilis, 259.
 zeae, 259.
 Sphenostethus taslei, **203**.
 SpheX ichneumonea, 210.
 mandibularis, 292.
 Spilda obliquata, 56.
 Sphinx, 325. baruta, 229.
 carolina, 209 (v. *Macrosila c.*).
 catalpa, 96. chersis, 320. con-
 volvoli, **164**. dollii, 38. drupi-
 ferarum, **226**. ephemeriformis,
 257. eremitus, 320. hageni, 98.
 libocedrus, 56. ligustri, 173.
 oreodapline, 55. perelegans, 55.
 quinque maculata, 209, 318. sequo-
 oia, 36. utahensis, 56.
 Spilosoma isabella, **281** (v.
Arctia i.). virginica, **281**.
 Spiropilpus, 259.
 Spragueia pardalis, 38.
 Statira, **39**.
 Steatoda, 259.
 Steganoptycha, 257.
 Stelis, 290, 291. interrupta,
 290. montana, 290.
 Stenobothrus, 296.
 Stenocenus, 260.
 Stenus, **19**, 344.
 Stereoptes skada, 294.
 Stigmonota, 257.
 Stilpnus, 259.
 Stizus, **338**. grandis, 210.
 speciosus, 210, 320.
 Stomoxys, 173, 230. calci-
 trans, **328**.
 Strangalia, 296.
 Stratiomys, 173.
 Strix perlata [aves], 264.
 Strobisia levipedella, 256.
 Strongylium, **39**.
 Strongylus pergracilis [verm.],
75.
 Strophocerus, 174.
 Stylogaster, 264. neglecta,
 264.
 Subula, 173.
 Sychesia, 174.
 Sympiezus sericeicornis, **91**.
 Synalissa, 174.
 Syneda faceta, 56. occulta, 56.
 Synedoida valens, 56.
 Synergus, **90-91**. apicalis,
90. connatus, **91**. facialis,
90. nervosus, **90**. thauma-
 cerus, **90**. vulgaris, **89-90**.
 Syneta tripla, **283**.
 Syntomaspis, **90-91**. cyanea,
90. fastuosa, **90**. saphirina,
90.
 Syrichtus alba, 293. oceanus,
 294. petreius, 294.
 Syrphus pensylvanicus, 16.
 pyrastri, 324. quadrimaculata,
 16.
 Systoechus, 158. oreas, 78,
 189.
 Tabanus, **69**. 172. 296. dod-
 gei, 210. sparus, 210. superju-
 mentarius, 210.
 Tachina aletiae, 228.
 Taczanowskia, 260.
 Taeniocampa gothica, 136. in-
 certa, **273**.
 Talmenia, 174.
 Tamias striatus [mamm.], **226**,
338.
 Tamyodes, 174.
 Tanypus nebulosus, **225**.
 Tarentula nidifex, 16. pikei,
 16.
 Taxonus glabratus, 171.
 Tegenaria guyonii, **54**, **206**,
 346. textura, 208.
 Tegeticula yuccasella, 136, 149,
 150 (v. *Pionuba y.*).
 Telea polyphemus, 231, 232,
313, **314**, 350* (v. *Attacus p.*).
 Teles, **99**.
 Telenomus brochymenae, 315.
 Telephorus bilineatus, **284**.
 Telesilla cinereola, 259.
 Tenaga, 256. pomiliella, 256.
 Tenebrio molitor, 187, **354**.
 Tentredo, 316.
 Tenthredoidea, 289.
 Tephrosia biundularia, 172.
 crepuscularia, 172.
 Teras ferrugana, 242. niveana,
 242.
 Terias nicippe, 18.
 Termes, 190.
 Terulia, 58.
 Tetracha carolina, **219**.
 Tetracis aegrotata, 56.
 Tetragnatha, 319. illinoiensis,
 260.
 Tetralopa diluculella, 321.
 Tetranorium caespitum, **32**.
 Tetrapedia, 290.
 Tetrastichus, **90**. terminalis,

- 90**.
 Tettigades papa, 55.
 Thagana, 174.
 Thais polyxena, 260.
 Thalpochara aethera, 322.
 Thamnophora tripunctaria, 56.
 Tharops obliquus, **203**.
 Thecla acadica, 294. affinis,
 294. alcestitis, 294. autolytus,
 294. behrii, 294. calanus, 117.
 californica, 294. castalis, 294.
 chalcis, 294. citima, 37. cloth-
 ilde, 293. cygnus, 294. damon,
 294. dryope, 294. exoleta, 37.
 irus, 37. henrici, 56. laeta, 294.
 mossii, 37. muiri, 37. nelsoni,
 37. niinus, 294. ontario, 294.
 spadix, 37. taicita, 37. tetra,
 294. viridis, 294.
 Thelia univittata, **240**.
 Thelidora, 174.
 Thelyphonus bohemicus, **226**.
 Thereva, 173.
 Theridion (Theridium), **66**,
 208, 259. gonygaster, 259. mi-
 gratum, 208. schizopoda, 208.
 sphaerula, 259.
 Theridula, 259. gonygaster,
 259. sphaerula, 259.
 Thomisus bigibbosus, 260.
 Thraulus, 171.
 Thrips, **195**.
 Thyatira lorata, 57.
 Thymalus fulgidus, **285**. lim-
 batus, **285**.
 Thymeticus hylax, 294.
 Thyredon morio, **282**.
 Thyres abbotii, **104**, **186**.
 Thyridia, **191**.
 Thyridopteryx, 257. ephem-
 eraeformis, 257. meadii, 56.
 Tillomorpha geminata, **204**.
 Timetes coresia, 294. eleucha,
 294.
 Tinea, **72-73**, 256. crinella,
39, 343. granella, **146**, 150.
 pellicionella, 256. rusticella, 256.
 tapetzella, **72**.
 Tineola biselliella, 256.
 Tingis juglandis, **241**.
 Tipha, **211**, **224**, 347, 350.
 Tipula, 173.
 Tischeria, **72**, **74**. 317. quer-
 citella, 256.
 Titanophasma fayoli, **54**.
 Tmeticus, 259.
 Tomicus, **164**.
 Tomocerus, **354**.
 Tomopteryx viduaria, 229.
 Tortrix, **90**. cinderella, 77.
 dissitana, 322. flaccidana, 38.
 nigridia, 320. quercifoliaria, 38.
 zebeana, **332**.
 Torymus, **91**. bedeguaris, **91**,
 cingulatus, **89-90**. euchlorus,
90. flavipes, **89**. glechomae,
91. nigricornis, **90**. viridissi-

- mus, **89-90**.
 Toxophoroides, 290.
 Trachys, **332**.
 Tremex columba, **285**.
 Trichodectes ovis, 97.
 Trichogramma, **51**. minutis-
 simum, 117. minutum, **51**, 117,
 347. pretiosa, **51**, 347.
 Trichonympha [infus.], **298**.
 agilis, **298**. leidyii, **298**.
 Trichorthosia, 322. parallela,
 322.
 Trichotapha alacella, 256.
 flavocostella, 256.
 Tricypha, 174.
 Trigonalys, 291. costalis, 291.
 gundlachi, 291. pulchellus, 291.
 Trigonaspis, **90**. crustalis,
90.
 Trimerotropis caeruleipes, 78.
 latifasciata, 78. similis, 78. vin-
 culata, 78.
 Triocnemis, 57. saporis, 57.
 Triodites, 188. mus, 78, 189.
 Trioza, **310**. maura, 323.
 remota, 323. scottii, 323.
 Triphosa dubitata, 56.
 Trochilium grande, 18. paci-
 ficum, 56.
 Trogoderma tarsale, **39**, **132**,
 345, 350.*
 Trogon †, v. Trogus.
 Trogosa corticalis, **285**.
 Trogoxylon parallelipedum,
 292.
 Trogus, 17, 289. exesorius,
 117. flavipennis, 290.
 Trombidium, 78, 324. fuligi-
 nosum, **14**.
 Tropaea luna, **94**, **313**, 350.*
 Tropisternus, 326. breviceps,
 326. dorsalis, 326. fulvipalpis,
 326. laucifer, 326. limbalis, 326.
 obscurus, 326. parananus, 326.
 proximus, 326. robustus, 326.
 Trothisa margaritae, 229.
 Trox, **146**.
 Trychodactylus, **206**.
 Trypeta asteris, 149. polita,
 138. pomonella, 257, 258. soli-
 daginis, 138, 149, 162.
 Tryphon, 289, 290.
 Trypoxylon, 189, 323. albi-
 tarse, 189, 210. sulcus, 172.
 Turdus migratorius [aves], 320.
 Tylenchus [verm.], **333**.
 Tylonotus bimaculatus, **204**,
283.
 Tympanoterpes elegans, 55.
 Typhlocyba, 190. aurea, 190.
 binotata, 190. pallidula, 190.
 Typhlodromus oiliicorus, 15.
 Tyroglyphus, **206**, 261. glov-
 erii, 227.
 Ulamia, 174.
 Ulesanis, 259.
 Uloborus, 319.
 Ulochlaena hirta, **163**.
 Urocerus areolatus, 289.
 Valeria conserta, 38.
 Valgus squamiger, **24**, 342.
 Vanessa, **104**, **201**, 260, 296.
 antiopa, **14**, 117, **282**. atalan-
 ta, 292. cardui, 18, **84**, 174,
312, **352**. goverilla, 323. io,
 260, **352**. milberti, **100**. poly-
 chloros, **192**, **234**, 352. urticae,
 137, 263, **352**.
 Vespa, 55, 296. crabro, 228.
 maculata, 210.
 Vespertilio isidori [mamm.],
 264.
 Viteus, 207. vitifoliae, 207.
 Wala, 323.
 Walshia, 257. amorphella, 117,
 150.
 Wilsonia, 257.
 Xanthothrix neumoenigeni, 56.
 Xenos, 228.
 Xorides borealis, 290.
 Xyliina antennata, 57. cinerea,
 57.
 Xylocopa, 290. azteca, 290.
 californica, 290. virginica, 292.
 Xylonomus, 290.
 Xylotrechus colonus, **283**.
 convergens, 17.
 Xyphidria attenuata, **286**.
 Xysticus feroceus, 260. verni-
 lis, 260.
 Xystus robiniae, 56 (v. Cos-
 sus r.).
 Ypsipetes sordidata, **352**.
 Ypsolophus, 256.
 Zaraea fasciata, **175**, 349.
 Zenodoxus canescens, 56.
 heucherae, 56. potentillae, 56.
 Zerene elegantaria, 56.
 Zeugophora reimecke, 321.
 Zeuzera, **106**.
 Zilla x-notata, **300**, 341.
 Zophodia, 57.

CORRECTIONS.

The passages indicated should read as follows. Errors in mere punctuation, capitalization, division of words, and turned letters are not noticed.

p. col.	1.	
9	1	—13 which do not imbricate. . . .
29	1	20 (<i>Compsomyia</i>) <i>macellaria</i> . . .
64	2	— 1 . . . spider, <i>Clubiona</i>
71	1	—12 . . . On page 37 he . . .
73	1	5 . . . <i>Tinea</i> , <i>Exapate</i> ,
95	folio	line . . . [3292-3302]. . .
108	2	— 9 . . . Special bibliography. . . .
123	1	4 <i>nebulosa</i> Lec.
128	2	1 . . . SCLEODONTA NEBULOSA Lec.
167		3 THREE EULMOIPLINI. . .
168	1	1 . . . <i>S. nebulosa</i>
168	2	5 . . . changed to <i>nebulosa</i>
168	2	8 . . . of <i>nebulosa</i> only.
213		9 Vol. 4. Nos. 126-128.
215	2	14 . . . took it in my . . .
237		6 . . . FORBES, <i>Cham-paign</i> .
257	folio	line . . . [3695-3704]. . . .
269		6 . . . FORBES, <i>Cham-paign</i> .
301		6 FORBES, <i>Cham-paign</i> .
333	1	6 . . . Julius edler von
333	1	11 ges. in Wien, 1870. . . .

EXPLANATION OF PLATE I.

FIG. 2. *Scelodonta nebulosa* Lec.

FIG. 3. Pupa of *Scelodonta nebulosa*.

p. col.	1.	
14	1	16 . . . <i>Limenitis disippus</i> . . .
18	2	7 des jahres 1879. . . .
19	1	— 8 DR. M. SCHULGIN . . .
31	1	16 . . . that it was . . .
32	2	2 bage.—Compiled . . .
36	1	—11 SPÄNGBERG, Jacob. . . .
39	1	3 gnats [<i>Simulium</i> sp.] . . .
54	1	12 American <i>solpugidae</i>
55	2	26 1879, v 11
57	2	34 . Professor Riley on
59	1	20 "Faune des coléoptères . . .
59	1	22 the rhynchophora which. . .
59	2	3 . in flight. Siewers'
76	2	12 Equador, by Mr.
78	1	5 . 24 X 15; map
79	1	13 helminth parasitic . . .
79	1	30 PROF. PHILIPP CHRISTOPH . . .
94	1	3 Dr. Leuthner, of Basle. . . .
94	1	11 Dr. Leuthner considers
98	1	—17 . and 1882, 1882 [Jan.
98	1	—11 . stalk-borer: genus-
98	2	2 <i>Anomis erosa</i> Hüb. . . .
117	2	2 . . . p. 418-419.
117	2	—19 . . . 6 Apr. 1881.
120	1	14 . . . in powdered form, . . .
135	2	9 . . . Paris, 1875
136	2	2 Laboulbène. . . .
150	2	— 3 . Sept. 1881, v. I, p. . . .
151	1	16 ogists' union has. . . .
151	2	21 . . . third numero of
151	2	—11 If any enthusiasts . . .
152	1	23 . . . and explaining in . . .

- 152 1 24 . . . to make Leuckart
 161 2 3 . . . 1 pl., 23 X 14.5. . .
 172 1 17 . . . 1 col. pl., 25 X 16.5, t
 172 2 14 kohls, *apocynum* . . .
 173 1 27 . . . 59 pl., 26 X 16. t 20 X
 11.5
 174 1 22 terlings-fauna . . .
 175 2 16 C. H. T. TOWNSEND,
 187 2 —22 p. 157-161, pl. 1.)
 187 2 —5 . . . p. 162-168, pl. 2-3.)
 188 2 16 . . . nouvelles plantes-
 190 1 10 . . . 1884], v. 15, p. 231-233, . . .
 206 1 5 sciences of Philadel-
 phia. . . .
 208 2 4 . . . t 17 X 9.5. il.
 211 2 19 . . . by the larva of
 211 2 20 . . . or *R. limbatus*, the
 223 2 —14 . . . student after another
 225 1 21 . . . that of *Euchro-*
 225 2 —12 *nuchicornis* from . . .
 228 1 31 . . . and to decomposing . . .
 232 1 1 [Instinct or . . .
 234 2 5 . . . Aubert and R. Dubois . . .
 235 1 21 . . . two myriopods in cap—
 235 2 24 . . . "Mr. B. T. Lowne gave
 235 2 2 Mr. Wood-Mason . . .
 248 22 GEOLOGICAL DISTRIBUTION . . .
 258 2 —5 . . . p. 198-201 . . .
 264 1 2 . . . rhopalocera of . . .
 264 1 27 . . . u. kunst pro
 287 2 12 . . . In 1877 he . . .
 287 2 30 . . . and then would
 291 1 —6 . . . genus *aleiodes*,
 293 2 13 America. No. 2. . . .
 294 2 29 v. 3, p. 266-277.)
 296 2 35 . . . 2d article.
 297 1 6 *Santalum cunningham-*
ii, . . .
 313 2 —6 of *Pelopoecus architectus*,
 and
 315 2 1 **Beijerinck**, M. W. . . .
 317 1 —26 . . . (Feuille des . . .
 318 1 15 . . . Russell, esq. on the hes-
 324 1 21 antérieur des . . .
 325 1 11 by the colours, . . .
 325 1 —3 *dum*. Fab. . . .
 340 1 27 . . . p. 122, 142, 154, 166, 178,
 194. . .
 341 1 29 . . . 166, 330, each 4 cm.)
 350* 2 3 330, each 2 cm.)
 350** 1 —13 . . . St., 330, each 3 cm.)
 351 2 6 fessor G. V. Ciaccio, . . .
 352 2 —16 PARASITIC NEMATODS—...
 354 1 17 . . . *Melitæa rubicunda*,
 354 2 —1 . . . 21 Feb. 1887.
 355 2 4 [Copyright, 1889, by . . .
 356 1 5 . . . Bůžek, 4143.
 356 2 —1 ten 3291r. . . .
 358 1 —20 **4294. Hebrew.** . . .
 361 2 16 **5892. FUNGI.**
 362 1 18 . . . Arachnida, 3825.
 362 1 19 . . . Bolito-
 364 2 31 . . . Zeugophora, 3979.
 364 2 —4 . . . Scjus.
 364 2 —3 . . . Leuco-
 368 1 34 Prizes, 4106-4107. . . .
 372 2 3 . . . 3745. Chryseudeton
 3983 . . .
 372 2 33 . . . [H]abrostola, 3734.
 374 1 37 oxys, 3502. . . .
 374 2 25 . . . Equus, 3998.
 16 1 11 tions other *aphididae* . . .
 16 1 12 . . . enemies of *aphididae* . . .
 16 1 13 *aphididae*. . . .
 16 1 25 . . . species of *chalcididae* . . .
 17 2 11 . . . *pontederia* in Louisiana; . . .
 38 1 8 . . . corrects error of . . .
 56 1 6 . . . *ctenucha rubrosca-*
 57 2 21 . . . H: E. (3265)
 78 2 20 . . . G. de Lucretiis' . . .
 95 2 3 . . . use of naphthalin (C₁₀ H₈) . . .
 137 2 —7 . . . to the action
 150 1 11 . . . [Rec., 3339].—The
 150 1 19 . . . described by R. Me-
 150 1 4 . . . *tegeticula yuccasella* . . .
 150 2 —17 . . . oviposit at
 161 1 27 tural skill (exemplified . . .
 163 2 17 *lamium album* . . .
 171 1 --7 jolia, rhoënanthus,
 171 1 4 . . . and bætis; . . .
 173 1 3 the insect [*prosopistoma* . . .
 173 1 2 . . . aquatic life."
 174 2 2 . . . of *aphididae*.
 189 1 22 . . . formerly attributed to . . .
 190 1 3 . . . p. 369, ulcerous . . .
 200 2 18 laboratory by . . .
 207 2 15 Process of oviposition . . .

p.	col.	l.		292	1	35 . . . <i>cus</i> ; ; <i>apis</i> . . .
209	1	11	fields; past . . .	293	2	17 . . . <i>l. pseudargiolus</i> , and . . .
209	2	— 2	. . . of larva, pupa . . .	294	1	24 . . . <i>argynnis</i> and to the <i>lycaena</i> .
209	2	1	<i>pis</i> its food-plant. . . .	294	2	32 . . . <i>thecla ninus</i> ♂, . . .
228	1	24	. . . of <i>darlingtonia californica</i> , . . .	316	1	23 . . . 9 new species of . . .
229	1	19	. . . upon <i>platyptilia bertrami</i> . . .	318	1	22 . . . <i>B</i> ; <i>P.M.</i> (3929)
229	2	35	10 new species, viz.: . . .	321	1	7 . . . opment of the larva. . . .
230	1	14	of certain <i>acridiidae</i>	322	1	13 . . . describes <i>alypioles</i> (n. g.) . . .
231	2	— 4	. . . of insects from . . .	322	1	— 5 . . . currence of . . .
232	1	— 5	important points from . . .	323	1	10 . . . of Claparède's "haftnäpfe," . . .
257	1	20	. . . <i>dasycera</i> , <i>anesychia</i> ,	323	2	18 . . . for "the apple
259	2	— 13	. . . <i>psylla celtidis-</i>	324	2	— 3 . . . <i>agaonidae</i> ; synonymy of . . .
261	1	11	1884. Honey when sealed . . .	325	2	29 . . . ing the occurrence and . . .
262	2	— 7	<i>tidis-]renusta</i> . . .	326	1	18 . . . (Colombia); creates . . .
263	2	1	Wallace , Alfred Russel, . . .	326	2	31 . . . Résumé of the . . .
263	2	14	. . . mites; quotation of other	344	1	— 16 . . . <i>scelodonta nebulosa</i> (misnamed. . .
264	1	— 1	. . . and <i>pelecocera</i>	344	1	— 4 . . . <i>scelodonta nebulosa</i> as
292	1	28	. . . July 1863, p.	345	1	— 3 . . . p. 278, of a communication
292	1	34	. . . " <i>apis griseicollis</i> " ♀ = . . .			made . . .

p. 329, line 14, for *Frank Karsch* read *Ferdinand Anton Franz Karsch*.

p. 330, col. 2, line 37, for *PSYCHE* read *PSICHE*.

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00842 9235