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GENERAL INDEX

AND

SUPPLEMENT

TO THE

NINE REPORTS

ON THE

INSECTS OF MISSOURI.

BY

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INTRODUCTION.

The present Bulletin has been prepared in response to frequent suggestions from those having occasion to use the nine Annual Reports on the Insects of Missouri, made by me, as State Entomologist, to the State Board of Agriculture, during the years 1868 to 1877, inclusive. Reports contain a good deal of matter anent the Cotton Worm, the Chinch Bug, the Rocky Mountain Locust, and other insects which the Commission has studied, and were published, as required by law, in the Annual Reports of said State Board of Agriculture for the years mentioned. That method of publication was always regretted by myself and by many others, inasmuch as the reports of the Board were generally volumes of such bulk as to delay publication and render mailing expensive. By virtue of the fact that they were distributed only to members of the State legislature and to State societies, access to them by persons outside the State of Missouri was extremely difficult; while the State printing and press-work were, as a rule, of a very unsatisfactory character. To avoid some of these difficulties it was my habit to have about 300 separate copies of the entomological portion printed on better paper, at my own expense, for distribution to correspondents both at home and abroad, and it is through these, principally, that the Reports have been accessible outside the State.

The demand for the Reports and the manner in which they have been used and commended by subsequent writers can but be gratifying to the author, who feels that whatever of commendation they deserve is due to the fact that they embody results of original investigation. They contain some matter that, with present light, he would expunge, and the earlier volumes, more particularly, contain imperfections which no one appreciates more fully than himself. Many of these are attributable to isolation from other working entomologists at the time, as well as to the almost absolute dearth of entomological works of reference in any of the libraries of Saint Louis.

The general plan of the Reports, which were addressed to the intelli-

gent cultivator of the soil rather than to the naturalist, is set forth in the following passage from the introduction to the first:

Fully aware that I write for those who, as a rule, are unversed in entomology, I have endeavored to treat of each insect with as little of the nomenclature of science as is consistent with clearness of expression. Yet, as much that is of scientific interest, such as descriptions of new species, must necessarily be inserted, I have had such descriptions printed in a type of smaller size than the text, so that it can be skipped if desirable, at the time of reading, and easily referred to for comparison, with specimens which one is desirous of naming. I have also endeavored to illustrate, as far as possible, the insects of which this report treats, believing that good illustration forms the basis of successful teaching in a science with which the general husbandman is not expected to be acquainted; for the eye conveys to the mind, in an instant, what the ear would fail to do in an hour. The practical man cares little to what genus or family an insect belongs, so long as he can tell whether it be friend or foe. He must become familiarized with the insects about him without having necessarily to overcome scientific detail and technicality.

I have made no effort at a systematic arrangement of the insects treated of. Indeed, that were useless for the purpose in view; but, in order that the reader may refer the more readily to any particular insect which interests him, I have separated them into three series—NOXIOUS, BENEFICIAL, and INNOXIOUS—and attached a very full index. For the benefit of those who are making a study of entomology, I have also given, with each species, the Order and Family to which it belongs, in parenthesis under each heading.

So far as possible, I have used a common name for each insect, knowing that the scientific name is remembered with greater difficulty, and is, consequently, distasteful to many. But as popular names are very loosely applied, and the same name often refers to different insects, in different localities, a great deal of confusion would ensue without the scientific name, which is, therefore, invariably added, for the most part, in parentheses, so that it may be skipped without interfering in any way with the sense of the text.

In order to add value to this general index, I have brought together tables of contents of the nine volumes and given corrections and some notes and additions. I have also reproduced the descriptions of new species, and added a list of descriptions of adolescent states, of descriptions of species not new, of illustrations by reports, of illustrations by classification, and of food-plants.

The Reports were independently paginated, and the separate copies were often distributed before the Agricultural Report was off the press. The date of publication and distribution is given for each in the tables of contents. The nomenclature of the Reports is retained in this Bulletin, the synonomy being indicated in the notes and additions and with the reproduced descriptions. The name of the author of the species and not of the genus was always given as authority, and in the later Reports I endeavored to indicate whether or not the insect was described under the generic name which it bears, by adding the authority without a comma when the specific name is coupled with the generic name under which it was first published — e. g., Phycita nebulo Walsh — but placed it in parentheses when a different generic name was used than that under which the insect was first described — e. g., Acrobasis nebulo (Walsh) — except where the whole name was already in parentheses when a comma

was used for the same purpose—e.g. (Acrobasis nebulo, Walsh). The same plan is adopted throughout this Bulletin.

It had always been my intention to publish a tenth volume and to end the decade with a review of, and general index to, the whole series. Indeed, an appropriation for the tenth year's work was made and the tenth report would have been duly issued had I not been called at the time to my present work for the General Government. This Bulletin is, in a measure, the fulfillment of that intention, and is issued in the hope that it will render the Reports more serviceable to the student of insect life and to those having to deal with insects injurious to agriculture.

My thanks are due to Messrs. E. A. Schwarz and W. H. Patton, agents of the Commission, for aid in its preparation.

C. V. R.

Washington, D. C., March 1, 1881.

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TABLES OF CONTENTS.

Neither of the first five volumes contained a table of contents, the plan of giving such having been adopted with the sixth. Most of these tables are, therefore, prepared for this Bulletin, while those of the Sixth and Seventh Reports are amplified. Those of the last two volumes are reproduced as they were originally made.

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CORRECTIONS.

A list of errata is given for each volume, and they are here reproduced with such additional ones as were previously omitted. Where foreign terms were not properly accentuated in the Reports, it was often due to the imperfect "plant" possessed by the State printer. In counting lines the running page title is omitted.

REPORT I.

Page 8, line 21, for being read were.

Page 10, line 1, for Figure 3,3 read Figure 3,2.

Page 12, line 20, for last read 1866.

Page 12, line 3 from bottom, after February add (1867).

Page 12, line 13 from bottom, for verter read venter.

Page 14, line 24, for hermaphrodite read agamic.

Page 14, line 32, for females read males.

Page 15, line 10 from bottom, for muscle-shaped read mussel-shaped.

Page 22, line 2 from bottom, for pupas read pupa.

Page 30, note, for F. read T.

Page 31, line 15, for 37° read 38°.

Page 32, line 4, for Kreitz read Kreutz.

Page 32, line 14 from bottom, for III read V.

Page 32, line 7 from bottom, for XIII read VIII.

Page 38, line 5, for Tredeim read Tredecim.

Page 47, line 16, for far read for.

Page 50, line 7, for none the less read no more.

Page 53, line 28, for laid read lain.

Page 54, line 4 from bottom, for hatch read are deposited.

Page 56, lines 5 and 12, for to read at.

Page 58, line 15 from bottom, for Aspidiglossa read Aspidoglossa.

Page 64, line 26, omit again.

Page 67, line 11 from bottom, for class read branch.

Page 76, line 48, for Climbing Rustic read Climbing Cut-worm Moth.

Page 78, line 46, for unipunctata read unipuncta.

Page 86, line 21, and wherever they occur, for Guénée read Guenée; and for Guén. read Guen.

Page 87, line 11 from bottom, for F. read T.

Page 96, note, line 4, for West. read Wesm.

Page 112, line 3, for abreviated read abbreviated.

Page 114, line 1, after "insect" read (Stiretrus fimbriatus, Say).

Page 120, line 30, after "Cottonwood" read (Pemphigus vagabundus, Walsh).

Page 123, last line, for eriosoma read eriosomatis.

Page 132, line 16, for ampelopsis read ampelopsidis.

Page 133, in heading, for Codling read Berry Moth.

Page 133, line 24 from bottom, for preceding insect read Grape Curculio.

Page 134, line 3 from bottom, for Part V read Part VI.

Page 142, under the heading, add (LEPIDOPTERA TORTRICID.E).

Page 150, line 26, for thyridopteryx read thyridopterigis.

Page 150, line 37, for ferruginuous read ferruginous.

Page 154, in the heading, for zeas read zew.

Page 155, line 13, for ZEAS read ZEÆ.

Page 161, line 38, for Trallien read Trallian.

Page 166, under heading, add (LEPIDOPTERA, PYRALIDE).

Page 171, line 3 from bottom, for transformation read transformations.

Page 173, line 3 from bottom, for it read the more liquid parts.

Page 174, line 3 from bottom, for Solidaga read Solidago.

Page 175, line 32, add front before wing.

Page 176, line 21, for through read into.

Page 177, line 26, strike out in.

Page 177, line 13, after coxw read trochanters.

Page 178, lines 2 and 3, for GELECHIA read GELECHIE.

Page 179, line 32, for assimilating read assimulating.

Page 179, in heading and line 12, for CHICKWEED read KNOTWEED.

Page 179, lines 12, 13, for (Stellaria media) read (Polygonum aviculare.)

Page 180, line 7, for Cersium lanceolata read Cirsium lanceolatum.

REPORT II.

Page 8, line 14 from bottom, for I have read has been.

Page 8, line 13, from bottom, before on read largely from Mr. Walsh's previous writings.

Page 13, line 25, for cupable read culpable.

Page 16, line 13, for lava read larva.

Page 23, line 6 from bottom, for hole read holes.

Page 32, line 17, for insect read insects.

Page 35, line 24, for Corimelana read Corimelana.

Page 40, line 23, for Ophinsa read Ophiusa.

Page 41, line 25, for Laphrygma read Laphygma.

Page 50, line 5 from bottom, for leuca[i] w read leucan[i] w.

Page 53, line 12, for perpulcra read perpulchra.

Page 56, line 7 from bottom, for Salanum read Solanum.

Page 58, line 19, for copalina read copallina.

Page 59, line 9 from bottom, for varigated read variegated.

Page 76, line 4 from bottom, for I read V.

Page 76, line 5 from bottom, for Daphni read Daphne.

Page 82, line 25, for one read our.

Page 92, line 3, for 125-131 read 129-131.

Page 107, line 12, for Naturalista read Naturaliste.

Page 111, line 34, for crysalis read chrysalis.

Page 116, line 4 from bottom, for month read molt.

Page 118, line 2, for carved read curved.

REPORT III.

Page 6, line 3 from bottom, for Rosa read Rose; and for rosa read rosa.

Page 7, line 31, for Hyleactus read Hyleactus.

Page 25, line 8 from bottom, for finely read finally.

Page 28, line 3 from bottom, for Holmgreu's read Holmgren's.

Page 30, line 16, for the read the.

Page 30, line 16, for characterize read distinguish.

Page 47, line 3, for Feunde read Feinde.

Page 55, line 50, for that read than.

Page 57, line 18 from bottom, add c before the first h.

Page 58, line 3 from bottom, for fornudolosus read formidolosus.

Page 64, line 19, for Bignonio read Bignonia.

Page 78, note, for I read II.

Page 95, line 26, for belongs read belonging.

Page 117, line 5 from bottom, for Harr. read Fabr.

Page 123, last line, for an read and.

Page 129, lines 12 and 17, for Colosoma and Calosoma.

Page 131, line 13 from bottom, for fauns read fauna.

Page 135, line 33, for dints read dents; and line 21, for a read b.

Page 136, line 22, for Guenèe read Guenée.

Page 136, line 33, for Furtsenthum Walldeck read Fürstenthum Waldeck.

Page 145, line 35, strike out second the.

Page 146, line 24, add s to transformation.

Page 150, line 14, at end, add from an.

Page 151, line 12, for Cnythia read Cynthia.

Page 166, line 16 from bottom, strike out first comma.

Page 166, line 6 from bottom, for phalangea read phalanga.

Page 169, line 33, for first i read e.

Page 170, line 10, for Nnaural read natural.

REPORT IV.

Page 6, first verse, for grow read grows.

Page 19, line 8, for 5 read 6.

Page 20, last line but one, for R read U.

Page 22, last line but one, for Aleochora read Aleochara.

Page 40, line 9 from bottom, for occular read ocular.

Page 41, line 59, for Vt. read Ct.

Page 41, line 15 from bottom, after "Larva" read Length 0.5 inch.

Page 42, line 5, add a comma after Lepidoptera.

Page 43, line 6 from bottom, for claud read cloud.

Page 46, line 29, for edgae read edge.

Page 46, line under heading, add a comma after Lepidoptera.

Page 47, line 30, for rhomboidally read trapezoidally.

Page 53, line 25, and page 54, line 27, for basillare read basilare.

Page 53, strike out all after for many in the note.

Page 59, line 10 from bottom, add winged before female.

Page 67, line 4 from bottom, for Cordifolia read Riparia.

Page 68, line 2 from bottom, for Oid read Oil.

Page 75, third line in heading, add a comma after Lepidoptera.

Page 103, third line of note, for insest read insert.

Page 105, line 8 from bottom, for chrysallis read chrysalis.

Page 110, line 3, for CHALSIS read CHALCIS.

Page 110, line 29, for extramatis read extrematis.

Page 112, in the heading, for Hübn read Drury.

Page 132, line 19, for Chesnut read Chestnut.

Page 137, line 1, for Pernyi Silkworm read Perny Silkworm.

Page 137, under fig. 60, for Pernyi read Perny.

REPORT V.

P

Page 7, line 22, for stage read state.

Page 7, second line from bottom, strike out second the.

Page 8, explanation of Fig. 1, first line, for and read the.

Page 9, under Fig. 2, for Bembex fasciata read Vespa Maculata.

Page 9, line 11, for last and read with the.

Page 11, line 9 from bottom, after worm add moth.

Page 11, line 3, from bottom, for four read eight.

Page 12, line 24, for ἐτεροῖς read ἔτερος.

Page 12, Fig. 5, for Euschistes read Euschistus.

Page 13, line 3 from bottom, for larvæ are read larva is.

Page 14, under Fig. 8, for ŒDIPODA DIFFERENTIALE read CALOPTENUS DIFFERENTI-LIS.

Page 18, line 10 from bottom, for pollenation read pollination.

Page 19, line 30, for Lymexilon read Lymexylon.

Page 21, line 8 from bottom, for Townsend read Townend.

Page 24, line 13, for ærial read aërial.

Page 33, in Fig. 15, for cloroform read chloroform.

Page 43, line 6 from bottom, after or add in.

Page 51, line 17, for J. S read S. J.

Page 56, line 24, for how read that.

Page 52, line 21, for peteolaris read petiolaris.

Page 58, line 16 from bottom, for decrepid read decrepit.

Page 61, line 18, for hypertrophized read hypertrophied.

Page 66, line 13, for Cordifolio read Cordifolia.

Page 67, line 27, for with read to.

Page 67, line 28, after and add to offer.

Page 83, line 13 from bottom, for who read as.

Page 85, line 17 from bottom, after fecundation add either the.

Page 85, line 18 from bottom, strike out either and after female add would.

Page 86, line 2 from bottom, for and read und.

Page 90, line 17, for had read has.

Page 100, last line, add a comma before say.

Page 101, line 10, for nole read noli.

Page 103, line 9, for Caryæ read caryæ.

Page 113, line 40, for 19 read 41.

Page 115, for exerted read exserted.

Page 120, line 25, for regulary read regularly.

Page 126, line 4 in note, for querciti read querceti.

Page 126, line 5 in note, for pithicium read pithecium.

Page 129, line 14, omit color of the.

Page 139, for Papineau read Popenoe.

Pages 140 and 141, wherever Belvosia occurs read Belvoisia.

Page 156, line 6, for consumes read has consumed.

REPORT VI.

Page 8, last line, for 1874 read 1873.

Page 12, line 13, for Sisimbrium read Sisymbrium.

Page 12, line 25, for osciamus read oscyamus.

Page 12, lines 13, 14, for Poligonum read Polygonum.

Page 27, line 2 from bottom, for pecorus read pecoris.

Page 27, line 15 from bottom, for vireus read vireus.

Page 28, last line, for XV read XVI.

Page 35, line 3, for three read four.

Page 37, line 16, for first by read be.

Page 42, line 11, for the read certain.

Page 43, line 26, strike out to be presently treated of.

Page 47, remove "Telegraph" from "Summer grape" of to that of "Northern Fox."

Page 51, line 7 from bottom, for insidious read insidiosus.

Page 53, line 18, for Maguin read Mégnin.

Page 82, line 5 from bottom, for New read West.

Page 87, line 3 from bottom, for Bignonio read Bignonia.

Page 92, line 6, for Callimorpa read Callimorpha.

Page 94, line 14 from bottom, for point read joint.

Page 100, line 31, omit comma after lardarius.

Page 108, line 28, for orage read orange.

Page 111, line 6, for perspicillata read tripunctata.

Page 118, last line, for Phytopoga read Phytophaga.

Page 136, line 15, for Rosel von Rösenhof read Rösel von Rosenhof.

Page 141, line 9, after found add that.

Page 150, line 9, for pictures of read imprints on.

Page 154, line 6, strike out t.

Page 154, line 16, for it is read they are.

Page 156, line 8, after and add more.

Page 162, line 10, for elytram read elytrum.

REPORT VII.

Page IV, line 9, for contemptibly read contemptuously.

Page 1, line 10, after and read invaded the.

Page 5, line 16, for State read state.

Page 7, line 7, for calubrine read colubrine.

Page 11, line 32, for stoma read stomata.

Page 11, line 33, for dilutent read diluent.

Page 11, line 37, for J read S.

Page 12, line 13, for W. K read R. C.

Page 17, last line, for Dep. de l'Hèrault read Dép. de l'Hérault.

Page 21, line 14 from bottom, for Lencopterus read leucopterus.

Page 39, under Fig. 6, for TTIM read TRIM.

Page 52, line 14, for McWallie read McNallie.

Page 52, line 46, for Princeton read Purinton.

Page 75, line 32, for breed read bred.

Page 80, line 7 from bottom, add a comma before and after pometaria.

Page 81, last line, for nidi read nidus.

Page 94, in the sub-head, for Gall-inhabiting read root-inhabiting.

Page 99, line 7, in note, for nerves read trachem.

Page 108, line 17, for two read too.

Page 117, line 15, for V read IV.

Page 118, line 17 from bottom, for hight read height.

Page 147, line 20, for 1873 read 1866.

Page 162, line 20, for larva read lava.

REPORT VIII.

Page III, line 13 from bottom, add 1 before the 3.

Page 7, line 26, for copper read soda.

Page 22, in notes, transpose the * and t.

Page 34, line 6, for tuliètes read tuélites.

Page 34, line 11, for three-hundredths read two-hundredths.

Page 37, under Fig. 23, for exerted read exserted.

Page 38, line 6, for glass read grass.

Page 52, line 1 in note, for Doliconyx read Dolichonyx, and for orizivora read oryzivora.

Page 53, line 32, for veridascens read viridascens.

Page 98, second line, in explanation of Fig., for e read c and for c read e.

Page 100, line 2, after they add are still imperceptible; in the third stage (after second molt) they.

Page 100, line 4, for third read fourth, and for second read third.

Page 100, line 7, for fourth read fifth, and for third read fourth.

Page 100, line 8, for fourth read fifth and for fifth read sixth.

Page 114, line 7 from bottom, for distinguish read distinguish.

Page 115, line 5, after histories add a comma.

Page 115, line 5 from bottom, for Pesotettix read Pezotettix.

Page 121, line 18, after limbs add and.

Page 149, under Fig. 46, for larva read pupa.

Page 150, line 10, for gran read granu.

Page 154, line 4 from bottom, for shell read shell.

REPORT IX.

Page 6, line 26, insert after "moth" (Euphanessa mendica, Walk.).

Page 15, line 3, for entite read entire.

Page 29, in explanation of cut, for Abbott's read Abbot's.

Page 50, explanation of cut, for e read c.

Page 50, line 3 from bottom, for Hubner read Hilbner.

Page 54, last line, in place of the comma, write is.

Page 55, line 1, for the other read the second.

Page 55, line 9 from bottom, for m. m read mm.

Page 55, line 7 from bottom, strike out the on.

Page 56, line 1, for m. m read mm.

Page 56, line 2, for the last and read anal.

Page 56, line 32, commence a new ¶ with "Chrysalis" and italicize it,

Page 57, in the heading for Spretus read spretus.

Page 58, line 14, strike out have.

Page 87, strike out the g in line 17 and also in figure.

Page 89, line 13, strike out the i after embryon.

Page 90, last line, for ambion read amnion.

Page 98, line 11 from bottom, for Compoplex read Campep'ex.

Page 98, line 6, add a comma before De Geer.

Page 98, note *, for Bastardii read Bastardi.

Page 98, under Fig. 28, for Bastardii read Bastardi.

NOTES AND ADDITIONS.

Under this head it is not my purpose to publish the many additional notes of observations which have been made by myself and others on the various insects treated of in the reports; but rather to indicate a few of the more important facts, especially such as are unpublished and bear on life-histories left incomplete. As, in preparing the reports, the older and better known generic nomenclature was almost uniformly employed, it is thought advisable to indicate in this bulletin the more recent nomenclature, and this is accordingly done either in these "Notes" or in connection with the reproduced "Descriptions of New Species" which follow:

HYMENOPTERA.

STIZUS GRANDIS Say (Rep. I, p. 27, Fig. 12)—This has been shown by Mr. W. H. Patton (Bull. U. S. Geol.-Geog. Survey, vol. V, p. 342) to be only a variety of speciosus Drury, which is the type of the genus Sphecius Dahlb.

CRYPTUS EXTREMATIS Cress. (Rep. IV, p. 111)—The questions in regard to the character of *C. samiae* Pack. have been settled by Dr. Hagen from an examination or the types (Bull. Buff. Soc. Nat. Sci., II, 206; 1875) confirming the conclusion which I came to. In Bulletin No. 3 of the Commission (p. 47) I have suggested that *extrematis* should sink as a synonym of *samia*, because two species (one of which is *nuncius*) were combined under it in the original description.

MICROGASTER MILITARIS Walsh (Rep. I, p. 89 and subsequently)—This is an Apanteles' (See my Notes on N. A. Microgasters, etc. (Extr. from Trans. St. Louis Ac. Sc. IV), p. 19.)

ANTIGASTER MIRABILIS Walsh (Rep. VI, p. 162)—Mr. L. O. Howard has shown (Can. Ent. October, 1880. p. 209, and February, 1881, p. 31) that the habit of rolling back is not uncommon in the Eupelmides, and that Antigaster cannot well be separated from Eupelmus as at present understood.

COLEOPTERA.

CARABID LARVÆ (Rep. IX, p. 97)—The second larva mentioned on this page was subsequently reared by me to the perfect state and proved to be *Amara obesa* Say. It will be found figured and described in the First Report of the Commission (p. 290).

Lebia Grandis, Hentz (Rep. III, p. 100)—This belongs to Chaudoir's genus *Loxopeza*.

Lebia Atriventris Say (Rep. VIII, p. 3)—Belongs to Chaudoir's genus *Loxopeza*.

HIPPODAMIA MACULATA, DeGeer (Rep. I, p. 112 and subsequently)—Now referred to Mulsant's genus Megilla. It does not appear that this species occurs also in Europe as

COCCINELLA MUNDA Say (Rep. II, p. 25)—This is now considered synonymous with Cycloneda sanguinea Linn.

COCCINELLA PICTA Randall (Rep. V, p. 101)—Now known as Harmonia picta.

Mysia 15-punctata, Oliv. (Rep. IV, p. 18)—This has been referred to the genus Anatis, Mulsant.

LACHNOSTERA QUERCINA, Knoch. (Rep. 1, p. 156)—This is synonymous with fusca Fröhlich, which has priority. The fungus affecting it (p. 158 and Rep. 6, p. 125) is Corduceps ravenelii Berkeley. (See American Entomologist, III, p. 139.)

CHAULIOGNATHUS PENNSYLVANICUS, De Geer (Rep. I, p. 57 and subsequently)—This is now known as *Ch. americanus* Forst., the latter name having priority. For an account of the eggs and young larvæ, see Second Report of the Commission, p. 261.

SAPERDA BIVITTATA Say (Rep. I, p. 42)—This is now admitted to be a synonym of candida Fabr. For a correct description of the eggs and mode of oviposition, see an article by me in New York Weekly Tribune, Feb. 20, 1878.

BRUCHUS PISI Linn. (Rep. III, p. 44)—This name of the 12th edition of Linnaeus's "Systema Nature" gives way in modern catalogues to pisorum L. of the 10th edition.

FIDIA VITICIDA Walsh (Rep. I, p. 32)—This species is not mentioned by Crotch in his "Materials for the Study of the Phytophaga of the U. S." (Proc. Ac. Nat. Sc. Phil., 1873), but his Fidia murina (l. c. p. 33) is undoubtedly synonymous with Walsh's riticida, the latter name having priority by several years. In Crotch's "Check list" this species is also omitted, but the Fidia vitis Walsh in the "Omissions" to that list (p. 127) is probably meant for viticida.

HALTICA CHALYBEA, Illiger (Rep. III, p. 79)—This belongs to the genus Graptodera Chevr.

HALTICA CUCUMERIS Harris (Rep. I, p. 101)—This is now referred to the genus *Epitrix*, Foudras.

PHYSONOTA QUINQUEPUNCTATA Walsh & Riley (Rep. II, p. 59)—This is synonymous with *Ph. unipunctata* (Say), there being no question as to the specific identity of the two, both having been bred by Mr. F. H. Chittenden, of Ithaca, N. Y., from larvæ on a wild sun-flower (*Helianthus*).

Cassida Nigripes Oliv. (Rep. II, p. 63)—The eggs of this species are much like those for aurichalcea (Rep. II, Fig. 31) in size, form and color, though the spine-like appendages break off more easily. They may, however, be distinguished by being larger (1.6mm long without projections), having, in fact, nearly double the bulk, and by the flat posteriorly projecting piece which bears the spine-like appendages being generally greatly developed so as sometimes to extend beyond the apex fully one-third the length of the whole egg. Sometimes this piece divides distinctly into three spines, but in other cases it is quite blunt.

Cassida bivittata Say (Rep. II, p. 61)—The eggs of this species are pale and ovoid, just 1^{mm} long, but invariably covered with a yellowish secretion which dries and spreads out each side, and this by a black excrementitious material which gives the egg from above the appearance of an ovoid bit of excrement flattened on the adhering side. The eggs are laid singly or in twos or threes.

Cassida aurichalcea Fabr. (Rep. II, p. 62)—This is now referred to the genus Coptocycla Chevr.

Cassida Pallida Herbst (Rep. II p. 62)—This is now recognized as a synonym of Coptocycla awrichalcea (Fabr.).

COPTOCYCLA GUTTATA, Oliv. (Rep. II, p. 63)—The eggs of this species, which I have often since observed, are deposited singly or in twos, threes or fours. They are rather more than 1^{mm} long, of the same general form and character as those of Cassida bivittata, but more narrow and elongate. The color is pale yellowish and translucent. The egg is always covered with a viscid fluid which dries to form a transparent covering verging to fulvous or gamboge in color. This covering almost always spreads out on each side of the egg in ray-like ridges, those on each side parallel and slightly oblique, and whenever the egg is single these ridges are remarkably regular and have a neat appearance. There is occasionally on the top of this a varying amount of ex-

crement. The structure of the covering is similar to that found in the egg of Cassida texana Cr. (which feeds on Solanum eleagnifolium), where, however, the ribs are finer and transverse, and there is no excrementitious covering. The newly hatched larva of guttata, like that of the other species is whitish, strongly recalling in general appearance an ordinary mite, the head not being concealed as it subsequently is, the hairs at the tip of the legs being frequently clavate or knobbed, and resembling those on the young of many Coccids. The marginal spines and the anal fork are quite well developed but simpler than in the subsequent larval stages. This newly hatched larva is quite nimble and crawls easily over glass.

DELOYALA CLAVATA, Oliv. (Rep. II, p. 56)-Now referred to the genus Coptocycla.

BLISTER-BEETLES (Rep. 1, p. 96 f.)—The larvae feed on locust eggs. For account of their larval economy see my paper "On the larval Characters and Habits of the Blister-beetles," etc., Trans. Ac. Sc. St. Louis III, p. 544 ff.: also Reports of the Commission I, p. 292 ff.: II, 262 ff. Remarks on synonymy are also there given, but the following may be repeated.

LYTTA CINEREA Fabr. (Rep. I, p. 97)—This is now known as Macrobasis unicolor (Kirby).

Lytta Murina Lec. (Rep. I, p. 98)—This is a color variety of Macrobasis unicolor.

LYTTA MARGINATA Fabr. (Rep. I, p. 98)—This is believed by Horn to be a color-variety of *Epicauta cinerca* (Forst.).

LYTTA ATRATA Fabr. (Rep. I, p. 98)—This is the Epicanta pensylvanica (De Geer) of Crotch's List.

Anthonomus prunicida, Walsh. (Rep. III, p. 39) — Upon this species, which is a synonym of scutcharis Lec., Dr. Leconte has since founded the genus Coccotorus (Proc. Am. Philos. Soc. vol. XV, 1876, p. 193).

CONOTRACHELUS NENUPHAR, Hbst. (Rep. III, p. 127, note) — The phytophagic variety of this species from Walnut and Butternut has since been characterized by Dr. Leconte as a distinct species, *C. juglandis* (Proc. Am. Philos. Soc. vol. XV, p. 226).

CŒLIODES INÆQUALIS, Say (Rep. I, p. 128) — Dr. Leconte has since founded upon this species the genus Craponius (Proc. Am. Philos. Soc. vol. XV, 1876, p. 268). The egg of this snout-beetle is quite large, bright yellow in color and deposited in a cavity half as large as the beetle, though the puncture leading to it is small. The lateral angularities or tubercles of the joints, as described by Walsh, are quite characteristic, and the dorsal view in my figure, given to show them, conveys a somewhat false impression of the larva, which is more or less curved, and has the general characteristics of Curculionid larvæ. The figure is rather more attenuated than it should be. That the beetle hibernates I have since proved beyond question.

Baridius trinotatus Say (Rep. I, p. 93) — Dr. Leconte (Proc. Am. Philos. Soc. XV, & 1876, p. 287) has since established for this and two allied species the genus *Trichobaris*.

SPHENOPHORUS ZE.E Walsh (Rep. III, p. 59)—This has been previously described by Mr. Uhler as S. sculptilis (Proc. Ac. Phil. VII, 1855, p. 416).

SPHENOPHORUS PULCHELLUS Schænherr (Rep. III, p. 60) — As intimated in the footnote on the same page, this species is synonymous with Say's S. 13-punctatus, for which species and for Sphenophorus pustulosus Gyllh. Dr. Leconte has established the genus Rhodobænus (Proc. Am. Philos. Soc. vol. XV, 1876, p. 332). I have reared both, and also intermediate forms, from Helianthus in Texas, and Ambrosia in Missouri.

Scolytus cary & Riley (Rep. V, p. 107) — Dr. Leconte (Proc. Am. Phil. Soc. XV, 1876, p. 371) has since decided that 4-spinosus Say is the 3 of this species, and Say's name consequently obtains.

LEPIDOPTERA.

Papilio Philenor Drury (Rep. II, p. 116) — Referred by Scudder to Hübner's genus Laërtias. For further notes and description of the egg and young larva, see Canadian Entomologist, January, 1881, p. 9, and American Naturalist, April, 1881, p. 327.

Danais Archippus, Fabr. (Rep. III. p. 143)—For further facts respecting the swarming and migrations of this butterfly, see the American Entomologist (III., p. 101), and for a fuller and more accurate account of the mode of pupation, see my paper on the "Philosophy of the Pupation of Butterflies and particularly of the Nymphalidæ" (Proc. Am. Ass. Adv. Sc. vol. XXVIII, 1880).

ÆGERIA ACERNI, Clem. (Rep. VI, p. 110)—Mr. D. S. Kellicott has an interesting article in the Canadian Entomologist for January, 1831, on the Ægerians inhabiting the vicinity of Buffalo, N. Y., in which he states that the chrysalis of this species in his locality does not agree with my description as "unarmed," if that description refers to the dorso-abdominal teeth. A reëxamination of my specimens shows that my statement applies to the absence of these teeth. It is, however, possible that there is some variation in this regard and that the eastern specimens from the Hard maple differ from the western ones from the Soft maple in having the teeth as indicated by Mr. Kellicott.

ARCTIA ISABELLA, Smith (Rep. IV, p. 143)—Referred to *Pyrrharctia* Packard. For further account of larval variation and parasites, see *American Entomologist*, III, p. 134 (June, 1880).

HYPHANTRIA TEXTOR Harr. (Rep. III, 130)—There is no doubt in my mind, from frequent breeding of specimens, that this is synonymous with *cunca* Drury and *punctata* Fitch, which are but varieties, Drury's name having priority.

CALLIMORPHA FULVICOSTA, Clem. (Rep. III, 132)—Grote and Robinson give the synonymy of this species in their "List of Lepidoptera of N. A.," etc., *lecontei* Boisd. having priority. The late Jacob Boll bred all the forms from larvæ feeding on the same species of plant.

Samia columbia Smith (Rep. IV, p. 107)—Mr. Herman Strecker has given a beautiful figure of the male of this species in his "Lepidoptera Rhopaloceres and Heteroceres, etc.," 1875 (Pl. XII, Fig. 3), and Mr. F. B. Caulfield has described and figured the larva (Canadian Entomologist, X, p. 41, 1878) showing that it is structurally identical with that of cecropia and differs only in the intenser green of the body, in the latera I tubercles and bases of the others being white instead of pale blue and in the upper thoracic tubercles being of a deeper coral-red. It accords more with the cecropia larva in the fourth stage. It is placed as a good species in Grote's "List of N. A. Platypterices," etc. (Am. Phil. Soc., 1874), but I am still of opinion that it should not be considered a distinct species but simply a well-marked local color-variety worthy of name. There is great variation in color, whether of the larva, cocoon or imago, in eccropia.

CALLOSAMIA ANGULIFERA, Walker (Rep. IV, p. 122, note)—This is still considered a good species by systematists. Mr. Jno. Akhurst, of Brooklyn, N. Y., informs me that he finds it rather constant from larvæ which seem to differ in no respect from those of promethea, but which feed on the Tulip tree (Liriodendron tulipifera), and make the cocoon near the ground without pedicel. I learn from Dr. Packard that Mr. Uhler has bred both it and promethia from the same lot of larvæ.

CLISIOCAMPA SYLVATICA Harr. (Rep. III, 121)—This is now referred to disstria Hübn., which has priority.

AGROTIS INERMIS Harr. (Rep. I, p. 72)—This is now recognized to be identical with the European A. saucia Treitschke.

NOCTUA CLANDESTINA Harr. (Rep. I, p 79)—An Agrotis.

AGROTIS TELIFERA Harr. (Rep. I, p. 80)—This is now recognized as the European A. ypsilon Hüfn. = A. suffusa (S. V.) = A. ortonii Pack.

AGROTIS SUBGOTHICA Harr. (Rep. I, p. 81)—The moth represented under this name at Fig. 29, a, has since been described by Grote as A. herilis, and that at Fig. 29, b, has since been described by Lintner as A. tricosa. (Notes on some N. Y. Noctuidæ, Ent. Cont. III in Rep. N. Y. St. Mus. Nat. Hist., 1872, p. 159.)

AGROTIS JACULIFERA Guen. (Rep. I, p. 82)—This is the true *subgothica* of Haw-(See Grote, List of Noctuidæ of N. A., Bulletin Buffalo Soc. Nat. Sc. II, 1874, and Lintner $l.\ c.$)

AGROTIS DEVASTATOR, Brace (Rep. I, p. 83)—Grote refers it to Hadena.

CELENA RENIGERA Stephens (Rep. I, p. 86)—Referred by Grote to Hadena. Specimens in the Fitch collection marked with names (evidently from Walker) infecta, egens, defectua, subcadens? and murcimaculata seem to be all synonyms and mere variations.

PRODENIA AUTUMNALIS Riley (Rep. III, p. 116 and subsequently)—As stated in the 8th Report (p. 48) this in the more typical form is recognized as Laphygma frugiperda, 8m. & Abb. The variety obscura, as Prof. Zeller, who has seen it, informs me is so near the European exigua Hübn. that it is not easily distinguished.

PRODENIA COMMELINÆ, Sm. & Abb. (Rep. I, p. 88, and III, p. 113)—Dr. Leon F. Harvey (Bull. Buff. Soc. Nat. Sci., vol. II, pp. 274, 275; 1875) has since proposed specific names for two of the forms hitherto considered to be but varieties of commelinæ. The moth represented at Fig. 48, c, of the Third Report, is named by him flavimedia, that at Fig. 48, b, lineatella, the true commelinæ, being a larger species. From larvæ with the series of black triangles bordered exteriorly by a yellow line (such as are represented on Plate I, Fig. 12 of Rep. I, and at Fig. 48 a of Rep. III) I have bred the flavimedia. But larvæ found on cotton in the Southern States, and differing in having black triangles on the second joint only, and also varying greatly in coloratiou, have produced the same moth. Abbot's figure of the larva of commelinæ shows the full series of black triangles, but without any yellow exterior line.

Gortyna nitela Guen. (Rep. I, p. 92)—I have proved by breeding that *G. nebris* Gn. is but a large, southern form of this species. In the Southern States it is most common in stems of *Ambrosia trifida*, often producing a swelling or pseudo-gall. Both forms are indiscriminately bred with intermediate variations. See an article by Miss E. A. Smith (7th Report on the insects of Illinois, Cyrus Thomas, pp. 112-114) for additional food-plants and the habit of the younger larvæ to infest wheat-stalks, corn, etc. See also Am. Ent. I, p. 252; my "Potato Pests" (Orange, Judd & Co., 1877, p. 91) and *Prairie Farmer*, August 11, 1877. The insect normally pupates in the stem and when infesting thin stalks like those of most cereals and blue-grass (in which it is also found) often of necessity leaves one stalk for another.

Anomis xylina, Say (Rep. II, p. 37; VI, 17)—This has since been referred by Grote to Hübner's Aletia argillacea, which has been generally adopted. See Bulletin 3 of the Commission on the Cotton Worm. While it will doubtless be found convenient in future to separate it from the other species of the genus Anomis, and Hübner's generic name may therefore obtain, I must confess, after a careful examination of Hübner's figure of argillacea, to grave doubts as to the correctness of Grote's reference thereto of our Cotton-worm Moth (xylina, Say). Hübner's figure lacks several of the most constant characteristics of xylina. It is fulvo-testaceous shaded with brown, with the under side bright yellow. It lacks the three white specks on primaries and has a dark (orbicular?) spot in place of the outer one. It has a large white circular spot with black annulus in place of the dusky elongate discal spot with its double pupil. The wavy lines are almost black and differ in form; the fringes are unicolorous, and the abdomen is narrower. The figure more nearly represents in fact a species which I have received from Bahia, Brazil, and which differs from xylina, though the larva (also quite different) feeds on cotton.

We are all inclined to follow determinations of those who make a specialty of any group, but after due allowance for faulty coloring in Hübner's figure, I am constrained to believe that in this instance Mr. Grote has been in fault.

CANKER-WORMS (Rep. VIII, p. 12)—For additional remarks as to the generic characters of the two Canker-worms, see my paper "On the differences between Anisopteryx pometaria Harr. and Anisopteryx ascularia W. V., with remarks on the genus Paleacrita. (Trans. Ac. Sc. St. Louis, Vol. III, p. 573 ff.)

Gallerea Cereana, L. (Rep. I, p. 166)—This is the mellonella L. of the 10th edition Syst. Naturæ.

PEMPELIA GROSSULARILE Packard (Rep. I, p. 140)—The European Zophodia convolutella Hübn. (Phycis grossulariella Treitschke), which has precisely similar habits, closely resembles this species. In 1871 I compared it with this last in Mr. Stainton's collection and with specimens received from Prof. Zeller and could detect no essential differences. The European specimens are slightly larger, with broader wings and usually clearer, paler gray coloring. Colorational markings are, however, very variable in specimens from both sides of the Atlantic.

P. grossulariæ Packard was subsequently described by Grote as Dakruma turbatella (Bull. U. S. Geol.-Geog. Survey, IV, No. 3, p. 702; 1878). Dakruma seems to differ from Zophodia in nothing but the absence of the basal portion of the subcostal vein and possibly, although this character is not mentioned by Grote, in the recurved palpi. According to the synoptical table given by Heinemann, grossularia would fall in the genus Stenoptycha, distinguished from Zophodia by the recurved palpi. We may well question the generic value of this character, for different authors describe it quite differently: thus, Heinemann describes the palpi of Stenoptycha and Homeosoma as recurved, whereas Grote describes them as porrect in these two genera, if we accept his statement that Honora Grote is to be considered a section of Stenoptycha: there appears also to be a difference in position in specimens of the same species, according as the palpi are heavily scaled or have lost the scales. From the known individual variation in the venation of these and other moths, especially in the hind wings, we cannot attach any specific, much less any generic, value to the slight difference in the subcostal vein of Dakruma noted above. Moreover, authentic specimens of grossulariæ do not appear to possess this character of Dakruma. I am, therefore, of opinion that a study of sufficient material from both continents will prove the two specifically identical, or at the most that our American insect is a variety, and that Dakruma will not obtain. Packard is of this opinion, as in the later editions of his Guide the species is called Myelois convolutella.

PENTHINA VITIVORANA Packard (Rep. I, p. 133) — This is identical with a European insect having the same habits. It was first described over a century since by Schiffermiller & Denis as Tortrix botrana, and has been referred to various genera since, and finally to Eudemis Hiibn., so that the insect should be known as Eudemis botrana (Schiff.). Conchylis ambiguella (Hiibn.) has very similar habits in Europe. See Nördlinger's "Die Kleinen Feinde der Landwirthschaft," p 424 ff. It is the Lobesia botrana of the later editions of Packard's Guide.

EURYPTYCHIA SALIGNEANA Clem. (Rep. II, 134). — This according to Prof. Fernald, who has seen the type, is the same as Clemens's Hedya scudderiana (Proc. Acad. Sci. Phila., 1860, p. 358), the description of which is very brief and presumably taken from a female. The genus Euryptychia (Proc. Ent. Soc. Phila. V, 140) is founded on the male, which has a broad fold extending to the middle of costa on the primaries and covering up a pencil of yellowish hairs. Zeller subsequently redescribed it as Pædisca affusana (Beiträge, etc., pt. III, p. 101 [307]). From a comparison of female specimens I am led to believe that this is the same species that is commonly known in Europe as Spilonota roborana Schiff., though in Staudinger and Wocke's Catalogue cynosbana Fabr., described in 1875, is given the priority and aquana Hübn. is placed as a synonym. The obliquity of the edge of the basal dark patch and the details of the ocellated spot upon which species have been separated, I find to be variable.

The insect in Europe is known to feed on the leaf-buds of the rose. I have abundant proof that in this country it is not a gall-maker, but, as was inferred in the Report, an inquiline. I have found its larva feeding upon the flowers as well as amid the terminal leaves of the Golden-rod, and have also found it in other galls. When feeding in the more exposed positions it generally has a carneous or rosy tint.

ANCHYLOPERA FRAGARLE W. & R. (Rep. I, 142) — This has been referred to *Phoxopteris comptana* Fröhl., and while the two very closely resemble each other Prof. Fernald informs me that he yet believes *fragariae* to be distinct.

ŒTA COMPTA, Clem. (Rep. I, p. 151)—Notwithstanding Mr. Grote doubts the identity of this insect with Cramer's *Phalana punctella*, there is no question in my mind about it, and I entirely agree with Zeller, who makes also the *Tinea pustulella* Fabr. a synonym (Beitr. z. Kenntn. N. A. Nachfalter II, p. 28). It was first described in this country in 1856 by Fitch as *Deiopeia aurea* (3rd Rep. Ins. N. Y., p. 163.) See also "Zygænidæ and Bombycidæ of N. A." by R. H. Stretch, 1872, pp. 159 and 241.

The egg of this insect is one of the most singular Lepidopterous eggs with which I am familiar. I have found it numerously in the South in midsummer. It is 0.9^{mm} long, soft and plastic so as to be variable in form; but when laid (as it often is) on the web which the young larvae make, where it takes on the more natural form, it is ovoid, somewhat compressed, with frequently a median ridge and one end narrowed and produced into a short neck. The color is cream-yellow and the delicate shell is corrugulate. It is laid singly and generally slightly attached by the broad side to the side of the mid-rib of the tenderest leaves, and its contact (by virtue, doubtless, of some poisonous liquid with which it is laid) causes a well defined swelling of the leaf-vein.

The species is placed among the Zyganida in Grote and Robinson's List, and has evidently more affinities therewith than with the Teneida.

PRONUBA YUCCASELLA Riley (Rep. V, p. 150 and subsequently)—For further facts regarding this species, see my papers in Trans. St. Louis Ac. Sc. III, p. 568; American Entomologist III, pp. 141, 182, 293, and also a paper read before the American Association for the Advancement of Science at Boston, Aug., 1830, and to be published in the Proceedings of the Association for that year.

PTEROPHORUS PERISCELIDACTYLUS (Rep. III, p. 65)—This belongs to the genus Oxyptilus, Zeller.

HETEROPTERA.

ARMA SPINOSA Dallas (Rep. II, p. 113 and subsequently)—Now referred to Stål's genus *Podisus*.

EUSCHISTUS PUNCTIPES, Say (Rep. IV, p. 19 and subsequently)—This is now known as *Euschistus variolarius* Beauv., this last having priority over Say's name.

Coreus tristis, De Geer (Rep. I, p. 113 and subsequently)—Belongs to Amyot & Serville's genus Anasa.

MICROPUS LEUCOPTERUS, Say (Rep. II, p. 15 and subsequently)—Now referred to Burmeister's genus *Blissus*.

Anthocoris insidiosus, Say (Rep. II, p. 27 and subsequently)—Belongs to Fieber's genus *Triphleps*.

REDUVIUS RAPTATORIUS Say (Rep. I, p. 114)—Belongs to Sinea, Amyot & Serv., and is synonymous with diadema Fabr.

HARPACTOR CINCTUS Fabr. (Rep. I, p. 114 and subsequently)—Belongs to Stål's genus Milyas.

HOMOPTERA.

CICADA SEPTEMDECIM (Rep. I, p. 18)—This orthography, used in the Reports, is grammatically correct, but I find that Linnæus himself wrote septendecim (Systema Nature, Tom I, Pars II, 12th Ed. Stockholm 1767). Fitch used both forms of spelling, but Westwood, Harris and most other authors follow Linnæus, and septendecim is, therefore, preferable. As to whether the 17 and 13-year broods should be considered specifically distinct, I am still of the opinion expressed in the First Report that the insects should not be looked upon as distinct species, but that tredecim Riley should rather be considered a race, or as Walsh (in a letter to Charles Darwin, which has kindly been shown me by Mr. G. H. Darwin) puts it, an incipient species, to which, for convenience, it is desirable to give a distinctive name. That it may be looked upon as a good species by excellent authority, will be seen by Walsh's discussion of the subject (American Entomologist II, p. 335) which I here quote:

What candid entomologist, who has worked much upon any particular order, will not allow that there are certain genera where it is often or almost or quite impossible

to distinguish species by the mere comparison of cabinet specimens of the imago? Low and Osten Sacken have said this of the genus Cecidomyia in Diptera; Osten Sacken of two other Dipterous genera, Sciara and Ceratopogon; Norton of the genus Nematus in Hymenoptera; and Dr. Le Conte lately assured me that, although when he was a young man he thought himself able to discriminate, in the closet, between the different species of Brachinus in Coleoptera, he now considered it quite impracticable to do so with any degree of certainty. And yet who doubts the fact of the existence, in North America, of very numerous distinct species of Cecidomyia, of Sciara,

of Ceratopogon, of Nematus, and of Brachinus. Upon the same principle I strongly incline to believe that the 17-year form of the Periodical Cicada (C. septemdecim, Linn.) is a distinct species from the 13-year form (C. tredecim, Riley) although it has been impossible for me, on the closest examination of very numerous specimens, to detect any specific difference between these two It is very true that the 13-year form is confined to the more southerly regions of the United States, while the 17-year form is generally, but not universally, peculiar to the Northern States; whence it has been, with some show of plausibility, inferred that the 13-year form is nothing but the 17-year form accelerated in its metamorphosis by the influence of a hot southern climate. But as these two forms interlock and overlap each other in various localities, and as it frequently happens that particular broods of the two forms come out in the same year, we should certainly expect that, if the two forms belonged to the same species, they would occasionally intercross, whence would arise an intermediate variety having a periodic time of 14, 15 or 16 years. As this does not appear to have taken place, but, on the contrary, there is a pretty sharp dividing line between the habits of the two forms, without any intermediate grades of any consequence, I infer that the internal organization of the two forms must be distinct, although externally, when placed side by side, they are exactly alike. Otherwise, what possible reason could there be for one and the same species to lie underground in the larva state for nearly 17 years in one county, and in the next adjoining county to lie underground in the larva state for scarcely 13 years? I presume that even the most bigoted believer in the old theory of species would allow that, if it can once be proved to his satisfaction that two apparently identical forms are always structurally distinct, whether in their external or in their internal organization, they must necessarily be distinct species.

On the other hand, I firmly believe that many perfectly distinct forms, which at one time passed current, or which even now pass current, as true species, are in reality mere dimorphous forms of one and the same species. We find a good example of this in the dimorphous $\mathcal{L}(ynips, q. aciculata, O. S.$, which has already been treated of at great length. We find another good example of the same thing in Cicada Cassinii $\mathcal{L}(x)$ Fisher, which is sufficiently distinct from the Periodical Cicada to have been classified as a distinct species, and yet never occurs except in the same year and in the same locality as this last, and what is more extraordinary still, is found not only along with the 17-year form (C. septemdecim), but also along with the 13-year form (C. tredecim).

Now, if Cassinii were a distinct species, and not, as I believe it to be, a mere dimorphous form of C. septemdecim and C. tredecim, the chances are more than a million

millions to one against its always coinciding with the two other forms, not only as to the particular locality but as to the particular year of its appearance.

I do not know that any one has heretofore attempted to set at rest, by actual proof, the very general skepticism as to this insect remaining so long underground, on the part of those persons who have given little attention to the subject. I have been able to trace the development from year to year of my tredecim brood XVIII in the vicinity of Saint Louis by digging up the larvæ each year from 1868 to 1876, and noting the annual growth. They could always be found within from two to five feet of the surface upon the roots of trees, and had by the 8th year attained the first pupa stage, and I have no doubt but that, at this writing, the true pupæ are nearing the surface of the ground to appear in myriads in the perfect state in May and June of this year.

The fungus affecting this Cicada has since been described by Mr. C. H. Peck as Massospora cicadina (31st Rep. N. Y. State Mus. Nat. Hist., pp. 44, 1879).

ERIOSOMA PYRI, Fitch (Rep. I, p. 118) — After comparing specimens in Europe with our American insect, I have no doubt of the specific identity of the two, or of the root-inhabiting and twig-inhabiting forms. The insect should be known, therefore, as Schizoneura lanigera (Hausm.). See my remarks in American Entomologist, II, 359;

^{*}For an excellent statement of the facts bearing upon this curious question, see a paper by Mr. Riley, the State Entomologist of Missouri, in No. 4 of the American Entomologist, and a still more complete one in his First Annual Report.

Rep. 3, p 95, and "Notes on Aphididæ of the U. S." (Hayden's Bull. U. S. Geol. & Geogr. Surv. of Terr., Vol. V, p. 3).

ASPIDIOTUS HARRISH Walsh (Rep. I, p. 7)—This belongs to Costa's genus *Diaspis*, and is apparently the species named *ostrewformis* by Curtis (Gardener's Chronicle, 1843, p. 805).

DIPTERA.

TRUPANEA APIVORA Fitch (Rep. I, p. 168; II, 122)—This has been renamed *Promuchus Fitchii* by Osten Sacken (Cat. of the described Diptera of N. A. 2nd Ed., 1878, p. 234), the species proving different from *Bastardii* Læw, and Fitch's name being preoccupied.

BEE-FLY LARVA (Rep. IX, p. 96) — The undetermined larva here illustrated (Fig. 24) has since proved to be that of a *Systachus*, a genus of Bombyliid flies. For further details and determinations see the Second Report of the Commission (pp. 262-9).

SARCOPHAGA CARNARIA, L. (Rep. IX, p. 95) — The variety sarraceniæ of this species there mentioned is now considered a good species, for reasons stated in Bulletin 3 of the Commission (pp. 39, 40, note).

EXORISTA LEUCANE.E, Kirkpatrick (Rep. II, p. 50 and subsequently) — Referred to the genus Nemorwa Desv. by Osten Sacken (Catalogue, etc., 1878, p. 150). The variety cecropiæ of this (Rep. IV, p. 108) is quoted by him as a distinct species under Exorista, probably a mistake caused by my employing the wrong figure in the American Entomologist, Vol. II, p. 101, where that of E. flavicauda is used for leucaniæ.

LYDELLA DORYPHORE Riley (Rep. I, p. 111)-Now included in the genus Exorista.

ORTHOPTERA.

ŒCANTHUS NIVEUS, De Geer (Rep. I, p. 138, and V, p. 120)—This species is common in all parts of the country, and I have proved, by breeding, that its eggs are those described and figured as such in the 5th Report. I agree with Scudder in considering fasciatus De Geer but a dark and rather well marked variety of it. Its chirp is intermittent, resembling a shrill te-reat te-reat with a slight pause between each. The eggs and punctures figured on page 119 of the 5th Report (Fig. 47) as probably those of Orocharis saltator are, as I have since proved by breeding and by watching the process of oviposition, those of a large species of Œcanthus, hitherto, I believe, very generally confounded with niveus, and which is described below as Œ. latipennis N. Sp. While niveus punctures all kinds of soft stems and pithy twigs, latipennis seems to prefer the more slender parts of the Grape-vine. The female, when she has sufficiently proceeded in the act of ovipositing, is so intent that she can very well be watched at night by the aid of a "bull's-eye."

The jaws are first used to slightly tear the outer bark. With the antennæ stretched straight forward and the abdomen bent up so as to bring the ovipositor at right angles with the cane, she then commences drilling, working the abdomen convulsively up and down about twice each second. The eggs, as described in the Report, are laid lengthwise in the pith, but always in two sets, one each side of the hole. The number varies according to the size of the cane, and the distance between the holes is also variable but usually less than in my figure. The hole is usually filled up with a white mucous secretion, though there is very little of it about the eggs. This secretion also doubtless serves to facilitate the drilling. The same female will lay over 200 eggs, and will sometimes puncture the same cane at intervals of $\frac{1}{2}$ inch for $1\frac{1}{2}$ feet or more.

The shrill of latipennis is continuous and recalls the trilling of a high-pitched dogwhistle in the distance. The key varies, however, and is sometimes much less high and more musical than at others. The commingled shrill of this species recalls also the distant croaking of frogs in spring. The broad wings are thoroughly elevated during the act or even bent forward, and the vibration is so rapid that there appears to be no motion. The species, in addition to these differences in stridulation and habits, may be distinguished from niveus by the following characters:

Described from 15 3 Q specimens from Missouri, 1 3 from Alabama, and 1 3 from

South Texas.

The form of the subgenital plate, the immaculate antennæ with their roseate base, and the larger size serve to distinguish the species as well in the pupa as in the imago state.

Œ. latipennis is a larger insect than niveus usually is. The ovipositor measures 6mm in length, whereas in niveus it rarely exceeds 5mm and in only one specimen, a sanguineous variety captured July 10, 1874, does it equal 6mm. The male elytra of niveus in only one specimen, captured September 19, 1877, reach 13mm in length by 6mm in width on the upper face, and the size is generally much less. In nireus the unfolded male elytra are less than $\frac{2}{3}$, and usually only $\frac{1}{2}$, as wide as long, and the rasp is only 1^{mm} long, and the teeth are not so tasily seen. The elytra of niveus female sometimes show an irregularity in the reticulation between the parallel oblique veins but never so great an irregularity as in latipennis, there being fewer cells. In only one specimen of latipennis, a male taken on cotton at Columbus, Tex., are there any black marks on the lower surface of the basal joints of the antennæ, representing the lines or dots which are always present in niveus. But the two species are most sharply separated by the form of the subgenital plate of the female, which in niveus narrows rapidly towards the tip which has a minute angular notch, and by the form of the male claspers, which in niveus have their tips very slender and parallel, being deeply parted, and then retreating rapidly from one another on each side.

Besides niveus there are recognized from North America three other species of Ecanthus, one of which, californica Sauss.,* recorded only from California, is described as having the posterior wings abortive.† The other two species, nigricornis Walk, from Illinois (description quoted in the American Entomologist, Vol. II, p. 207; 1870) and varicornis Walk, from Mexico, both described only in the female sex and differing from niveus in nothing but the slightly longer hind wings and the slightly greater size of the insect, and in varicornis having a slightly longer prothorax, have been retained as distinct species by Saussure. But niveus, as may be seen in a series of specimens, varies in these characters indefinitely, just as other species of crickets are admitted to vary; so we may consider Walker's species to be but varieties of niveus. They cannot be referred to latipennis, for in this species the wings rarely, and then but slightly, exceed the elytra.

One other North American species, bipunctatus DeG., has been referred to Ecanthus. It belongs, however, to the genus Xabea and should be known as Xabea bipunctata (DeG.).

As the female of Xabea; has not hitherto been described and Saussure did not recognize the genus as distinct from *Ecanthus*, it may be well to give here the characters drawn from both sexes to show how very clearly the two genera differ. The type of the genus is from Sumatra, and Walker, being unacquainted with our species, an Saussure, dhaving only imperfect specimens, both failed to recognize the existence of the genus in North America.

^{*}Études sur les Orthoptères, (in Mission Scientifique au Mexique, etc. Recherches Zoologiques 6me partie.) 3me livraison; p. 462; 1874.

[†]By "abortive" is evidently meant, from the description following the diagnosis, simply shorter than abdomen. In this respect and in the male (which alone is described) being shorter than niveus, californicus, which I know only from the description, may most easily be distinguished.

Walker, Cat. Derm. Salt. Brit. Mus., Pt. I, p. 109.

Xabea Walk.—First joint of autenme armed with a stout, blunt tooth in front. Female elytra irregularly reticulated, the oblique longitudinal veins not being conspicuous; male elytra with the mediastinal vein strongly arouated; no humeral angle. Wings twice as long as the elytra. Cerci only half as long as the abdomen, sinuous. Outer valves of the ovipositor ending in a single outwardly directed tooth which is preceded on the outside by a longitudinal series of three teeth; the inner valves compressed, ending in three teeth of which the middle one is much the longest. Posterior tibiæ with neither spurs nor serrations and having only 4 apical spurs, 2 within and 2 without; the first joint of posterior tarsi unarmed, the tarsi clearly but 3-jointed, the second joint short as in the other legs; tarsal claws with the inner tooth acute.

OROCHARIS SALTATOR Uhler (Rep. V, p. 119).—The eggs figured and described on page 119 as probably those of this insect are, as above stated, those of *Œcanthus latipennis*. I have, however, frequently obtained the eggs of the Orocharis since. In December, 1877, I watched a female ovipositing in the end of a dead and rather soft twig of the Soft-maple at Kirkwood, Mo. The twig had been pruned and the bark was somewhat gnawed by the cricket and the eggs thrust in irregularly from the end and from the sides. Both wood and pith were crammed with eggs, but all longitudinally inserted. The favorite nidus of the species is, however, the soft and somewhat corky, rough bark of the trunk and older branches of the American elm, the eggs being thrust in singly or in small batches, either longitudinally with, or very slightly obliquing from, the axis of trunk or branch. The female is very intent in the act, working her abdomen deliberately from side to side during the perforation. The ovipositor is held more obliquely than in *Œcanthus*.

The egg is amber-colored and very slender and elongate, the tip rather pointed and very faintly opaque with the surface but slightly granulate. It has scarcely any curve and varies from 3.5^{mm} to 4^{mm} in length and from 0.4^{mm} to 0.5^{mm} in diameter at middle.

The stridulation of this cricket is a rather soft and musical piping of not quite half a second's duration, with from 4 to 6 trills, but so rapid that they are lost in the distance. The key is very high, but varies in different individuals and according to moisture and temperature. It most resembles the vibrating touch of the finger on the rim of an ordinary tumbler when three-fourths filled with water—repeated at intervals of from 2 to 4 per second, and it may be very well likeued to the piping of a young chick and of some tree frogs. As the species is very common in the Southwest its chirp is everywhere heard and is so distinctive that when once studied it is never lost amid the louder racket of the katydids and other night choristers. It is frequently heard during the day time in cloudy or damp weather, and I have heard it at Saint Louis the first days of November after a slight frost. The elytra in stridulating are raised less than in *Ecanthus* and are depressed at intervals.

The courting of the sexes is amusing. They face each other and play with their antennæ for the best part of an hour or more than an hour. The female is, otherwise, pretty quiet, but the male continually mouths the twig or the bark upon which the courting is being done, and plays his palpi at a great rate, very stealthily approaching nearer to his mate meanwhile. At last the antennal fencing ceases and those of the female bend back and then the male approaches until their heads touch. He then deliberately turns round, elevates the elytra and slips his abdomen under the female, who virtually mounts and assists him, his elytra overshadowing her head.

The eggs of this insect, as also those of *Ecanthus latipennis*, are devoured by a parasitic larva of similar form and size, and which I have not yet reared to the perfect state.

ORCHELIMUM GLABERIMUM, Burm. (Rep. V, p. 123)—The egg-punctures illustrated at Fig. 56 are, as there correctly supposed, those of this species, as I have since proved by watching the act of oviposition and by rearing from the eggs. The insect is very fond of using the tops of corn-stalks for the same purpose.

NEUROPTERA.

CORYDALUS CORNUTUS, L. (Rep. V, p. 141; IX, p. 125)—For additional facts relating to the early larval stages, see my notes on the "Larval Characteristics of Corydalus and Chauliodes and on the development of Corydalus cornutus (Proc. Am. Ass. Adv. Sc., 1878).

MITES.

TROMBIDIUM SERICEUM Say (Rep. VII, p. 175 and subsequently)—For the natural history of this species and the specific identity with it of the larval form known as Astoma gryllaria LeBaron, and for further facts respecting the other mites mentioned in the Report, see my remarks in the Transactions of the Academy of Science of Saint Louis, (Vol. III, p. cclxvii, October, 1877) in the American Naturalist for March, 1878, and in the First Report of the Commission (p. 306 ff.).

DESCRIPTIONS OF NEW SPECIES AND VARIETIES.

Some systematists have questioned whether descriptions of species in Agricultural Reports should be recognized. While my own views on this subject are pretty freely expressed on page 56 of my Third Missouri Report and elsewhere, the publication of this Bulletin affords a good opportunity to bring the descriptions that are scattered through the nine volumes together, with such notes on synonymy as present knowledge suggests, and such corrections as are given in the Errata. In the earlier reports the measurements were expressed in inches and hundredths of an inch, while in the later volumes the metric system was adopted as most convenient and accurate, and the measurements which follow have all been reduced to this standard. All changes of this character or other changes from the original are included in brackets, while the additional notes are in Long Primer type.

HYMENOPTERA.

PORIZON CONOTRACHELI, N. Sp.—Head pitchy-black, opaque, the ocelli triangularly placed and close together; eyes oval, polished, and black; face covered with a silvery-white pubescence; labrum rufous, with yellowish hairs; mandibles and palpi, pale yellowish-brown; antennæ inserted in depressions between the eyes, reaching to metathorax when turned back, filiform, 24-jointed; black with basal joints 6-1 becoming more and more rufous, the bulbus always distinctly rufous; bulbus rather longer and twice as thick as joint 3; joint 2 about one-third as long. Thorax pitchyblack, opaque, the sides slightly pubescent with whitish hairs, the mesothorax rounded and bulging anteriorly, the scutellum slightly excavated and sharply defined by a carina each side; metathorax with the elevated lines well defined and running parallel and close together from scutellum to about one-fourth their length, then suddenly diverging and each forking about the middle. Abdomen glabrous, polished, very slender at base, gradually broader and much compressed from the sides at the apex which is truncated; peduncle uniform in diameter and as long as joints 2 and 3 together; joints 2-5 subequal in length; color rufous with the peduncle wholly, dorsum of joint 2, a lateral shade on joint 3, and more or less of the two apical joints superiorly, especially at their anterior edges, black; venter more yellowish: ovipositor about as long as abdomen, porrect when in use, curved upwards when at rest, rufous, with the sheaths longer and black. Legs, including trochanters and coxe uniformly pale yellowish-brown with the tips of tarsi dusky. Wings, subhyaline and iridescent, with veins and stigma dark brown, the stigma quite large, and the two discoidal cells subequal and, as usual in this genus, joining end to end, but with the upper veins which separate them from the radial cell, slightly elbowed instead of being straight, thus giving the radial cell a quadrangular rather than a triangular appearance. 3 differs from \circ only in his somewhat smaller size and unarmed abdomen. Expanse \circ 0.32 inch [=8mm], length of body, exclusive of ovipositor, 0.22 [=5.5mm]; expanse & 0.28 [= 7^{mm} , length 0.18 [= 4.5^{mm}].

Described from $3 \circ \circ$, 13 bred May 26th-28th, 1870, from cocoons received from Dr.

I. P. Trimble, of New Jersey, and 1♀ subsequently received from the same gentleman—all obtained from larvæ of Conotrachelus nenuphar.

As I am informed by Mr. E. T. Cresson, of Philadelphia, who pays especial attention to the classification of the *Ichneumonidæ*, it might more properly be referred to Holmgren's genus *Thersilochus*, which differs from *Porizon* in the greater distance between the antennæ at base, and in the venation of the wing.—[Third Rept., p. 28, Fig. 9.

LIMNERIA LOPHYRI, N. SP.—Q, length 0.30—0.35 inch [7.5—8.7mm]. Head and thorax black with silvery white pile. Antennæ piceous, more than half as long as body; but slightly paler toward tip; bulbus either yellowish or rufous. Ocelli either rufous or black. Mandibles, palpi, front and middle coxæ trochanters and tibiæ, pale yellow. Tegulæ almost white. Abdomen, with faint pile, rufous, the petiole and sides of next joint usually blackish. Hind legs rufous, the base of tibiæ and of tarsi paler.

3 somewhat smaller, and with more black on the abdomen.

Four 3's, 12 2's bred from larvæ of Lophyrus Abbotii.—[Ninth Rept., p. 32.

Hemiteles (?) Cressonii, [N. Sp.]—3—Length 0.25 [6mm]. Black, opaque, head transversely-subquadrate; face clothed with pale glittering pubescence; spot on mandibles, palpi, scape of antennæ in front and the tegulæ, white; eyes large, ovate; antennæ longer than head and thorax, slender, black; thorax closely and minutely punctured; mesothorax with a deeply impressed line on each side anteriorly; scutellum convex, closely punctured, deeply excavated at base; metathorax coarsely sculptured, truncate and excavated behind, the elevated lines sharply defined, forming an irregularly shaped central area, and a triangular one on each side of it, the outer posterior angle of which is prominent and subaceute; wings hyaline, iridescent, nervures blackish, stigma large, areolet incomplete, the outer nervure wanting; legs pale honeyyellow, coxæ paler, tips of posterior femora, and their tibiæ and tarsi entirely blackish; abdomen elongate ovate, flattened, petiolated, the first segment flat, gradually dilated posteriorly, somewhat shining, and indistinctly longitudinally aciculate; the two following segments opaque, indistinctly sculptured; remaining segments smooth and shining.—[First Rept., p. 177. Figured at Pl. II, Fig. 7.

Hemiteles (?) thyridopterigis, N. Sp.—♀ Length 0.36 [inch = 9mm]; expanse 0.50 [inch=12.5mm]. Ferruginous, opaque. Head transverse, rather broader than thorax, the front much depressed; face prominent centrally beneath antennæ, closely punctured, thinly clothed with pale pubescence; clypeus and cheeks shining; tips of mandibles black; antennæ, long, slender, filiform, ferruginous, blackish at tips; thorax rugose; scutellum prominent, with sharp lateral margins; metathorax prominent, quadrate, abrupt laterally and posteriorly, finely reticulated and pubescent, the upper posterior angles produced on each side into a long, divergent, flattened, subacute spine; disk with two longitudinal carinæ, from which diverges a central transverse carina; tegulæ piceous; wings hyaline, subiridescent; a narrow, dark fuliginous band crosses the anterior pair a little before the middle, and a broad band of same color between middle and apex, this band having a median transverse hyaline streak; are olet wanting, second recurrent nervure straight, slightly oblique; apex of posterior wing fuscous; legs long and slender, ferruginous, more or less varied with fuscous; pos. terior coxe, tips of their femora, and their tibiæ and tarsi, fuscous; base of four posterior tibiæ more or less whitish, forming a rather broad annulus on posterior pair: abdomen petiolated, subconvex, densely and finely sculptured, blackish, basal segment tinged with reddish, the second and third segments distinctly margined at tip with whitish; apical segments smooth and shining, thinly pubescent; ovipositor half as long as abdomen, sheaths blackish.

3.—Not at all like the 9. Length 0.33 [inch = 8mm], expanse 0.44 [inch = 11 mm]. Long, stender, black, polished, without distinct punctures, thinly clothed with white pubescence; palpi white; antennæ long, slender; scape reddish; mesothorax gibbous, with two deeply impressed longitudinal lines; metathorax with well-defined elevated

lines, forming several irregular areas; sides rugulose, apex without spines or tubercles; tegulæ white; wings whitish-hyaline, subiridescent, the nervures and stigma white, subhyaline, neuration as in \mathcal{Q} ; legs long, slender, pale honey-yellow; coxæ, posterior trochanters, apex of their femora, and their tibiæ and tarsi, blackish; base of posterior tibiæ with a white annulus; abdomen long, slender, flattened, petiolated, smooth and polished, the apical margin of second segment being narrowly whitish.

Described from four Q and one J specimens bred from the same [Thyridopteryx] cocoon.—[First Rept.p. 150. Figured at Pl. II, Figs. 11, 12.

The species is quite common in Washington, D. C., and is often attacked by a secondary Chalcid parasite.

MICROGASTER LIMENITIDIS, N. Sp.—3 Q. Length 0.09 inch [= 24^{min}]. Color pitchyblack. Antenne black, about as long as body; palpi whitish. Thorax minutely punctured. Abdomen with the two or three basal joints emarginate and rugose, the terminal joints smooth and polished. Legs dusky; front and middle femora yellowish, hind femora black; front and middle tibiæ yellowish, hind tibiæ with terminal half dusky, but the spur pale; front and middle tarsi yellowish tipped with dusky, hind tarsi dusky above, paler below. Wings hyaline, iridescent, the nervures and stigma black or dark-brown, the radial nervule, the cubital nervules and the exterior nervule of the discoidal cell, sub-obsolete.

Described from $6 \, \circ$, $1 \, \circ$, bred from larvae of *Limenitis disippus*.—[Third Rept., pp. 158, 159.

The specimens referred to in connection with this description as bred from Gelechia gallwsolidaginis prove to belong to a distinct species. Both species belong to the genus Apanteles Först. as at present accepted. See my "Notes on N. A. Microgasters" (Trans. Ac. Sc. St. Louis, IV, Author's separata, p. 13.)

Microgaster gelecule.—Length 0.20 [=5^{mm}] & \varphi\$.—Black, clothed with a short, thin, glittering, whitish pubescence, most dense on the face, which latter is closely punctured; occiput and cheeks shining; mandibles rufopiceous; palpi whitish; eyes pubescent; antennæ as long as the body in \(\delta\), shorter in \(\varphi\), 18-jointed; thorax shining, feebly punctured, mesothorax closely and more strongly punctured, with a deeply impressed longitudinal line on each side over base of wings; scutellum smooth and polished, the lateral groove broad, deep, arched and crenulated; metathorax opaque, densely rugose, with a sharp, central, longitudinal carina, and a smooth, flat, transverse carina at base; tegulæ testaceous, wings hyaline, iridescent, apex smoky, nervures blackish, arcolet complete, subtriangular, radial nervure indistinct; legs pale honey-yellow, coxæ blackish, pale at tips, middle pair in \(\varphi\) concolorous with legs; abdomen with the two basal segments densely rugose and opaque, the remainder smooth and shining; venter more or less varied with pale testaceous.—[First Rept., p. 178.]

This is a true Microgaster.

Perilitus indagator, N. Sp—Imago—♀, Head almost glabrous, transverse, deep honey-yellow, the trophi pale, except the tips of jaws, which are dusky; ocelli touching each other, black; eyes black, very large, occupying nearly the whole side of face, and with a few very short hairs; antennæ with about 24 joints, pale fuscous; reaching, when turned back, to about the middle of abdomen. Thorax honey-yellow beneath and very slightly pubescent; very finely punctured and slightly pubescent above; prothorax honey-yellow and prominently convex; mesothorax with lateral and posterior sutures black; metathorax black. Abdomen with the pedicel black and slightly punctured; depressed, narrow at base, widening behind, slightly pubescent above; the other joints glabrous, polished, deep honey-yellow, the second joint largest and as long as all the subsequent ones together; ovipositor extending about the length of the abdomen beyond its tip, rufous with the sheaths black. Legs

pale honey-yellow, the tarsi, especially at tips, slightly dusky, the hind femora and tible a little dusky towards tips, and a narrow rufous ring at base of former. Wings hyaline, iridescent; veins brown; stigma honey-yellow, with an opaque brown cloud; two cubital cells, the outer small, sub-quadrate; the radial large; one discoidal, long and narrow. Length, exclusive of ovipositor, 0.18 inch [=4.5mm].

Described from 1 9 bred from Acrobasis juglandis, LeB.-[Fourth Rept., p. 43.

Spathius trifasciatus, N. Sp.—Q. Average length, 0.18 inch [=4.5nm]. Color, light-brown. Head pubescent, palpi long and pale; eyes black; ocelli black, contiguous; antennæ smooth, pale, and reaching to second abdominal joint. Thorax with sutures dark-brown; legs more or less dusky, the tarsi (except at tip) an annulus at base of tibiæ, and the trochanters, pale; wings fuliginous, with a white fascia at base, at tip and across outer middle of front wing, including the inner half of stigma, the outer half of which is dark-brown; middle fascia most clearly defined. Abdomen slightly pubescent at sides and tip; first joint pale, petiolate, and with short and longitudinal acculations above; second joint pale above, the others more or less brown; ovipositor pale, dusky at tip, and long as abdomen.

One bred specimen.

3-Differs in being much darker colored, the head, thorax and femora being brown, and the metathorax and base of first abdominal joint black.

One bred specimen.—[Fifth Rept., p. 106.

Bracon charus, N. sp. -9 Length of body 0.35 inch [= $8.7^{\rm mm}$]; of ovipositor 0.40 inch [= $10^{\rm mm}$]; expanse of wing 0.65 inch [= $16^{\rm mm}$]. Colors black and deep rufous. Head, thorax, legs and antennæ polished black, the legs and sides of head and thorax with a fine grayish pubescence; trophi also black. Abdomen uniformly deep rufous. Terebra of ovipositor pale yellow, the sheaths black and very faintly pubescent. Wings deep fuliginous with a faint zig-zag, clear line across the middle from the stigma.

Described from 7 9's, all bred from Chrysobothris femorata.—[Seventh Rept., p. 75. Fig. 13.

Bracon scolytivorus. Cress. -9—Black, shining, metathorax and base of abdomen pubescent; face, anterior orbits, lower half of cheeks, clypeus, mandibles, except tips, palpi, tegulæ, legs, including coxæ, and abdomen, honey-yellow, the latter darker; posterior coxæ sometimes dusky; antennæ at base beneath, dull testaceous; wings fuliginous, apical half paler, iridescent: abdomen shining, first segment whitish laterally, the base and disc sometimes dusky: base of second segment with a large subtrigual flattened space inclosed by a deep groove, the posterior side of which is generally blackish; ovipositor longer than abdomen: sheaths black; length. .15—.17 inch [= $\frac{34}{4}$ — $\frac{44}{4}$ ^{mm}].

&—More pubescent; posterior coxe blackish, also the femora above, especially the posterior pair; posterior tibie dusky; abdomen black, polished; apex of first, basal half of second, and sides of apical segments more or less honey-yellow; sides of basal segment whitish; wings paler; abdomen narrower and rather more convex; length, .16 inch [$=4^{\text{mm}}$].

Three &, three Q specimens.—[Mr. E. T. Cresson, in Fifth Rept., p. 106.

SIGALPHUS CURCULIONIS, Fitch—Imago.—Head black, sub-polished, and sparsely covered on the face with short whitish hairs; occili touching each other; labrum and jaws brown; palpi pale yellow; antennæ (Fig. 7, c) 27-jointed, filiform, reaching, when turned back, to middle joint of abdomen and beyond, the bulbus and small second joint rufous and glabrous, the rest black or dark brown, though 3-10 in many specimens are acre or less tinged with rufous; 3-14 very gradually diminishing in size; 14-27 sub-equal. Thorax black, polished, the metathorax distinctly and broadly punctate, and the rest more or less distinctly punctate or rugose, with the sides sparsely pubescent. Abdomen pitchy-black, flattened, the dorsum convex, the venter concave, and the sides narrow-edged and slightly carinated; the three joints distinctly separated and of about equal length; the first joint having two dorsal longitudinal carinæ down the

middle: all densely marked with very fine longitudinally impressed lines, and sparsely pubescent; (Dr. Fitch in his description published in the Country Gentleman, under date of September, 1859, states that these lines leave "a smooth stripe along the middle of its second segment and a large smooth space on the base of the third;" which is true of a few specimens, but not of the majority, in which the impressed lines generally cover the whole abdomen.) Ovipositor longer than abdomen, but when stretched in a line with it, projecting backwards about the same length beyond; rufous, with the sheaths black. Legs pale rufous, with the upper part of hind tibiæ and tarsi, and sometimes the hind femora, dusky. Wings subhyaline and iridescent, the veins pale rufous, and the stigma black. Length \mathfrak{P} , 0.15–0.16 inch [=3.7-4^{mm}], expanse 0.30 [= 7.5 mm]; \mathfrak{F} differs only in his somewhat smaller size and in lacking the ovipositor. In many specimens the mesothorax and the eyes are more or less distinctly rufous.

Described from $50 \ Q \ Q$, $10 \ Z \ Z$, bred June 23d-July 29th, 1870, from larvæ of Conotrachelus nenuphar, and $2 \ Q \ Q$ obtained from Dr. Fitch.

Larra (Fig. 8, a)—White, with translucent yellowish mottlings.

Cocoon (Fig. c, b)—Composed of one layer of closely woven yellowish silk.

VARIETY RUFUS—Head, thorax, and most of the first abdominal joint entirely usous, with the middle and hind tibise dusky, and the ovipositor three times as long as abdomen and projecting more than twice the length of the same beyond its tip.

Described from three $\mathfrak{Q} \mathfrak{Q}$ bred promiscuously with the others. This variety is slightly larger and differs so remarkably from the normal form that, were it not for the absolute correspondence in all the sculpturing of the thorax and body, and in the venation of the wings, it might be considered distinct. The greater length of the ovipositor is very characteristic, and accompanies the other variation in all three of the specimens.—[Third Rept., p. 27. Fig. 7.

Eurytoma Bolteri, N. Sp.— Q Length 0.18 inch [=4.5 mm]. Antennæ black, not much longer than the face, perceptibly thicker towards the end, and apparently 10-jointed, though the three terminal joints are almost always confluent. Dimensions and appearance of joints, represented in the annexed Figure 97, a. Head and thorax roughpunctured and finely bearded with short, stiff gray hairs. Abdomen about as long as thorax, scarcely so broad, viewed from above, but wider viewed laterally; highly polished, smooth and black, the three terminal segments with minute stiff gray hairs along the sutures; visibly divided into seven segments, the four anterior ones of about equal length, the two following shorter, and the terminal one produced into a point. Legs fulvous with the cora, [trochanters], thighs and more or less of the shanks blackish-brown. Wings perfectly transparent, glossy, colorless, and with the nerves very faint.

& Measures but 0.14 inch [= $3.5^{\rm mm}$], and differs in the antennæ, being twice as long as the face, in their narrowing towards the tip and in being furnished with whorls of long hairs. The number of joints are not readily made out, and I have consequently presented at Figure 97, b, a magnified figure. His body is but half as wide and half as long as the thorax viewed from above, and not quite as broad as the thorax, viewed laterally: it it also lacks the produced point of the $\mathcal Q$. His wings are also cut off more squarely and more distinctly nerved.—[First Rept., p. 187. Pl. II, Fig. 9.

For further descriptive details see Walsh's posthumous paper on the Eurytomides (Am. Ent. II, p. 298-9), where the insect is looked upon as a variety of Eurytoma diastrophi.

[TRICHOGRAMMA MINUTA, N. Sp.] * * * It comes nearest the genus Trichogramma, Westw., and may be provisionally called Trichogramma (?) minuta. It differs

from that genus and from all other Chalcididan genera with which I am acquainted, in the antennæ being but 5-jointed (scape, plus 4 joints), the scape stout and as long, or longer, than joints 2, 3, and 4 together; joints 3 and 4 small and together as long as joint 2; 5 very stout, fusiform, and as long as 2, 3, and 4 together. The legs have the trochanters stout and long, the tibiæ not quite so long nor so stout as the femora, and with a long tooth; the tarsi are 3-jointed, with the joints of equal length and with the claws and pulvilli sub-obsolete. The abdomen is apparently 6-jointed, the basal joint wide, the 2nd narrower, 2-5 increasing in width till 5 is as wide as 1. The ovipositor of Q extends a little beyond the apex, and starts from the anterior edge of the 5th joint.—[Third Rept., p. 158. Fig. 72.

The species was provisionally referred to *Trichogramma*, and I subsequently proposed for it the generic name *Pentarthron* (Record of Am. Ent. 1871, p. 8). *Pentharthrum* has, however, been used by Wollaston in beetles, and until allied genera are better characterized than at present, the old generic name may be retained.

COLEOPTERA.

BRUCHUS FABÆ N. Sp. (Fig. 19,)—General color tawny-gray with more or less dull yellowish. Body black tinged with brown and with dull yellowish pubescence, the pygidium and sides of abdomen almost always brownish. Head dull yellowish-gray with the jaws dark brown and palpi black; antennæ not deeply serrate in Q, more so in 3; dark brown or black with usually 5, sometimes only 4, sometimes 4 and part of 5 basal joints, and with the terminal joint, more or less distinctly rufous, or testaceous, the color being so slight in some specimens as scarcely to contrast at all with the darker joints. Thorax narrowed before, immaculate, but with the pubescence almost always exhibiting a single pale medio-dorsal line, sometimes three dorsal lines, more rarely a transverse line in addition, and still more rarely (two specimens) forming a large dark, almost black patch each side, leaving a median stripe and the extreme borders pale and thus approaching closely to erythrocerus Dej.; base with the edges almost angulated; central lobe almost truncate and with a short longitudinal deeply impressed median line; no lateral notch; sentel concolorous and quadrate with the hind legs more or lest notched. Elytra with the interstitial lines having a slight appearance of alternating transversely with dull yellowish and dusky; so slight however that in most of the specimens it can hardly be traced: the dark shadings form a spot on each shoulder and three transverse bands tolerably distinct in some, almost obsolete in others, the intermediate row being the most persistent and conspicuous: between these dark transverse rows the interstices are alternately more or less pale, especially on the middle of the 3rd interstitial lines. Legs covered with grayish pubescence, and with the tibiæ and tarsi, especially of first and second pair, reddish-brown; the hind thighs usually somewhat darker, becoming black below and inside, and with a tolerably long black spine followed by two very minute ones. Length 0.09-0.14 inch $[=2\frac{1}{4}-3.5^{\text{mm}}]$. Described from 40 specimens all bred from different kinds of beans. Hundreds of others examined.

This insect has been for several years ticketed in some of the Eastern collections by the name of B. fabw, or else, what is worse, the corruption of it, fabi. The former name has been disseminated by my friend F. G. Sanborn of Boston, Massachusetts, who says that he received the weevil thus named, together with beans attacked by it, in the year 1862 from Rhode Island. The name was credited to Fabricius, but I can find no notice in any of the works I possess of any European Bruchus fabw, and several of my Eastern correspondents who have access to large libraries have been unable to find any description or allusion to a species by that name. Dr. LeConte has given it the MS name of varicornis but as his description will not appear perhaps for years to come and as no comprehensive description has yet been published, I have deemed it advis-

able to dispel in a measure the confusion that surrounds the nomenclature of the species. There is need of a description of so injurious an insect, and as fabæ is not preoccupied I adopt the name because it is entirely appropriate and because it is more easily rendered into terse popular language than varicornis.

It resembles most closely of any other species which I have seen, the B. eruthrocerus,

It resembles most closely of any other species which I have seen, the *B. erythrocerus*, Dej., which, however, is smaller, and differs in having a narrower thorax which has light sides and a dark, broad dorsal stripe divided down the middle by a pale narrow line: *erythrocerus* is further distinguished by the antennæ being entirely testaceous, and the hind thighs more swollen.

From obsoletus Say, fabæ differs materially: obsoletus is a smaller species, dark gray, with the antennæ all dark, the pygidium not rufous, the thorax with a perceptibly darker dorsal shade so that the sides appear more cinereous, a white scutel, and each interstitial line of the elytra with a slight appearance of alternating whitish and dusky along its whole length: for though there is nothing in Say's language to indicate whether it is the interstitial lines that alternate transversely, whitish and dusky, or each line that so alternates longitudinally, I find from an examination of a specimen in the Walsh collection, that the latter is the case, and so much so that the insect almost appears speckled. The two species differ both in size and color, though, as Say's description is short and imperfect it is not surprising that fabæ should have been referred to it.

From the European bean-feeding *Br. flavimanus* (which is apparently either a clerical error for, or a synonym of *Br. rufimanus*, Schenh.) as described by Curtis, it differs notably; as it does likewise from their *Br. serratus*, Ill., which also attacks beans.

Dr. LeConte, according to Mr. Rathvon, was inclined to consider this insect the obsoletus of Say, from the fact that in specimens which the latter gentleman sent him, the antenna were not varied as in his MS. varicornis, but uniformly black. A few specimens which Mr. Rathvon sent me nearly two years ago, taken from the same lot as were those which he forwarded to Dr. LeConte, were singularly enough, all decapitated but two; and these two showed the varied antenna. These specimens had all been kept in alcohol, and I am greatly inclined to believe that the uniformly dark appearance of the antenna that was noticed by LeConte was the effect of the alcohol on those which naturally had the rufous joints but faintly indicated. At all events, though Mr. Rathvon tells me that he found a small proportion of beetles with dark antenna, after examining, at my suggestion, over two hundred specimens that had thus been kept in alcohol; yet from over one hundred specimens which he had the kindness to send me, I only find (after thoroughly drying them) three with the terminal joint really as dark as the subterminal, and not a single one in which the rufous basal joints cannot be more or less distinctly traced.—[Third Rept., p. 55-56. Fig. 19.

Since the above was written, Dr. Horn has given us a revision of the Bruchidæ of the United States (Trans. Am. Ent. Soc., Vol. IV, 1873), in which he makes fabæ a synonym of obsoletus Say, expresses regret that another synonym must be added and states that the obsoletus which I referred to is the transversus Say (=hibisci Oliv.). This criticism is not deserved, and while the decision of one who has done such excellent work in Coleoptera as Dr. Horn has will be generally accepted as final, yet no one can compare his redescription of obsoletus with Say's description and not feel that the two apply to different insects. Fabæ is usually one-third larger, tawny-gray above with vari-colored antennæ, concolorous scutely emarginate behind, and rufous legs and abdomen; obsoletus, on the contrary, according to Say, is blackish-cinereous, the thorax cinereous each side, with a whitish scutel and with the abdomen and legs not differing in color from the rest of the body. Fabæ breeds in beans; obsoletus in the seeds

of Astragalus. Indeed one would be far more justified in considering B. alboseutellatus Horn a synonym of obsoletus Say than in considering fabæ a synonym of it, and when the Bruchus from Astragalus in the Eastern States is bred, I fully expect Dr. Horn to change his mind. Nor is the assumption justifiable that the obsoletus referred to by me, and destroyed in the Walsh collection, is hibisci Oliv. It was far more like alboscutellatus as far as I remember, and there is not a character about this species which does not accord with Say's description of obsoletus except that the scutel is described as rounded, while that of obsoletus is described by Say as quadrate. I am of opinion that too much stress has been laid on this difference by Dr. Horn, as, when the pubescence is separated behind, the scutel appears quadrate, whereas in fabæ it appears bifid. The scutel of alboscutellatus when denuded is quadrate, but it is doubtless the clothed appearance which Say described. Say, as appears from his text, had abundant material, and it is assuming too much to suppose that he could overlook the striking differences in size and coloration of fabæ, as above indicated.

The specific name fabæ was used by Brullé for Bruchus pisorum Linn.

Madarus vitis, N. Sp.—Length, exclusive of rostrum 0.10 [inch=2.5mm]. Color uniformly rufous, without maculations, the eyes alone being darker. Highly polished; rostrum arcuated, stout and about as long as thorax; thorax and body with extremely minute and distant punctures, anterior margin of thorax abruptly narrowed, especially laterally, into a collar; elytra slightly undulate, with 4 distinct elevations, one on the extreme outer margin close to the thorax, and one on the middle of each, near the extremity.—[First Rept., p. 132. Fig. 74.

For further details as to the synonymy of this insect, see American Entomologist I, p. 105. Dr. LeConte's description of Baridius sesostris was published about three months earlier than my own and he subsequently (Proc. Amer. Phil. Soc., Vol. XV, 1876, p. 299) erected the genus Ampeloglypter for this and two other species, so that Madarus vitis=Ampeloglypter sesostris Lec.

ANALCIS FRAGARIÆ, N. Sp.—Imago, (Fig. 14, b, c)—Color deep chestnut-brown, subpolished, the elytra somewhat lighter. Head and rostrum dark, finely and densely punctate and with short fulvous hairs, longest at tip of rostrum; antennæ rather lighter towards base, 10-jointed, the scape much thickened at apex, join 2 longest and robust, 3 moderately long, 4-7 short, 8-10 connate and forming a stout club. Thorax dark, cylindrical, slightly swollen across the middle and uniformly covered with large thimble-like punctures, and with a few short coarse fulvous hairs, unusually arranged in three more or less distinct longitudinal lines; pectoral groove ending between front legs. Abdomen with small remote punctures and hairs which are denser towards apex. Legs of equal stoutness, and with shallow dilated punctures and uniform very short hairs. Elytra more yellowish-brown, dilated at the lower sides anteriorly, and with about 9 deeply-punctured strize, the strize themselves sometimes obsolete; more or less covered with coarse and short pale yellow hairs which form by their greater density, three more or less conspicuous transverse bands, the first of which is at base; between the second and third band, in the middle of the elytron, is a smooth dark-brown or black spot, with a less distinct spot of the same color below the third, and a still less distinct one above the second band. Length 0.16 inch [=4mm].

Described from four specimens bred from strawberry-boring larvæ. The black spots

on the elytra are quite distinct and conspicuous on two specimens, less so on one, and entirely obsolete on the other.

Larva, (Fig. 14 a)—White with back arched Lamellicorn-fashion. Head gamboges yellow, glabrous, with some faint transverse striations above mouth; mandibles rufoutipped with black; labrum emarginate, and with palpi, pale. A faint narrow dorsal vasculer line. Legs replaced by fleshy tubercles. Length 0.20 inch [=5^{mm}] when stretched out.—[Third Rept., p. 44. Fig. 14.

Say's generic name Tyloderma having priority over Schönherr's Analeis, the name of this insect becomes Tyloderma fragaria.

LEPIDOPTERA.

ÆGERIA RUBI, N. Sp.—Imago.—Expanse, 3, 1.00 [inch=25mm]; Q, 1.25 inch [=31mm]. Front wings transparent, with a broad costal border extending half the width of wing at base, a narrow discal spot, and more or less of the tip dull-ferruginous; the inner border, the inner longitudinal vein, the intermediate space toward posterior angle, and sometimes its whole length, of the same color; veins brownish within and black without the discal spot. Hind wings perfectly transparent, or rarely with a few sparse ferruginous scales; the transverse discal vein pale, the others pale & at base, but black toward extremities; costa narrowly golden-yellow, becoming darker toward apex. Fringes dark-brown, those of hind wings appearing darkest by virtue of a dark wing border. Under surface somewhat paler. Abdomen stout, with a very slight anal tuft in 9; a stouter one in 3. Antennæ blue-black, not enlarging toward tip, quite pectinate in 3. Palpi, a narrow ring around neck, the sides of the collar, a broad band curving across tegulæ and around the base of wings, a faint line across middle of thorax, two faint longitudinal lines between it and collar, legs, except outer base (sometimes whole length) of femora and tibiæ, hind third of abdominal joints, and a dorsal and lateral series of abdominal tufts or patches (the dorsal ones, especially on 3d and 7th joints, most persistent and conspicuous)-all golden-yellow: the rest of body black. The orbits are of a somewhat paler-yellow, and the face either gray or bluish.

3 differs from Q in the darker color of primaries, the narrower fringe of secondaries, the narrower ferruginous spot at apex of primaries, the more tufted abdomen, the broader and darker anal tuft, and the pectinate antennæ.

Described from 6 3's, 6 \circ 's, bred from Rubus. Approaches nearest to Trochilium marginatum Harr., and T. tibiale Harr., from which it differs in the thoracic marks and the abdominal tufts.

Larva—Length 0.90-1.10 inch [=22.5-27.5 mm]; diameter 0.18 [=4.5 mm]. Color pale-yellow. Head dark-brown, with a few whitish hairs; mandibles black, the other trophi paler. Cervical shield horny, pale-brown. Each joint with 8 pale, shiny piliferous spots, transversely arranged on 2, 3 and 12; the dorsal 4 quadrangularly arranged and the lateral 2 interrupted by stigmata on all the others. Thoracic legs slightly tinged with brown; prolegs, with the hooklets dark. Several specimens examined.— [Sixth Rept., p. 113. Fig. 30.

ACRONYCTA POPULI, N. Sp.—Larra—Length 1.50 [inch, =37nm]. Color yellowishgreen, covered with long soft bright yellow hairs which spring immediately from the body, part on the back, and curl round on each side. On top of joints 4, 6, 7, 8 and 11, a long straight double tuft of black hairs, those on 7 and 8 the smallest. Head polished black with a few white bristles. Joint 1 with a black spot above, divided longitudinally by a pale yellow line, giving it the appearance of a pair of triangles. Joint 2 with two less distinct black spots. Thoracic legs black; prolegs black with brownish extremities. Venter greenish-brown. Described from many specimens. When young of a much lighter color, or almost white, with the black tufts short but

more conspicuous, with a distinct black dorsal line, two lateral purplish-brown bands, and with hairs white, sparse and straight.

Individuals vary much: some have a black dorsal line, some have but three distinct black tufts; some have a sixth tuft of black hairs on joint 9, and others have a few black hairs on all but the thoracic joints. Just before spinning up, many of the hairs are frequently lost, and the body acquires a dull livid hue.

Moth. - ♀, front wings, white, finely powdered with dark atoms which give them a very pale gray appearance; marked with black spots as follows: a complete series of small spots on posterior border extending on the fringes, one between each nerve; near the anal angle between nerves 1 and 2 a large and conspicuous spot bearing a partial resemblance to a Greek psi, placed sidewise, and from this spot a somewhat zigzag line running parallel with posterior border, but somewhat more arcuated towards costa, least distinct between nerves 3 and 4, and forming a large distinct dart-like spot between nerves 5 and 6; space between this line and posterior border, slightly darker than the rest of the wing-surface on account of the dark atoms being more thickly sprinkled over it; four costal marks, one subobsolete in a transverse line with the reniform spot, one conspicuous about the middle, and in a line with reniform spot and anal angle, one about the same size as the last and looking like a blurred X about one-third the length of wing from base, and one subobsolete, near the base; orbicular spot flattened and well defined by a black annulation: reniform spot indicated by a blurred black mark running on the cross-vein and sometimes somewhat crescent-formed; a V-shaped spot pointing towards base half-way between costa and interior margin, in a transverse line with the large costal spot which looks like a blurred X; a blurred mark in middle at base, and lastly a narrow spot on the inferior margin, half-way between base and anal angle. Hind wings same color as front wings: somewhat more glossy, with the lunule, a band on posterior border one-fourth the width of wing, and sometimes a narrow coincident inner line, somewhat darker than the rest; the posterior border also with a series of spots one between each nerve. Under surface of front wings pearly-white with an arcuated brown band, most distinct towards costa, across the posterior one-third, all inside of this band of a faint yellowish-brown: lunule and fringe spots distinct, and with a faint trace of the psispot; hind wings uniform pearly-white with a distinct and well defined dark wavy line running parallel with posterior margin across the posterior one-third of wing, and with the lunule and fringe spots distinct. Antenna simple and bristle-formed, gray above, brown beneath. Head thorax and body, both above and below, silvery-gray. Legs with the tarsi alternately dusky and gray. ∂ differs from ♀ by his somewhat stouter antenna; much narrower body, and narrower wings and fringes, the front wings having the apex more acuminate, and the hind wings scarcely showing the darker hind border.

Described from 2 9, 2 3 all bred. In the ornamentation of the front wings this species bears some resemblance to the European species tridens and psi, but otherwise differs remarkably, and especially in its larval characters. It bears a still closer resemblance both in the larva and imago state to the pale variety of a common species known in England as the "Miller" (A. leporina), but judging from the figures and description in "Newman's Natural History of British Moths," it may be easily distinguished from leporina by the well defined orbicular spot, by the greater proximity of the two large costal spots, by lacking a round spot behind the disk, and by the more prolonged apex. It differs also in the larva state from leporina which feeds on the Birch. It likewise closely resembles interrupta, though the larvae are remarkably different; and it also resembles lepusculina, the larva of which is unknown; but the specific differences will be readily perceived upon comparing Guenée's descriptions. How near it approaches to Acronycta occidentalis, Grote, it is impossible to tell, as the author's description is exceedingly brief, considering the number of closely allied forms; but as that species has a bright testaceous tinge on the reniform spot, it evidently differs from mine. Harris's Apatela [Acronycta] Americana, though very different in the imago, yet closely resembles *populi* in the larva state. I have on two occasions found the larva of *Americana* feeding on the Soft Maple, and it may be distinguished from *populi*, by its greater size; by the paler color of the body; by the hairs being paler, more numerous, shorter and pointing in all directions, especially anteriorly and posteriorly of each segment; by having on each of joints 4 and 6 two distinct long black pencils, one originating each side of dorsum, and on joints 11 one thicker one originating from the top of dorsum; by a substigmatal row of small black spots (three to each segment, the middle one lower than the others) and by a trapezoidal velvety black patch starting from anterior portion of joint 11 and widening to anus.—[Second Rept., pp. 120, 121, Figs. 87, 88.

Grote refers it, in his List, to lepusculina Go.; having, I believe, seen the type. Guenée must have had a uniformly colored and pale specimen as my typical specimens have a distinct orbicular mark, deeper subterminal markings and the terminal space contrasting by its darker gray with the rest of primaries—all unmentioned in Guenée's descrip-

tion.

XYLINA CINEREA, N. Sp.—Larva—Length when full grown 1.20—1.30 inches [=30—32^{mm}], color shiny silvery-green on the back, darker below. A medio-dorsal or cream-colored stripe; a subdorsal one represented by 3 or 4 irregularly shaped spots on each joint. A broad deep cream-colored stigmatal line, with a few green dents in it, extending to anal prolegs. Four slightly elevated cream-colored spots, encircled by a ring of rather darker green than the body, in the dorsal space, and in the subdorsal space there are four or more similar but smaller spots. Venter glaucous-gray. Head as large as joint 1, free, glassy-green with white mottlings at sides and top, and pearly-white lips. Thoracic legs whitish. Prolegs concolorous with venter. When young the body is darker and the markings paler. Described from two living specimens.

Imago (Fig. 57, b)-Front wings, with the ground-color pale cinereous shaded and marked either with light brown, having a faint purplish tint, or with darker brown, having a similar reflection, or with a colder grayish-brown with the faintest mossgreen reflection: in the first two cases the dark color either blends and suffuses with the ground-color so as to give the wing a nearly uniform and smooth appearance, or else contrasts sufficiently to bring out all the marks distinct; in the latter case (two specimens) the markings are very distinct and the ground color is whiter and more irrorate. In the well-marked specimens the usual lines are readily distinguished, the basal half line, transverse anterior and transverse posterior being quite wavy, pale, and bordered each side with a dark shade, the median shade dark and well defined and the subterminal line, though sometimes pale near costa, forming a series of dark angular spots: in the more uniform specimens these lines are barely distinguishable and perhaps the most constant is the sub-terminal which most often takes the form of a series of dark angular spots: the ordinary spots have a pale inner and a more or less distinct dark outer annulation; the orbicular is larger than the reniform and is suffi-, ciently double to take on the form of an 8, the upper part of which is always largest and with the interior space paler than the general surface, while that of the lower part is either concolorous or darker; the form is, however, quite irregular and differs sometimes in the two wings of the same species: the reniform spot is generally welldefined, and is either darker, or has a tinge of reddish-brown, interiorly: at the base of the wing is a more or less distinct pale space occupying the upper half, and bordered below by a brown line which is straight about half its length and then extends upwards and outwards towards transverse anterior. A tolerably distinct terminal line, with the fringes dark. In taking a general view of the varying specimens this pale basal space, the pale upper part of the orbicular and the dark subterminal line, seem to be the most constant characters of the species. Hind wings gray-brown inclining to cinnamon-brown, with the posterior border but slightly darker and the fringe paler. Under surface quite uniform, that of front wings being nacreous gray with a faint discal spot and with a narrow costal and broad terminal border of pale fulvous, dusted with purple-gray; the hind wings of this last color with the lunule and line distinct. Head nearly entire, though the quadrifid arrangement of the hairs is traceable; palpi hairy throughout. Thorax quite square, of same color as primaries and with the collar bordered behind with brown and sometimes the edges of the tegulæ similarly bordered. Abdomen of same color as hind wings with lateral tufts, and cut off squarely at apex. Expanse 1.32—1.82 inches [=34—45mm].

Described from 3 specimens fed on grape-vine, 2 on peaches and 1 on *Cercis canadensis*. Other captured specimens examined.

This species is the analogue of, and very closely resembles the European Xylina conformis, which is known under various synonyms. A specimen sent to Mr. P. C. Zeller of Stettin, Prussia, was, however, pronounced distinct. The well-marked irrorate form still more closely resembles Guenée's cinerosa found in Switzerland, and which he himself thinks may prove to be a variety of conformis. The more I study the species of the NOCTUIDÆ as they occur in nature, the more I am struck with their great variability, and there can be no doubt that many of the so-called species will turn out to be but varieties when we better understand them. In this large family none but the more strikingly marked species should ever be described without an accompanying description of their preparatory states and of their principal variations. I am unacquainted with any of Walker's species except subcostalis, which is very different, and if this should prove to be a synonym of any of them the fault must be laid to the difficulty under which the naturalist in the Western States labors for want of proper libraries to refer to. It differs essentially from Grote's Bethunei and capax as described and illustrated in Volume I of the Transactions of the American Entomological Society. I am informed by Mr. [J.] A. Lintner of Albany, N. Y., that Dr. A. Speyer of Rhoden, Fürstenthum Waldeck, Prussia, who gives much attention to the Noctuidæ, has it marked Celana oblonga in his MS., but the insect evidently does not belong to that genus, and as the German pronunciation of Xylina much resembles the English pronunciation of Celana, the reference to the latter is doubtless due to a verbal misunderstanding.—[Third Rept., pp. 135, 136. Fig. 57.

Now referred, in Grote's List of Noctuida of N. A., to Hübner's genus Lithophane.

AMPHIPYRA CONSPERSA, N. Sp.—Larva.—Found full grown July 2, 1867, on Hazel. No pyramidal hump, and of a uniform emerald-green, the dorsal palpitations visible and the stigmata pale, with a black annulation, but with no other markings either on the head, body, or legs.

Imago—Like pyramidoides in every particular except that the brown of front wings is almost uniformly spattered over, more or less suffusely, with pale-grayish spots, so that no regular marks appear. The costal marks are, however, tolerably distinct as in pyramidoides, and by careful examination and comparison traces of the more conspicuous marks of that species may be discerned.

Described from one ♀ bred July 31.—[Third Rept., p. 75.

As remarked at the time, the specimen from which the description was made was a bred one and perfect. Grote, in his *List of Noctuidæ*, considers it simply an aberration of *pyramidoides*, but this can hardly be the case, as the larva also shows differences.

AGROTIS SCANDENS, N. Sp.—Larva.—Average length when full grown 1.40 [inch, =35^{mm}]. Ground-color very light yellowish gray, variegated with glaucous in the shape of different sized patches, which are distinctly see nunder the lens to be separated by fine lines of the light ground-color. A well-defined dorsal and less distinct

subdorsal and stigmatal line, caused by these patches becoming larger and darker; another and still less distinct line of the same kind under stigmata. The dorsal line frequently with a very fine white line along its middle, especially at sutures of segments. Piliferous spots in the normal position; those above black, those at the sides lighter. Stigmata black. Head and cervical shield tawny, the latter with a small black spot each side, the former with two in front, and two eye-spots each side. Caudal plate tawny, speckled with black. Venter and legs glaucous. Bristles fine and small. Filled with food it wears a much greener appearance than otherwise, while when young it is of a more uniform dirty whitish-yellow, the lines less distinct but the piliferous spots proportionately larger. Head quite variable in depth of shade.

Perfect Insect.—Average length 0.70 [inch, = 17.5^{mm}]; alar expanse 1.50 [inch, = 37^{mm}]. General color of fore wings very light pearly bluish-gray, with a perceptible deepening posteriorly. Quite variable, sometimes of a more decided blue, at others inclining to buff as in Lencania unipuncta, Haw. Markings, when distinct, as in Plate 1, Figures 5 and 6. With the exception of the reniform spot and subterminal line, however, they are usually distinct only on costa, being either indistinct or entirely obsolete on the rest of the wing. The subterminal line is light, with a more or less dark diffuse shade each side, which, in some instances, forms into sagittate spots. A black stain at the lower part of reniform spot forms a most distinctive character. Hind wings very pale and lacking the bluish cast of fore wings; lunule distinct, and a dark shade, enclosing a lighter mark, as in Heliothis, along posterior margin. Eyes dark; head and thorax same as fore wings: abdomen same as hind wings. The whole under surface the same as hind wings above, the lunules and arcuated bands faintly traced, the fore wings having a darker shade in the middle.

Described from 30 bred specimens.—[First Rept., pp. 78-79. Pl. 1, Figs. 5, 6.

AGROTIS COCHRANII, Riley—Imago.—Fore wings of a light warm cinereous, shaded with vandyke brown and umber, the terminal space, except at apex, being darker and smoky. Basal, middle and limbal areas of almost equal width, the middle exceeding somewhat the others. A geminate dark basal half-line, usually quite distinct. Transverse anterior geminate, dark, somewhat irregularly undulate, and slightly obliquing outwards from costa to interior margin. Transverse posterior geminate, the inner line being dark, distinct and regularly undulate between the nerves, while the outer line is plain and much paler; it is arcuated superiorly and inversely obliques for two-thirds its width. Orbicular and reniform spots of normal shape, having a fine, dark annulation, which is however obsolete in both, anteriorly; the orbicular is concolorous with the wing, whilst the reniform has a dark inner shade with a central light one, and forms with the transverse posterior a somewhat oval spot which is also dark. Median shade dark and distinct interiorly, shading off and becoming indistinct in center of wing, and quite dark between the two spots, giving them a fair relief. Subterminal line single, light, acutely and irregularly dentate, with an inner dark shade, but warmer than that of terminal space. Terminal line very fine, almost black, slightly undulate. Fringes of same color as wing, with a light central line, having an outer dark coincident shade. A dark costal spot in basal area; at termini of the usual lines, and two light ones in subterminal space. In some specimens one or two fine dark sagittate marks are discernable, and also a fine black claviform mark. Hind wings: whitish, with a darker shade along posterior margin. Under surface of fore wings somewhat lighter than the upper surface and pearlaceous interiorly, with a smoky arouated band - more definite near the costa than elsewhere - and a tolerably distinct lunule. Under surface of hind wings concolorous; slightly irrorate with brown anteriorly and posteriorly, and with an indistinct lunule and band. Antennæ, prothorax, thorax, tegulæ and body of same color as primaries, the prothorax having a darker central line, and in common with the tegulæ a carneous margin. Under surface lighter; legs with the tarsi spotted.

This moth, in its general appearance, bears a great resemblance to *Hadena chenopodii*, but the two are found to differ essentially when compared. From specimens of *H*.

chenopodii, kindly furnished me by Mr. Walsh, and named by Grote, I am enabled to give the essential differences, which are: 1st. In A. Cochranii, as already stated, the middle area exceeds somewhat in width either of the other two, while in H. chenopodii it is but half as wide as either. 2d. In the Agrotis the space between the spots and between the reniform and transverse posterior is dark, relieving the spots and giving them a light appearance, whilst in the Hadena this space is of the same color as the wing, and the reniform spot is dark. The claviform spot in the Hadena is also quite prominent, and one of its distinctive features, while in the Agrotis it is just about obsolete.

There are specimens that seem to be intermediate between these two, but all those bred by me, both male and female, were quite constant in their markings, and their intermediates will doubtless prove to be distinct species or mere varieties.

Larva—Length 1.07 inches [=26.8mm]. Slightly shagreened. General color, dingy ash-gray, with lighter or darker shadings. Dorsum light, inclining to flesh color, with a darker dingy line along its middle. The sides, particularly along the sub-dorsal line are of a darker shade. On each segment there are eight small, black, shiny, slightly elevated points, having the appearance of black sealing-wax, from each of which originates a small black bristle. The stigmata are of the same black color, and one of the black spots is placed quite close to them anteriorly. Head shiny and of the same dingy color as the body, with two darker marks, thick and almost joining at the upper surface, becoming thinner below and diverging toward the palpi. The upper surface of first segment is also shiny like the head. Ventral region of the same dingy color, but lighter, having a greenish tinge anteriorly and inclining to yellow under the anal segment. Legs of same color. It has a few short bristles on the anterior and posterior segments.

Chrysalis.—Length 0.70 of an inch [= 17.5mm]. Light yellowish brown with a dusky line along top of abdomen. Joints, especially of the three segments immediately behind the wing-sheaths, dark brown. The brown part of these three segments, minutely punctured on the back. Eyes dark brown, and just above them, a smaller brownish spot. Two quite minute bristles at extremity.

Described from numerous bred specimens. — [First Rept., pp. 75-76. Fig. 26.

There is little question but that this is the moth briefly characterized by Harris (Ins. Inj. to Veg., p. 444) as Agrotis messoria, an examination of the types confirming this view. A. repentis G. & R. and A. lycarum are also conceded by Grote to be synonyms.

Plusia brassic., N. Sp. — Larva — Pale yellowish translucent green, the dorsum made lighter and less translucent by longitudinal opaque lines of a whitish-green; these consist each side, of a rather dark vesicular dorsal line, and of two very fine light lines, with an intermediate broad one. Tapers gradually from segments 1-10, descending abruptly from 11 to extremity. Piliferous spots white, giving rise to hairs, sometimes black, sometimes light colored; and laterally a few scattering white specks in addition to these spots. A rather indistinct narrow, pale stigmatal line, with a darker shade above it. Head and legs translucent yellowish-green, the head having five minute black eyelets each side, which are not readily noticed with the naked eye. Some specimens are of a beautiful emerald-green, and lack entirely the pale longitudinal lines. Described from numerous specimens.

Chrysalis — Of the normal Plusia-form, and varying from yellowish-green to brown.

Moth — Front wings dark gray inclining to brown, the basal half line, transverse anterior, transverse posterior, and subterminal lines pale yellow inclining to fulvous, irregularly undulate, and relieved more or less by deep brown margins; the undulations of the subterminal line more acuminate than in the others, and forming some dark sagittate points; the basal half-line, the transverse anterior near costa, and the transverse posterior its whole length, being sometimes obscurely double: four distinct equidistant costal spots on the terminal half of wing, the third from apex formed by

the termination of the transverse posterior; posterior border undulate with a dark brown line which is sometimes marked with pale crescents; a series of similar crescents (often mere dots) just inside the terminal space; the small sub-cellulary silver spot oval, sometimes uniformly silvery-white but more often with a fulvous centre, sometimes free from, but more often attached to the larger one which has the shape of a constricted U, very generally with a fulvous mark inside, which extends basally to the transverse anterior at costa. Fringes dentate, of the color of the wing, and with a single undulating line parallel to that on the terminal border. Hind wings fuliginous, inclining to yellowish towards base, and with but a slight pearly lustre; fringes very pale with a darker inner line. Under surfaces pale fuliginous with a pearly lustre, the front wings with a distinct fulvous mark under the sub-cellulary spots, speckled more or less with the same color around the borders of the wing, the fringes being dentate with light and dark; the hind wings speckled with fulvous on their basal half, and with the fringes as above. Thorax variegated with the same color as front wings, the tufts being fulvous inclining to pink. Abdomen Q gray, with a few pale hairs near the base, and scarcely extending beyond the margin of the hind wings; & longer, covered with pale silky hairs, a distinct dorsal brown tuft on each of the three basal segments, and two large lateral either fawn-colored or golden-yellow brushes on the fifth segment, meeting on the back and partly covering two smaller brushes on the sixth, which are tipped with black; terminal segment flattened and with two lateral more dusky and smaller tufts: underside of thorax and abdomen gray, mixed with flesh-color. Alar expanse 1.55 inches. Described from numerous bred specimens. In a suite of specimens bred from the same broad of larvæ a considerable difference in the general depth of color is found, some being fully as dark again as others.

Closely resembles *Plusia ni*, Engr., which occurs in Italy, Sicily, France, and the northern parts of America. Mr. P. Zeller of Stettin, Prussia, to whom I sent specimens, considers it distinct however from the European *ni*, and I have consequently given it a name in accordance with its habits.—[Second Rept., pp. 111-112. Fig. 81.

Notwithstanding its close resemblance to ni, the best authorities agree with Zeller in considering it distinct, as it certainly is. Strangely enough this same brassica, or what is extremely close to it, occurs also in South Europe and is figured in Stainton's Entomologist's Annual for 1870 as P. ni, one specimen having been found on the south coast of England, which specimen Zeller, as he wrote me, believes to have come from America. Staudinger would probably characterize brassica as a "species Darwiniana," and there are doubtless individuals of both the species which approach each other so closely as to be undistinguishable. is such variation in the silver spot in either that it cannot be depended on alone, but Speyer (Europäisch-Americanische Verwandtschaften; Stettiner Ent. Zeit., June, 1875, p. 165) has presented other differences that are constant in detail, the most noticeable of which are the darker and more irrorate coloring and the interrupted and wavy terminal line of brassica, against the paler, smoother, more metallic coloring and the perfectly straight and unbroken terminal line of ni.

The larva is the most common cabbage pest in the Southern States, and is infested with an undetermined parasite. Mr. E. A. Popenoe has found it feeding on the leaves of *Crepis*, and what appears to be the same has been found by my assistants on Clover, Dandelion, *Senecio scandens*, and *Chenopodium*.

APLODES RUBIVORA, N. Sp. — Larra — Average length 0.80 inch [= 20^{mm}]. Color light yellowish-gray, darker just behind each joint, and very minutely shagreened all over. On each segment a prominent pointed straight projection each side of dorsum, and several minor warts and prickles below. Two very slightly raised, longitudinal lighter lines along dorsum, between the prominent prickles. Ten legs.

Perfect insect—Alar expanse 0.50 inch [=12.5^{mm}]; length of body 0.25 inch [=6^{mm}]. Color verdigris-green, the scales being sparse so that the wings appear sub-hyaline. Fore-wings with two transverse lighter lines dividing the wing into three parts, proportionate in width as 3, 4, 2 counting from base, and parallel with posterior margin; also a faint line between these two, running to about ½ of wing from costa. Hind wings with two similar transverse lines, dividing the wing in like proportion, the outer line not parallel with margin, but wavy and produced posteriorly near its middle. Costa pale; fringes obsolete. Head, thorax and abdomen green above, but, together with antennæ and palpi, white beneath.

Described from one ♀ specimen. — [First Rept., pp. 139-140. Pl. II, Fig. 25.

Dr. Packard, in his Monograph of the Geometred Moths, etc. (U. S. Geol. Surv. of Terr., Vol. X, 1876, p. 382), refers it to the genus Synchlora Gor., and adds the conventional ending to the specific name, so that the species becomes Synchlora rubivoraria. Synchlora albolineata Pack. and Eunemoria gracilaria Pack. are given as synonyms.

PHYCITA [ACROBASIS] NEBULO, Walsh—Imago.—I reproduce here the description of the moth in Mr. Walsh's original words: "Expansion of wings 7-10. Length of body 3-10. General color light cinereous, varied with dusky. A row of about seven subsemilunar or linear dark spots on outer margin of fore wing. Then one-fourth of the distance to the body a waving light cinereous band parallel to the exterior margin, marked on each side with dusky black. Nearly at the centre a much abbreviated black band. Beyond the centre on the costal margin a subtriangular dusky black spot, the apex of which connects with the apex of a much larger subobsolete triangular brickred spot which extends to the interior margin, and is bounded on the outside by a wavy light cinereous band, which is again bounded by a wavy dusky black band proceeding from the apex of the costal triangle. Base of wing dusky black, inclosing a small round light cinereous spot. Hind wings and all beneath light cinereous shaded with dusky, the fore wings darker. Tarsi dusky with a narrow light cinereous fascia at the apex of each joint. Hind tibia fasciate with dusky at the apex, sometimes obscurely bifasciate. Intermediate tibia fasciate with dusky at the centre, the fascia generally extending to the base, but becoming lighter. Anterior tibia dusky, with a narrow apical light cinereous fascia. Palpi, both labial and maxillary, dusky."

When compared with other closely allied and resembling species, this little moth may be characterized in the following manner: The ground color of the front wing is decidedly bright and pale; the discal spots are almost always confluent, thus forming an abbreviated transverse bar; the dark markings are well defined and the triangular dark costal spots starting from the inner third of the wing is distinctly relieved, while the "brick-red" (nearer a cinnamon-brown) triangular spot which opposes it is large, so that the space it occupies on the inner margin is nearly as wide (generally within one-third) as that between it and the transverse posterior line. The lower half of the basal space is often of a distinct cinnamon-brown, and an oblique dusky band, which Mr. Walsh has not mentioned, is often quite distinct, running from near the apex to the brown triangle, where it connects with the inner margin. The species recalls, in facies, the European Myelois snavella. In a suite of specimens bred from Apple, Quince, Plum and Cherry, there is sufficient variation to prevent a too rigidly drawn description, but the above characters obtain in all of them, and such variation as occurs runs in the direction of the variety presently to be described.

Larva-[Length 0.5 inch] Brown or greenish in color. Cylindrical. Tapering grad-

ually from first to last joint. Head and cervical shield darker than the rest of body, slightly shagreened, sparsely covered with long hairs, the shield quite large, convex, and occupying the whole surface between stigmata—there being in front of the latter a sub-cervical dark horny plate. Joints 2 and 3 wrinkled as at Fig. 18, c the former with two rather conspicuous dark dorsal piliferous spots. The other joints with a few fine hairs, the stigmata plainly visible, and the anal covering but slightly horny. Legs and prolegs of moderate size and of same color as body.

Described from numerous specimens.

Chrysalis—Mahogony-brown, with no striking character. Abdomen, especially above, with very minute punctures.

Variety Nebulella (Fig. 20, e).—I have bred a single specimen from wild Crab (Crategus) which differs in some essential features from the normal form, but which nevertheless can only be considered a variety of it, as I observed no larval differences. It differs in the more uniform and subdued tone of the front wings, the markings being more suffused and indistinct; but principally in the relative narrowness of the space outside the transverse posterior line the greater consequent width of the middle area, and smallness of the triangular brown spot—the space it occupies on the inner margin being scarcely one-half as wide as that between it and the transverse posterior line. The discal spots are also separated.

Described from one good specimen. An interesting fact connected with this variety is, that precisely the same form occurs in Europe, as I found a single specimen in the cabinet of M. J. Lichtenstein of Montpellier, France, which he had captured in that vicinity, and which he allowed me to bring home for comparison. It seems to be rare, even there, and whether indigenous or imported from this country, is a question yet to be solved.—[Fourth Rept., p. 41–42, Figs. 18, 19, 20.

ACROBASIS JUGLANDIS, LeBaron.—(Fig. 20, d)—I have bred this species from Hickory, but as Dr. LeBaron has also bred it abundantly from Walnut, and has signified his intention of describing it in his second annual Report, I adopt his proposed name, and shall content myself with pointing out the manner in which it may generally be distinguished from nebulo. Firstly, by the paler basal area of the front wings, which is sometimes almost white, especially near the costa, and by the head and shoulders and sometimes the β antennal horn partaking of this paler color. Secondly, by the darker median space, the dark triangular costal spot not being well relieved posteriorly, but extending so as sometimes to darken the whole space. Thirdly, by the discal spots always being well separated.

Such are its specific characters as taken from 3 hickory-bred and 6 walnut-bred specimens; but of the former there is 1 which when placed alongside of some of the more abnormal specimens of nebulo, can scarcely be distinguished from them, and, if chosen without knowledge of its larva, would certainly be placed with them; while of the latter there are two which nearly as closely resemble the variety nebulella. In general characters, in the size of the brown triangular spot, and the manner in which the inner margin is divided, juglandis is intermediate between nebulo and nebulella. In one of the hickory-bred specimens, the general color is quite warm, and the basal area carneous rather than white.—[Fourth Rept., p. 43. Fig. 20, a, b, d.

Dr. LeBaron published his description of it about the same time, under the name *Phycita juglandis*, in his Second Report on the Insects of Illinois, p. 123.

Pempelia Hammondi, N. Sp. Imago (Fig. 21, d).—Average expanse 0.48 inch $[=12^{\mathrm{mm}}]$. Front wings glossy purplish-brown with two silvery gray transverse bands dividing the wing on costa in about three equal parts, the basal band sharply defined outwardly and always extending to inner margin, the posterior band never extending more than half way across the wing, and generally not more than one-third, illy defined. In some specimens the basal transverse band is quite narrow, with the basal space a shade paler than the median: in others the band forms a double line. In some

specimens also, a narrow pale transverse line outside the second hand, and a pale terminal shade, are visible. Hind wings uniformly paler gray. Under surface glossy gray, with no marks, the front wings a shade darker than the hind. β differs from φ in the basal portion of the antennæ being curved, and the curve filled with a tuft of scales.

Described from numerous bred specimens. The species has the general facies of the European Cryptoblabes bistriga, which is a larger insect.

Larva.—Length 0.45—0.50 inch [=11—12.5mm]. General color olive, or pale green, or brown, with a broad dark stripe along each side of back. Tapers slightly both ways, joints 4-12 inclusive, divided into two transverse folds. Freckled with numerous pale specks and with piliferous spots, the specks often taking the form of two pale broken lines along the upper edge of dark stripe. The piliferous spots are pale with a central black dot, and are best seen in the dark specimens. On joints 4-12 inclusive they are placed 4 in a square on the middle of the back, and four more each side, the two upper lateral ones being on the anterior fold, the stigmata appearing as minute rufous specks between them. Both these spots are often double. The third lateral spot is on the posterior fold and the fourth is subventral and anterior. The hairs proceeding from these spots are long and setaceous. Head horizontal, freckled, pale behind, tinged with green in front and with a few long hairs. Joint 1 also freckled and with a large black piliferous tubercle with a pale basal annulation and in range with middle of dark stripe. Joint 2 with similar black tubercles with a white centre and replacing the uppermost lateral pale spot. There are but two of the small pale dorsal piliferous spots on this joint (between the tubercles) as well as on joint 3. Beneath immaculate, except that the thoracic legs have sometimes a few dusky dots.

In the very dark specimens the head, cervical shield and anal plate remain pale. The cervical shield is then well defined with four small piliferous specks at anterior edge, and the large shiny tubercle forms the extreme anterior angle.

Described from numerous specimens.

 $Pupa.{-0.24}$ inch [$=6^{\rm mm}$] long; rather stout and short, with two minute diverging spines and a few stiff bristles at tip.

In many specimens the subdorsal dark stripe is obsolete or sub-obsolete, but even then the four black tubercles on joints 1 and 2 characterize the larva sufficiently.— [Fourth Rept., p. 46. Fig. 21.

TORTRIX RILEYANA, Grote—Larva—Length, Hickory feeding, 0.60-0.80 inch [= 15—20mm]; Snowberry feeding, 0.40-0.50 inch [=10—12.5mm]. Largest on segment 2, tapering thence gradually to anus. Ground color dull yellow. Covered with large, distinct, black, sealing-wax-like, slightly elevated spots, each giving rise to several fine bristles. These spots are thus arranged on each segment: 2 each side of dorsum the posterior ones widest apart; 1 at sides in the middle of the segment, containing the stigmata in its lower hind margin; 1 smaller and narrower just below this, on a somewhat elevated longitudinal ridge, and 1 round one below this ridge on the posterior part of the segment. Segments 2 and 3 have but one spot each side of dorsum. Two distinct wrinkles on all the segments, more on 2 and 3. Head, cervical shield, and caudal plate black. Venter dirty yellow with black marks; legs ditto.

Chrysalis—Honey-yellow, robust in the middle, and with two transverse rows of minute teeth across the back of each segment.

Perfect Insect—From Hickory—Average expanse 1 inch, length of body, 0.35 [=8.8mm]. Deep ochreous. Fore wings evenly washed with purplish, leaving the fringes and costal edge dark ochreous. The markings take the shape of dark velvety brown rounded maculations, generally of small size and faintly shaded with ochreous on the edges. Three of these subterminally at the base of the wing, subequal, situated interspaceally between the nervures. At a little within the middle of the costa are two fused maculations, the most prominent. Before and beyond these, some faint costal marks. At the extremity of the discal cell, above median nervure, is the first of a

series of maculations, normally four in number but not constant, usually uneven in size. A subterminal series of spots is inaugurated on costa by a large, compound shaded maculation. Below this, over the median nervules, sweeps an outwardly rounded series of small approximate dots. Two dots on costa, within and at the apex, and a faint terminal series of minute streaks is shortly discontinued. Hind wings of a lustrous bright deep ochreous; pale along the costal margin and darker shaded along internal margin. Beneath, as are the hind wings above; both wings immaculate, fore wings the darker. Body and appendages concolorous, bright deep ochreous. Antennæ simple. Numerous bred specimens.

From Snowberry—var. symphoricarpi—Much paler, the fore wings not being as dark as the hind wings of the above. The upper surface of fore wings not washed with purplish but merely of a darker ochreous than the hind wing. The maculations entirely similar but ferruginous, paler and the slighter costal marks obsolete. Legs at base and under thoracic surface almost whitish. Average expanse, 0.62 [=15.5^{mm}]; length of body, 0.30 [=7.5^{mm}]. Described from numerous specimens. Under surfaces exactly alike in both varieties.—[First Rept., p. 154. Fig. 85, and Pl. 2, Figs. 3, 4.

TORTRIX CINDERELLA. N. Sp.—Imago.—Alar expanse exactly 1-2 inch [=12.5mm]. Front wings deep glossy ash-gray, immaculate. Under a lens they have an irrorate appearance, while in certain lights some of the scales appear to form a series of darker transverse sinuous lines. Also scattered over the wing may be noticed a dozen or more reddish scales, which are not sufficient, however, to destroy the uniform immaculate appearance. Head, mouth-parts, antennæ, legs, and abdomen of same color. Hind wings paler and semi-transparent. Fringes of all wings concolorous. Under surface of wings pale nacreous, inclining to pale fulvous around the margins.

Described from two bred specimens.

Larva (Fig. 22, a).—Length 0.50 inch [=12.5^{mm}]. Form of that of Acrobasis nebulo, wrinkled very much in the same manner. Color yellowish-green, the piliferous spots of the same color, but readily distinguished by their polished surface; they are placed in a transverse row on thoracic joints, and on joints 4—12 there are four trapezoidally on dorsum, two laterally on the first fold and one subventral. Stigmata between the two lateral spots, and yellowish. Head and cervical shield gamboge-yellow; only a shade darker than body; labrum and two basal joints of antennæ paler or white, the terminal joint brown; occili on a somewhat crescent-shaped black spot (the most conspicuous character) a second dusky spot at base of head laterally. Legs immaculate.

Described from many specimens. Pupa (Fig. 22, b).—Length 0.25—0.30 inch [=6—7.5^{mm}]. Brown, characterized by a peculiar rounded projection from front of head; by a little pointed prominence at base of each antenna, and each side of penultimate abdominal joint; and by terminating in a broad suppressed piece which produces two decurved hooks. Posterior rim of abdominal joints rasped dorsally, and a slight rasped dorsal ridge near the anterior edge of larger joints. Legs reaching only to end of wing-sheaths. The head-prominence varies in size and slightly in form.—[Fourth Rept., p. 47.

From specimens reared from cranberry-feeding larvæ received from Mr. Jno. H. Brakeley, of Bordentown, N. J., I am satisfied that this is the same species briefly characterized by Packard in the 1st edition of his Guide (p. 334) as Tortrix oxycoccana, and that T. malivorana LeBaron (my Rep. IV, p. 47) is but a dimorphic orange form, subsequently described by Packard as T. vacciniivorana (Hayden's Report of the U. S. Geol. and Geogr. Survey of the Territories 1878, p. 522). The orange and ash-gray specimens are thus bred both from Apple and Cranberry. I have reared both forms from Cranberry and from Apple, and they are undistinguishable in the larva and pupa states. The gray form is often

more or less suffused with orange scales and the orange form less frequently with gray scales. This is the most remarkable case of dimorphism with which I am familiar in the family, and points strongly to the important bearing of biological facts on a true classification. The dimorphic coloring is not sexual, but occurs in both sexes. The eggs of this species are very flat, circular and translucent, with a diameter of 0.7^{mm} , and are laid singly on the underside of the leaf near the mid rib. The species belongs to the genus *Teras*, and as Packard's specific name oxycoccana has priority, the insect should be known as *Teras oxycoccana*, Pack. The insect, according to Mr. Brakeley, who gives an account of it in the Report of the Seventh Annual Convention of the New Jersey Cranberry Association (1879, p. 7), commonly affects, also, the high-bush whortleberry. The gray form of the moth is most frequent in autumn.

Gelechia Gallesolidaginis, N. Sp.—Larra.—Length 0.60 [inch, = 15^{mm}]. Cylindrical. Color dark dull-brown, without shine. Largest on middle segments; tapering from 4th to head, and from 9th to extremity. Each segment impressed transversely in the middle, thus forming two folds, the thoracic segment having other such folds. Six small piliferous spots, two each side of dorsum and one above stigmata, which, together with the stigmata, are shiny and of a lighter brown than the body. Head and cervical shield light shiny-brown.

Chrysalis.—Length 0.50 [inch, = 12.5^{num}]. Mahogany-brown. Form normal. Blunt at extremity.

Perfect moth.—Average length 0.38 [= 9.5 mm]. Alar expanse \circ 0.95 [inch, = 24 mm], \circ 0.75 [inch, = 18.8 mm]. Fore wings deep purplish-brown, more or less sprinkled with carneous. A light carneous band starts from the costa near the base, and curves towards the middle of the inner margin, which it occupies to a little beyond the beginning of the cilia, where it curves upwards towards the tip, reaching only half way up the wing. Here it is approached from above by a somewhat diffuse spot of the same color, which starts from the costa just behind the apex, and runs down to the middle of the wing.

In the plainly marked individuals there is an extra line running from the middle of the inner margin, outwardly obliquing to the middle of the wing, and then back to the inner margin a little beyond where the cilia commences, but in the great majority of specimens this mark is indistinct. Cilia light carneous. Hind wings slate-gray, with the cilia lighter. Antenna finely annulated with the same two dark and light colors. Head, thorax and palpi light with a sprinkling of the dark brown. Body dark, with light annulations. The species varies in the distinctness of its markings, and the light parts of the front wing appear finely sprinkled with brown under the lens. Male generally smaller than female, with the antenna proportionately a little longer.

Described from numerous bred specimens.

It seems to resemble G. longifasciella of Clemens, in coloration and pattern; but unfortunately our late lamented microlepidopterist, failed almost always to give the measurement of the species he described, and it is impossible to tell how much mine resembles that species. Yet, as longifasciella was described from two mutilated specimens, received from A. S. Packard, jr., and as that gentleman has seen my insect and declared it an undescribed species, there can be little doubt of the fact.—[First Rept., p. 175. Pl. II, Figs. 1, 2, 5.

Pterophorus Cardui, N. Sp.—Larva.—Average length 0.60. Largest in the middle of body, tapering thence each way. Color light straw-yellow—greener when young. Somewhat darker, partly translucent, dorsal, subdorsal and stigmatal lines. Two lateral rows of black spots, the lower spots rather smaller and placed behind the

upper ones. A third row above these, and others along the back, but so small that they are generally imperceptible with the naked eye, except on the thoracic segments, being especially distinct on segment 2. Head small, black, sometimes inclining to brown. Cervical shield black, divided longitudinally in the middle by a lighter line. Caudal plate also black. Segment 11, besides the spots above mentioned, has two transverse black marks, the posterior one the largest. Thoracic legs black, the others of the same color as the body.

Described from 12 specimens.

Pupa.—Average length 0.45. Of form of Plate 2, Fig. 14. Soft, dull yellow, with a lateral dusky line each side of dorsum, and another, less distinct, each side of venter. Also dusky about the head and wing-sheaths.

Perfect insect.—Length 0.45; alar expanse 0.80. Front wings bifid, the cleft reaching not much more than ‡ of wing; tawny yellow, with a distinct dark brown triangular spot running from costa to the base of cleft-sometimes a little below it-its posterior margin with a slight concave curve. Three dusky, diffuse longitudinal spots, one placed on the basal third of the wing at costa and frequently reaching along the costa to the triangular spot; one near the interior margin, a little nearer to the base of wing than the last, and one on the outer third of the interior margin. light-colored transverse lines across the end of wing, one very near and parallel with posterior margin, the other bordering the triangular spot behind, and curving across the lower lobe towards posterior angle. The space between these two light lines usually darker than the ground-color. Fringes dark with a light margin. wings trifid, the upper cleft reaching a little beyond the middle, the lower one to the base of wing. Color ashy-brown, the lower lobe produced into a dark angular spot about their middle posteriorly. Antennæ, palpi, head, thorax, and body, tawny yellow; legs of the same color with the exception of the tarsi, which are almost white, with alternate dark brown spots, the spines being black, with dusky tips .-- [First Rept., pp. 180-181. Fig. 98, and Pl. II, Figs. 13, 14.

Zeller has since (1872) referred it to the genus *Platyptilia* (Beitr. zur Kenntn. N. A. Nachtfalter, 2nd part, p. 118), and indicates the difference between it and a very closely allied European species, *P. Zetterstedtii*. He very properly, because of the incongruous compound, drops the conventional ending *dactylus* which I used in the original description.

HETEROPTERA.

NYSIUS DESTRUCTOR, N. Sp.-General color grayish-brown; of shape of N. thumi Wolff. Head either minutely or more coarsely punctate, and more or less distinctly pubescent; the surface usually brown, with a distinct black, longitudinal line each side, broadening on the crown, but generally leaving the orbit of the eyes pale; these lines sometimes more diffuse and occupying the whole surface, except a median brown spot at base of crown, and a narrow, paler spot on the clypeus; ocelli piceous; eyes opaque, either black or slate-color; face sometimes uniformly pubescent and appearing dark grayish-brown; but more generally black each side of rostrum, with a distinct yellowish-brown spot on the cheeks below the eyes; rostrum piceous, paler at base and reaching to hind coxæ; antennæ either pale yellowish-brown or darker brown, the torulus and first joint darkest. Thorax, pronotum narrowing anteriorly, the sides slightly sinuate, irregularly and more coarsely punctate than the head, more or less pubescent, dingy yellow or brown, with a transverse black band near the anterior edge, obscuring the incision and leaving the edge pale, especially in the middle, where there is often a conspicuous pale spot; also five more or less distinct longitudinal dark lines, the central one most persistent and leading on the posterior margin to a pale, shiny, impunctate spot; the callus at hind angles, and sometimes an intermediate spot between it and the median one, and the entire posterior margin, also pale and impunctate; scutellum dark, coarsely punctate, sometimes with a smooth median lon-

gitudinal ridge ending in a pale spot, and with the lateral margins pale; prosternum dark, more or less pubescent, the anterior and posterior margins, and a band outside of coxie, more or less broadly pale; mesosternum and metasternum also dark, with the pale spots outside of coxe. Legs pale yellow, inclining more or less to brown; coxe dark at base, pale at tip; trochanters pale; front and middle femora spotted more or less confluently on the outside with brown; hind femora, & dark brown, except at tips and base; Q spotted only; tibia ringed with brown at base; tarsi marked more or less with brown, especially at tip. Hemelytra either colorless, transparent and prismatic, or distinctly tinged with dingy yellow; shallowly punctate and very finely pubescent, the veins of corium and clavus dingy yellow, with brown streaks, the more constant of these streaks being two on posterior margin of corium, and one at the tip of clavus. Abdomen, & tergum piceous, with the sutures and sides of some of the joints rarely paler; venter piecous, minutely and regularly covered with gray pubescence; Q sutures and spots on tergum more often pale; venter dingy yellow, except at base; Q paler than &, and generally larger. Average length 0.13 inch $[=3.4^{mm}].$

Larra.—Dingy yellow, with more or less distinct longitudinal dark lines, especially on head.

Pupa.—Same color, with more distinct red and brown longitudinal lines, and two little tooth-like, pale yellow processes at inner base of hemelytra pads, indicating the wings; the abdomen paler than the rest of the body.

Described from numerous specimens. I have some, especially males, in which the black so predominates that the paler parts of the head and thorax are scarcely traceable, while in others again the pale parts predominate almost to the exclusion of the black. Indeed, so variable is the species that it is difficult to see wherein some of the specimens differ from the European thymi, or from N. angustatus Uhler, and it is barely possible that future comparison will show specific identity between some or all of the three. But as long as authors fail to give the variation a species is liable to, or the number of specimens a description is drawn up from, it will remain impossible to decide such questions satisfactorily, and I name destructor at the suggestion of our Hemipterist, Mr. P. R. Uhler, of Baltimore, who has examined specimens which I sent him.—[Fifth Rept., p. 113. Fig. 41.

MYTILASPIS POMICORTICIS, N. Sp.—Eggs—from 30 to 100 under each scale; length scarcely 0.01 inch, irregularly ovoid, nearly thrice as long as wide, snow-white, except just prior to hatching, when they become yellowish. Larra—Length of body 0.01 inch, ovoid, thrice as long as wide, pale yellow, with a darker yellow spot near each end; a few short hairs seen around border; two fine anal setæ about half as long as body springing from two lobes between which two spinous hairs are always seen; antennæ quite variable, the joints irregular and not easily resolved, sometimes appearing only 6-jointed, but more generally 7-jointed, with a few hairs, two or three at tip the longest and most persistent; legs with a one-jointed tarsus, a feeble claw, and, among other hairs, four more or less distinctly knobbed ones near tip, the two uppermost longest.

6—Length of body, 0.022 inch [= .5.5^{mm}]; color, translucent carneous-gray; a dorsal transverse band on each abdominal joint, and portions of the mesothorax and metathorax darker, or purple-gray; the members somewhat lighter. Head, sub-triangular; rostrum rudimentary; ocular tubercles, one each side of it, plainly visible, the eyes on the upper surface prominent, dark, and with few facets; antennæ as long as body, 10-jointed, joints 1 and 2 bulbous and sometimes indistinctly separated; 3—9 about four times as long as wide, slightly constricted: 10 half as long and fusiform; all but basal two with a whorl of about eight hairs, slightly clavate and as long as width of joint. Thorax very large, oval; prothoracic portion narrowing in front, composed of two transverse folds, the anterior one having a transverse row of four dusky dots; the mesothoracic portion large and elevated, showing three lateral swellings: a well-defined medio-dorsal plate, rounded in front, shallowly-notched behind, with a medio-

longitudinal suture, and a transverse one dividing it in two, the anterior half pale, the posterior darker; the metathoracic portion showing a sub-triangular scutel, and separated from mesothorax by the transverse band (apodema of Targioni). about as long as body, arising from base of mesothorax, spatulate, closing flat on back in repose, and appearing whitish, finely and uniformly covered with short, stiff hairs; supported by a bifurcate vein, the bifurcation arising from basal fourth, and each fork running near and almost parallel with the wing-margins; balancers dark, with the hook quite long. Legs with the middle pair longest, and—from large size of coxe -further from front than from hind pair; the coxa and femora large and swollen, the latter with a more or less distinct lobe near the base below; the tarsi one-jointed, with a constriction occasionally indicated, and terminating in a single flexible claw, surrounded by four clubbed hairs; the tibiæ and tarsi are quite bristly, but on the femora there are usually but two bristles, one about the middle above, and one on the basal lobe below; the coxe also have one above. Abdomen, seen from above, nearly as long as thorax; appearing shorter from below; 8 joints only discerned; the last joint abruptly narrowed into a large tubercle bearing four bristles on the under side, and sending forth the genital armor in the form of an awl-shaped style as long as the abdomen.

¿Scale—Larval part golden yellow; the anal shield yellowish-brown, sometimes quite pale, inclining to white, flattened, straight, rather more than twice the length of larval scale, increasing in width from tip to end, where it is slightly truncate; attached by a white film; average length, 0.035 inch.

Q—Average length, 0.05 inch; color, pale yellow; jug-shaped and flattened when young, more globular when mature, and twice as long as wide; the cephalo-thoracic portion rounded and entire, but narrower than the abdominal, at the juncture with which it forms a more or less conspicuous lateral projection; on its inferior side is a tubercle, having two longitudinal ridges, and giving rise to a corneous, filiform proboscis, longer than the body, and composed of four separate parts; posterior abdominal joints deeply lobed laterally, with two or three blunt, fleshy hairs to each lobe; anal plate gamboge-yellow, corneous, with an irregular border, presenting two larger, slightly tri-lobed, median projections, and one or more smaller ones each side, furnished with spinous hairs, two especially between the tri-lobed projections aforenamed; five more or less complete sets of secretors visible from below, arranged around anus in form of an arc, the median set with normally 10, the upper laterals 20, and the lower laterals 14; besides these, some six or more blunt tubes, and a series of shorter pointed ones, may be noticed along the border, and doubtless serve as secretors. (See Fig. 32 b.)

Q Scale—Larval scale golden-yellow; median scale somewhat darker; anal shield varying from pale brown to deep purplish-gray, and generally of a color with the bark it is upon. The whole scale is often incanous, but the hoary film easily rubs off; it averages 0.12 inch in length, but is quite variable in form and size, being either straight or curved, narrow and strongly arched, or broad and flatter, but always rounded at the end; the white inferior lamine at sides sometimes show distinctly from above, and give the appearance of a pale border.

The lice, whether 3 or 2, vary in appearance according to position and state of maturity. In making the foregoing descriptions and figures, I have taken what appeared the most natural positions, after examination of many specimens. The 3 abdomen shrinks very much in drying, and the more detailed 2 characters are variable. While the normal number of secretors in the middle set is never more than 10, I have sometimes found but 8 or 9; that of the upper laterals never surpasses 20, but may be as low as 15; while that of the lower laterals is more uniformly 14, though I have sometimes found 16, and at others 12. Opposite sets do not always contain the same number.—[Fifth Rept., pp. 95–96. Figs. 31, 32.

This is the species previously known as Aspidiotus conchiformis, or popularly as the Oyster-shell Bark-louse, and the reasons for separating it are given in the report.

ERIOSOMA ULMI, N. Sp.—Color dark blue. Length to tip of closed wings, exclusive of antennæ, 0.12 [inch,= $3^{\rm mm}$]. Wings hyaline, three times as long as wide, and more pointed at the ends than in *E. pyri*. Costal and subcostal veins, and that bounding the stigma behind, robust and black. Discoidal veins together with the 3d forked and stigmal veins, all slender and black, the forked vein being as distinct to its base as are the others, with the fork but $\frac{1}{3}$ as long as the vein itself and curved in an opposite direction to the stigmal vein. Antennæ 6-jointed and of the same color as the body; joints 1, 2, 4, 5 and 6 of about equal length, joint 3 thrice as long as either. Legs of the same color as body.

The young lice are narrower and usually lighter colored than the mature individuals, varying from flesh or pink to various shades of blue and purple.—[First Rept.,

p. 124.

Professor Thomas (Trans. Ill. St. Hort. Soc., 1876, p. 191) has called it *Erisoma Rileyi** because of *ulmi* being preoccupied by an European species. It belongs to *Schizoneura*. For subsequent remarks see "Notes on the Aphididæ of the United States, etc., by C. V. Riley & J. Monell," (Bull. Hayden's U. S. Geol. & Geogr. Survey, Vol. V, No. 1, p. 3.)

DIPTERA.

ASILUS MISSOURIENSIS N. Sp.-Alar expanse 1.85 [inches, = 47mm]; length of body 1.30 inches [=33mm]. Wings transparent, with a smoky yellow tinge, more distinct around the veins, which are brown. Head pale yellow, sometimes brownish; moustache straw-yellow with a few stiff black hairs below; beard pale straw-yellow; crown very deeply excavated; base of the same pale yellow with short, stiff, yellowish hairs, and a crown of black ones near the border; eyes large, prominent, finely reticulated and almost black; antennæ, first joint black tipped with brown, cylindrical and hairy; second joint black, short, thick and rounded at tip, with a few stiff hairs; third joint as long as first, tapering each way, smooth, black and terminating in a long, brown bristle; proboseis black and nearly as long as face; neck with pale and black hairs. Thorax leaden-black, slightly opalescent with reddish brown at sides, more or less pubescent with pale yellow, especially laterally and posteriorly and in three narrow longitudinal dorsal lines which gradually approach towards metathorax; bearded at sides and behind with a few decurved black bristles, those behind interspersed with a few smaller pale hairs; scutel of the same color, with upwardcurving, black bristles; halteres brown. Abdomen, &, general color dull leaden-yellow, with darker transverse bands at insections; the light color produced by a yellowish pubescence and numerous short close-lying yellow hairs, the dark bands produced by the absence of this covering at the borders of each segment; basal segment broad, bilobed, and with lateral black bristles; segments 6, 7, 8 and anal valves with a decided pink tint, especially 7; 8 but one-third as long as 7 above. Q, broader, flatter, more polished and brassy, with no transverse darker bands, segments 7 and 8 polished black, the latter narrow and longer than any of the others; anus with a few black bristles. Legs, dull purple-brown, with black bristles; thighs very stout, the hind pair rather darker than the others, the two front pair of trochanters with long, yellowish hairs; pulvilli, generally fulvous.

Described from two \$\mathcal{I}\$, and two \$\mathcal{Q}\$, all captured while sucking honey-bees. I have not access to Loew's descriptions, and cannot therefore compare it with already described species; but specimens have been sent to Dr. Wm. LeBaron, of Geneva, Illinois, and to Baron Osten Sacken, of New York, and both these gentlemen are unacquainted with it, and believe it to be new. In the well marked \$\mathcal{J}\$ specimens, the body bears a general resemblance to that of Trupanea [Promachus] vertebrata, Say.—

[Second Rept., pp. 122-123. Fig. 89.

^{*} By typographical error Rilepi.

Baron Osten Sacken has since placed this as a synonym of *Procta*canthus Milbertii Macq. in the second edition of his Catalogue of the described Diptera of North America (1878), p. 81.

Lydella doryphore, New Species.—Length 0.25 [=6mm]. Alar expense 0.48 [= 12mm]. Antennæ black. Palpi fulvous. Face silvery white. Front silvery, tinted with pale golden-brown, with a broad middle stripe black. Thorax cinereous with imperfect black stripes. Abdomen black and silvery-ash, changing into each other when viewed from different angles. When viewed from above: first segment deep black with a posterior border of silver-ash very narrow in the middle, much widened laterally, but abbreviated at the sides of the abdomen. The other segments with the basal half silvery-ash, terminal half black. Legs black. Fourth longitudinal vein of the wings straight after the angle. Posterior transverse vein arcuate.

Described from numerous bred specimens.—[First Rept., pp. 111-112. Fig. 48.

This species is referred by Osten Sacken to the genus *Exorista* of Schiner, *Lydella* not being received as a distinct genus. The name *Lydella* is used also for a genus of Acarina.

EXORISTA FLAVICAUDA, N. Sp.—Length 0.35 to 0.50 inch [=8.5-12.5mm]. Head broader than thorax; face, silvery-white, the cheeks inclining to yellow, with lateral black hairs extending to near the base of antennie, and one stiffer and longer bristle at top of cheeks; front, dusky, ferruginous, with two rows of black converging bristles; divided by a broad depressed stripe of a brighter ferruginous color and without bristles; occiput bright ferruginous; labium ferruginous with hairs of same color; maxipalps rufous; eyes dark mahogany-brown, and perfectly smooth; antennæ, two basal joints rufous, with black hairs, third joint flattened, dusky, and thrice as long as second; seta, black; entire hinder part of head covered with dense white hairs. .Thorax, more decidedly blue than in leucania, broader (instead of narrower) in front than behind; the vitte less distinct; scutel of same color as thorax. Abdomen, stout and more cylindrical than in leucania; first joint dark bluish-gray; second, light bluish-gray, becoming darker along the middle, at sides and at lower border; third joint, like second above, but golden-gray at sides (no rufous); last joint entirely yellow or pale orange, with no other color and but few black bristles around anus. Wings more dusky than in leucanie; alulæ, opaque bluish-white. Legs, black; pulvilli pale yellow.

Described from one captured, 4 bred Q. Space between eyes at occiput fully one-third the width of head.—[Second Rept., pp. 51-52. Fig. 18.

Tachina [Exorista] phycitæ, LeBaron—Imago.—Length, 0.20 inch [=5^{mm}]. Antennæ black, third joint twice as long as the second; face silvery, without bristles at the sides; sides of the front silvery at the lower part, pale golden above; the middle black vitta occupying a little more than half of the width of the inter-ocular space; frontal bristles continued down the face to opposite the end of the second joint of antennæ; palpi blackish-brown; eyes hairy. Thorax black, with the ordinary cinereous stripes scarcely perceptible. Abdomen black, varied with cinereous at the base of the segments; a large fulvous spot on the side of the abdomen occupying nearly the whole of the side of the second segment, half or more of the third, and sometimes a small spot on the first; bristles on the middle as well as at the hind-margin of the second and third segments. Venation of the wings of the usual type; first posterior cell almost closed, before the end of wing; fourth long vein slightly curved after the angle; fifth long vein prolonged to the margin; hind cross vein moderately sinuous. Tarsal claws and pulvilli unusually long.

Female? A single specimen, a very little larger than the others, was obtained from the same lot of leaf-crumplers, which possibly may be the $\mathfrak P$ of the same species. It differs as follows: Front broader; antennæ dark brown; the cinereous markings of the body more distinct; the tip of abdomen fulvous, but without the fulvous spot at the sides; and with the tarsal claws of ordinary length.

This species appears to belong to the subgenus *Exorista* of Meigen, closely allied to *Tachina* proper, and differing from it chiefly in having the eyes hairy, and in the presence of bristles on the middle, as well as at the hind margin of the second and third abdominal segments, whereas *Tachina* has only the latter.—[Fourth Rept., p. 40-41.

This species was simultaneously published by Dr. LeBaron in his 2d Rept. Ins. Ill., p. 123. It is retained in *Exorista* by Osten Sacken.

Anthomyia zeae Q, N. Sp. (Pl. 2, Fig. 24). Length 0.20 [inch, =5^{mm}]; alar expanse 0.38 [inch, =9.5^{mm}]. Antennæ black; style microscopically pubescent; front, fulvous, with a distinct, rather narrow, brownish, cinereous margin; face and orbits brownish-white; palpi and proboscis black; ocellar area somewhat heart-shaped; thorax and abdomen pale yellow-brownish cinereous, with minute black points at the insertion of the bristles; thorax with an indistinct middle stripe of brown; legs black, tinted with cinereous; poisers pale ochre-yellow; scales small, the upper valve larger than the lower.—[First Rept., p. 155. Figs. 86, 87, and Pl. II, Fig. 24.

Anthomyia radicum (Linn.) var. calopteni—Egg—Oval, smooth, white, 0.04 inch long.

Larva—Skin unarmed, 0.24 inch [$=6^{\rm min}$] long when extended, of the normal form, the mandibular hooks black, quite conspicuous, and diverging at base. Prothoracic spiracles elongate. Anal spiracles minute, yellowish-brown, with the 8 fleshy surrounding tubercles, small.

Pupa—Pale-brown, rounded at each end, with the prothoracic spiracles and lips anteriorly, and the anal spiracles and lower tubercles posteriorly, showing as minute points.

Imago—Q. Average expanse 0.48 inch [=12mm]. General color ash-gray with a ferruginous hue, especially above, and a more or less intense metallic reflection. Face with white reflections below; eyes smooth, brown, encircled by the ground color, and this behind and on forehead bordered by a brown line; 2 similar lines at back of head from upper corners of eyes and approaching to neck; forehead dusky-brown, becoming bright yellowish-red toward base of antenne, and the brown forking at right angles around occiput. Trophi and antenne black, the style simple and somewhat longer than the whole antenne. Thorax with three dusky longitudinal lines, obsolete behind; legs black, with cinereous hue beneath; wings faintly smoky, with brown-black veins, the discal cross-vein straight and transverse, the outer one bent and more oblique; balancers crumpled, yellowish. Abdomen with faint dusty mediodorsal spots, broad at base, tapering and obsolescing toward end of each joint.

In the δ , aside from the larger eyes, stronger bristles, and narrower, less tapering abdomen with its additional joint—all characteristic of the sex—the face is whiter, and the medio-dorsal dark mark of abdomen continuous.

Described from 25 specimens of both sexes, reared from locust-egg-feeding larvæ.

Specimens bred from cabbage and radish roots, and others in my cabinet taken from the burrows (made in Osage Orange in Missouri) of Crabro stirpicola Pack.; do not differ specifically.—[Ninth Rept., p. 95.

For further details see First Rept. of the Commission (pp. 285-9), where the species is shown to be the *Anthomyia angustifrons* of Meigen.

ORTHOPTERA.

CALOPTENUS ATLANIS N. sp.—Length to tip of abdomen 0.70—0.85 inch [=17.5—Amm]; to tip of closed wings 0.92—1.05 inches [=23—26mm]. At once distinguished from femur-rubrum by the notched character of the anal abdominal joint in the male and by the shorter, less tapering cerci; also by the greater relative length of wings which extend, on an average, nearly one-third their length beyond the tip of the abdomen in the dried specimens: also by the larger and more distinct spot on the wings—in all which characters it much more closely resembles spretus than femur-rubrum.

From spretus, again, it is at once distinguished by the smaller size, the more distinct separation of the dark mark running from the eyes on the prothorax and of the pale line from base of wings to hind thigh; also by the anal joint in the 3, tapering more suddenly and by the two lobes forming the notch being less marked. From both species it is distinguished not only by its smaller size but by the deeper, more livid color of the dark parts, and the paler yellow of the light parts—the colors thus more strongly contrasting.

6J's, Q7's from New Hampshire. Just as the typical femur-rubrum is at once distinguished from the typical spretus by the characters indicated; so Atlanis, though structurally nearer to spretus, is distinguished from it at a glance by its much smaller size and darker, more marbled coloring. The contrast is all the greater in the living specimens, and I have seen no specimens of spretus that at all approach it in these

respects.

Whether this is the femur-rubrum as defined by DeGeer or by Harris, it is almost impossible to decide, though Harris's figure of femur-rubrum better represents it than the true femur-rubrum, as subsequently defined by Thomas, and as found in Illinois and Missouri.—[Seventh Rept., pp. 169-170.

For further details and structural differences between it and C. spretus

see First Report of the Commission.

LIST OF DESCRIPTIONS OF ADOLES-CENT STATES.

In making out the following list of descriptions of adolescent states, etc., that appeared in the Reports, the nomenclature there used is retained. Unless otherwise stated the insects, in the particular states indicated, were at the time unknown or undescribed, the descriptions first appearing in the Reports. Those published in connection with the preceding descriptions of new species are omitted here:

HYMENOPTERA.

Nematus ventricosus; larva: IX, 21. (Previously described by several writers.) Pristiphora grossulariæ; larva: IX, 26. (Description quoted from Walsh.)

Emphytus maculatus; larva and pupa: IX, 28-29. (Previously described by me in the Prairie Farmer, May 25, 1867.)

Lophyrus abbotii; larva: IX, 32.

Lophyrus lecontei; larra: IX, 33. (This and abbotii both partially described by me in the Prairie Farmer, November 10, 1866; May 25, 1867; May 2, 1868, and in the Prairie Farmer Annual, 1869.)

Tiphia inornata; larva: VI, 126.

COLEOPTERA.

Harpalus (probably herbivagus Say); larva: IX, 97.

Harpalid; larva: I, 59.

Mysia 15-punctata; larva: IV, 18.

Chilocorus bivulnerus; larva and pupa: I, 16. .

Hippodamia convergens; larra and pupa: I, 112. (Previously mentioned in the Am. Ent. I, 46, and elsewhere.)

Coccinella picta; larva: V, 101.

Passalus cornutus; larva and pupa: IV, 140-141. (Previously mentioned by Burmeister and by Walsh.); egg: V, 55.

LACHNOSTERNA QUERCINA; egg: V, 55.

Pelidnota punctata; larva and pupa: III, 78-79. (First described by me in Am. Ent. II, 295.)

Telephorus bilineatus; larva: IV, 30. (First described by Packard.)

Chauliognathus pensylvanicus: larva: I, 57. (Quoted from the Am. Ent. I, 35.)

Chrysobothris femorata; eggs: VII, 73: larva, I, 46. (Previously described by Fitch and others); eggs, larva, and pupa: VII, 73.

Sinoxylon basilare; larva and pupa: IV, 54. Corynetes rufipes; larva and pupa: VI, 101, 102.

Prionus laticollis; larva: I, 126; larva and pupa: II, 87; egg: V, 56.

* laticollis.)

Saperda bivittata; pupa: I, 43. (Previously described by Harris.)

Lema trilineata; larva and pupa: I, 99. (From the Prairie Farmer; and the Am. Ent. I, 26. Previously described by Harris and others.)

Doryphora juneta; larva: I, 106. (First described in the Am. Ent. I, 43.)

Doryphora 10-lineata; eggs and larva: I, 105. (From the Am. Ent. I, 43. Previously described by me in Prairie Farmer Aug. 8, 1863.

Colaspis flavida; larva: III, 84, and IV, 34.

Coscinoptera dominicana; eggs and larva: VI, 128, 130.

Haltica chalybea; larra and pupa: III, 81. (Quoted from Am. Ent. II, 327. The larva first described by Packard, Guide, p. 507.)

Blepharida rhois; egg, larva and pupa: VI, 121.

Cassida bivittata; larva and pupa: II, 61. (First described by me in the Prairie Farmer Annual for 1868, p. 53.)

Cassida aurichalcea; egg: II, 60; larva and pupa: II, 62. (Previously described by Harris.)

Cassida pallida; larva: II, 62.

Cassida guttata; larva and pupa: II, 63. Cassida nigripes; larva and pupa: II, 63, 64.

Bruchus pisi; egg: III, 47.

Tenebrionid?; larva: VI, 113. (Previously described as the larva of Eupsalis by Harris.)

Eupsalis minuta; larva and pupa: VI, 115, 116. (The pupa first described by Harris.)

Conotrachelus cratægi; larva and pupa: III, 39.

Baridius trinotatus; larva and pupa: I, 95. (From the Am. Ent. I, 22.)

Anthonomus quadrigibbus; egg: III, 31; larva and pupa: III, 35.

LEPIDOPTERA.

Papilio philenor; larca and pupa: II, 117. (Previously described by Smith and Abbot, and by Boisduval and Le Conte; also by Harris in Ent. Corr.)

Pieris protodice; larva and pupa: II, 104. (Published simultaneously in the Am. Ent. II, 77.)

Pieris rapie; larva and pupa: II, 108. (Previously described by various authors.)

Danais archippus; egg: III, 144.

Limenitis disippus; egg and larva: III, 154. (The mature larva previously described by various authors.)

Apatura lycaon; egg, larva and pupa: VI, 146, 147. (The larva and pupa badly described by Boisd. & Lec.)

Apatura herse; egg, larva and pupa: VI, 148. (The larva and pupa badly described by Boisd. & Lec.)

Paphia glycerium; larva and pupa: II, 127. (First published by me in Am. Ent. II, 123); egg and larval changes: V, 146.

Megathymus yuccae; egg, larva and larval changes: VIII, 174, 181. (First published by me in Trans. St. Louis Ac.); IX, 129.

Cherocampa pampinatrix; egg, larva and pupa: II, 71, 72. (Previously described, except egg, by various authors.)

Philampelus achemon; young and full grown larvæ and pupa: II, 74, 75. (Previously described by various authors.)

Philampelus satellitia; eggs, young and full grown larvæ, and pupa: II, 76-78. (Previously described, except egg, by various authors.)

Sphinx 5-maculata; larva pupa: I, 95. (From the Am. Ent. I, 23; previously described by several authors.)

Thyreus Abbotii; larva and pupa: II, 78, 79. (Previously described by various authors.)

Deilephila lineata; two forms of larva: III, 141, 142. (Previously described, but not in connection. Quoted from the Am. Ent., II, 258.)

Ægeria acerni; larva and pupa: VI, 110.

Ægeria rubi; larva: VI, 113.

Psychomorpha epimenis; larva and pupa: III, 64, 65; VI, 88. (First described as the possible larva and pupa of Eud. unio, Am. Ent. II, 152 and in 1st Rept., p. 84.)

Eudryas grata; eggs, larva and pupa: II, 83; VI, 89, 90. (The larva previously described by Harris and others.)

Eudryas unio; larva and pupa: VI, 92. (First described by Lintner.)

Alypia octomaculata; larva: I, 136, (previously mentioned by Fitch); II, 80, published simultaneously in the Am. Ent., II, 151, (previously described in Harris' Corr.); VI, 94.

Procris americana; larra and pupa: II, 86. (First described by Harris.)

Callimorpha fulvicosta; larra: III, 134.

Spilosoma virginica: larva and pupa: III, 69. (Previously described by various authors.)

Hyphantria textor; larra: III, 132. (First described by Harris.)

Ecpantheria scribonia; larra: IV, 143. (Previously described by other authors.)

Bombyx mori; egg and larva: IV, 86. (Previously well known.)

Attacus cecropia; larval changes: IV, 106. (Quoted from the Am. Ent. II, 100.)

Attacus cynthia; larval changes: IV, 117. (Previously described by other authors.)
Attacus promethea; larval changes: IV, 121. (Partially given by other authors previously.)

Attacus luna; larval changes: IV, 124. (Previously given by Lintner.)

Attacus polyphemus; larval changes: IV, 126.

Attacus yama-maï; larval changes: IV, 132. (Previously described by other authors.)

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Agrotis inermis; larva and pupa: I, 74.

Agrotis cochranii; larva and pupa: I, 76. (First described by me in the Prairie Farmer, June 22, 1867.)

Agrotis clandestina; larva and pupa: I, 79. (Previously mentioned by Harris.)

Agrotis telifera; larva and pupa: I, 81. (Described by me in the Prairie Farmer, June 22, 1867; and previously described in Europe, where the species also occurs and is known as A. ypsilon.)

Agrotis subgothica; larva: I, 82.

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Hadena subjuncta; larva and pupa: I, 85.

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Eufitchia ribearia; egg, larva and pupa: IX, 3.4. (The larva first described by Fitch.)
Phacellura nitidalis; larva: II, 67.

Asopia costalis; larra and pupa: VI, 106. (The larva mentioned by Harris, but first described by Walsh in the Prac. Ent., and first bred and determined by me, Prairie Farmer, April 20, 1857.)

Phycita nebulo: larva and pupa: IV, 41. (The larva first described by LeBaron.)

Pempelia grossularie: larva and pupa: I, I41. (Larva previously described by Fitch and by Packard.)

Tortrix rileyana; larva and pupa: I, 154.

Anchylopera fragariæ; larva: I, 143. (First described in the Am. Ent., I, 90.)

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Walshia amorphella; larva and pupa: II, 133.

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Œta compta; larra and pupa: I, 152.

Pterophorus periscelidactylus; larva and papa: I, 137; III. 66. (Previously described by Fitch.)

Pterophorus carduidactylus; larva and pupa: I, 180.

Pronuba yuccasella; larva: V, 155; pupa, VI, 131 (from Trans. St. Louis Acad.); egg, VI, 133 (from Am. Nat.).

Orgyia leucostigma; eggs, larva and pupa: I, 144-146. (Previously described by others.)

Thyridopteryx ephemeræformis; eggs, larva and pupa: I. 148, 149. (Previously described by others.)

Hæmatopis grataria; eggs, larva and pupa: I, 179.

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Strachia histrionica; eggs, larva and pupa: IV, 37.

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Cicada septemdecim; egg and young larva: I, 25. (The eggs previously described by several writers.)

Peciloptera pruinosa; eggs: V, 122.

Ceresa bubalus; eggs: V, 121.

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Phylloxera vastatrix; various forms: VI, 66 (previously described elsewhere and byothers); impregnated egg: VIII, 159. (Previously described by me in the Trans. St. Louis Acad. for Oct. 18, 1875, and independently by Balbiani in the Comptes rendus de l' Ac. d. Sc. Paris for Oct. 4, 1875.)

Eriosoma pyri; larva: I, 120. (From the Am. Ent., I, 82; previously described by

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Tabanus atratus: barra and papa: II, 139, 131. (Previously described, but not specifically identified, by Walsh.)

Erax bastardi; larva and pupa: II, 124.

Bombyliid; larva: IX, 96.

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Phaneroptera curvicauda; eggs: V, 124, and VI, 165; larva and pupa: VI, 166.

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Phylloptera oblongifolia; eggs: V, 123. (See Microcentrus.)

Platyphyllum concavum; eggs: V, 124; VI, 167.

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The following list includes the species, already known, of which a complete redescription of the adult is given in the Reports, either because the original description was in a foreign language, or not easily accessible, or of one sex only, or for other reasons.

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Tiphia inornata Say: VI, 126.

Cryptus extrematis Cress.: IV, 111.

Pezomachus minimus Walsh: II, 52. (From Walsh.)

Ophion purgatus Say: II, 53.

Mesochorus vitreus Walsh: II, 52. (From Walsh.)

Pimpla annulipes Brullé: V, 49.

Macrocentrus delicatus Cress.: V, 50.

Microgaster militaris Walsh: II, 52. (From Walsh.)

Chalcis mariæ Riley: IV, 110. (From the Am. Ent., II, 101-102.)

Isosoma vitis Saunders: II, 93. (From Saunders.)

Antigaster mirabilis Walsh: VI, 163. (From the Am. Ent., II, 169-170.)

Pristiphora grossularia Walsh: IX, 26-27. (From the Prac. Ent., I, 123.)

Nematus ventricosus (Klug): IX, 22. (From the Prac. Ent., I, 120-121, and the Am. Ent., II, 16-17.)

Emphytus maculatus Nort.: IX, 28.

Lophyrus LeContei Fitch: IX, 33.

COLEOPTERA.

Doryphora 10-lineata Say, var.: IX, 40.

Sphenophorus zeæ Walsh: III, 59. (From Walsh.)

Scolytus caryæ Riley: V, 107. (Female first described in Prairie Farmer Feb. 2, 1867.)
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Apatura lycaon (Fabr.): VI, 144.

Apatura herse (Fabr.): VI, 144.

Megathymus yuccæ (Walk.): VIII, 175-176.

Ægeria polistiformis Harr.: III, 76.

Ægeria acerni Clem.: VI, 110.

Prodenia autumnalis Riley: III, 116-117. (From Am. Ent., II, 365.) [See Notes.]

Leucania unipuncta Haw.: II, 56.

Leucania albilinea Guen.: IX, 56-57.

Acronycta oblinita Sm. & Abb.: III, 71.

Amphipyra pyramidoides Guen.: III, 74.

Celæna renigera Steph.: I, 86.

Hadena subjuncta Gr. & Rob.: I, 85.

Noctua clandestina Harr.: I, 79.

Agrotis inermis Harr.: I, 74.

Agrotis cochranii Riley: I, 75.

Agrotis telifera Harr.: I, 81.

Agrotis jaculifera Guen.: I, 83.

Anisopteryx pometaria *Harr.*: VIII, 15-17. (From the Trans. St. Louis Acad. Sc.) Paleacrita vernata (Peck): VIII, 15-17. (From the Trans. St. Louis Acad. Sc.)

Asopia costalis (Fab.): VI, 107.

Pempelia grossulariæ (Pack.): I, 141.

Walshia amorphella Clem.: II, 133.

Penthina vitivorana Pack.: I, 135.

Euryptychia sa igneana Clem.: II, 134. (From Clemens.)

Tortrix rileyana Grote: I, 154.

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Holcocera glandulella Riley: IV, 145. (From the Can. Ent., IV, 13-19.)

Pronuba yuccasella Riley: V, 150, 151, 155; VI, 131-132. (Both from the Trans. St. Louis Acad. Sc.)

Eta compta Clem.: I, 153.

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Mytilaspis pinifoliæ (Fitch): V, 99.

Eriosoma pyri (Fitch): I, 120.

Phylloxera vastatrix *Planchon*; VIII, 159 (From Trans. St. Louis Acad. Sc.); VI, 66-67; VII, 93, 99.

Phylloxera Rileyi Lieht.: IV, 66; VI, 64, 86; VII, 118-120.

Phylloxera caryæ-gummosa Riley: VII, 118. (From the Comptes Rendus, Paris Acad. of Sci., Dec. 14, 1874.)

Phylloxera caryæ-ren Riley: VII, 118. (From the Comptex Rendus, Paris Acad. of Sci., Dec. 14, 1874.)

Phylloxera caryæ-fallax Riley: VII, 118. (From the Comptes Rendus, Paris Acad. of Sci., Dec. 14, 1874.)

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Erax bastardi Macq: II, 124.

Pipiza radicum Walsh & Riley: I, 121-122. (From the Am. Ent. I, 83-84.)

Exorista leucaniæ Walsh: II, 51. (From Walsh.) Tachina bifasciata (Fabr.): V, 140.

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Caloptenus femur-rubrum (DeG.): VII, 126-128.

Caloptenus atlanis Riley: VIII, 117.

Caloptenus spretus (Thos.): VII, 128-132; VIII, 117.

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Hoplophora arctata Riley: VI, 81. (From Trans. St. Louis Acad., III, 216.) Tyroglyphus phylloxeræ Riley & Planchon: VI, 81. (From Trans. St. Louis Acad., III, 215.)

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LIST OF ILLUSTRATIONS.

The illustrations in the Reports were prepared at the author's expense, neither the State nor the Board of Agriculture making any provision therefor. The wood-engraving was done for the most part in St. Louis, by either Wm. Macwitz, Emile Lampe, or Wittemberg & Sorber. Some of it was done by Van Ingen & Snyder, of Philadelphia. A few of the later illustrations are by photo-engraving, and Figs. 50-52 of the 8th Report show the first attempt to combine this process with lithography. In the following list, all drawings were made from nature by the author unless otherwise stated, and when the figure is enlarged the natural size, unless otherwise apparent or stated in this list, will be found indicated in hair-line. The nomenclature of the Reports is retained.

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- Fig. 83. White-marked Tussock Moth (Orgyia lencostigma, Sm. & Abb.), male.
- Fig. 84. Bag-worm (Thyridopteryx ephemeræformis Haw.); a, larva; b, male chrysalis; c, female moth; d, male moth; e, female chrysalis in bag, sectional view; f, caterpillar and bag; g, very young caterpillars in their bags.

Fig. 85. Walnut Tortrix (Tortrix Rileyana Grote); a, larva; b, side view of one segment.

Fig. 86. Seed-corn Maggot (Anthomyia zew Riley); a, enlarged; b, puparium.

Fig. 87. Seed-corn Maggot (Authomyia zew Riley); kernels of corn containing the maggot.

Fig. 88. White Grub or May-beetle (Lachnosterna quercina, Knoch); 1, pupa; 2, the grub; 3, 4, the beetle.

Fig. 89. White Grub attacked by fungus.

Fig. 90. American Meromyza (Meromyza americana Fitch); a, infested stalk; b, maggot; c, pupa.

Fig. 91. Sheep Head Maggot (Estrus oris Linn.); 1 and 2, the Gad-fly; 3, the puparium; 4, larva, dorsal view; 5, larva, ventral view; 6, younger larva; a, head; b, corneous appendages at anus; c, spiracles.

Fig. 92. Bee-moth (Galleria cereana Fabr.); a, larva; b, cocoon; c, pupa; d, e, moth.

Fig. 93. Nebraska Bee-killer (Trupanea apivora Fitch = Promachus Fitchii O. S.).

Fig. 94. Camel-cricket (Mantis carolina, Linn.); a, female; b, male.

Fig. 95. Camel-cricket (Mantis carolina, Linn.), egg-masses.

Fig. 96. Solidago Gall of Gelechia gallesolidaginis Riley; a, section of gall; b, whole gall; c, orifice through which the moth escapes; d, excrement of the larva; e, larva.

Fig. 97. Eurytoma Bolteri Riley; antennæ of 3 and 9.

Fig. 98. Thistle Plume-moth (Pterophorus carduidactylus Riley = Pt. cardui Zellemend), anterior and posterior joints of the larva.

REPORT II.

Fig. 1. Chinch-bug (Micropus leucopterus, Say).

Fig. 2. Chinch-bug (Micropus leucopterus, Say), short-winged form.

Fig. 3. Spotted Ladybird (Hippodamia maculata, DeGeer). [From Practical Entomologist.]

Fig. 4. Trim Ladybird (Coccinella munda Say).

Fig. 5. Lacewing (Chrysopa sp.). [After Westwood.]

Fig. 6. Insidious Flower-bug (Anthocoris insidiosus, Say).

Fig. 7. Spined Soldier-bug (Arma spinosa Dallas).

Fig. 8. Ash-gray Leaf-bug (Piesma cinerea, Say). Fig. 9. Flea-like Negro-bug (Corimelana pulicaria, Germar).

Fig. 10. Bordered Soldier-bug (Stiretrus fimbriatus, Say).

Fig. 11. Tent-caterpillar of the Forest (Clisiocampa sylvatica Harr.).

Fig. 12. Cotton-worm (Anomis xylina, Say); a, egg; b, worm, one-third grown; d, top view; c, side view of full-grown worm; e, cocoon; f, chrysalis. [Adapted from Glover.]

Fig. 13. Cotton-worm Moth (Anomis xylina, Say); a, with wings expanded; b, wings closed.

Fig. 14. Army-worm (Leucania unipuncta Haw.).

Fig. 15. Army-worm (Leucania unipuncta Haw.), chrysalis.

Fig. 16. Army-worm Moth (Leucania unipuncta Haw.).

Fig. 17. Red-tailed Tachina-fly (Exorista leucaniæ Kirk.).

Fig. 18. Yellow-tailed Tachina-fly ($Exorista\ flavicauda\ Riley$).

Fig. 19. Glassy Mesochorus (Mesochorus vitreus Walsh). [After Walsh.]

Fig. 20. Pezomachus minimus Walsh. [After Walsh.]

Fig. 21. Pezomachus minimus Walsh; bunch of cocoons. [After Walsh.]

Fig. 22. Chalcis albifrons Walsh. [After Walsh.]

Fig. 23. Microgaster militaris Walsh. [After Walsh.]

Fig. 24. Glyphe viridascens Walsh. [After Walsh.]

Fig. 25. Ophion purgatus Say.

Fig. 26. Clubbed Tortoise-beetle (Deloyala clavata, Oliv.).

Fig. 27. Two-striped Sweet-potato Beetle (Cassida bivittata Say); 2, larva; 3, pupa; 4, beetle.

- Fig. 28. Chelymorpha cribraria, Fabr.; pupa (enlarged). [After Packard.]
- Fig. 29. Chelymorpha cribraria, Fabr. (enlarged). [After Packard.]
- Fig. 30. Physonota quinquepunctata Walsh & Riley; a, larva; b, beetle.
- Fig. 31. Golden Tortoise-beetle (Cassida aurichalcea, Fabr.), egg.
- Fig. 32. Two-striped Sweet-potato Beetle (Cassida bivittata Say), larvæ.
- Fig. 33. Golden Tortoise-beetle (Cassida aurichalcea, Fabr.), larva; a, natural size; b, enlarged and with the dung taken from the fork.
- Fig. 34. Golden Tortoise-beetle (Cassida aurichalcea, Fabr.); a, pupa; b, beetle.
- Fig. 35. Mottled Tortoise-beetle (Cassida guttata, Oliv.); a, larva; b, pupa.
- Fig. 36. Mottled Tortoise-beetle (Cassida guttata, Oliv.).
- Fig. 37. Black-legged Tortoise-beetle (Cassida nigripes Oliv.); a, larva; b, larva cleaned and enlarged; c, pupa (enlarged).
- Fig. 38. Black-legged Tortoise-beetle (Cassida nigripes Oliv.).
- Fig. 39. Striped Cucumber-beetle (Diabrotica vittata, Fabr.). [From Practical Ento-mologist.]
- Fig. 40. Striped Cucumber-beetle (Diabrotica vittata, Fabr.), larva; a, dorsal view; b, side view.
- Fig. 41. Striped Cucumber-beetle (Diabrotica vittata, Fabr.) pupa; 1, ventral; 2, dorsal view.
- Fig. 42. Twelve-spotted Diabrotica (Diabrotica 12-punctata, Oliv.). [From Practical Entomologist.]
- Fig. 43. Pickle-worm (Phacellura nitidalis Cram.); a, natural size; b, head and first joints, enlarged; c, side view of a joint, enlarged; d, cervical shield, enlarged; e, side of first joint, enlarged; f, 2d joint from above, enlarged; g, anal joint, enlarged; h, cocoon; i, moth, male.
- Fig. 44. Hog-caterpillar of the Vine (Cherocampa pampinatrix, Sm. & Abb.).
- FIG. 45. Hog-caterpillar of the Vine (Charocampa pampinatrix, Sm. & Abb.), chrysalis.
- Fig. 46. Hog-eaterpillar of the Vine (Charocampa pampinatrix, Sm. & Abb.), moth.
- FIG. 47. Microgaster cocoons or Hog-caterpillar of the Vine (Chur. pampinatrix, Sm. & Abb.) [After Harris.]
- Fig. 48. Microgaster = Apanteles. [After Harris.]
- Fig. 49. Achemon Sphinx (Philampelus achemon, Drury), caterpillar.
- Fig. 50. Achemon Sphinx (Philampelus achemon, Drury), chrysalis.
- Fig. 51. Achemon Sphinx (Philampelus achemon, Drury), moth.
- Fig. 52. Satellite Sphinx (Philampelus satellitia, Linn.); a, full-grown larva; b, its position at rest; c, young larva.
- Fig. 53. Satellite Sphinx (Philampelus satellitia, Linn.), moth.
- Fig. 54. Abbot Sphinx (Thyreus Abbotii Swainson); larva and moth.
- Fig. 55. Eight-spotted Forrester (Alypia octomaculata, Fabr.); a, caterpillar; b, side view of one joint; c, moth.
- Fig. 56. Beautiful Wood-nymph (Eudryas grata, Fabr.).
- Fig. 57. ! Pearl Wood-nymph (Endryas unio, Hiib.); a, larva; b, side view of one segment enlarged; c, hump on 11th joint, enlarged. (See 3d Rep., Fig. 25.)
- FIG. 58. American Procris (*Procris americana* Boisd.); a, larva; b, chrysalis; c, cocoon; d, e, moth.
- Fig. 59. American Procris (Procris americana Boisd.), larvæ.
- Fig. 60. Gigantic Grape-root Borer (Prionus laticollis, Drury).
- Fig. 61. Broad-necked Prionus (Prionus laticollis, Drury), female.
- Fig. 62. Gigantic Grape-root Borer (Prionus laticollis, Drury), pupa.
- Fig. 63. Tile-horned Prionus (Prionus imbricornis, Linn.), male.
- Fig. 64. Grape-seed Maggot (Isosoma vitis Saunders).
- Fig. 65. Joint-worm Fly (Isosoma hordei, Harr.); a, female; b, male; c, ♀ antenna;
 d, ♂ antenna; e, ♀ abdomen; f, ♂ abdomen.

- FIG. 66. Canker-worm; a, eggs of Fall Canker-worm (Anisopteryx pometaria Harr.); b, five eggs of same, enlarged; c, larva of Spring Canker-worm (Paleacrita vernata, Peck), d, cocoon, e, crysalis, f, male moth, g, female moth—all probably of vernata. (See 6th Rept., p. 29). [a, b, c, d, e, after Harris; f, g, after Packard.]
- Fig. 67. Spring Canker-worm (Paleacrita vernata, Peck), head enlarged.
- Fig. 68. Mite (Nothrus ovivorus Pack.), enlarged. [After Packard.]
- Fig. 69. Rummaging Ground-beetle (Calosoma scrutator, Fabr.).
- Fig. 70. Fiery Ground-beetle (Calosoma calidum, Fabr.).
- Fig. 71. Fraternal Potter-wasp (Eumenes fraterna Say); b, clay nest; c, same cut open.
- Fig. 72. Southern Cabbage-butterfly (Pieris protodice Boisd.); a, caterpillar; b, chrysalia
- Fig. 73. Southern Cabbage-butterfly (Pieris protodice Boisd.), female.
- Fig. 74. Southern Cabbage-butterfly (Pieris protodice Boisd.), male.
- Fig. 75. Potherb Butterfly (Pieris oleracea Boisd.). [After Harris.]
- Fig. 76. Potherb Butterfly (Pieris oleracea Boisd.), chrysalis. [After Harris.]
- Fig. 77. Imported Cabbage-butterfly (*Pieris rapæ* Schrank.); a, larva; b, chrysalis. [After Curtis.]
- Fig. 78. Imported Cabbage-butterfly (Pieris rapæ Schrank.), female.
- Fig. 79. Imported Cabbage-butterfly (Pieris rapæ Schrank.), male.
- Fig. 80. Butterfly Net: 5, socket; 6, ring.
- Fig. 81. Cabbage Plusia (*Plusia brassica* Riley); a, caterpillar; b, chrysalis in cocoon; c, moth, male.
- Fig. 82. Zebra-caterpillar (Mamestra pieta Harr.); a, caterpillar; b, moth.
- FIG. 83. Tarnished Plant-bug (Capsus oblineatus Say).
- Fig. 84. Philenor Swallow-tail (Papilio philenor Drury), caterpillar.
- Fig. Philenor Swallow-tail (Papilio philenor Drury); a, chrysalis, back view; b, lateral outline.
- Fig. 86. Philenor Swallow-tail (Papilio philenor Drury).
- Fig. 87. Cottonwood Dagger (Acronycta populi Riley); caterpillar.
- Fig. 88. Cottonwood Dagger (Acronycta populi Riley).
- Fig. 89. Missouri Bee-killer (Asilus missouriensis Riley).
- Fig. 90. Wing of Promachus (a), Asilus (b), Erax (c).
- Fig. 91. Silky Asilus (Asilus sericeus Say). [After Harris.]
- Fig. 92. Erax bastardi Macq., larva.
- Fig. 93. Erax bastardi Macq.; a, fly; b, pupa.
- Fig. 94. Goat-weed Butterfly (Paphia glycerium Doubl.); a, caterpillar; b, chrysalis.
- Fig. 95. Goat-weed Butterfly (Paphia glycerium Doubl.), male.
- Fig. 96. Goat-weed Butterfly (Paphia glycerium Doubl.), female.
- Fig. 97. Black Breeze-fly (Tabanus atratus Fabr.); a, larva; b, pupa shell; c, fly.
- Fig. 98. False-indigo Gall-moth (Walshia amorphella Clem.); a, moth; b, caterpillar; c, gall; d, section of gall, showing larva in burrow.
- Fig. 99. Misnamed Gall-moth (Euryptychia saligneana Clem.); a, moth; b, gall with protruding pupa-shell.

REPORT III.

- Fig. 1. Plum Curculio (Conotrachelus nenuphar, Herbst); a, larva; b, pupa; c, curculio, enlarged; d, punctured plum with curculio resting on it, natural size.
- Fig. '2. The Hull Curculio-catcher.
- Fig. 3. The Hull Curculio-catcher; viewed from beneath; a, slide for closing central hole, d; b b, handles; c c, wheels; e, f, position of bag.
- Fig. 4. The Hull Curculio-catcher; viewed from above.
- Fig. 5. Strips of sheeting for closing up the tree-way in Hull's Curculio-catcher.
- Fig. 6. The Hooten Curculio-catcher.

- Fig. 7. Sigalphus Curculio-parasite (Sigalphus curculionis Fitch); a, male; b, female; c, antenna.
- Fig. 8. Sigalphus Curculio-parasite (Sigalphus curculionis Fitch); a, larva; b, cocoon; c, pupa.
- Fig. 9. Porizon Curculio-parasite (Porizon conotracheli Riley); a, ♀; b, ♂; c, antenna.
- Fig. 10. Apple Curculio (Anthonomus quadrigibbus Say); a, natural size; b, side view;
 c, back view.
- Fig. 11. Apple Curculio (Anthonomus quadrigibbus Say); a, pupa; b, larva.
- Fig. 12. Quince Curculio (Conotrachelus cratægi Walsh.); a, side; b, back.
- Fig. 13. Plum Gouger (Anthonomus prunicida Walsh.).
- Fig. 14. Strawberry Crown-borer (Analcis fragariæ Riley); a, larva; b, side view of beetle; c, dorsal view.
- Fig. 15. Pea-weevil (Bruchus pisi Linn.); a, beetle; b, injured pea.
- Fig. 16. Pea-weevil (Bruchus pisi Linn.), egg enlarged.
- Fig. 17. Pea-weevil (Bruchus pisi Linn.); b, beetle, side view; c, larva; d, pupa, dorsal view; g, pea, infested. [After Curtis.]
- Fig. 18. Grain Bruchus (Bruchus granarius Linn.). [After Curtis.]
- Fig. 19. American Bean-weevil (Bruchus fabæ Riley); a, beetle; b, bean, infested.
- Fig. 20. New York Weevil (*Ithycerus novæboracensis*, Forster); a, excavation made by female to deposit eggs; b, larva; c, beetle.
- Fig. 21. Imbricated Snout-beetle (Epicarus imbricatus, Say).
- Fig. 22. Corn Sphenophorus (Sphenophorus zew Walsh); a, back view: b, outline side view; c, enlarged punctures of elytra.
- Fig. 23. Cocklebur Sphenophorus (Sphenophorus pulchellus Scharn.); a, back view; b, outline side view.
- Fig. 24. Grape Leaf-folder (Desmia maculalis Westw.); 1, caterpillar in folded leaf; 2, enlarged view of head and anterior joints; 3, chrysalis; 4, male moth; 5, female moth.
- Fig. 25. Grape-vine Epimenis (*Psychomorpha epimenis*, Drury); a, larva; b, side view of one segment, enlarged; c, hump on 11th joint, enlarged.
- Fig. 26. Grape-vine Epimenis (Psychomorpha epimenis, Drury), moth, male.
- Fig. 27. Grape-vine Plume (Pterophorus periscelidactylus Fitch); a, caterpillars in their retreat; b, chrysalis; c, one of the dorsal processes of chrysalis; d, moth; one joint of larva enlarged, side view.
- Fig. 28. Yellow-bear Caterpillar (Spilosoma virginica, Fabr.); a, caterpillar; b, chysalis; c, moth.
- Fig. 29. Smeared Dagger (Acronycta oblinita, Sm. & Abb.); a, caterpillar; b, cocoon; c, moth.
- Fig. 30. Aleiodes Rileyi Cress.; hardened skin of caterpillar of the Smeared Dagger (Aeronycta oblinita, Sm. & Abb.) from which the Aleiodes has emerged.
- Fig. 31. Pyramidal Grape-vine Worm (Amphipyra pyramidoides Guen.), moth.
- Fig. 32. Pyramidal Grape-vine Worm (Amphipyra pyramidoides Guen.).
- Fig. 33. Grape-root Borer (Egeria polistiformis Harr.); a, male; b, female.
- Fig. 34. Spotted Pelidnota (*Pelidnota punctata*, Linn.); a, larva; b, pupa; c, beetle; d, anal joint of larva; e, antenna of larva; f, leg of larva.
- Fig. 35. Grape-vine Flea-beetle (Haltica chalybea Illiger); a, larva on leaf; b, larva, enlarged; c, earthen cell containing pupa; d, beetle. [d after Harris.]
- Fig. 36. Grape-vine Flea-beetle (Haltica chalybea Illiger). [From Practical Entomologist.]
- Fig. 37. Grape-vine Colaspis (Colaspis flavida Say); 1, enlarged; 2, natural size,
- Fig. 38. Grape-vine Colaspis (Colaspis flavida Say); a, enlarged side view of larva; b, terminal joints seen from beneath.
 - Fig. 39. Galls of the Grape Phylloxera (Phylloxera vitifolia, Fitch=vastatrix Pl.).

Fig. 40. Grape Phylloxera (Phylloxera vitifolia, Fitch = Ph. vastatrix Pl.); a, the winged ${\it female}\;;\;b, {\it her foot or tarsus--after Signoret}\;;\;c, {\it egg}\;;\;d, {\it newly-hatched gall--}$ inhabiting type; e, same, dorsal view; f, section of gall; g, tubercled rootinhabiting form; h, mother gall-louse at height of her fertility; i, same, dorsal view; j, k, differently veined wings of the Oak Phylloxera of Europe.

Fig. 41. Great Lebia (Lebia grandis Hentz.). Fig. 42. Boll-worm (Heliothis armigera Hübn.) on tomato.

Fig. 43. Boll-worm (Heliothis armigera Hübn.); a. egg, side view; b, egg, top view; c, caterpillar; d, chrysalis in carthen cocoon; e, moth, wings expanded; f, moth, wings closed. $\lceil a, b, c, d \rceil$ after Glover.

FIG. 44. Army-worm (Leucania unipuncta Haw.).

Fig. 45. Fall Army-worm (Prodenia antunnalis Riley=Laphygma frugiperda, Sm. & Abb.); a, natural size: b, head magnified; c, one segment enlarged, from above; d, same, from side.

Fig. 46. Fall Army-worm (Prodenia antumnalis Riley=Laphyjma frugiperda, Sm. &

Abb.); a, b, c, three varieties.

Fig. 47. Army-worm Moth (Leucania unipuneta Harr.).

Fig. 48. Spiderwort Owlet-moth (Prodenia commelina, Abb.); a, caterpillar; b, c, dark and light varieties of the moth. [See Notes, etc., p. 56.]

FIG. 49. Unarmed Rustic (Agrotis inermis Harr. = A. saucia Hübn.); a, egg, enlarged; b, batch of eggs, natural size.

Fig. 50. Apple-tree Tent-caterpillar (Clisiocampa americana Harr.); a, b, caterpillars; c, eggs; d, cocoon.

Fig. 51. Apple-tree Tent-caterpillar (Clisiocampa americana Harr.) moth.

Fig. 52. Tent-caterpillar of the Forest (Clisiocampa sylvatica Harr.); a, eggs; b, female moth; c, egg enlarged, top view; d, enlarged eggs, side view.

Fig. 53. Tent-caterpillar of the Forest (Clisiocampa sylvatica Harr.).

Fig. 54. Rummaging Ground-beetle (Calosoma scrutator, Fabr.).

Fig. 55. Fall Web-worm (Hyphantria textor Harr.); a, caterpillar; b, chrysalis; c, moth.

Fig. 56. Blue-spangled Peach-worm (Callimorpha fulricosta Clem.); a, caterpillar; b, moth; e, one segment enlarged, side view; d, same, top view.

Fig. 57. Ash-gray Pinion (Xylina cinerca Riley); a, worm in fruit; b, moth.

Fig. 58. Glassy-winged Soldier-bug (Campyloneura vitripennis, Say).

Fig. 59. Glassy-winged Soldier-bug (Campyloneura vitripennis, Say), pupa.

Fig. 60. White-lined Morning Sphinx (Deilephila lineata, Fabr.), moth.

Fig. 61. White-lined Morning Sphinx (Deilephila lineata, Fabr.), caterpillar, light

Fig. 62. White-lined Morning Sphinx (Deilephila lineata, Fabr.); caterpillar, dark form.

Fig. 63. Archippus Butterfly (Danais archippus, Fabr.).

Fig. 64. Archippus Butterfly (Danais archippus, Fabr.); a, egg, greatly enlarged; c, natural size; e, f, lateral and dorsal views of a segment of the larva in its first stage, enlarged; b, larva in act of casting its skin, to show how the flexible horns are folded (d).

Fig. 65. Archippus Butterfly (Danais archippus, Fabr.), caterpillar.

Fig. 66. Archippus Butterfly (Danais archippus, Fabr.); a, b, c, successive stages in changing from caterpillar to chrysalis.

Fig. 67. Archippus Butterfly (Danais archippus, Fabr.), chrysalis.

Fig. 68. Disippus Butterfly (Limenitis disippus, Godt.), showing upper surface of left wing, and under surface on the right. [After Harris.]

Fig. 69. Disippus Butterfly (Limenitis disippus, Fabr.); a, egg greatly enlarged; c, natural size; d, one cell of the egg-shell, greatly magnified; b, one segment of the larva, in its first stage.

Fig. 70. Disippus Butterfly (Limenitis disippus, Fabr.); a, caterpillar; b, chrysalis; c, hibernaculum; d, leaf cut for hibernaculum.

- Fig. 71. Disippus Butterfly (Limenitis disippus, Fabr.); a leaf eaten by the caterpillar.
- Fig. 72. Disippus Egg-parasite (Trichogramma? minuta Riley); a, fly with wings folded; b, front wing; c, hind wing; d. leg; e, antenna—all enlarged.

Fig. 73. Microgaster militaris Walsh. [After Walsh.]

REPORT IV.

Fig. 1. Perforated tin box for sifting paris green.

Fig. 2. Creighton's "Improved Patent Insect Destroyer."

Fig. 3. Grand-Daddy-Long-Legs (Phalangium dorsatum Say).

Fig. 4. Fifteen-spotted Ladybird (Mysia 15-punctata, Oliv.); a, larva; b, pupa; c, first joint of larva, enlarged; d, e, f, g, different varieties of the beetle.

Fig. 5. Icy Ladybird (Hippodamia glacialis Fabr.).

- Fig. 6. Ring-banded Soldier-bug (Perillus circumcinctus Stâl); b, antenna; c, beak (enlarged).
- Fig. 7. Dotted-legged Plant-bug (Enschistus punctipes, Say); c, beak (enlarged).

Fig. 8. Spined Soldier bug (Arma spinosa Dallas); a, beak (enlarged).

Fig. 9. Spined Soldier-bug (Arma spinosa Dallas); a, pupa; b, larva; c, egg (all enlarged).

Fig. 10. Rove-beetle (Philonthus apicalis, Say).

Fig. 11. Rove-beetle larva (Goërius olens). [After Westwood.]

Fig. 12. Rove-beetle (Quedius molochinus, Grav.), pupa.Fig. 13. Wier's Apple-worm Trap.

Fig. 14. Pennsylvania Soldier-beetle (Chauliognathus pensylvanicus DeG.); a, larva; b, head and prothorax, enlarged; c, labium; d, labrum; e, leg; f, maxilla; g, antenna; h, mandible.

Fig. 15. Two-lined Soldier-beetle (*Telephorus bilineatus*, Say); a, larva; b, anterior joints enlarged; c, beetle.

Fig. 16. Grape-vine Colaspis (Colaspis flavida Say); one joint of larva, viewed from beneath and enlarged; b, head of larva, from beneath; c, same, from above, enlarged.

Fig. 17. Harlequin Cabbage-bug (Strachia histrionica Hahn); a, larva; b, pupa; c, eggs; d, eggs enlarged, side view; e, same, top view; g, bug; h, same, with wings expanded.

Fig. 18. Rascal Leaf-crumpler (*Phycita nebulo* Walsh); a, case, containing caterpillar; b, cases in winter; c, head and thoracic joints of larva, enlarged; d, moth.

Fig. 19. Larval cases of the Rascal Leaf-crumpler (Phycita nebulo Walsh) in winter.

Fig. 20. Walnut Case-bearer (Acrobasis juglandis LeBaron); a, case between two leaflets; b, case; c, wings of nebulo for comparison; d, wings of moth; e, wings of a variety of same from the crab-apple.

Fig. 21. Apple-leaf Skeletonizer (Pempelia Hammondi Riley); a, larva; b, middle joint, enlarged; c, anterior joints, enlarged; d, moth.

Fig. 22. Green Apple-leaf-tyer (Tortrix cinderella Riley); a, caterpillar; b, chrysalis; c, moth; d, pupal case.

Fig. 23. Apple-leaf Bucculatrix (Bucculatrix pomifoliella Clem.); a, cocoons on twig; b, cocoon, enlarged; c, moth.

Fig. 24. Apple-twig Borer (Bostrichus bicaudatus, Say). [After Walsh.]

Fig. 25. Apple-twig Borer (Bostrichus bicaudatus, Say); twigs bored by this insect.

Fig. 26. Red-shouldered Sinoxylon (Sinoxylon basilare, Say); a, larva; b, pupa; c, beetle.

Fig. 27. Red-shouldered Sinoxylon (Sinoxylon basilare, Say); a, head and thoracic joints of larva greatly enlarged; b, labrum and mandibles; c, anterior leg; d, intermediate leg; e, posterior leg.

- Fig. 28. Grape Phylloxera (*Phylloxera vitifoliw*, Fitch = *Ph. vastatrix* Pl.); a, shows a healthy root; b, one on which the lice are working, representing the knots and swellings caused by their punctures; c, a root that has been deserted by them, and where the rootlets have commenced to decay; d, d, d, shows how the lice are found on the larger roots; e, female pupa, dorsal view; f, same, ventral view; g, winged female, dorsal view; h, same, ventral view; i, magnified antenna of winged insect; j, side view of the wingless female, laying eggs on roots; k, shows how the punctures of the lice cause the larger roots to rot.
- Fig. 29. Mulberry Silkworm (Bombyx mori Linn.), larva.
- Fig. 30. Mulberry Silkworm (Bombyx mori Linn.), cocoon.
- Fig. 31. Mulberry Silkworm (Bombyx mori Linn.), moth.
- Fig. 32. Mulberry Silkworm (Bombyx mori Linn.), cocoons; a, White French Annual; b, Yellow French Annual; c, Green Japanese Annual; d, White Japanese Annual; e, White Chinese Annual.
- Fig. 33. Cecropia Silkworm Moth (Attacus Cecropia Linn.).
- Fig. 34. Cecropia Silkworm (Attacus Cecropia Linn.), cocoon.
- Fig. 35. Cecropia Silkworm (Attacus Cecropia Linn.), chrysalis.
- Fig. 36. Cecropia Silkworm (Attacus Cecropia Linn.).
- Fig. 37. Ophion macrurum, Linn. [After Packard.]
- Fig. 38. Ophion macrurum, Linn., larva.
- Fig. 39. Mary Chalcis-fly (Chalcis mariæ Riley).
- Fig. 40. Cecropia Cryptus (Cryptus samie Pack.), cocoons within the larger Cecropia cocoon.
- Fig. 41. Cecropia Cryptus (Cryptus samiæ Pack.); a, female; b, female abdomen of C. nuncius; c, male abdomen; d, highly magnified piece of wing.
- Fig. 42. Ailanthus Silkworm (Attacus cynthia, Hübn.); 1, caterpillar; 2, moth; 3, cocoon; 4, chrysalis; 5, eggs.
- Fig. 43. Promethia Silkworm (Attacus promethea Drury); a, third stage; b, head in fourth stage, enlarged; c, lateral view of a joint in fourth stage, enlarged; d, full-grown caterpillar.
- Fig. 44. Promethia Silkworm (Attacus promethea Drury), cocoon.
- Fig. 45. Promethia Moth (Attacus promethea Drury), male. [After Harris.]
- Fig. 46. Promethia Moth (Attacus promethea Drury), female. [After Harris.]
- Fig. 47. Luna Moth (Attacus Luna Linn.). [After Harris.]
- Fig. 48. Luna Silkworm (Attacus Luna Linn.).
- Fig. 49. Luna Silkworm (Attacus Luna Linn.), cocoon. [After Harris.]
- Fig. 50. Polyphemus Moth (Attacus Polyphemus Linn.), male.
- Fig. 51. Polyphemus Moth (Attacus Polyphemus Linn.), female. [After Harris.]
- Fig. 52. Polyphemus Silkworm (Attacus Polyphemus Linn.). [After Trouvelot.]
- Fig. 53. Polyphemus Silkworm (Attacus Polyphemus Linn.), cocoon. [After Trouvelot.]
- Fig. 54. Polyphemus Silkworm (Attacus Polyphemus Linn.), chrysalis. [After Trouvelot.]
- Fig. 55. Yama-maï Moth (Attacus yama-maï, Guér.-Mén.), male.
- Fig. 56. Yama-maï Silkworm (Attacus yama-maï, Guér.-Mén.); egg, natural size and enlarged; young caterpillar on leaf; full grown caterpillar at rest on twig.
- Fig. 57. Yama-maï Silkworm (Attacus yama-maï, Guér.-Mén.), at rest on leafy twig, at a. [After Adams.]
- Fig. 58. Yama-maï Silkworm (Attacus yama-maï, Guér.-Mén.), cocoon.
- Fig. 59. Cage for receiving the deposition of the eggs of Yama-maï Moth. [After Adams.]
- Fig. 60. Pernyi Moth (Attacus Pernyi, Guér.-Mén.).
- Fig. 61. Pernyi Silkworm (Attacus Pernyi, Guér.-Mén.); egg, natural size and enlarged cocoon.

- Fig. 62. Horned Passalus (Passalus cornutus Fabr.); a, larva; b, pupa; c, beetle; d, under side of three thoracic joints of larva, showing legs; e, metathoracic leg of larva.
- Fig. 63. Great Leopard-moth (Ecpantheria scribonia, Stoll.), a, caterpillar; b, one hair, enlarged.
- Fig. 64. Great Leopard-moth (Ecpantheria scribonia, Stoll.); a, female; b, male.
- Fig. 65. Isabella Tiger-moth (Arctia isabella, Smith); a, caterpillar; b, chrysalis; c,
- Fig. 66. Acorn-moth (Holcocera glandulella Riley); a, caterpillar in acorn; b, perforated acorn; e, head and thoracic joints of caterpillar, enlarged; d, e, lateral and dorsal views of one segment of larva; f, moth; g, base of antenna of male.

REPORT V.

- Fig. 1. Pyramid, showing the nature of the mouth, the relative rank of the Orders and the affinitives of the Sub-orders of Insects.
- Fig. 2. Bald-faced Hornet (Vespa maculata Linn.). [After Sanborn.]
- Fig. 3. Goldsmith-beetle (Cotalpa lanigera, Linn.).
- Fig. 4. Deiopeia bella, Drury.
- Fig. 5. Dotted-legged Plant-bug (Euschistus punctipes, Say).
- Fig. 6. Buffalo Tree-hopper (Ceresa bubalus, Fabr.); a, side view; b, view from above.
- Fig. 7. Missouri Bee-killer (Asilus missouriensis Riley).
- Fig. 8. Differential Locust (Caloptenus differentialis Walk.).
- Fig. 9. Dragon-fly (Libellula trimaculata, DeGeer.) [After Sanborn.]
- Fig. 10. Hull's Curculio-catcher.
- Fig. 11. Butterfly net; b, hinge in the ring; c, ring folded; d, nut sunk and soldered into brass tube at end of handle; e, screw; f, tip of handle, showing attachment of the ring.
- Fig. 12. Butterfly net; a, ring; b, socket; c, cork plug.
- Fig. 13. Butterfly net, head for attaching the ring to the rod.
- Fig. 14. Poison-bottle for killing insects; a, wadding to keep the cyanide grains in place.
- Fig. 15. Chloroform in stoppered bottle with brush.
- Fig. 16. Chloroform in bottle with tube passing through the cork.
- Fig. 17. Method of pinning insects; a, beetle; b, bug. Fig. 18. Method of carding small insects.
- Fig. 19. Method of "setting" Lepidoptera on a spreading board.
- Fig. 20. Setting-needle.
- Fig. 21. Sections of framework of glass-covered volume to display showy insects; a, ends; b, front; c, back.
- Fig. 22. Forceps for pinning insects.
- Fig. 23. Forceps for pinning insects.
- Fig. 24. Forceps for pinning insects.
- Fig. 25. Breeding-cage; a, bottom board; b, four-sided frame, with glass sides and door, fitting over a zinc pan (f) attached to the bottom board; c, cover fitting to the frame and having a wire gauze top; d, zinc tube attached in centre of the pan, to contain a bottle for the reception of the food plant; e, sand in the pan; gg, cross pieces for supporting the cage and to prevent warping.
- Fig. 26. Ring-legged Pimpla (Pimpla annulipes Br.), female; to the right a figure of the ovipositor to show the two inner rods; to the left the abdomen of the male.
- Fig. 27. Delicate Longsting (Macrocentrus delicatus Cress.); to the right the abdomen of the male.
- Fig. 28. Rust-red Social Wasp (Polistes rubiginosus St. Farg.); b, nest, the natural position being with the mouths of the cells down.

· Fig. 29. Apple-tree Tent-caterpillar (Clisiocampa americana Harr.), eggs.

Fig. 30. Grape Phylloxera (*Phylloxera vastatrix* Plan.); a, b, peculiar pedunculated galls; c, gall just forming; d, same from beneath.

Fig. 31. Oyster-shell Bark-louse (Mytilaspis pomicorticis Riley); a, male louse from beneath; b, same from above and with wings expanded; c, male scale; d, leg of male; e, portion of wing very highly magnified; f, one joint of male antennæ (all highly magnified).

Fig. 32. Oyster-shell Bark-louse (Mytilaspis pomicorticis Riley); anal joint of louse, with a more highly magnified segment of edge at b, and of a single pore at c; d, female louse; c, a section of its proboscis more highly magnified; g h f,

female scale, h, first scale, g, second scale, f, third scale.

Fig. 33. Mite (Dermaleichus?).

Fig. 34. Aphelinus mytilaspidis LeBaron.

Fig. 35. Pine-leaf Scale-insect (Mytilaspis pinifolia, Fitch.); a, scales on leaves of white pine; b, male scale; c, female scale from white pine; d, female scale from broader leaved pine (b, c and d, enlarged).

Fig. 36. Pine-leaf Scale-insect (Mytilaspis pinifoliae, Fitch); male, highly magnified.

Fig. 37. Painted Ladybird (Coccinella picta Randall); a, larva; b, beetle; c, beetle, enlarged.

Fig. 38. Hickory Bark-borer (Scolytus caryæ Riley); 1, view of its galleries on the inside of the bark, showing the beetle in the central gallery and the larvæ at the ends of the side galleries; 2, burrows made by larger larvæ; 3, beetle, magnified and natural size; 4, larva, magnified and natural size; 5,

pupa, magnified; 6, sculpture of elytra, magnified.

Fig. 39. Rose Chafer (Macroductylus subspinosus, Fabr.), with the enlarged anterior tibia at the left.

Fig. 40. Chinch-bug (Micropus leucopterus, Say).

Fig. 41. False Chinch-bug (Nysius destructor Riley); a, potato leaf showing some effects of its punctures; b, pupa; c, mature bug.

Fig. 42. Grape-vine Apple-gall (Vitis-pomum Walsh & Riley); a, exterior; b, section.

Fig. 43. Gall-gnat (Cecidomyia salicis-strobiloides Walsh), a, female; b, male autenua.

Fig. 44. Grape-vine Filbert-gall (Vitis-coryloides W. & R.); a, anterior joints of larva, showing breast-bone; b, cluster of galls; c, section of single gall.

Fig. 45. Grape-vine Tomato-gall (Vitis-tomatos Riley = Lasiopiera vitis O. S., gall); a, section of a single swelling.

Fig. 46. Grape-vine Trumpet-gall (Vitis-viticola Riley = Cecidomyia viticola O. S.)

Fig. 47. Jumping Tree-cricket (Orocharis saltator Uhler) eggs in grape twig; a, eggs; b, punctures; c, egg, enlarged.

Fig. 48. Jumping Tree-cricket (Orocharis saltator Uhler); a, female; b, male.

Fig. 49. Snowy Tree-cricket (*Œeanthus niveus* Harr.) eggs; a, punctures in twig; b, section of twig showing the eggs within; c, egg, enlarged; d, granulations at rounded end of egg, more highly magnified.

Fig. 50. Buffalo Tree-hopper (Ceresa bubalus Fabr.) eggs in slits in the bark of a tree;

a, one slit enlarged; b, natural size.

Fig. 51. Buffalo Tree-hopper (Ceresa bubalus, Fabr.); a, side; b, dorsal view.

Fig. 52. Buffalo Tree-hopper (Ceresa bubalus, Fabr.); a, larva; b, pupa; c, ovipositor of the female, all enlarged.

Fig. 53. Egg-punctures of Tree-hopper (?) on apple twigs; a, natural size; b, enlarged.

Fig. 54. Frosted Lightning-hopper (Paciloptera pruinosa, Say) eggs; a, enlarged; & in position within twig, enlarged; c, natural size.

Fig. 55. Frosted Lightning-hopper (Paciloptera pruinosa, Say).

Fig. 56. Egg-punctures of (?) Orchelimum glaberimum (Burm.).

Fig. 50. Eggs of the Angular-winged Katydid (Microcentrus retinervis, Burm.); a, front b, side view, just before hatching.

- Fig. 58. Eggs of the Angular-winged Katydid (Microcentrus retinervis, Burm.); a, front; b, side view, soon after laid.
- Fig. 59. Eggs of the Broad-winged Katydid (*Platyphyllum concavum Harr.*); a, side; b, fron't view, enlarged; c, d, natural size.
- Fig. 60. Buck Moth (Hemileuca maia, Drury).
- Fig. 61. Buck Moth (Hemileuca maia, Drury) eggs.
- Fig. 62. Buck Moth (Hemileuca maia, Drury); a, full-grown larva; b, pupa; c, ordinary form of spine of larva in the first stage; d, branched spine on thoracic joints of same; e, form of spines in second stage of larva; f, g, spines of full-grown larva.
- Fig. 63. Io Moth (Hyperchiria Io, Fabr.), male.
- Fig. 64. Io Moth (Hyperchiria Io, Fabr.), female.
- Fig. 65. Io Moth (Hyperchiria Io, Fabr.), caterpillar.
- Fig. 66. Io Moth (Hyperchiria Io, Fabr.), spines in 1st (c), 2d (b), and 5th (a) stages of caterpillar.
- Fig. 67. Green- striped Maple-worm (Dryocampa rubicunda, Fabr.); a, caterpillar; b, chrysalis; c, female moth.
- Fig. 68. Belvoisia bifasciata, Fabr.
- Fig. 69. Hellgrammite Fly (Corydalus cornutus, Linn.); a, larva; b, pupa; ε, male fly;
 d, outline of head and prothorax of female.
- Fig. 70. Hellgrammite Fly (Corydalus cornutus, Linn.); supposed eggs.
- Fig. 71. Hellgrammite Fly (Corydalus cornutus, Linn.), pupa.
- FIG. 72. Goat-weed Butterfly (Paphia glycerium Doubl.); a, leaf eaten by the larva (natural size); b, head of larva in the first stage; c, larva in third stage; d, head in second stage; e, head in fourth stage—all enlarged.
- Fig. 73. Painted-wing Digger-wasp (Ammophila pictipennis Walsh).
- Fig. 74. Yucca-moth (Pronuba yuccasella Riley); a, head with pollen mass (1), (2) the maxillary tentacle, (3) the maxillae, (4) maxillary palpi, (5) antenna; b, maxillary palpi with tentacle; c, single spine from maxillary tentacle; d, maxillary palpus of male; e, wing scale; f, anterior leg; g, labial palpus; h, venation of anterior wing; i, venation of posterior wing, male; j, last joint of the abdomen of the female with the ovipositor exserted—all enlarged.
- Fig. 75. Yucca-moth (Pronuba yuccasella Riley); a, larva; b, moth with wings folded; c, female moth with wings expanded, (all natural size); d, side view of one joint of larva; ε, head of larva from below; f, same from above; g, leg of larva; h, maxilla; i, mandible; j, labial palpi and spinneret; k, antenna—all enlarged.

REPORT VI.

- Fig. 1. Potato-beetle Catcher. Made of five barrel hoops and four (BB. EE) barrel staves, covered with cotton cloth.
- Fig. 2. Grape Phylloxera (Phylloxera vastatrix Planchon), galls on the leaf, seen from beneath.
- Fig. 3. Grape Phylloxera (*Phylloxera vastatrix* Plan.); a, b, pedunculated galls; c, gall just forming; d, same from beneath.
- Fig. 4. Grape Phylloxera (*Phylloxera vastatrix* Plan.)—Type Gallicola; a, b, newly-hatched larva, ventral and dorsal view; c, egg; d, section of gall; e, swelling of tendril; f, g, h, mother gall-louse—lateral, dorsal and ventral views; i, her antenna; j, her two-jointed tarsus.
- FIG. 5. Grape Phylloxera (Phylloxera vastatrix Plan.)—Type Radicicola; a, roots of Clinton vine, showing relation of swellings to leaf galls, and power of resisting decomposition; b, larva as it appears when hibernating; c, d, antenna and leg of same; e, f, g, forms of more mature lice; h, granulations of skin; i, tubercle; j, transverse folds at border of joints; k, simple eyes.

- Fig. 6. Grape Phylloxera (Phylloxera vastatrix Plan.)—Type Radicicola; a, shows a healthy root; b, one on which the lice are working, representing the knots and punctures caused by their punctures; c, a root that has been deserted by them, and where the rootlets have commenced to decay; d, d, d, show how the lice are found on the larger roots; e, female pupa, dorsal view; h, same, ventral view; i, magnified antenna of winged insect; j, side view of the wingless female, laying eggs on roots; k, shows how the punctures of the lice cause the larger roots to rot.
- Fig. 7. Grape Phylloxera (Phylloxera vastatrix Plan.). Pterogostic characters; a, b, different venation of front wing; c, hind wing; d, e, f, showing development of wings.
- Fig. 8. Grape Phylloxera (*Phylloxera vastatrix* Plan.)—Type Radicicola; a, b, pupa and imago of a problematical individual or supposed male; c, d, its antenna and leg; e, vesicles found in abdomen.
- Fig. 9. Thrips, enlarged, wings at right more highly enlarged.
- Fig. 10. Lace-wing fly (Chrysopa sp.); a, eggs; b, larva; c, cocoon, the upper figure with the lid open after the fly has escaped; d, fly, the wings omitted on the left. [a, b, d, after Westwood.]
- Fig. 11. Ladybird (Hippodamia convergens Gué.); larva, pupa and beetle.
- Fig. 12. Syrphus larva; b, one joint enlarged.
- Fig. 13. Syrphus-fly (Helophilus latifrons Loew).
- Fig. 14. Insidious Flower-bug (Anthocoris insidiosus, Say).
- Fig. 15. Root-louse Syrphus-fly (Pipiza radicum W. & R.); a, larva; b, pupa; c, fly.
- Fig. 16. Phylloxera Mite (Tyroglyphus phylloxeræ Planchon & Riley); a, dorsal; b, ventral view of female; c, mouth parts; d, f, g, h, forms of tarsal appendages; e, ventral tubercles of male.
- Fig. 17. Hoplophora arctata Riley; a, b, c, d, e, different attitudes assumed by it; f, strongly magnified leg.
- Fig. 18. American Oak Phylloxera (Phylloxera Rileyi Lichtn.); a, pupa; b, winged females; c, antenna greatly enlarged; d, portion of infested leaf, under side.
- Fig. 19. American Oak Phylloxera (*Phylloxera Rileyi* Lichtn.); a, b, dorsal and ventral views of larva as seen hibernating; c, d, highly magnified leg and antenna of same.
- Fig. 20. Grape-vine Epimenis (Psychomorpha epemenis, Drury); a, larva; b, one joint, enlarged, side view; c, hump on joint 11.
- Fig. 21. Grape-vine Epimenis (Psychomorpha epimenis, Drury), male moth.
- Fig. 22. Beautiful Wood-nymph (Eudryas grata, Fabr.); a, full grown larva; b, one joint, enlarged, side view; c, cervical shield from behind; d, anal hump from behind; e, f, top and side views of egg.
- Fig. 23. Beautiful Wood-nymph (Eudryas grata, Fabr.), female moth.
- Fig. 24. Pearl Wood-nymph (Eudryas unio, Hübn.), male moth.
- Fig. 25. Eight-spotted Forester (Alypia octomaculata, Fabr.); a, larva; b, one joint, enlarged, side view; c, female moth.
- Fig. 26. Red-legged Ham-beetle (Corynetes rufipes, Fabr.); a, larva; b, pupa; c, co-coon; d, beetle, enlarged; e, same, natural size; f, leg of larva; g, mandible, h, labium, i, maxilla, j, antenna, of larva—all enlarged.
- Fig. 27. Larder-beetle (Dermestes lardarius Linn.); a, larva; b, one of its barbed hairs; c, beetle.
- Fig. 28. Clover-hay Worm (Asopia costalis, Fabr.); 1, 2, larva; 3, cocoon; 4, chrysalis; 5, 6, moth with wings expanded, and closed; 7, worm covered with silken web.
- Fig. 2). Legged Maple Borer (*Ejeria acerni*, Clem.); a, a, larva, dorsal and lateral views; b, b, b, cocoons exposed by detachment of bark; c, moth; d, chrysalis skin as it is often left remaining in the hole of exit.

- Fig. 30. Raspberry-root Borer (Ejeria rubi Riley); a, male moth; b, female moth.
- Fig. 31. Northern Brenthian (Eupsalis minuta, Drury); a, larva; b, pupa; c, female beetle; d, head of male do.; f, leg of larva; g, head of larva, from in front; h, labium; i, labrum; j, mandible; k, maxilla; l, head from beneath, all of larva and enlarged; m, end of body of pupa, dorsal view.
- Fig. 32. Larva of Tenebrionid (?); b, front view of head; c, mandible; f, antenna; g, maxilla; h, labium; d, e, concave end of the body, full and side views.
- Fig. 33. Sumach Flea-beetle (Blepharida rhois, Forst.); a, egg; b, b, egg-masses, covered with excrement; c, c, c, c, larva; d, cocoon; e, pupa; f, beetle; g, antenna of larva; h, maxilla do.; i, mandible do.; j, labium do.; k, labrum do.; l, leg do.
- Fig. 34. Tiphia inornata Say; a, perfect wasp; b, head or larva, enlarged; c, larva, ventral view; d, cocoon cut open.
- Report VI, p. 122, Jiggers (Leptus irritans Riley, to the right; L. americanus Riley, to the left).
- Fig. 35. White-grub Fungus (Torrubia ravenelii, Berk.).
- Fig. 36. Dominican Case-bearer (Coscinoptera dominicana, Fabr.); a, larva extracted from case; $\it b$, do. with case; $\it c$, beetle, showing punctures; $\it d$, same, natural size; e, egg, enlarged; i, eggs, natural size; g, head of male beetle, enlarged; h, mandible of same, more enlarged; j, leg of larva, with the claw joint more enlarged; f, under side of larva; k, its mandible; l, maxilla, all enlarged.
- Fig. 37. Chlamys plicata, Oliv.; a, larva extracted from case, the figure at the right showing the larva in the case. [After Packard.]
- Fig. 38. Yucca-moth (Pronuba yuccasella Riley); m, female chrysalis; l, male chrysalis, the apical joints more highly enlarged and viewed from the side in lower figure.
- Fig. 39. Eyed Emperor (Apatura lycaon, Fabr.); a, eggs; b, larva; c, d, chrysalis, dorsal and lateral views; e, imago, male, the dotted line showing form of female - all natural size.
- Fig. 40. Eyed Emperor (Apatura lycaon, Fabr.); f, egg, magnified; g, larva, lateral view; h, imago, under side - natural size; i, j, k, l, m, the five different larval heads; n, o, dorsal and lateral views of one joint of larva — enlarged.
- Fig. 41. Tawny Emperor (Apatura herse, Fabr.); a, eggs; b, larva; c, chrysalis; d, imago, male, the dotted line showing form of female - all natural size.
- Fig. 42. Tawny Emperor (Apatura herse, Fabr.); g, larva, half grown, dorsal view; h, imago, male, under side - natural size; i, j, k, l, m, the five different heads of larva; n, o, dorsal and lateral views of one joint of larva; p, egg — enlarged; g, larvæ as when hibernating — natural size.
- Fig. 43. Eggs of the Angular-winged Katydid (Microcentrus retinervis, Burm.); a, front; b, side view, just before hatching.
- Fig. 44. Eggs of Angular-winged Katydid (Microcentrus retinervis, Burm.); a, front; b, side view, soon after laid.
- Fig. 45. Angular-winged Katydid (Microcentrus retinervis, Burm.); male wings closed.
- FIG. 46. Angular winged Katydid (Microcentrus retinervis, Burm.); a, ovipositor of
- female, nat. size; b, tip of same, enlarged. Fig. 47. Angular-winged Katydid (Microcentrus retinervis, Burm.); female ovipositing.
- Fig. 48. Back-rolling Wonder (Antigaster mirabilis Walsh); a, female, wings expanded; b, same, side view, partly rolled up; c, same nearly rolled up; d, antenna of same.
- Fig. 49. Back-rolling Wonder (Antigaster mirabilis Walsh); a, eggs of Microcentrus from which it has issued; b, female pupa, ventral view; c, male fly; d, his antenna.
- Fig. 50. Narrow-winged Katydid (Phaneroptera curvicanda, DeGeer); female. [After Harris.] 8 MO

- Fig. 51. Narrow-winged Katydid (*Phaneroptera curricanda* DeGeer); a, ovipositor of female, nat. size; d, end of same, enlarged; c, anal appendage of male, side view; b, same, back view.
- Fig. 52. Broad-winged Katydid (*Platyphyllum concavum* Harr.); male (after Harris). [Adapted from Harris.]
- Fig. 53. Broad-winged Katydid (Platyphyllum concavum Harr.); a, ovipositor of female, nat. size; b, end of same, enlarged.
- Fig. 54. Eggs of Broad-winged Katydid (*Platyphyllum concavum* Harr.); a, side; b, front view—enlarged; c, d—natural size.
- Fig. 55. Oblong-winged Katydid (*Phylloptera oblongifolia*, DeGeer), outline of female [adapted from Harris]; b, end of ovipositor, enlarged.

REPORT VII.

- Fig. 1. Gray's Improved Sprinkler, for the use of Paris Green water. [From inventor.]
- Fig. 2. Chinch-bug (Micropus leucopterus, Say).
- Fig. 3. Chinch-bug (Micropus leucopterus, Say); a, b, eggs; c, newly hatched larva; d, its tarsus; e, larva after first molt; f, same after second molt; g, pupa, the natural sizes indicated at sides; h, enlarged leg of perfect bug; j, tarsus of same still more enlarged; i, proboscis or beak, enlarged.
- Fig. 4. Chinch-bug (Micropus leucopterus, Say), short-winged form.
- Fig. 5. Spotted Ladybird (Hippodamia maculata, DeGeer). [From Practical Ento-mologist.]
- Fig. 6. Trim Ladybird (Coccinella munda Say).
- Fig. 7. Insidious Flower-bug (Anthocoris insidiosus, Say).
- Fig. 8. Many-banded Robber (Harpactor cinctus, Fabr.); a, bug; b, its beak, enlarged.
- Fig. 9. False Chinch-bug (Nysius destructor Riley); b, pupa; c, mature bug.
- Fig. 10. Ash-gray Leaf-bug (Piesma cinerea Say).
- Fig. 11. Flea-like Negro-bug (Corimetena pulicaria, Germar); natural size and enlarged.
- Fig. 12. Flat-headed Apple-tree Borer (Chrysobothris femorata, Fabr.); a, larva, dorsal view; b, pupa; c, swollen thoracic joints of larva from beneath; d, beetle.
- Fig. 13. Cherished Bracon (Bracon charus Riley).
- Fig. 14. Spring Canker-worm (Anisopteryx vernata, Peck); a, full grown larva; b, egg, enlarged, the natural size shown in the small mass at the side; c, d, one joint enlarged, side and dorsal views.
- Fig. 15. Spring Canker-worm (Anisopteryx vernata, Peck); a, male moth; b, female do.—natural size; c, joints of her antennæ; d, joint of her abdomen, showing spines; e, her ovipositor—enlarged.
- Fig. 16. Spring Canker-worm (Anisopteryx vernata, Peck); front view of head.
- Fig. 17. Fall Canker-worm (Anisopteryx pometaria Harr.); a, b, egg, side and top views; c, d, side and top views of one joint of larva,—enlarged; e, batch of eggs; f, full grown larva; g, female chrysalis—natural size; h, top view of anal tubercle of chrysalis.
- Fig. 18. Fall Canker-worm (Anisopteryx pometaria Harr); a, male moth; b, female do.—natural size; c, joints of her antennæ; d, joint of her abdomen—enlarged.
- Fig. 19. Phylloxera, Male (Phylloxera caryæcaulis, Fitch?).
- Fig. 20. Grafting; a, b, incisions to receive the scion; d, scion; c, string to secure scion—to prevent phylloxera injury.
- Fig. 21. Grafting—to prevent phylloxera injury.
- Fig. 22. American Oak Phylloxera (*Phylloxera rileyi* Licht.); a, male, ventral view; b, genital organ; c, tarsus—all greatly enlarged.

- Fig. 23. Rocky Mountain Locust (Caloptenus spretus Thomas); a, a, a, female in different positions, ovipositing; b, egg-pod extracted from ground, with the end broken open, showing how the eggs are arranged; c, a few eggs lying loose on the ground; d, e, shows the earth partially removed, to illustrate an eggmass already in place, and one being placed; f, shows where such a mass has been covered up.
- Fig. 24. Rocky Mountain Locust (Caloptenus spretus Thomas); anal characters of female, showing horny valves of ovipositor; b, an upper valve; c, a lower valve-all enlarged.
- Fig. 25. Rocky Mountain Locust (Caloptenus spretus Thomas); a, a, newly hatched larva; b, full grown larva; c, pupa.
- Fig. 26. Red-legged Locust (Caloptenus femur-rubrum, DeG.).
- Fig. 27. Rocky Mountain Locust (Caloptenus spretus Thomas).
- Fig. 28. Rocky Mountain Locust (Caloptenus spretus Thomas); a, tip of abdomen of male, side view; b, c, hind and top views of tip—all enlarged.
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CLASSIFIED LIST OF ILLUSTRATIONS.

The following list of illustrations, brought together in classificatory order, will prove serviceable to entomologists, as it will enable such to readily ascertain whether or not any particular insect of a particular Order has been figured in the Reports. The explanations to the figures are omitted, since they are already given in the preceding list. The nomenclature of the Reports is here, also, retained, and references to figures other than those of insects or their products are omitted. The number of the Report is indicated in Roman and of the figure in Arabic numerals.

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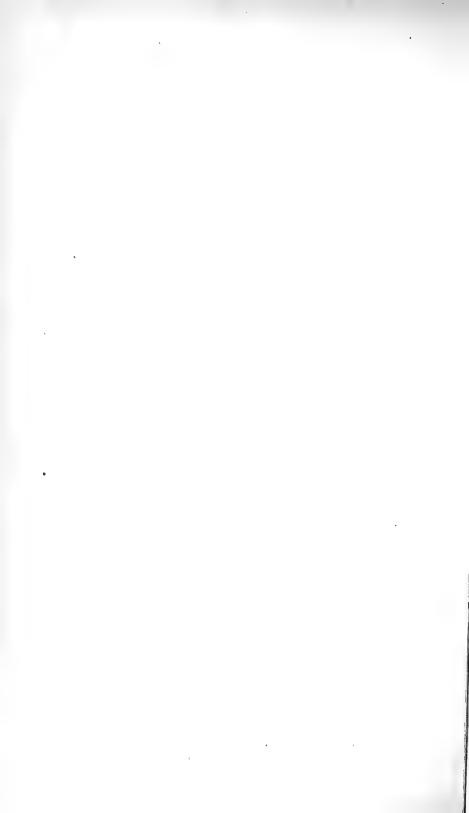
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Page III, line 9, for Classified read Classified.

Page 60, line 17, for LEUCANE.E read LEUCANLE.

Pages 93, 94. In making up these pages several of the names got misplaced. "Orgyia" and "Thyridopteryx," on p. 94 should follow "Ecpantheria" on p. 93. "Hæmatopis," on p. 94, should follow "Eufitchia," on p. 93. "Pronuba" and "Gålleria," p. 94, should follow "Carpocapsa," on the same page; "Œstrus" should follow "Pipiza" on the same page.

Page 94. After line 10 add "Gelechia gallæsolidaginis, larva and pupa: I, 173-174."