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Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

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ENTOMOLOGICAL NEWS

VOL. L. JANUARY, 1939 No. 1

Butterflies of a Wood Road at Suffolk, Virginia.

By AUSTIN H. CLARK and LEILA F. CLARK, U. S. National Museum, Washington, D. C.

Seventy-three species of butterflies we have found along a half-mile stretch of abandoned woodland road on the northwestern border of the Dismal Swamp parallel to a lumber railway on the outskirts of Suffolk, Virginia. Such a wealth of butterflies, including so many rarities, in a restricted and easily accessible locality is unusual and seems worth recording. Indeed, more species undoubtedly are to be found there, for our visits to the region have been few, and our time on each visit limited to a few hours. Furthermore, every visit has yielded species we had not seen before, and in the more or less immediate vicinity we have found nine additional species that might well occur there.

Perhaps the most interesting butterfly here is *Enodia creola* which is found in the cane (*Arundinaria gigantea*) along the road for a distance of about 150 feet. Here we once took twenty-one specimens in a couple of hours. Since then we have paid little attention to it, but have noted its constant presence. Everywhere along the road, except in this special region, *E. portlandia* is abundant.

Inconspicuous and always keeping near the ground, feeding on the flowers of violets, *Prunella* or *Elephantopus* according to season, is the little skipper *Amblyscirtes carolina*. It is not very common, but you may see as many as a dozen in the course of a morning. Usually you will see three or four—sometimes none. Much more numerous and conspicuous is *A. textor*, which is sometimes abundant. On two brief visits two days apart, just before the middle of June, Mr. and Mrs. E. L. Bell secured sixty and we secured fifty-eight, after which we passed them by.

From time to time you notice the strangely inert *Atrytone dion* in the grass, and occasionally the wary *Poanes yehl* or *Atrytone logan,* the last named of large size. Incidentally it is the northern form of *Atrytone dion* that is found here, not the smaller, darker, southern form (*alabamae*) found further northward in the Dahl Swamp in Accomac County on the Eastern Shore.

Near the trees burdened with mistletoe on the southern edge of the road you sometimes notice the unsuspicious and stupid *Atlides halesus,* and in the grass, if you look closely, you may find *Nymphidia pumila* perched head downward with wings outspread.

Naturally, all of the butterflies we have found here do not occur at the same season, nor are they equally abundant in different years. Most of the more unusual ones are commonest in a wet season—rain with intervals of sunshine.

In the course of our investigations we have covered every section of Nansemond, Norfolk and Princess Anne Counties. Most of this area, more or less extensively drained and intensively cultivated, is singularly devoid of butterflies, even of the commonest species. When butterflies do occur they are mainly the species of barren country and waste lands, or of weedy roadsides. In the height of the season many gardens yield no butterflies at all, while in others you find only *Vanessa virginiensis, Euptoieta claudia, Pieris rapae, Atalopedes campestris, Hylephila phylaeus* and *Panoquina ocola,* with an occasional swallowtail, usually *Papilio glaucus* or *P. troilus,* and sometimes *Terias lisa* and *Phoebis eubule.* Only in localized and usually widely separated regions are the more interesting species found.

There are some other spots that are very rich, perhaps as rich as this woodland road, but we have not worked them so intensively. And still others are notable for the occurrence in numbers of a particular species.

As an example, along the main highway (route 10) about two miles west of Spring Grove, Surry County, we have found *Argynnis diana* more numerous than we have ever seen it elsewhere. Mrs. Barnes, who very kindly gave us permission to look over her garden, told us that she had seen as many as twenty-five at one time about her butterfly-bush.

The wood road is reached as follows: Starting from the Hotel Elliott opposite the Post Office at Suffolk you go southeast on Main Street for two blocks, then turn left onto Washington Street. Following Washington Street for about a mile you come to a fork with an Esso station in it. Bearing to the right on the White Marsh road past the Esso station you come in less than a mile to a lumber railway that crosses the road. Just beyond this railway crossing, on the left, is a large lumber yard. Turn to the left at the company store and, securing permission from the "boss-man," park your car in the lumber yard. Going to the lumber railway, you will see that it goes down a short incline into the Dismal Swamp. At the bottom of the incline leave the railway, cross the dry ditch on its north side and, passing through the brush, you immediately find yourself on the wood road.

The butterflies for which we have records from along this road and the nearby lumber railway are the following:

SATYRIDAE: *Neonympha gemma* (Hübner), *N. eurytus* (Fabricus), *N. sosybius* (Fabricius), *Cercyonis alope alope* (Fabricius), *Enodia portlandia portlandia* (Fabricius), *E. creola* (Skinner).

NYMPHALIDAE: *Polygonia interrogationis* (Fabricius), *P. comma* (Harris), *Nymphalis antiopa creta* (Verity), *Vanessa atalanta* (Linné), *V. virginiensis* (Drury), *V. cardui* (Linné), *Precis coenia* Hübner, *Basilarchia arthemis astyanax* (Fabricius), *B. archippus* (Cramer), *Phyciodes tharos* (Drury), *Argynnis diana* (Cramer), *A. cybele* (Fabricius), *Euptoieta claudia* (Cramer).

DANAIDAE: *Danaus plexippus* (Linné).

RIODINIDAE: *Nymphidia pumila* Boisduval and LeConte.

LYCAENIDAE: *Lycaenopsis argiolus pseudargiolus* (Boisduval and LeConte), *Everes comyntas* (Godart), *Atlides halesus* (Cramer), *Strymon m-album* (Boisduval and LeConte), *Strymon cecrops* (Fabricius), *Strymon melinus* (Hübner).

PIERIDAE: *Pieris rapae* (Linné), *P. protodice* Boisduval and LeConte, *Euchloë genutia* (Fabricius), *Phoebis eubule* (Linné), *Colias philodice philodice* Godart, *C. p. eurytheme*

Boisduval and LeConte, *Terias nicippe* (Cramer), *T. lisa* (Boisduval and LeConte).

Papilionidae: *Papilio philenor* Linné, *P. polyxenes asterius* Cramer, *P. cresphontes* Cramer, *P. glaucus* Linné, *P. troilus* Linné, *P. palamedes* Drury, *P. marcellus* Cramer.

Hesperiidae: *Epargyreus clarus* (Cramer), *Achalarus lyciades* (Geyer), *Thorybes bathyllus* (Smith), *T. pylades* (Scudder), *T. confusis* Bell, *Pyrgus communis* (Grote), *Pholisora catullus* (Fabricius), *Erynnis icelus* (Scudder and Burgess), *E. brizo* (Boisduval and LeConte), *E. juvenalis* (Fabricius), *E. horatius* (Scudder and Burgess), *E. terentius* (Scudder and Burgess), *Ancyloxypha numitor* (Fabricius), *Hylephila phylaeus* (Drury), *Atalopedes campestris* (Boisduval), *Polites verna* (W. H. Edwards), *P. manataaqua* (Harris), *P. themistocles* (Latreille), *P. peckius* (Kirby), *Wallengrenia otho egeremet* (Scudder), *Poanes zabulon* (Boisduval and LeConte), *P. yehl* (Skinner), *Atrytone aragos* (Boisduval and LeConte), *A. logan* (W. H. Edwards), *A. dion* (W. H. Edwards), *A. ruricola* (Boisduval), *Lerema accius* (Smith), *Amblyscirtes textor* (Hübner), *A. carolina* (Skinner) (and var. *reversa* Jones), *Lerodea l'herminier* (Latreille), *Panoquina ocola* (W. H. Edwards).

The butterflies of this region that we have not found along this woodland road are: *Neonympha areolatus areolatus* (Hübner), found a few miles southwest; *N. a. septentrionalis* Davis, a few miles south and southwest; *Satyrodes eurydice* (Linné), a few miles west; *Dione vanillae incarnata* Riley, a few miles northeast; *Mitoura gryneus* (Hübner), a few miles northwest; *Urbanus proteus* (Linné), a few miles east; *Pholisora hayhurstii* (W. H. Edwards), a couple of miles south; *Erynnis martialis* (Scudder), a few miles south; *Poanes viator* (W. H. Edwards), a few miles northwest; *Atrytone dukesi* Lindsey, gum swamp at North Landing; *Lerodea eufala* (W. H. Edwards), within a mile, in open fields; *Calpodes ethlius* (Cramer), a pest on canna in Suffolk in 1937.

Some of these undoubtedly occur along the woodland road from time to time, but others live in specialized habitats from which they do not stray. Still other species have been recorded from this region, but have not been found by us.

Mr. Frank Morton Jones deserves the credit for first having called attention to this region, he having collected along the lumber railway. Mr. Ernest L. Bell was the next visitor. On two days last June we had the pleasure of visiting the wood road in company with Professor and Mrs. Charles T. Brues and Miss Alice Brues, and Mr. and Mrs. E. L. Bell. Others who have collected in this locality are Dr. G. W. Rawson of Detroit, Mr. W. Herbert Wagner of Washington, and Mr. John Boyd of Southern Pines, N. C. All of these have been so very kind as to send us their records.

A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera.

By Wm. P. Hayes, University of Illinois.

(Continued from Vol. XLIX, page 251.)

Simuliidae.

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(To be continued.)

A Synopsis of the Odonata of Alaska.

By Leonora K. Gloyd, Chicago Academy of Sciences, Chicago, Illinois.

Until recently most of the specimens of Odonata recorded from Alaska were taken by men whose task was to gather as many objects of natural history as time and facilities permitted, by collectors who were obliged to obtain as many specimens in all orders of insects as possible, or by men in other fields of activity who took time from their own work to capture a few insects for entomological friends. Naturally the Odonata, a group often difficult to catch and to preserve, would not be well represented in such collections.

The first dragonflies reported from Alaska (Hagen 1856, 1857 and 1861), representing four species, were taken between 1823 and 1839 in the vicinity of Sitka, Norton Sound and Kenai Island, by some adventurous Russian explorers who skirted the north Pacific coast-line from the Kurile Islands north of Japan to San Francisco, California. Apparently the next specimens taken (Hagen 1875, Walker 1912 and 1925) are from Fort Yukon, collected by W. H. Dall, probably during his survey of The Yukon River in 1867. In 1890 Hagen recorded another species from Sitka but did not give the date of collection or the name of the collector. In 1894, J. A. Cadenhead secured a specimen from Burrough's Bay (Walker, 1912). In 1899 members of the Harriman Alaska Expedition obtained eight species, six of which were new to the known fauna (Currie 1901, 1904); later in the same year Rev. S. Hall Young and J. Murray Presnall collected two dragonflies from the interior between Mission and Forty-Mile Creeks and at Eagle City (Holland, 1900). In 1908 another species was recorded without data by Martin. Sometime prior to 1917 a species new to the fauna was taken by A. Stecker from the Kuskokwim River (Kennedy 1917 and Walker 1925). Except for a series of specimens of a previously reported species collected in 1917 by J. S. Hine at Katmai (Walker 1925), apparently no more were taken until 1933 when R. R. Sheppard, a student from the University of Florida, visited Admiralty Island, securing ten species and adding three to the list (Gloyd 1938). Thus, almost a hundred years of incidental collecting yielded only a total of eighteen species. Then in the summer of 1937 Carsten Ahrens went to Alaska primarily for the purpose of collecting Odonata and, although the season was unusually cold, was successful not only in finding all but four of the previously reported species but also six additional ones (Ahrens 1938).

From this review of the literature it is evident that few collections have been recorded and that little is known about the distribution of even the most common species in the region. Many of the records are in diverse publications some of which are now difficult of access and it is hoped that the following synopsis and bibliography may facilitate the studies of others and may help to increase interest in the odonate fauna of this far north land.

References under each species are given in chronological order and those repeating earlier records are omitted in the list unless they are of taxonomic importance. As much as permitted by available data, the earliest and latest dates of collection are also included.

LEUCORRHINIA BOREALIS Hagen. Anchorage, Gulkana (Ahrens 1938*b*, p. 227). July 17-27.

L. HUDSONICA (Selys). Kukak Bay, Virgin Bay (Prince William Sound) (Currie 1901, pp. 221-222) ; Admiralty Island (Gloyd 1938, p. 199) ; Chitina, Gulkana, Juneau, Ketchikan (Ahrens 1938*b*, p. 226). June 25-August 26.

L. PROXIMA Calvert. Anchorage (Ahrens 1938*b*, p. 227). July 22.

LIBELLULA QUADRIMACULATA Linné. Fox Point (Currie 1901, p. 221, as *Leptetrum quadrimaculata*) ; Juneau (Ahrens 1938*b*, p. 226). July 11-26.

SYMPETRUM DANAE (Sulzer). Admiralty Island (Gloyd 1938, pp. 198, 199) ; Juneau (Ahrens 1938*b*, p. 226). August 5-21.

S. DECISUM (Hagen). Chitina (Ahrens 1938*b*, p. 226). July 28.

Cordulia shurtleffi Scudder. Kukak Bay, Fox Point (Currie 1901, p. 220); Anchorage, Gulkana, Juneau, Palmer *(Ahrens 1938*b*, p. 226); Fort Yukon.[1] June 25-July 26.

Somatochlora albicincta (Burmeister). Fort Yukon (Hagen 1875, pp. 59-60, as *Epitheca albicincta*); Kodiak, Kukak Bay (Currie 1901, p. 221; Walker 1925, p. 172); Katmai (Walker 1925, p. 173); Admiralty Island (Gloyd 1938, p. 199); Anchorage, Juneau, Palmer (Ahrens 1938*b*, p. 226). June 25-August 26.

S. hudsonica (Hagen). Fort Yukon (Walker 1925, p. 180). June 25.

S. sahlbergi Trybom. Kuskokwim River (Kennedy 1917, pp. 229-236, pl. 13, as *walkeri* n. sp.; Walker 1925, pp. 163-167).

S. semicircularis (Selys). Admiralty Island (Gloyd 1938, pp. 198, 199); Juneau (Ahrens 1938*b*, p. 226). July 11-August 25.

Aeshna eremita Scudder.[2] Alaska (Martin 1908, p. 37, as *clepsydra;* Muttkowski 1910, p. 111); Bethel, Kuskokwim River[3] (Walker 1912, p. 126); Admiralty Island (Gloyd 1938, p. 199); Anchorage, Chitina, Gulkana, Palmer (Ahrens 1938*b*, p. 226). July 19-August 19.

Ae. interrupta interrupta Walker. Admiralty Island (Gloyd 1938, pp. 198, 199); Ketchikan (Ahrens 1938*b*, p. 226). July 8-August 19.

Ae. interrupta lineata Walker. Chitina, Palmer (Ahrens 1938*b*, p. 226). July 19-28.

Ae. juncea (Linné). Kenai Island, Norton Sound (Hagen 1856, pp. 369, 380; 1861, pp. 120-121); Kodiak, Unga Island

[1] Hagen, 1875, p. 60, says "The specimen from Ft. Yukon, Alaska, quoted as *C. Shurtleffi* Dall, belongs to a different species," but no other reference to this specimen was found in the literature. However, in 1935, I examined 5♂ 3♀, collected June 25 by W. H. Dall at Fort Yukon, of *C. shurtleffi* in the U. S. National Museum.

* After the present paper was in type it was noted that Mr. Ahrens in his published list records this locality as "Matanuska Valley."

[2] Currie, 1901, lists *Aeshna clepsydra* (Say) (= *eremita*, Walker 1912, p. 119) as previously reported, but from the literature cited by him I found no definite Alaskan record.

[3] Recorded as Kuskoquin River by Walker, *ll. cc.*

(Shumagin Islands), Nushagak River (Currie 1901, pp. 219-220; Walker 1912, p. 91); Bethel, Kuskokwim River[3] (Walker 1912, p. 91); Admiralty Island (Gloyd 1938, p. 199); Anchorage, Gulkana, Juneau, Ketchikan, Palmer, Seward, Valdez (Ahrens 1938*a*, pp. 8-9, 26; 1938*b*, p. 226). July 11-August 25.

AE. PALMATA Hagen. Kodiak, Cook Inlet (Currie 1901, pp. 219-220, as *constricta* (Say); Walker 1912, p. 163); Admiralty Island (Gloyd 1938, p. 199); Juneau, Palmer (Ahrens 1938*b*, p. 225). July 11-August 21.

AE. SITCHENSIS Hagen. Sitka (Hagen 1861, pp. 119-120, type description; 1890*b*, pp. 353-355); Burrough's Bay (Walker 1912, p. 83); Juneau, Palmer (Ahrens 1938*b*, p. 225). July 19-August 6.

ANAX JUNIUS (Drury). Sitka (Hagen 1890*a*, p. 306); mountains between Mission and Forty-Mile Creeks, Eagle City (Holland 1900, p. 382). July 25-August 3.

CORDULEGASTER DORSALIS Hagen. Sitka (Hagen 1856, pp. 367, 381; *in* Selys 1857, p. 347, type description; 1861; p. 116; 1875; p. 50).

AGRION RESOLUTUM Hagen. Anchorage, Gulkana, Palmer (Ahrens 1938*b*, p. 227). July 17-27.

ENALLAGMA BOREALE Selys. Cook Inlet, Juneau, Kukak Bay (Currie 1901, pp. 218-219, as *calverti* Morse); Admiralty Island (Gloyd 1938, p. 199); Gulkana, Awk Lake (Juneau), Matanuska, Palmer (Ahrens 1938*b*, p. 227). June 29-August 25.

E. CYATHIGERUM (Charpentier). Sitka (Hagen 1856, pp. 367, 381; 1861, p. 87, as *Agrion annexum*, n. sp.); Admiralty Island (Gloyd 1938, p. 200); Awk Lake (Juneau), Palmer (Ahrens 1938*b*, p. 227). July 19-August 26.

LESTES DISJUNCTUS Selys. Fox Point (Currie 1901, p. 217, as *Lestes* sp.; Muttkowski 1910, p. 37); Admiralty Island (Gloyd 1938, p. 200); Anchorage, Gulkana, Juneau, Palmer (Ahrens 1938*b*, p. 227). July 19-August 26.

L. DRYAS Kirby (*uncatus* Kirby). Chitina (Ahrens 1938, p. 227). July 28.

Hagen (1856, p. 381) mentioned *Aeshna borealis* Zett. (= *caerulea* Ström) from Sitka "von Brandt in Hamburg" but I regard this record as questionable. While it is possible that this may represent *A. caerulea septentrionalis* Burm., Hagen's reference is not included in the synonymy of this species by Walker (1912, p. 76) and its occurrence in Alaska has not been verified.

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A New Species of Coelus Eschscholtz. (Coleoptera: Tenebrionidae).

By Frank E. Blaisdell, Sr., Stanford Medical School and Associate in Research, California Academy of Sciences, San Francisco, California.

Coelus gracilis new species.

Gracilis belongs to the Globosus Group [1] which also includes *globosus* Lec., *grossus* Csy. (*solidus* Csy., immature form) and *saginatus* Csy.; also the insular species *pacificus* and *remotus* of Fall. It is the smallest species of the group thus far discovered, some specimens scarcely exceeding in size the larger ones of *Coelomorpha* Csy. that occur in a similar habitat in the vicinity of Ensenada, Lower California, Mexico. All of the species belonging to the tribe Coelini burrow in sand dunes or sandy areas, under vegetation in littoral regions along the Pacific coast. Mainland species of the Globosus Group are known, from the data at hand, to occur only in the vicinity of Ensenada northward to Santa Cruz, California. It is interesting to discover a species as far north as Antioch, Contra Costa County, California; the author knows of no record of species belonging to the group under discussion occuring north of Santa Cruz.

[1] Blaisdell, Synopsis and review of the species of Coelus. Trans. Amer. Ent. Soc., XIV, p. 318, 1919.

Form oval to slightly oblong-ovate, small in size and about one-fifth longer than wide. Color nigro-piceous to ferruginous or paler due to immaturity; antennae and palpi flavo-testaceous, legs more or less piceous. Cilia along sides of body, long, dense, erect and fulvous, with bristling hairs of the same kind on the legs; hairs not occurring on the anterior pronotal margin and head behind the frontal suture, as in the species of the Ciliatus Group.

Head relatively moderate in size, twice as wide as length of an antenna; epistoma relatively large and more prominent laterally than the eyes, sides arcuately convergent anteriorly, angles broadly rounded, apical margin moderately deeply sinuate in middle two-fourths, sinus rather evenly arcuate, surface gradually arising from the frontal suture, somewhat convex and more or less impressed within the apical margin lateral to the sinus, rather closely punctate especially toward the sides, punctures moderate in size; frontal suture well marked, straight in middle three-fifths with lateral fifths arcuately attaining the eyes. Frons somewhat convex, broadly flattened in the central area, rather densely punctate, most so laterally and against the suture, punctures slightly larger and stronger than on the epistoma. Eyes coarsely facetted. Antennae in length equal to one-half the width of the epistoma, last four segments moderately compressed and somewhat gradually widened except the last; first segment not visible from above, second and third obconical, the former slightly larger than the latter, both a little longer than wide, fourth to the seventh inclusive slightly wider at apex and briefly constricted at base, as long as wide; last four segments forming a feebly defined club, the eighth triangular and as long as wide, ninth and tenth transverse the latter slightly wider, eleventh smaller, narrower and subquadrate.

Pronotum transverse, slightly more than twice as wide as long and twice as wide as the head; base less than one-half wider than apex, sinuation of the latter broad, moderately deep and rather straight in middle two-fourths, apical angles prominent and well rounded, margin beaded; sides broadly arcuate and moderately convergent anteriorly, margin beaded and continuously so with that of the apex; base transverse, margin thin and coriaceous, angles rather narrowly rounded; disk moderately convex from side to side, almost evenly punctate, punctures small, well defined and separated by a distance equal to about three to six times their diameter, larger and denser in the submarginal area, the latter not widely impressed, each puncture with a moderately long and more or less semi-erect hair. Sides less than moderately explanate. Surface finely alutaceous.

Elytra more or less moderately inflated posteriorly, about one-fifth longer than wide and three times as long as the pronotum; sides subparallel and moderately arcuate, apex subogival; disk strongly convex from side to side, less so in basal one-third, strongly so and arcuately declivous apically, surface moderately closely punctate, punctures separated by a distance equal to two to four times their diameter, smaller and quite simple in the central area, becoming a little larger and feebly muricate laterally and apically; each puncture with a fine subrecumbent, short hair which becomes coarser at the periphery.

Measurements.—(Types) Male: length 5 mm.; width 3 mm. Female: length 7 mm.; width 4 mm.

Holotype, female, no. 4698, and *allotype*, male, no. 4699, in the collection of Dr. E. C. Van Dyke, Museum of the California Academy of Sciences; collected at Antioch, Contra Costa County, CALIFORNIA, April 24, 1938, by Dr. Van Dyke. Thirty-four *paratypes* with same data; two are to be placed in the collection of the American Entomological Society, Philadelphia. Largest specimen measures: Length 7 mm., width 4 mm.; smallest: length 4.5 mm., width 2.5 mm.

The author has figured the genitalia of *Coelus ciliatus* Esch.,[2] genotype of the genus.[3] Those of *gracilis* are of the same phylogenetic type, but show some specific differences. The aedeaga [4] of the female is testaceous in color and feebly chitinized, the lateral plates have a few very fine punctures, each with a long fine erect seta, none have been observed on the dorsal and ventral plates in the specimens examined.

Gracilis is to be recognized by its small size, smooth integument, fine and nearly simple punctation and with a facies somewhat like that of a small *Eusattus dubius* Lec.; the sides of the pronotum are but feebly explanate.

[2] Synopsis and review of the species of Coelus. Trans. Amer. Ent. Soc., xiv, p. 318, 1919, pl. xxxii.

[3] Eschscholtz, Zool. Atlas, Heft iii, p. 5, pl. 14, fig. i, 1829.

[4] In Transactions of the American Entomological Society 59, p. 223, I have proposed "that the term aedeaga be applied to the combination of sclerites in the female sexual segment."

A New Holopyga from the Western United States (Hymenoptera: Chrysididae).

By WM. G. BODENSTEIN, Cornell University, Ithaca, New York.

In a recent loan of Chrysididae from the United States National Museum there is a large series of the following new species of *Holopyga*.

Holopyga taylori*, new species.

Head: In anterior aspect transverse, oval; in dorsal aspect slightly wider and about as long as the pronotum. Vertex with shallow, well-spaced punctures becoming very fine and widely spaced on the occiput. Facial basin with a moderate vertical depression, polished, and with traces of transverse striations; punctured at the sides similarly to the vertex. Clypeus elevated between the antennae, with a few very fine punctures. Mandibles with three teeth. Antennae with the second joint of the flagellum slightly longer than the fourth.

Thorax: Prothorax punctured similarly to the occiput, the fine punctures interspersed with large, shallow, almost obsolete punctures; the punctuation not much heavier at the sides than on the disc. Mesothorax with very fine, well-separated punctures, becoming close and dense at the anterior ends of the parapsidal sutures; the punctures becoming sparser toward the posterior end of the segment. Mesopleurae with the punctuation indistinct and with traces of fine striations. Scutellum smooth and polished with some traces of obsolete punctures. Postscutellum reticulately punctured on the disc with a small, oblique, rectangular area on each side which is transversely striated. Propodeum reticulately punctured; oblique foveolae roughly triangular in shape with the broad base of the triangle at right angles to the lateral angles of the propodeum; about in the middle of the base of the triangle there is a low, blunt projection. Between the foveolae is a rugose, almost striate area below which there is a vertical ridge. Lateral angles of the propodeum short and acute. Tegulae dark brown, smooth and polished. Wings with the discoidal cells completely lacking; not infuscated. Claws with two inner teeth.

Abdomen: In dorsal aspect the abdomen is egg-shaped, about three-quarters as wide as long; all segments are of about equal length on the median line. First segment with fine

*I name this species for Dr. Leland H. Taylor whose notes and material on the Chrysididae have been of inestimable value to me.

punctures and fine transverse striations, impunctate in the center of the anterior border. Second and third segments punctured as the first, the punctures becoming a little closer together posteriorly. Third abdominal segment truncate at the apex, the truncate portion roughly about one-third the width of the segment at the base. Apical margin very thin, not membranous and not turned under.

Color: Blackish-bronze in color with blue and green reflections on sides of thorax and abdomen. Tibiae and tarsi light brown.

Female: The female differs from the male as follows: vertex and occiput evenly puctured with fine punctures, slightly larger than those of the male. Facial basin with the transverse striations more distinct. Thorax more evenly punctured; mesopleurae with more distinct punctures. Scutellum more distinctly punctured at the sides. Punctures of the propodeum continued evenly between the oblique foveolae. Abdomen not as heavily punctured, the transverse striations very faint. Face metallic blueish-green in color.

Length: 2-3.5 mm.

Type.— ♂ ; Hollister, Twin Falls County, IDAHO. August 7, 1930. (Plot 3a.) [United States National Museum.] *Allotype.*— ♀ . The same locality, August 21, 1930. (Outside.) [United States National Museum.]

Paratypes. — Seventeen males, twenty females, as follows: IDAHO: 4 ♂ ; 1 ♀ ; Hollister, Twin Falls County; June 13 to July 24, 1931; (D. E. Fox; on *Sophia sophia* and *Salsola pestifera*) ; 2 ♂ ; August 13, 1929; 5 ♀ ; August 7, 1930; 1 ♀ ; July 30, 1929; (F. B. Hinnenkamp; on *Salsola parviflora).* 2 ♂ ; Adelaide, July 25, 1928; (on *Sophia sophia*) ; and 1 ♂ ; September 14, 1929; on (*Salsola pestifera*) ; and 1 ♀ ; July 21, 1927; (on *Salsola filipes*). 2 ♀ ; Burley, June 16, 1931; also August 7, 1929; (on *Salsola pestifera*, at edge of cultivated area). 1 ♂ ; Castelford, June 28, 1928; (on *Sophia sophia*) ; and 1 ♀ ; August 25, 1927; (on *Atriplex rosea*). 1 ♀ ; Berger; September 5, 1930; (on *Salsola pestifera*). 1 ♂ ; Kimama; May 15, 1931; (F. B. Hinnenkamp; on *Norta altissima*). [All U. S. N. M.]

MISSOURI: 3 ♀ ; St. Louis; January 8, 1920; (Phil Rau; numbers 3812 and 3813) ; [U. S. N. M.]

CALIFORNIA: 1 ♀ San Diego County; April; (Coquillett) ;

[U. S. N. M.]. 6♂; 3♀; Emeryville, October 26 and November 3, 1938; (J. W. MacSwain).

This species may be easily distinguished from the previously described North American species of *Holopyga* by its small size, its reduced punctuation, the absence of the discoidal cells, the two teeth in the tarsal claw, and by the apical margin of the third abdominal segment which is very thin and not turned under. A further discussion of this and a related species will be made in a revisionary paper now in preparation.

A Treatment for Crumpled Wings of Odonata Nymphs to Disclose Their Venation.

By May K. Gyger, Ithaca, New York.

Dragonfly nymphs may often be determined to the genus by means of the venation in the wing pads. However, in the latter part of the ultimate nymphal instar the wings are much crumpled and their characters thereby obscured. In the course of some work on nymphs from the Philippine Islands a very peculiar and unique specimen with wing pads badly crumpled was found and Dr. Needham suggested to the author to see whether anything could be done to stretch the wings so that the venation could be seen. The following method is the outcome of much trial and error and, while probably not the best possible, does give usable results.

To prepare an anisopterous wing pad for study, clip it from the nymph and remove the outer layer by cutting along its entire hind margin with a razor blade, then tease the wing out with a dissecting needle. Immerse the wing in boiling water for about three minutes and next place it in twenty drops of a one percent solution of potassium hydroxide. The membrane will begin to expand in a few seconds. Leave it in this solution until it has ceased swelling. Remove, place in boiling water again and float therefrom onto an ordinary glass slide. If the specimen has been in alcohol for a long time further treatment is necessary. Holding the slide in both hands with the fingers underneath and the thumbs on top, gently pull and stretch the entire wing in all directions with the edges of the balls of the thumbs. Continue to do this until the wing dries. It will adhere to the slide and should be nearly the size of the adult wing. Now it may be made into a dry mount or mounted in balsam or, if desired, may be replaced in the vial of alcohol with the nymph from which it came. To study the wing at any later time after it has been in alcohol, it may need to be placed in boiling water for one or two minutes, placed on a slide and stretched again as described above. A dry mount usually seems the most satisfactory means of permanent preservation.

A zygopterous wing pad requires somewhat simpler but more delicate treatment. After removing the nymphal skin place the wing in a hot one-half of one percent solution of potassium hydroxide. Let it remain there until it has ceased to expand and remove immediately to hot water and thence to a slide where it can be teased out with needles.

Anyone who wishes to identify rare specimens is strongly advised to practice first with some common forms since both speed at the right moments and very gentle handling are necessary to avoid ruining the preparation.

Acknowledgment and thanks are due to Dr. Julio García-Díaz, of the University of Puerto Rico, who really did most of the work on the method for Zygoptera nymphs.

Apis griseocollis DeGeer—Bombus separatus Cresson. (Hymenoptera: Bombidae.)

In connection with my work on bumblebees, several years ago I ran across a note by W. A. Schulz (*Berlin. Entom. Zeitschr.* 57: 59, 1912) which stated that the type of *Apis griseocollis* DeGeer was still in the Museum in Stockholm and was a bumblebee.

H. J. Franklin in his Monograph "The Bombidae of the New World" (*Trans. Am. Ent. Soc.* XXXVIII, 1912) I, p. 177, puts the name given by DeGeer, with a question-mark, as synonym of *Bombus impatiens* Cresson. The characters given by Schulz eliminate this possibility, but they are in several respects not complete enough to indicate clearly the species involved. There is, for example, no mention of the position of ocelli. Schulz himself was unable to determine the species concerned from Handlirsch's paper ("Die Hummelsammlung des k. k. Naturhistorischen Hofmuseums" in *Ann. K. K. Naturh. Hofmus.* III, Wien 1888).

To clear up finally this uncertainty, I shipped a determined lot of bumblebees to Stockholm and asked Professor Sjöstedt for his kind help. At his request Dr. A. Roman of the Museum compared the type with the material sent by me and informed me as follows:

The type of "*Apis griscocollis* DeGeer" is a worker of the species known to us now as *Bombus separatus* Cresson.

This conclusion, Dr. Roman informed me, he had reached years ago, and was able now to corroborate it from the material shipped by me.

I rather reluctantly publish this note as I am not fond of nomenclatorial changes. As the type is still in existence and the case is a clear one I see, unfortunately, no way to avoid the application of our existing nomenclatorial rules.

By P. Peter Babiy, Cornell University, Ithaca, New York.

A Substitute Name for Patera Schwarz (Hymenoptera: Meliponidae).

Recently in a paper on the stingless bees of British Guiana, I proposed the name *Patera* (Bull. Amer. Mus. Nat. Hist., LXXIV, p. 475, [1938]) for a subgenus of the Meliponid genus *Trigona*. Dr. V. S. L. Pate has brought to my attention that this name has unfortunately been used twice previously,—first in 1837 by R. P. Lesson (Prod. Medus., P. 34) for a Coelenterate, and later in 1850 by J. C. Albers (Die Heliceen, p 97) for a subgenus of the land snail *Helix*. Therefore, to replace my preoccupied *Patera*, I adopt his suggestion that the name *Partamona* be adopted, with the same genotypic species, i. e. *Melipona testacea* Klug, 1807 [=*Trigona* (*Partamona*) *testacea* (Klug)]. The name *Partamona* is taken from a tribe of Indians of Arawak stock inhabiting the hinterland of British Guiana.—Herbert F. Schwarz, American Museum of Natural History, New York.

A New Species of Aphodius from New Jersey (Coleoptera: Scarabaeidae).

By Mark Robinson, 1533 So. 56th Street, Philadelphia, Pennsylvania.

Aphodius odocoilis, n. sp.

1930. *Aphodius crassulus* Sim (not Horn, 1870), Journ. N. Y. Ent. Soc., XXXVIII, p. 142.

This is the species mentioned by Sim as being *crassulus* Horn but the concave elytral intervals will serve to distinguish this species from *crassulus* and allied species.

Robust, very convex, sides parallel, piceous, shining.

Head tuberculato-rugose in front, punctate posteriorly with barely a trace of tubercules. Clypeus emarginate with distinct denticles on each side.

Prothorax slightly wider than long, sides parallel, with the hind angles obtusely rounded, basal marginal line distinct. Rather sparsely punctured at the middle the punctures becoming denser laterally, the punctures are moderately deep with a few finer punctures intermixed.

Elytra parallel. Striae sparsely, crenately, punctured. Intervals distictly concave at base gradually flattening towards apex, finely and sparsely punctured. Humeri denticulate.

Anterior tibiae smooth in front, finely crenulate above the third tooth. First joint of hind tarsi equal to next three.

Length, 2.7 to 3.7 mm.; Breadth, 1.4 to 2.0 mm.

Type. — Mt. Misery, New Jersey, March 22, 1937 (Mark Robinson). In author's collection.

Paratypes. — 30, Mt. Misery, N. J., various dates between March 22, 1937 and June 6, 1938 (Mark Robinson). Mt. Misery, N. J., March 27, 1938 (L. J. Bottimer). Mt. Misery, N. J., May 30, 1938 (L. W. Saylor). Ballingers Mill, N. J., June 3 and 11, 1929 (R. J. Sim) Sim and Wenzel.

Paratypes have been deposited in the collection of the following: Academy of Natural Sciences of Philadelphia, Museum of Comparative Zoology, U. S. National Museum, American Museum of Natural History, H. C. Fall, C. A. Frost, L. W. Saylor, R. C. Casselberryi, O. L. Cartwright and L. J. Bottimer.

This species has been taken only in deer and rabbit excrement.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL. — **Anduze, P.** — Viaje por el Oriente de Venezuela. [Bol. Soc. Venezolana Cien. Nat.] 4: 282-307, ill. **Cresson, E. T.** — Centenary, by S. R. Raganathan. [Current Sci., Calcutta] 6: 929-930. **Darlington, P. J.** — Was there an Archatlantis? [90] 72: 521-533, ill. **Eddy, B.** — Insect zoo as a wildlife conservation project. [68] 88: 215-216. **Jones, Weber & Dowden.**—Effectiveness of imported insect enemies of the satin moth. [U. S. D. A. Circ.] no. 459; 24 pp., ill. **Martin, C. H.**—Effect of sunlight and of location of logs on the beetle infestations of elm logs. [19] 33: 195-203, ill. **Phelps, W. H.** — La expedicion del American Museum of Natural History at Monte Auyantepuy. [Bol. Soc. Venezolana Cienc. Nat.] 4: 251-265, ill. **Portevin, G.**—Ce Qu'il Faut Savoir des Insectes. 188 pp., ill. Lechevalier, Paris. **Rothschild, Lord.**—In memory of, by K. Jordan. [71] 41: 1-41, ill. **Uvarov, B. P.**—Fourth International Locust Conference. [31] 142: 174-175.

ANATOMY, PHYSIOLOGY, ETC. — **Anonymous.** — Female wasp fixes sex of hatch from her eggs. [J. Tenn. Acad. Sci.] 13: 247. **Carpenter & Eltringham.** — Audible emission of defensive froth by insects; with an appendix on the anatomical structures concerned in a moth. [93] 108A: 243-252, ill. **Chauvin, B.**—Morphologie et pigmentation externes de Schistocerca gregaria (transiens dissocians). [Bull. Soc. Hist. Nat. Afr. Nord.] 29: 249-267, ill.

Eggers & Gohrbanat.—Hypogymna morio—ein Sonderfall —in der Desetzmassigkeit phyletischer Korrelationen? [89] Abt. Syst. 71: 264-276, ill. **Grandjean, F.**—Remarques sur la terminologie des divisions du corps chez les Acariens. [Bull. Mus. Nat. Hist. Nat., Paris] 9: 373-378. **Grasse & Lesperon.**—Notes histologiques et biologiques sur un larve de Coleoptere Termitophile, Troctonotus silvestrii, n. sp. [Arch. Zool. Exp. Gen., Paris] 79: 463-486, ill. **Hadorn, E.** —Die degeneration der Imaginalscheiben bei letalen Drosophila-larven der Mutation "lethal-giant." [Rev. Suisse Zool.] 45: 425-429, ill. **Hennig, W.**—Beitrage zur Kenntnis der Kopulationsapparates und der Systematik der Acalyptraten. [109] 5: 201-213, ill. **Hurlbut, H. S.**—A study of the larval chaetotaxy of Anopheles walkeri (Culicidae). [Amer. J. Hygiene] 28: 149-173, ill. **von Lengerken, H.**—Beziehungen zwischen der Ernahrungsweise und der gestaltung der mandibeln bei den larven der Silphini (Coleo.). [34] 122: 171-175, ill. **Lison, L.**—Le systeme malpighiens de Araeocerus fasciculatus (Coleo: Phytophaga). [Ann. Soc. R. Zool. Belg.] 68: 103-120, ill. **Lutz, F. E.**—The insect glee club at the microphone. [Natural History] 42: 338-345, ill. **Mahler, H.** — Histologische untersuchungen uber die spinndrusen einiger spinnen. [46] 34: 439-498, ill. **Orosi-Pal, F.**—Studien uber die Bienenlaus (Braula caeca, Dipt.). [Zeitschr. Parasitenk.] 10: 221-238, ill. **Paulian, R.**—Contribution a l'etude quantitative de la regeneration chez les Arthropodes. [93] 108A: 297-383, ill. **Rait, W. L.** — A study of the growth of the fore wing-sheaths in Eusthenia spectabilis (Plecop.) [Trans. & Proc. R. Soc. So. Australia] 61: 63-73. Further remarks on terminology relation to the growth of the fore wing-sheath in the larva of Eusthenia spectabilis (Plecop.). [Trans. & Proc. R. Soc. So. Australia] 61: 158. **Rivnay, E.**—Moisture as the factor affecting wing development in the citrus aphis, Toxoptera aurantii. [22] 28: 173-179. **Rosenthal, H.** — Azione delle temperature elevate sui vari stadi di sviluppo di Dermestes vulpinus (Coleo.). [Boll. Zool.] 9: 37-39. **Sen, P.**—On the biology and morphology of Rhabdophaga saliciperda (Dipt: Cecidomyid.), a common pest of willows. [89] Abt. Anat. 65: 1-36, ill. On the structure (anatomical and histological) of the full grown larva of Rhabdophaga saliciperda (Dipt: Cecidomyid.). [89] Abt. Anat. 65: 37-62, ill. **Smreczynski, S.** — Entwicklungsmechanische Untersuchungen am Ei des Kafers Agelastica alni. [89] Abt. All. Zool.

59: 1-59, ill. **Subkleir, W.** — Zur morphologie der larven von Melolontha hippocostani (Scarab.). [52] 7: 270-304, ill. **Tazelaar, M.**—Some studies on regeneration and relative growth of limbs in mayfly larvae. [93] 108A: 257-265, ill. **Thomsen, E.**—Uber den Kreislauf im flugel der Musciden mit besonderer berucksichtigung der akzessorischen pulsierenden organe. [46] 34: 416-438, ill. **Tischler, W.**—Zur Okologie der wichtigsten in Deutschland an Getreide schadlichen Pentatomiden. [46] 34: 317-366, ill. **Wigglesworth, V. B.** — "Climbing organs" in insects. [31] 141: 974-975.

ARACHNIDA AND MYRIOPODA. — **Berland, L.** — Les Araignees. [Livr. Nat. no. 43] xii + 173 pp., Delamair et Bontelleau, Paris. **Bristow, W. S.** — The classification of Spiders. [93] 108B: 285-321, ill. (k). **Everly, R. T.** —See under Coleoptera. **Grandjean, F.** — Observations sur les Acariens. [Bull. Mus. Nat. Hist. Nat., Paris] 10: 64-71, ill. **Jacot, A. P.**—Four new Arthropods from New England. [Amer. Midl. Nat.] 20: 571-574, ill. **Kaston, B. J.**—New spiders from New England with notes on other spp. [19] 33: 173-191, ill. North American spiders of the gen. Agroeca. [Amer. Midl. Nat.] 20: 571-74, ill. (k*). **de Toledo Piza, S.** — Novas especies de Aranhas myrmecomorphas do Brasil e consideracoes sobre o seu mimetismo. [Rev. Mus. Paulista] 23: 309-319, ill.

THE SMALLER ORDERS OF INSECTS.—**Carpenter, F. M.** — Two Carboniferous insects from the vicinity of Mazon Creek, Illinois (Palaeodictyoptera and Protorthoptera). [Amer. J. Sci.] 36: 445-452, ill., (*). **Clay, T.** — A revision of the genn. and spp. of Mallophaga occurring on Gallinaceous birds. Pt. I.—Lipeurus and related genn. [93] 108B: 109-204, ill., (k*). **Clay & Rothschild.**—Ectoparasites from captive birds. [71] 41: 61-73. **Gloyd, L. K.** —A n. sp. of the gen. Libellula from Yucatan. [114] no. 337: 1-4, ill. **Guimares & Lane.**—Contribucoes para o conhecimento das Mallophagas das aves do Brasil. VI.—Novas especies parasitas de Tinamiformes. [Rev. Mus. Paulista] 23: 1-22, ill. **von Hagen, W.**—Contribution to the biology of Nasutitermes (s. S.) (Isoptera). [93] 108A: 39-49, ill., (S). **Jacot, A. P.** — See under Arachnida. **Keler, S.** — Baustoffe zu einer monographie der Mallophagen. 1.— Ueberfam. Trichodectoidea. [N. Act. Leopoldina] 5: 395-

467, ill. Ueber einige Mallophagen aus Paraguay und Kamerun. [109] 5: 228-241, ill., (*). **Krey, J.**—Untersuchungen zur Okologie der Trichopterenlarven unter besonderer Berucksichtigung der Moorbewohner Schleswig-Holsteins. [Schrift. Naturwissensch. Ver. S. H.] 22:271-318. **Thompson, G. B.**—The Lice of Petrels. Pt. 1.—The elongate forms. [75] 2: 481-493. On two spp. of Mallophaga from Phaethon rubrocauda roseotincta. [75] 2: 459-465, ill., (S).

ORTHOPTERA.—Chopard, L.—La Biologie des Orthopteres. [Encyl. Ent.] Ser. A, 20; 541 pp., ill., Lechevalier, Paris. **Harvey, L. A.**—Preliminary note on the relations between grasshoppers and the re-colonisation of denuded heath and moor-land vegetation. [Trans. Soc. Brit. Ent.] 5: 291-297, ill.

HEMIPTERA.—Beamer, R. H.—Two n. spp. of Allygianus (Cicadellidae). [55] 14: 153-155, ill. **Caldwell, J. S.**—The Jumping Plant lice of Ohio (Chermidae). [Ohio Biol. Surv. Bull. 34] 6: 228-282, ill. (k*). **DeLong, D. M.**—Three n. spp. of Texananus (Cicadellid.). [55] 14: 185-186. **Drake & Harris.**—A new Rhagovelia from Cuba. [55] 14: 152. **Hungerford, H. B.**—A n. sp. of Neocorixa (Corixidae). [19] 33: 170-172, ill. **Lepage, H. S.**—Catalogo dos Coccideos do Brasil. [Rev. Mus. Paulista] 23: 327-491. **Osborn, H.**—The Fulgoridae of Ohio. [Ohio Biol. Surv., Bull. 35] 6: 283-349, ill., (k). **Pratt, R. Y.**—Observations on the striding habits of the Gerridae. [55] 14: 156. **de la Torre-Bueno, J. R.**—Stenomacra marginella H.-Sch. and S. cliens Stal, a taxonomic note and a correction (Pyrrhocor.). [19] 33: 192-193, (k).

LEPIDOPTERA.—Brubaker, L. H.—The life of the mourning cloak [Nature Mag.] 31: 354-357. **Kohler, P.**—Neotropischer Psychiden aus dem Deutschen Entomologischen Institut. [109] 5: 246-248, ill., (*). **Lichy, R.**—Lepidopteros nuevos para Venezuela. [Bol. Soc. Venezolana Cien. Nat.] 4: 266-278, ill. (*). **Mendes, D.**—Nota sobre Maruca testulalis (Pyralid.). [Rodriguesia] 3: 167-169, ill. **Schaus, W.**—N. spp. of American Heterocera in the U. S. National Museum. [75] 2: 504-517, (S). **Travassos, L.**—Sobre um novo typo de Syssphingidae. [Rodriguesia] 3: 199-201, ill.

DIPTERA. — **Alexander, C. P.** — New or little known Tipulidae: Neotropical Species. [75] 2: 416-438. **Antunes & Lane.** — Um novo Aedes, Aedes (Ochlerotatus) pennai, encontrado em Sao Paulo. [Rev. Mus. Paulista] 23: 605-614, ill. **Ayrosa Galvao & Lane.**—Notas sobre os Nyssorhynchus de Sao Paulo (Culicidae). [Rev. Mus. Paulista] 23: 23-28, ill. **Beckman, H.**—A simple feeding device for Culex pipiens in avian malaria studies. [68] 88: 114, ill. **Guimares, L. R.** — Sobre as especies sul Americanas do genero Trichobius (Streblidae). [Rev. Mus. Paulista] 23: 651-666, ill., (k). **Hall, D. G.**—N. genn. and spp. of South American Sarcophagidae. [109] 5: 253-259, ill. **Hennig, W.** —See under Anatomy. **Hurlbut, H. S.**—See under Anatomy. **James, M. T.** — A second species of Scoliopelta (Stratiomy.). [55] 156-157. **Lane & Antunes.**—Notas sobre o genero Mansonia subgen. Rhynchotaenia, com descripcao de uma nova especie (Culic.). [Rev. Mus. Paulista] 23: 225-232. **Lane & Ayrosa Galvao.**—Sobre a posicao systematica de Anopheles gilesi Neiva, 1908 (Culic.). [Rev. Mus. Paulista] 23: 29-34, ill. **Seguy, E.**—Fam. Muscidae. [Gen. Insect.] Fasc. 205; 604 pp., ill., (k). **Steyskal, G.**—The precopulatory behaviour of the male of Dolichopus omnivagus (Dolichopodid). [19] 33: 193-194.

COLEOPTERA.—**Bierig, A.** — Un Trogatus nuevo de Panama (Staphyl.). [115] 12: 243-244, ill. **Blaisdell, F. E.**—A n. sp. of Listus from the Sequoia National Park, California (Melyr.). [55] 14: 165-167. **Borchmann, F.**—Fam. Lagriidae. [Gen. Insect.] Fasc. 204; 561 pp., ill., (k). **Cazier, M. A.**—A new California Polyphylla with notes concerning the variability of certain characters within the genus. [55] 14: 161-164. **Darlington, P. J.**—The American Patrobini (Carabidae). [70] 18: 135-183, ill., (k*). **Everly, R. T.** — Spiders and insects found associated with sweet corn with notes on the food habits of some spp. I.—Arachnida and Coleoptera. [43] 38: 136-148, ill. **Hatch, M. H.**—Report on the Coleoptera collected by Dr. Victor B. Scheffer on the Aleutian Islands in 1937. [55] 14: 145-149. **Hatch & Beer.**—A n. sp. of Dicerca (Buprestidae) from Washington. [55] 14: 151. **Hustache, A.**—Curculionides nouveaux de l'Amerique meridionale, qui se trouvent dans le Deutsches Entomologisches Institut. [109] 5: 265-288. **Kleine, R.**—Neue Brenthiden aus dem Deutschen Entomologischen Institut. [109] 5: 289-291, ill. **Korschefsky, R.**—Eine neue Cycloneda-Art aus Brasilien. [109] 5: 264, ill.

Lane, F.—Notas sobre Lamiides Neotropicos e descripcao de especies novas. [Rev. Mus. Paulista] 23: 631-642, ill. Esboco monographico dos Anoplodermideos. [Rev. Mus. Paulista] 23: 153-224, ill. **Lane & Jesus Moure.**—Os Cholineos do Museu Paulista. I.—Descripcao de algunas especies novas. [Rev. Mus. Paulista] 23: 612-630, ill. **Lane & Pessoa.**—Sobre a validade especifica do Canthon dives Harold, 1868 (Scarab.). [Rev. Mus. Paulista] 23: 643-649, ill. **von Lengerken, H.**—See under Anatomy. **Linsley, E. G.**—Longevity in the Cerambycidae. [55] 14: 177. **McCauley, R. H.**—A revision of the genus Microrhopala in North America, north of Mexico (Chrysomel.). [19] 33: 145-169, ill., (k). **Maulik, S.**—On the structure of larvae of Hispine beetles. [93] 108B; 49-71, ill., (k). **Pessoa & Lane.**—Notas sobre o genero Phanaeus (Scarab.) com a descripcao de uma nova especie. [Rev. Mus. Paulista] 23: 323-326, ill. **Pratt, R. Y.**—One hour's collecting of Scaphinotus on Whidby. [55] 14: 167. **Schedl, K. E.**—Die Einteilung der Pityophthorinae (Rhynchophora). [52] 7: 157-188, ill., (Sk*). **Van Dyke, E. C.**—Calendra (Sphenophorus) minimus Hart in Calif. [55] 14: 187.

HYMENOPTERA.—Cockerell, T. D. A.—A new Bembecine wasp from San Nicolas Isl., California. [55] 14: 150. **Mickel, C. E.**—Photopsoid Mutillids collected by Dr. K. A. Salman at Eagle Lake, Calif. [55] 14: 178-185. **Mitchell, T. B.**—Notes on the Megachilid subgenera Xeromegachile and Derotropis. [55] 14: 168-177, ill. **Weyrauch, W.**—**Recherches sur la chaleur dans le nids d'Hymenopteres sociaux.** [Mem. Soc. R. Sci. Liege] 2: 307-394.

Occurrence of Aphodius scrofa Fabricius in Western Maine (Coleop.: Scarabaeidae).

Two specimens of this species were given me by Mr. W. J. Brown, Dominion of Canada Entomologist, which were taken by him at Aldouane, New Brunswick, July 6, 1928. The western march is indicated by the capture of five specimens at Weld, Maine, on July 2, 1938, in a single cow dropping. None of the other droppings in the pasture contained specimens and two days later there were none present in the dropping where the five were found.

Weld is situated about 25 miles south east of the Rangeley Lakes in the western part of the state.

C. A. Frost, Framingham, Massachusetts.

Entomological News for December, 1938, was mailed at the Philadelphia Post Office, January 11th, 1939.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Chrysalids of Papilio ajax and philenor, cocoons of Rothschildia orizaba and jorulla. Buy or exchange. Newark Entomological Society. Curator, Chas. Rummel, Green Village Rd., R. D. 2, Madison, New Jersey.

Have large list of Lepidoptera wants and offers. Send me yours. Carpenter, Box 1344, Hartford, Conn.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis** or **Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Subscriptions for 1939 are now due.

ENTOMOLOGICAL NEWS

FEBRUARY, 1939

Vol. L — No. 2

CONTENTS

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ENTOMOLOGICAL NEWS

Vol. L. FEBRUARY, 1939 No. 2

When is a Name a Subspecific Name?

The Editor, Entomological News:

Sir,

I have read with some interest and considerable dismay an article by William Hovanitz on "The Interpretation of the term subspecies, etc., etc.," which appeared in your February, 1938, issue. This article is of value in calling attention to the anomalous position in which entomological names of a category lower than subspecies now find themselves, inasmuch as they are not covered by the International Rules of Nomenclature. Lepidopterists are concerned more than other entomologists with names of this kind, and, writing as one of them, I agree with Mr. Hovanitz that the practice of lepidopterists is not as consistent as it should be, and undoubtedly calls for action; I cannot, however, believe that the action he appears to envisage will do anything to remedy this state of affairs.

The authors of the Rules cannot have been unaware of these other categories of names; they do not deny their existence, they merely ignore it (Article 2). To deduce from the premises set forth by Mr. Hovanitz that "it follows that the subspecies *is* the only category of lower rank than the species" is surely quite unwarranted; he is confusing taxonomy with nomenclature. One may, however, deduce from these same premises certain other things, namely (1) that the correct way of writing a subspecific name is the trinomial, and conversely that (in the absence of information to the contrary) any trinomial must be assumed to have reference to a subspecies; (2) that the rules do not apply to other categories of names and that in our treatment of these names, therefore, we are not governed by the Rules; (3) that these names in categories lower than the subspecies, having no status in scientific nomenclature, cannot take precedence over names recognized as valid under the rules.

One may illustrate these points by making use of Mr. Hovanitz's own examples.

1. *Eurymus alexandra edwardsi* form *hatui* B. & B. is not quadrinomial (on Mr. Hovanitz's own reasoning such a thing could not exist, there being only uni-, bi- and tri-nomials in nomenclature), it is a valid trinomial to which is added a name that the authors, by calling it a form-name, have carefully excluded from the operation of the rules; *hatui* may not be a scientific name controlled by the rules, but one cannot deny that it is a name.

2. *Euphydras editha.* Neither "ab. *fieldi*" nor "r. *wrighti*" has any status in nomenclature, not being set forth as a trinomial or as a subspecific name by its author. Neither is a valid subspecific name until published as a trinomial, and whichever is published first in that form is the name of the subspecies, provided that no valid subspecific name has been published in the interval.

3. *interligata* Cabeau. As Mr. Hovanitz has been unable to refer to the original descriptions of the names which he discusses in this paragraph, I quote below the exact form in which each name was published:

(Rev. Men. Soc. Ent. Namuroise, 1919 : 49)

1. *Argynnis selene* Schiffermiller ab. *interligata,* n. ab.
2. *Argynnis euphrosyne* Linné ab. *interligata,* n. ab.
3. *Argynnis lathonia* Linné ab. *interligata,* n. ab.

(loc. cit., 1922 : 18)

4. *Argynnis dia* Linné ab. *interligata* n. ab.

(loc. cit., 1922 : 46)

5. *Argynnis pales* Schiffermiller forme *arsilache* Esper ab. *interligata,* n. ab.
6. *Argynnis ino* Rottemburg ab. *interligata,* n. ab.

If I understand Mr. Hovanitz correctly, he would have us believe that all these names (except No. 5 presumably) are trinomials. But a trinomial is written, thus: *Alpha beta gamma,* not *Alpha beta* ab. *gamma;* and the author here has obviously taken considerable pains to make it clear that he is describing aberrations, and therefore, presumably, not subspecies. Mr. Hovanitz, however, in spite of this would appear to suggest that, whatever the author intended to do, he had in fact described, willy nilly, six homonymous subspecies* in the genus *Argynnis;* which, as Euclid used to say, is absurd.

4. Although the statement of fact given in this paragraph does not contain the whole truth, as the author himself suggests, that is immaterial to the argument. There are several species known to me of which the first name valid under the code was based upon a specimen which proved subsequently to be very atypical of the species, or, in other words an aberration. Does this present any difficulty? Take the (hypothetical) case quoted by Mr. Hovanitz. Is there any objection to referring to the aberration of *Argynnis niobe* as *A. niobe* ab. *adippe? Niobe* and *adippe* at the time of publication were equally valid *names, whatever their taxonomic values* may have been.

5. Precisely the same misunderstanding of the Rules leads Mr. Hovanitz again to an untenable position in this paragraph; but there is at least a clue to the nature of his misunderstanding. He uses the phrase "*Erebia ligea* ab. *subcaeca* Schultz; a trinomial." That seems to crystallise the difficulty. I maintain, and I believe that ninety nine lepidopterists out of a hundred would agree with me, that that is not a trinomial. A subspecific name is a trinomial name; does it follow that every use of three terms in conjunction must, whatever form it takes, be a subspecific name, even though its author explains that it is not?

Nomenclature is a sufficiently vexed and vexing a subject as it is, without the dragging of such red herrings as this across its tortuous path. Let Mr. Hovanitz apply to the Commission for a definition of a "trinomial" if he thinks it worth while: we would prefer to give our time to more productive labours.

Yours very truly,

N. D. Riley.

* Since the Code lays it down (Art. II) that specific and subspecific names are co-ordinate, the third term in a trinomial must not occur more than once in any one genus.

An Annotated List of The Butterflies of Nebraska (Lepid.: Rhopalocera).

By R. A. Leussler, Omaha, Nebraska.

(Continued from Vol. xlix, page 280.)

134. H. comma (L.) race colorado (Scud.). Flies on the higher plains of the western part of the state with the preceding species and is equally common. Specimens are rather bright yellow fulvous and match up with the low altitude found in Colorado.

135. H. pahaska Leussler. Sioux County near Harrison, Nebraska; see Ent. News xlix, p. 5, 1938.

136. H. attalus (Edw.). Rare. 1 female, Omaha, June 21, 1913; 2 females, 1 male, Omaha, June 17, 1922.

137. H. ottoe (Edw.). The typical form is found only occasionally, and as *ogallala,* a darker, more heavily marked form is the prevalent one in the eastern as well as in the western part of the state, it is my opinion that the latter is the normal form of the first brood of this species, and that *ottoe* was described from an abnormally light specimen. The fact that intergrades of every degree are found strengthens this belief. Typical specimens from Pilger (2 ♂), Omaha (1 ♂ 1 ♀,) Hackberry Lake, Cherry County (1 ♂).

H. ottoe form ogallala (Leussler). As stated above, this is the normal form of the early brood. It is found only in native prairie in late June and early July. Has been taken at Omaha, Lincoln, West Point, Pilger, Hackberry Lake and Wauneta, near the Colorado line.

H. ottoe form pawnee (Dodge). This, the late brood, makes its appearance about August 25. The type locality is about 35 miles northwest of Fremont, and not far from there I have found it abundant upon a number of occasions. It is partial to the flowers of blazing star (Liatris).

138. Hylephila phylaeus (Dru.). Rare. Taken only in some years. Omaha, Papilion, Blair, and reported from Dodge County by Dodge. Frequents wild asters and the blossoms of alfalfa.

139. Polites verna (Edw.). Very rare. 1 specimen taken at Omaha, July 3, another July 5, 1912; 1 at Plattsmouth, June 26, 1930.

140. P. mantaaqua (Scud.). I have found this only in two pieces of native prairie land near Omaha and never in large numbers. Some specimens appear intermediate between

typical *manataaqua* and the western race *rhena* (Edw.).

P. MANATAAQUA race RHENA (Edw.). Not uncommon in Sioux County in June and July.

141. P. THEMISTOCLES (Latr.). Our commonest skipper. Found over the entire state. Most numerous in June and again in August.

142. P. MYSTIC race DACOTAH (Edw.). Common in Sow Belly Canyon, Sioux County in June 1911. In June, 1918, F. H. Shoemaker collected a long series at Bazile Mills, some of which were dark, heavily marked specimens like typical *mystic* from eastern states, but most of them were race *dacotah*.

143. P. CORAS (Cram.). A very common skipper of general distribution throughout the state; flies with *themistocles*, the seasons being about the same.

144. ATALOPEDES CAMPESTRIS (Bdv.). Very common, at least as far west as Valentine; June to October. The late fall brood is much darker on under surface than the earlier broods.

145. CATIA OTHO (A and S.) race EGEREMET (Scud.). Rather local but found regularly at Omaha the latter part of July; partial to flowers of bergamot.

146. ATRYTONE LOGAN (Edw.). Rather rare. Specimens from Omaha, Lincoln, West Point, Meadow and Plattsmouth, all taken in June and July.

A. LOGAN race LAGUS (Edw.). Not uncommon in Sioux County in July, and has also been taken in Cherry County. This race has the ground color paler and the black borders much narrower.

147. A. AROGOS (Bdv. and Lec.). Formerly quite common, now found only where original prairie remains. Single brooded; flies from about June 20 through July. Omaha, West Point, McCook and Oconto.

148. A. VESTRIS (Bdv.). Found over the entire state, being common in the western part. Apparently double brooded for it has been taken in every month from June to September.

149. A. BIMACULA (G. and R.). Very local; I have taken specimens in only two moist meadows at Omaha and in another similar meadow at Valley, early part of July. At the latter locality a female without spots was taken, *contradicta* Leussler.

150. A. DION (Edw.). Not uncommon but very local, being found only in marshy places where wild rice and marsh grasses grow. Late June to middle of July. Omaha, Waterloo and Valley.

151. A. PONTIAC (Edw.). Frequents the same localities as

the preceding species and flies in company with it. It makes its appearance perhaps a week later but its season is overlapped by that of *dion*. Nebraska specimens are very much larger than those from eastern states.

152. Poanes viator (Edw.). Another marsh species, but more rare in the state than either *dion* or *pontiac*. July. Omaha, Valley and Hackberry Lake.

153. P. hobmok (Harr.). Common; single brooded; appears about Memorial Day and flies throughout June. Omaha, Lincoln, West Point, Neeley, Valentine, Cedar Bluffs and Harrison. Although I have collected hundreds of specimens I have never found the dark female Pocahontas (Scud.). in the state.

154. P. taxiles (Edw.). Common in the canyons of Sioux County. Appears last week in June and remains through most of July. Fond of the flowers of bergamot.

155. Atrytonopsis hianna (Scud.). Common in the sand hills of Cherry County where it appears to be particularly attracted to the yellow puccoon flowers which abound there. Has been taken in Sioux County also and at West Point. It is subject to much variation in the number and size of spots, both above and beneath. Flies from the end of May well into June.

156. Ambliscirtes vialis (Edw.). Fairly common in the eastern part of the state especially where patches of vetch are found, the flowers of which prove attractive to it. Double brooded, about the first of May and about the middle of July.

157. A. oslari (Skin.). Common in the western part of the state. Usually found in wet, gravelly spots. Double brooded, first appearing between 10th and 20th of June, and the second about the middle of August. Specimens from Valentine, Bloomington and Harrison.

158. Lerodea eufala (Edw.). Found in the eastern part of the state, where it is sometimes quite abundant in September and October on a great variety of flowers, both wild and cultivated.

159. Megathymus streckeri (Skin.). Inhabits the sand hill regions where the yucca plant flourishes. Single brooded so far as known, appearing early in June. It is extremely variable with regard to size, wing shape, width of border on secondaries, size and shape of spots, depth of color of the yellow spots and border, and number of spots on under side of secondaries. It is this race which Dr. Holland figures in the revised Butterfly Book, Pl. LXXII, and to which he has given

the name *leussleri.*

SPECIES INCLUDED IN PREVIOUS LISTS BUT OMITTED FROM THE PRESENT ONE.

THECLA POEAS (Hub.) (*Strymon cecrops* Fabr.). Albert Cassell lists it as being found at Nebraska City and Barber from Nemaha County, on the authority of W. E. Taylor. Both are in the same general locality, and as *cecrops* is a well marked species, not easily confounded with any of the other hairstreaks, it seems fairly certain that it occasionally occurs in Nebraska.

LYCAENA FILENUS (Poey). Mentioned in Cassell's list as quite numerous at Nebraska City. *Filenus* is a synonym of *hanno* (Stoll), a species not likely to occur in Nebraska. It seems probable that *isola* (Reak,) is the species referred to.

The following are all included in Barber's list. Quotations are from the list; comments are the writer's. For the generic names in Barber's list it has been thought best to substitute those used in Barnes and Benjamin's check list.

ARGYNNIS ATLANTIS (Edw.). "West Point, Northern Nebraska. Not very common." I have seen no specimens from Nebraska.

EUPHYDRYAS PHAETON (Dru.). "Lancaster County (Mr. McMillan). Mr. Scudder in his map showing the distribution of this species indicates its presence in the extreme eastern portion of the state along the Missouri river." I know of no reason why it should not occur here but have seen no specimens taken in the state.

MELITAEA MINUTA (Edw.). "Sioux County." Probably *pola* (Bdv.), which is the species found in Sioux County.

POLYGONIA FAUNUS (Edw.). "Nemaha County (W. E. Taylor) Found occasionally." I fear this was a misidentification on Taylor's part.

BASILARCHIA ARTHEMIS (Dru.). "Nemaha County (W. E. Taylor) Rare." J. D. Gunder in an article on Basilarchia (Can. Ent. Feb. 1934) mentions *arthemis* and *proserpina* from Lincoln, Nebr. As neither Dr. Wolcott, Dr. Dawson, nor the many collectors among students of Nebraska University, had ever taken true *arthemis* in the state, I wrote to Gunder for particulars of the record. He replied that he had obtained the specimens through Lloyd Martin, of Roscoe, Calif. Mr. Martin in turn wrote me that he had obtained them from Geo. W. Baker of Lincoln, Nebr., and Mr. Baker, a young collector, informed me that whatever material he sent Mr. Martin has been collected locally but that he did not recall taking any white-banded *Basilarchia,* and thought he surely would have noticed it if he had. Under the circumstances, I fear, the record must be classed as doubtful.

Incisalia irus (Godt.). "Not taken by us in the state. Strecker says 'it occupies the same territory as *niphon* and *titus;*' and these two are found in the state, though uncommon." It is possible that this species occurs here but I have not seen any specimens taken in the state.

I. niphon (Hbn.). "Nemaha County (W. E. Taylor). Rare." Not impossible, but no Nebraska specimens found.

Lycaena epixanthe (Bdv. and Lec.). "Not taken by us in the state. Scudder says 'I find a memorandum of its occurrence in Iowa and Nebraska', and Edwards credits it to Kansas." I can add nothing to the above.

Plebejus scudderii (Edw.). "Sioux County." In the collection of the University of Nebraska I found specimens labeled *scudderii,* from Sioux County, but the female proved to be *shasta* race *minnehaha* (Sud.) and the male *melissa* (Edw.).

Ascia napi (L.) oleracea (Harr.). "Lancaster and Nemaha Counties (W. E. Taylor)." It is possible that in the early days this species did occur in Nebraska.

Papilio oregonia Edw. "Sioux County." Probably *brucei* Edw.

P. zoliacon Bdv. "Sioux County." This, too, probably refers to *brucei* Edw.

Oarisma powesheik (Parker). "Not taken by us in the state. Scudder writes 'It flies in Iowa, Nebraska and Dakota according to Parker and Dodge'." Although I have not found it in Nebraska, I have found it in abundance at Lake Okoboji in northwestern Iowa, and therefore think it likely it may extend over the line into Nebraska.

Poanes massasoit (Scud.). "Dodge County (Dodge) Nebraska. (Prof. French Butt. East U. S.)" I have every reason to believe that this species has been taken in the state, although it has not been my good fortune to encounter it.

P. zabulon (Bdv. and Lec.). "Dodge County (Dodge). Fort Niobrara (W. L. Carpenter) Lincoln, Nebraske City, West Point." I surmise that all of the above records refer to *hobomok.* An examination of the West Point and Lincoln specimens in the collection of the University of Nebraska tend to bear this out.

Hesperia sassacus Harr. "Not taken by us in the state. Nebraska is mentioned by Prof. French in Butt. East U. S." I very much doubt that the true *sassacus* occurs in the state.

It is more likely to be *dacotae* (Skin.). which was described from Volga, S. D., and which I have taken sparingly at Lake Okoboji, Iowa.

H. LEONARDUS Harr. "Dodge and Nemaha Counties (W. E. Taylor)." I am inclined to think the above records rest upon a misidentification. Dark specimens of true *pawnee* somewhat resembles *leonardus* on the upper surface and may have been mistaken for the latter species.

OCHLODES SYLVANOIDES (Bdv.). "Not taken by us in the state. Mr. Edwards mentions this species for Nebraska in his list (Trans. Amer. Ent. Soc. XI? 1884, 311)." It is probable that Edwards had in mind the race he named *napa,* which I have taken in the Black Hills of South Dakota, and which it is conceivable may come into Nebraska.

P. OCOLA (Edw.). "New Halena, Custer County." Clearly a misidentification. A specimen labeled *Pamphila ocola* from New Halena, Custer County, was located in the collection of the University of Nebraska and proved to be a female *Atrytone bimacula.*

ATRYTONE ARPA (Bdv. and Lec.). "Not taken by us in the state. Edwards records it for the state in his list of butterflies. (Trans. Amer. Ent. Soc. VI. 1877, 54)." Most likely refers to *dion* (Edw.).

A. PALATKA (Edw.). "Nebraska. (Prof. French Butt. Of East. U. S.)" This too, most likely refers to *dion* (Edw.).

ERYNNIS ICELUS (Lint.). "Not taken by us in the state. Scudder in his map showing the distribution of this species indicates its presence over the entire state." I can add nothing to the above.

Marking the Amherst Insectary.

A founding-place of economic entomology as well as a founder were honored at Massachusetts State College, in Amherst, on September 30, when the original insectary was marked with a bronze plaque. Among those who gathered to do homage to Charles Henry Fernald, founder of the department of Entomology, was his son, Henry T. Fernald, of Winter Park, Florida. Both father and son taught entomology at Massachusetts State in the early days.

The building honored was originally 28 by 20 feet and was the headquarters for the fight against the Gypsy Moth in 1890. Charles Henry Fernald, who was the director of that fight, is an acknowledged founder of economic entomology.

Iridescence.

By Wm. T. M. Forbes, Cornell University,
Ithaca, New York.

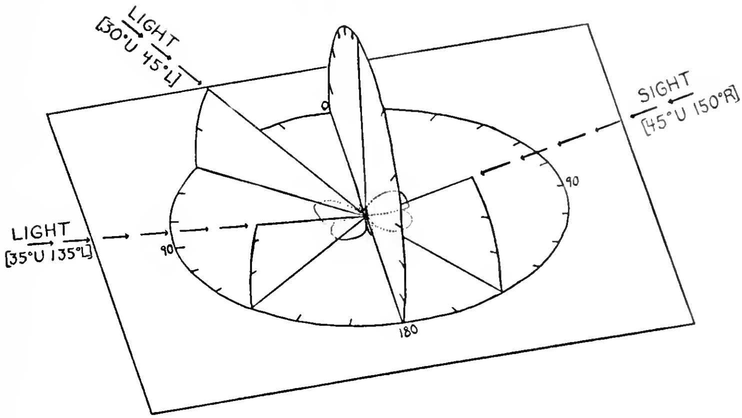
A delicate and complicated problem in describing butterflies is the specification of iridescence. It varies enormously from angle to angle, and in some cases, such as the basal spot on the fore wing of *Chlorippe,* the angle of easy vision is a limited one. Also the color seen, or even the portion of wing which may show iridescence, will change with the lighting and angle of vision.

A review of published descriptions shows a great variety of consistently ambiguous language. Most often one reads merely such statements as "wing brilliantly blue-iridescent at a suitable angle" or even vaguer ones. Perhaps once in a hundred times there is a warning to turn one's back to the window; to use diffuse (or concentrated) light, or a mention of grazing incidence.

In this paper I propose to specify, sufficiently accurately and as simply as possible, the angle of illumination and the angle of vision needed to bring out some well known cases of iridescence; and so illustrate what I hope may become a standard scheme.

Most cases of butterfly iridescence fall into one of two types. In such cases as the Morphos the light may fall from any direction (not too near grazing) and the sight is in the opposite direction and at about the same angle of elevation. In these cases the angle is not at all critical, and the direction not critical at all. I shall call such cases *Specular.* In the others the light must fall on the surface from a particular direction, and the angle of vision must be from some other fixed direction to give the maximum brilliancy. I shall call these cases *Oriented.* In most oriented cases the lines of illumination and of sight may be exchanged, and usually an inaccuracy of 15° or even somewhat more in a horizontal direction, makes very little difference.

In the case of specular iridescence it is obviously only neces-



sary to specify the vertical angle,—the same for light and for sight; but with oriented iridescence both light and sight must be specified separately, and the horizontal angle as well as the vertical. For the latter purpose I propose that we adopt the scheme of the diagram. Set the butterfly on a flat surface (black for translucent species); take the direction directly forward from the head as zero, directly to the sides as 90° (L and R), and directly behind as 180°. Then, since closer accuracy is of no advantage we may divide each right angle into sixths (15° intervals). So if the light should come about halfway from the front to the left side (considering the right pair of wings) we make the notation 45° L (see diagram). In the same way we may divide the vertical angle also into six equal parts, and for instance if the best angle is a little less than half way from horizontal to vertical (as in the diagram) we note 30° up (U). In exactly the same way we can specify the best angle from which to view the surface. For the diagram I have taken a case where the best view was somewhat to the right of, behind, and a little steeper than the angle of illumination (i. e. 45 U 150 R).

Obviously this method automatically becomes a formula. In the first case, instead of merely writing "fore wing iridescent blue" we can write "iridescence specular, 45 U," instead of some such statement as "iridescence best seen a little asymmetrically" we can be specific with the formula: "iridescence oriented, light 30 U 45 L, sight 45 U 150 R." We have assumed that formulae are drawn up with the right side in mind, of course for the left side we must merely exchange "left" and "right" in reading our formula.

On the practical side we may suggest that a diffuse but fairly oriented light is usually best, such as a window a few feet away. It is a great convenience in judging angles to pin the insect with wing surfaces horizontal, on the middle of a flat block (white or black), and judge angles by the slope of the block rather than of the insect itself. When the block is lying horizontally on a table, a window usually gives an angle of "light" of 30 or 45 degrees,—to get a lower angle the block may be lifted toward the eye level, for a greater one it will be tilted. We also tend to hold the block nearer to ourselves than to the window, so our angle of "sight" is likely to be a unit greater than the angle of "light." This is usually best for seeing oriented iridescences. It is also convenient to remember that if the angles of "light" and "sight" are similar the butterfly is best held with our back to light; if they are nearly supplementary and not too steep we should have the light in front of us. In some cases the convenient position is with one's side to the light,—usually where the angles of sight and light are more or less at right angles, or the horizontal directions are opposite and the vertical angles moderately high. In the latter case we will be holding the butterfly tilted, with the pin-head pointing over a shoulder. Note that with low horizontal angles the head of the butterfly is toward the light (or observer), with high angles, the tail.

The following list of examples are chosen partly for variety, and partly to illustrate cases (such as *Talanga*) where present descriptions are completely ambiguous. The majority are from the Nymphalinae, famous for their varied types of iridescence.

Argynnis sagana ♀ (China). 1, oriented, light 30 U 90 L; sight 60 U 105 R. A rather faint green, especially on base of fore wing along veins and beyond the white fascia of hind wing.

2, (under side) 45 U 90 R; 60 U 105 L. Brilliant green on postmedial area of fore wing and fainter on the white markings.

3, 45 U 135 R; 60 U 75 L. The hind wing shows its iridescence at a somewhat different angle, because of the slant of its axis in the usual spreading position. The fascia shows faint pink at the same angle.

Phyciodes levina (South America). Specular 45. A not very brilliant blue.

2, oriented 45 U 90 L or R; 60 U 90 R or L. At a cross light of about this angle in either direction the blue goes greenish or brassy,—the effect is faint at other angles.

3, oriented 45 U 90 L; 90 U. A faint iridescence on the black ground. (As usual the hind wing needs a different angle, 60 L.)

Precis radama (Madagascar). Iridescence changeable. The best blue is seen at 90 U; 90 U, but so long as *viewed* from directly above the color is blue. Best violet 45 U; 30 U, viewed from opposite side from illumination; the best copper is at 20 U 90 R; 10 U 90 L.

P. artaxia (Africa). Blue base of fore wing specular, the angle not critical; the best (but very faint) violet nearly specular at 20 U; 10 U.

P. lavinia hubneri (South America). Oriented but not critical. Perhaps best green at 75 U 180; 75 U 75 L. Is good at 90 U; 90 U, but almost dead at 45 U; 30 U, where *radama* shows a very good violet. In general should be lighted at a higher angle than viewed and from the opposite side.

Salamis parrhasus (Africa) Changeable. The best green is at 30 U; 60 U, viewed from the same side as lighted, at any angle. Best brassy at 45 U; 30 U, viewed from *opposite* side; the best rose perhaps at 75 U 90 L; 90 U, and is quite critical, the irregularities of the surface destroying the effect in patches.

Callicore eluina (South America). 1, blue band specular, the angle not critical. The best copper at 75 U; 75 U, the deepest violet at grazing (perhaps 5° U).

2, the famous blue flash on hind wing is *oriented* 45 U 75 L; 60 U 60 L, and in general shows at steep angles with the light behind the observer.

3, Blue-green spot at base of fore wing same but less critical, —it still shows well at 60 U; 90 U.

C. gabaza (Columbia). 1, blue band specular and not critical, but is brassy at 75 U 60-120 R; 60 U 60-120 R.

2, oriented; 45 U 60 L; 60 U 75 L shows the best violet on the ground. It is not critical but is dead when the band is brassy.

C. asteria (Mexico). 1, oriented 30 U 0; 45 U 0. (i. e. illuminated and viewed from low angles and directly in front.) Anterior two thirds of hind wing deep purple; basal half of fore wing and inner margin of hind wing glossy blue-gray.

2, 60 U 0; 90 U. Basal half of fore wing purple, matching costal half rather than dorsal third of hind wing. Oriented but less critical.

C. neglecta (South America). 30 U 90 L; 60 U 90 R. This gives the best contrast of the two portions of the blue border of the hind wing, the band blue with gray-white edge.

2, 45 U 60 R, 60 U 120 L. Band violet, its edge green.

Perisama saussurei (South America). 1, partially oriented, 60 U; 90 U, shows best the blue patch on hind wing.

2, oriented, 45 U 90 L; 45 U 60 L shows black streaks on brown instead.

3, light blue of fore wing is semispecular, but most brilliant below cell at 45 U 135 L; 75 U 90 L, and most intensely blue perhaps at 45 U 90 L; 60 U 180.

4, the deep purple around it shows better at 45 U 135 L; 90 U.

5, at 30 U 90 L; 45 U 105 L both blues practically vanish.

6, line on hind wing specular and not critical.

Temenis laothoe (South America). This shows a good deal of local and individual variation. A very bright specimen (var. *violetta*) from the middle Napo shows:

1, oriented 45 U 0; 60 U 0. Best violet on border of hind wing.

2, oriented 60 U 180; 90 U. Best rose on disc of hind wing.

3, 60 U with any azimuth; 90 U. Deep violet on black part of fore wing (except border).

4, specular but limited, 90 U; 90 U shows blue on under side of hind wing and tip of fore wing,—becoming a rose flush at 45°.

5, to show most nearly the pure pigment buff color use oriented 15 U 180; 15 U 180.

A specimen from Peru with minimum iridescence lacks 1, 2, 3, but shows 4, 5.

Temenis pulchra (South America). Shows best purple on hind wing at a little steeper angles than *T. laothoe*,—45-60 U 0 or 180; 60-90 U 0 or 180.

(To be continued.)

The Mating and Egg-laying of Malacosoma americana (Lepid.: Lasiocampidae).

By Joseph L. Williams, University of Pennsylvania. and Lincoln University, Pennsylvania.

Introduction.

In a preceding paper, Williams (1938), an effort was made to verify double copulation among Lepidoptera, reported by Pictet (1931) for the European *Lasiocampa quercus*. Upon finding none of the species studied copulating in this manner, the author decided to confine his researches to the American species of the family Lasiocampidae, since *Lasiocampa quercus* is not an inhabitant of this country. Except for the author's paper (1938), those of Pictet (1931) and Norris (1932) are almost the only others that deal at length with copulation among Lepidoptera.

The study of copulation among Lepidoptera was suggested to me by Professor P. P. Calvert, to whom I am indebted for many kindnesses and valuable criticisms during the preparation of this manuscript. I am also grateful to Professor H. F. Grim of Lincoln University for many helpful suggestions and other circumstances, which made it possible to carry on this work.

Experimental Methods.

Tent caterpillars (*Malacosoma americana* Fab.) were allowed to feed on wild cherry trees near Oxford, Chester County, Pennsylvania, until they were nearly grown. They were collected early on the morning of May the twenty-first, while most of them were still in their nests. The nests were pulled apart and the caterpillars were raked into lard cans. The cans were only filled one quarter full to prevent smothering the larvae. All pupae found in the nests were placed into a different container. The larvae were then taken to the laboratory, poured into long glass dishes and freed of excrement and other foreign matter. They were then placed into large evaporating dishes and carried to their cage.

The cage was a portion of a room, the dimensions of which were 9 ft. x 4 ft. 2 ins. x 7 ft. 4 ins. (2.743 x 1.337 x 2.354

meters). It had a door through which one could enter. One inner side was covered with ordinary wire window screen. The other three sides were lined with thick pasteboard, which covered over all cracks to prevent the caterpillars from escaping.

Wild cherry foliage was placed into two two-liter flasks filled with water, and put into the cage for food. The flasks were arranged so that the foliage rested against the walls of the cage, which enabled the caterpillars to crawl upon it to feed. Newspaper was folded and placed here and there on the floor. Many larvae pupated between the folded edges of the paper, which prevented them from crowding into the corners of the cage for this purpose.

The pupae were gathered each day in the following manner. With the aid of a pair of tweezers they were removed from the newspaper and corners of the cage and placed into a large evaporating dish. They were then scattered on the bottom of a wooden box, which was covered with clean newspaper. The box had a sliding door and its top was covered with wire screen. As the moths emerged, they were removed from the wooden box and placed into large paper boxes covered with wire screen. These breeding boxes had small doors cut in one side, which could be opened and closed. When a pair of moths began to mate, they were not disturbed until the male was firmly attached to the female. They were then removed by carefully sliding a smooth piece of paper between the box and legs of the insects. The insects and paper were then placed in wide-mouth glass bottles and observed. When the mating period was over, they were distributed in the following manner and further observed.

1. Several mated pairs were placed each into a half-pint milk bottle containing a strip of absorbent paper and plugged with cotton.

2. Some mated pairs were placed each into a half-pint milk bottle without the absorbent paper.

3. Several mated pairs were placed together in a large pasteboard box, like the breeding boxes.

4. Several mated pairs were placed together in a round cage, which fitted over a gallon jug filled with water containing wild

cherry twigs. The frame of this cage was covered with mosquito netting.

5. Mated and virgin females were placed upon twigs of apple, pear, peach, plum, maple, cherry, and oak. These twigs were kept in containers filled with water.

6. Mated and virgin females were placed upon twigs of dead pear, which had been in several fires on a refuse dump for two months.

7. Virgin females were placed in a large pasteboard box, like the breeding boxes, and observed for egg-laying.

8. The egg-laying orifices of mated and virgin females, unable to lay, were probed with bristles, which were used as mechanical stimulants, to try to induce egg-laying.

9. A juice expressed from the reproductive organs of the male was injected by means of a micro-pipette into the egg-laying orifice of females unable to lay in order to try to stimulate egg-laying.

10. The reproductive organs of virgin females that made no attempt to lay, of mated and virgin females unable to lay, and of mated females that had laid were dissected from the bodies, stained, mounted as slides and studied.

Results.

The adults began to emerge on June 10, and increased in numbers each day until the maximum emerged June 18th. After the 18th, daily emergings became fewer until the last of the moths emerged, June 21st. During this period, experimental observations were conducted upon the copulatory and egg-laying habits of this moth. They began to emerge around 4:00 p. m., Eastern Summer Time, and stopped around 7:00 p. m. As soon as they emerged from the cocoons, they crawled upon the sides of the box and in this position the wings were expanded. These moths became active around 11:00 p. m. and intermittently swarned sometimes for less, and sometimes for more, than a half an hour, with rest intervals of fifteen minutes or longer. These swarming intervals continued throughout the night until around 9:00 a. m. the following morning. After 9:00 a. m. they remained quiet until late in the evening, when swarming at intervals began again. Matings took place during the swarming periods. If couples mated a half an hour before 9.00 a. m., they remained fastened together sometimes for a half a day. The total number of moths was approximately seven thousand. Five hundred other individuals were prevented from emerging by being parasitized. The same parasite reduced the number of emerging moths the preceding year. A factor which increased the yield of moths this year was the removal of the adults from the wooden box as soon as they emerged. Last year, the adults were allowed to remain in the wooden box with the pupae, and of a thousand pupae only 74 males and 17 females emerged. Perhaps the imagos disturbed the pupae and so caused the death of the latter.

With the aid of a dissecting microscope, more than five hundred matings were observed. In every case the penis was in the bursal opening. Many pairs were plunged into ether, which instantly killed them and a dissection of these moths revealed the penis to be only in the bursal opening. If a female mated later in the day, say between 9 and 11:00 a. m., she would lay between 11:00 p. m. of the same day and 9:00 a. m. of the following day. Sometimes the insects became active before 11:00 p. m., but activity ceased by 9:00 a. m.

Females that were placed in milk bottles and the pasteboard box without twigs (nos. 1-3 above) did not lay except in a very few cases. Less than a dozen cases took place under these conditions. Virgin females that were placed in a pasteboard box (no. 7) did not lay. Mated females laid eggs on the twigs of cherry in the round cage (no. 4). They generally begin by coiling the abdomen around a twig of .3 to .5 cm. in diameter. The selected spot is a fork between the petiole of a leaf and the stem. The laying is conducted in the following manner: The head of a female is on one side of the twig and her abdomen is coiled around the twig, so that its hind end faces the head. The eggs are placed in rows at right angles to the stem and are covered with the glue-like secretion of the accessory glands. The distance from one end of the egg mass to the opposite end, due to a sidewise movement of the abdomen, parallel to the stem, is about 20 mm. This movement continues while eggs are being deposited for from 55 minutes to 1¾ hours. While the female is depositing her eggs, her body moves forward to make room for the next row of eggs. If the row being deposited is not exactly smooth, she smoothes it out before continuing further. When the eggs are a little more than half-way around the twig, she crawls upon the petiole still depositing her eggs until the mass has nearly surrounded the twig. To complete the laying she moves her body forward over the eggs that were laid first, the accessory gland secretion having hardened sufficiently by this time to enable her to walk upon it. When oviposition is completed, some females are unable to pull themselves away and are left hanging to the egg mass. Others fly away, but life for them is very short, for many of them die within twenty-four hours.

A similar observation was made by Le Baron (1870) on the oviposition of this moth. He says: "Three female moths (presumably mated) were enclosed in a glass vessel. They were quiet during the day but became very restless as night approached, showing that like the moths in general, they are nocturnal in their habits. On the third day a twig of apple tree was introduced into the vessel. The moths immediately ran up upon it, and put themselves in a position for laying their eggs."

Generally, a female indicating readiness to lay crawls around on the bottom and sides of the box, vibrating her wings. Many females in this condition were picked up by their wings and placed upon twigs of different trees (no. 5). No cage is necessary when this method is practised because they begin to lay at once. They laid most eggs upon wild cherry. The next choice was apple; third, peach; fourth, pear, and the last, plum.

Mated females laid freely upon the dead pear twigs taken from a refuse dump (no. 6). They did not lay, however, upon oak and maple. Virgin females were tried in the same manner (nos. 5 and 6); a few were able to deposit less than a dozen eggs, after which they remained coiled around the twigs unable to lay.

Probing the egg-laying orifice with bristle or injecting the juice expressed from the male reproductive organs into it, failed to make these females lay (nos. 8 and 9).

A study of the reproductive organs mounted on slides (no. 10) showed empty egg tubes and empty accessory gland vesicles of females that had mated and laid. Mated and virgin females unable to lay and virgin females that made no attempt to lay showed the egg tubes filled with eggs and the vesicles of the accessory glands filled with secretion after death. The female *Malacosoma americana* mates only once. This habit differs from that of *Ephestia kuehniella,* which is known to mate up to five times. The bursa of *Malacosoma americana* is not as long as that of *Ephestia kuehniella*, but the greatest tranverse diameter is longer. The length of the virgin bursa of *Malacosoma americana,* including its neck, in fixed preparations averages 1.7 mm. Its greatest transverse diameter is about 1.5 mm. The length of the virgin bursa of *Ephestia kuehniella* averages about 3.5 mm. The length of bursa of a mated *Malacosoma americana* averages about 2 mm.; its greatest transverse diameter is about 2.2 mm. The length of the bursa of *Ephestia kuehniella,* that has mated only once is about 4.2 mm. The length of its greatest transverse diameter averages about 1 mm. Every egg mass of *Malacosoma americana* found on a tree represents one oviposition and the purpose of a female life fulfilled.

(To be continued.)

Average Number of Nymphs in the Egg-masses of Tenodera sinensis, (Orthoptera: Mantidae).

The egg masses of *Tenodera sinensis* vary much in size, a large mass measures one and a third inches, by an inch and an eighth, while the smaller ones measure an inch by seven-eighths of an inch. From a large mass 289 nymphs emerged, while from a small mass 139 emerged. This gives an average of 214 nymphs to an egg mass.

PHILIP LAURENT.

Current Entomological Literature

COMPILED BY V. S. L. PATE, LAURA S. MACKEY and E. T. CRESSON, Jr.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Cole, A. C.—Insect collecting in the Great Smoky Mts. National Park, Tenn. [J. Tenn. Acad. Sci.] 13:274-276. **Jenks, G. E.**—Marvels of metamorphosis. [Nat. Geogr. Mag.] 74:807-828, ill. **Kozhantchikov, I. V.**—On the role of metamorphosis in the zonal distribution of insects. [C. R. Acad. Sci. URSS] 20:199-201. **Lutz, F. E.**—The insect glee club at the microphone. [Natural History] 42:338-345, ll. **McClure, H. E.**—Insect aerial populations. [7] 31: 504-513, ill. **Steyskal, G.**—Notes on preparation technique. [19] 33:235. **Weber, N. A.**—The food of the giant toad, Bufo marinus, in Trinidad and British Guiana with special reference to the ants. [7] 31:499-503. **Woodward, A.**—The "Honey" of the early California Indians—a strange ethnological error. [The Masterkey] 12:175-180.

ANATOMY, PHYSIOLOGY, ETC.—Balsac, H. Heim de.—See under Coleoptera. **Carlson, J. G.**—Mitotic behavior of induced chromosomal fragments lacking spindle attachments in the neuroblasts of the grasshopper. [Proc. Nat. Acad. Sci.] 24:500-507, ill. **Cooper, R. H.**—Notes on the internal anatomy of Canthon laevis (Coleo: Scarab.). [Iowa St. Coll. J. Sci.] 12:461-466, ill. **Cumley & Haberman.**—Serological investigation of Drosophila antigens with the complement fixment reaction. [6] 46:401-415. **DiMaria, G.**—Richerche sulla vita asettica. Studio sul fabbisogno vitaminico e sell'azione svolta dai microorganismi per lo sviluppo della Sarcophaga. [Arch. Zool. Ital.] 25: 469-507, ill. **Ditman & Weiland.**—The Metabolism of the corn ear worm. II.—Glycogen and moisture. [7] 31:578-587. **Englehardt, G. P.**—An incidental observation on phototropism. [19] 33:223. **Gerould, J. H.**—Structure actions of the heart of Bombyx mori and other insects. [Acta Zoologica, Stockholm] 19:297-353, ill. **Gosswald, K.**—Ueber den einfluss von verschiedener Temperatur und Luftfeuchtigkeit auf die Lebensausserungen der Ameisen. 1.—Die Lebensdauer okologisch verschiedener Ameisenarten unter den Einfluss bestimmter Luftfeuchtigkeit und Temperatur. [94] 151:337-381, ill. **Guareschi, C.**—Ricerche sperimentali sulla ninfosi degli insetti, II. [Arch. Zool. Ital.] 25:133-197, ill. **Harries & Henderson.**—Growth of insects with reference to progression factors for successive growth stages. [7] 31:557-572. **Haskins & Enzmann.**—On a characteristic somatic modification induced by adverse environmental conditions in Drosophila. [6] 46: 453-455. **Hsüeh, Mu-Lien.**—A study of the treacheation and venation of Gampsocleis gratiosa (Orth:Tettigon.). [Peking Nat. Hist. Bull.] 13:19-27, ill. **Korschelt, E.**—Einige Bemerkungen zur Frage des Muskelansatzes und der Muskelnervenverbindung. [94] 151:286-290. **Lotmar, R.**—Untersuchtungen ueber den Eisenstoffwechsel der Insekten besonders der Honigbiene. [Rev. Suisse Zool.] 45:237-271. **Ludwig & Fox.**—Growth and survival of Japanese beetle larvae reared in different media. [7] 31:445-456. **Mueller, K.**—Histologische Untersuchungen ueber der Entwicklungsbeginn bei einem Kleinschmetterling (Plodia interpunctella). [94] 151:192-242, ill. **Pflugfelder, O.**—Weitere experimentelle Untersuchungen ueber die Funktion der corpora allata von Dixippus morosus. [94] 151:149-191, ill. **Platania, E.**—Ricerche sulla struttura del tubo digerente di Reticulitermes lucifugus, con particolara riguardo all natura, origine e funzione della peritrofica. [Arch. Zool. Ital.] 25: 297-328, ill. **Rau, Phil.**—Additional observations on the sleep of insects. [7] 31:540-556, ill. **Snodgrass, R. E.**—Evolution of the Annelida, Onychophora and Arthropoda. [Smithson. Misc. Coll.] 97, no. 6:1-59, ill. The loral plates and the hypopharynx of Hemiptera. [10] 40:228-236, ill. **Stanley, T.**—The egg-producing capacity of populations of Tribolium confusum as affected by intensive cannibalistic egg-consumption. [Can. J. Res.] 16:300-306. **Stirrett, G. M.**—A field study of the flight, oviposition and establishment period in the life cycle of the European corn borer, Pyrausta nubialis, and the physical factors affecting them. [Scientific Agr.] 18:355-369; 462-484; 536-557; 568-585; 656-683, ill. **Szekessy, W.**—Ein bisher unbekannter sprungapparat bei Koleopteren. [97] 58:435-440, ill. **Terio, B.**—Influenza della luce bianca e delle luci monocromatiche sullo sviluppo somatico e sulla funzionelita degli organi genitali esperienza zu Sarcophaga carnaria. [Arch. Zool. Ital.] 25:457-468, ill. **Walker, E. M.**—The cervical and thoracic exoskeleton of Grylloblatta. [Trans. R. Soc. Can.] 32(3):151. On the anatomy of Grylloblatta campodeiformis. 3.—Exoskeleton and musculature of the neck and thorax. [7] 31:588-640, ill. **Wight & Barua.**—Toxicity of mercury vapor to insects. [31] 142:754. **Williams, E. C.**—Spermatogenesis of a Mantid, Choeradodis rhombicollis. [Trans. Amer. Micros. Soc.] 57:387-394, ill.

ARACHNIDA AND MYRIOPODA.—Aragao, H. de Beaurepaire.—Nota sobre os Ixodideos da Republica Argentina. [111] 33:319-327. **Chamberlin, R. V.**—New Diplopods. [95] 51:205-208. **Fage, L.**—Quelques Arachnides provenant de fourmilieres ou de termitieres du Costa Rica. [Bull. Mus. Nat. Hist. Nat., Paris] 10:369-376, ill., (*). **Grandjean, F.**—Observations sur les Tydeidae. [Bull. Mus. Nat. Hist. Nat., Paris] (2)10:377-384, ill. **Hubbard, W. E.**—Ophiopneumicola colubri n. gen., n. sp., a lung mite from a snake. [Trans. Amer. Micros. Soc.] 57:400-406, ill. **Jenks, G. E.**—See under General. **Loomis, H. F.**—New and noteworthy Millipeds from Cuba, collected by Dr. P. J. Darlington in 1936. [Bull. M. C. Z., Harvard] 82:429-480, ill. The Cambaloid millipeds of the U. S., including a family new to the fauna and n. genn. & spp. [50] 86:27-66, ill., (k). **de Mello-Leitao, C.**—Notas sobre Alacranes Argentinos. [Not. Mus. La Plata] 3; Zool. no. 9:83-95, ill. (*). **Savory, T. H.**—Notes on the biology of harvestmen. [J. Quekett Microsc. Club] 1 (4): 89-94. **Sellnick, M.**—Eine neue Anoplocelaeno-Art aus einem Nest der Blattschneiderameise Atta sexdens (Acar.). [34] 122:5-70, ill., (*). **Stiles, K. A.**—The first record of the black widow spider (Latrodectus mactans texanus) from Iowa. [Proc. Iowa Acad. Sci.] 44:213.

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ORTHOPTERA.—Drake & Decker.—Grasshoppers in Iowa in 1936. [Proc. Iowa Acad. Sci.] 44:189-192, ill. **Gould & Deay.**—The biology of the American cockroach. [7] 31:489-498, ill. **Rehn, J. W. H.**—Notes on the genus Haaniella with the description of a n. sp. (Phasmatidae). [1] 64:367-371.

HEMIPTERA.—Allard, H. A.—Notes on some Cicadas in Virginia and West Virginia. [6] 46:449-452. **Beamer & Lawson.**—The gen. Acinopterus (Cicadell.). [7] 31:476-488, ill., (k*). **Caldwell, J. S.**—Three n. spp. of Psyllids and the description of the allotype of Livia opaqua. [7] 31:442-444, ill. **Decker & Andre.**—Biological notes on Blissus iowensis (Lygaeid.). [7] 31:457-466, ill. **Dias & Torrealba.**—Infeccao naturae do Eutriatoma maculata pelo Schizotrypanum cruzi, no Brazil e na Venezuela. [111] 33:249-252, ill. **Hungerford, H. B.**—Mesoveloidea williamsi—a note on its distribution. [19] 33:218. **Knull & Auten.**—Some Erythroneura from the southwest (Cicadell.). [7] 31:532-539, ill., (*). **Metcalf, Z. P.**—The Fulgorina of Barro Colorado and other parts of Panama. [Bull. M. C. Z. Harvard] 82:277-423, ill., (k*). **Ruckes, H.**—Two n. spp. of Brochymena (Pentatom.) from Arizona. [19] 33:236-242, ill. **Spooner, C. S.**—Berbid field days. [Trans. Ill. St. Acad. Sci.] 30:315-316. **Strom, L. G.**—N. spp. of Aphids with notes on described forms. [7] 31:471-475, ill.

LEPIDOPTERA.—d'Almeida, R. F.—Nota supplementar a "Revisao das Terias Americanas" (Pierid). [111] 33: 231-247, ill., (S). **Bell, E. L.**—A catalogue of the original descriptions of the Rhopalocera found north of the Mexican border. [Bull. Cheyenne Mt. Mus.] 1; no. 1. **Clark & Clark.**—Notes on Virginia butterflies. [95] 51:177-181. **Oiticica Filho, T.**—Uma nova especie do genero Eacles (Sysspling.). [111] 33:281-290, ill., (S). **Scott, F. B.**—Notes on Indian hawkmoths. [J. Darjeeling Nat. Hist. Soc.] 13:74-89, ill. **Stirrett, G. M.**—See under Anatomy. **Travassos Filho, L.**—Contribuicao ao conhecimento dos Euchromiidae genero Corematura. [111] 33:259-262, ill., (S). Contribuicao ao conhecimento dos Euchromiidae. I.—Genero Desmotricha. [111] 33:39-48, ill., (S*). **Warren, B. C. S.**—On the evolution of subspecies as demonstrated by the alternation of variability existing in the subspecies of the genus Erebia. [J. Linn. Soc. London] 40:305-323.

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Special Notices.

Annual Report of the Institute for Medical Research for the Year 1937. By A. Neave Kingsbury, Director. Federated Malay States, Kuala Lumpur, v + 174 pp., 1938.—This Institute for Medical Research comprises Divisions of Bacteriology, Chemistry, Entomology, Filariasis Enquiry, Malaria Research, Pathology, Rat Virus Enquiry, and a Serological and Medico-Legal section. The work of at least four of these includes entomological topics. A general review of the work of the year is furnished by the Director preceding the more detailed reports from each division. It appears that filariasis, including at least 50,000 cases of elephantiasis, is more wide-spread than had been previously thought. Researches by Mr. E. P. Hodgkin indicate that five species of the mosquito genus *Mansonia* are actual or possible carriers of *Wuchereria bancrofti* and *Microfilaria malayi.* The number of species of anopheline mosquitoes acting as carriers of malaria continues to be increased. Much attention is being given to investigations of rural tropical typhus, considered to be caused by the same virus as Japanese River Fever, and to urban tropical typhus and the question of transmission of the latter by the rat flea, *Xenopsylla cheopis.*

Endemic Filariasis in the Federated Malay States. By J. Orde Poynton and E. P. Hodgkin. Bulletins from The Institute for Medical Research, Federated Malay States, Kuala Lumpur, No. 1, 1938. 67 pp., 1 colored plate illustrating typical elephantiasis due to *Microfilaria malayi.* — From the summary of conclusions we quote as follows: Two species of the *Filariidae* are responsible for filariasis in the Federated Malay States. *Wuchereria bancrofti* is found sporadically distributed among immigrants from India and China, but is only rarely transmitted in this country. *Microfilaria malayi* is endemic in certain riverine areas, in which it is transmitted freely by certain mosquitoes of the genus Mansonia. Infestation with *Mf. malayi* may give rise to adenitis, periodic lymphangitis, and to elephantiasis in which the feet and legs are typically involved. The intensity of endemic filariasis on the lower reaches of the Pahang, Perak and Bernam rivers is sufficient to warrant action towards arresting the spread of this disease, being responsible for a considerable degree of incapacity among adult males. At the present time the disease is tending to increase in certain areas, and it is in these in particular that action is indicated as numbers of children are becoming involved. The methods of treatment at present available are not satisfactory, and there is scope for further experimentation in this direction. The control of the vector mosquitoes presents many difficulties, but is the logical method, combined with other means of interrupting transmission, by which to approach the elimination of the endemic filariasis that is caused by *Mf. malayi* in this country.

OBITUARY

Guillaume Severin.

The compte rendu of the monthly meeting of the Entomological Society of Belgium of August 6, 1938, states: We have learned of the decease, on July 23 last, of M. Guillaume Severin, former member of the society and honorary conservator of the entomological section of the Royal Museum of Natural History of Belgium. M. Severin died suddenly of an embolism while he was determining some insects captured by him the day before. The *Faune* of M. Lameere was found open by his side. An obituary notice by M. Lameere will appear in this number.

We translate this notice as follows: Guillaume Severin (1862-1938) by A. Lameere. Our former colleague died unexpectedly, the 23d of July last, aged 76 years, at Saint Idesbald. Although even before his retirement as conservator from the Museum of Natural History on reaching the age limit, he had withdrawn from our society, the services which he rendered to entomology in our country are too important that we should forbear to pay him an affectionate tribute.

G. Severin, born at The Hague, was a decorative industrial designer at Liége when his health, momentarily weakened, brought him to the attention of Dr. Ernest Candèze. Our illustrious colleague advised him to go out as much as possible in the open air, and, that he might have some objective for his walks in the country, to interest himself in insects. Thus it was that G. Severin became an entomologist and began to occupy himself with the Coleoptera. In 1889 he published in our *Annales* a *Catalogue des Gyrinides.* On the recommendation of Dr. Candèze and of Edmund de Selys-Longchamps, who had come to appreciate his merits, he was named, on the resignation of Alfred Preudhomme de Borre, aid-naturalist to the Museum, then promoted to be conservator of the section of Articulata. He fulfilled these functions with a remarkable comprehension of his duties and with untiring devotion. Under his excellent administration, and thanks to his enlightened zeal, the collections made real progress and he contributed much to bring us new adepts in entomology. We owe to him the creation of ecological collections of native insects, in the formation of which he devoted years to the exploration of the country.

He interested himself actively in the organization of the International Congress of Entomology and was the secretary of the first congress, held at Brussels, in 1910. His relations with foreigners permitted him to determine to which of the different museums of Europe collections should be sent to be studied. It was he also who assumed the task of obtaining collaborators for the *Catalogue des Collections d'Edmond de Selys Longchamps* and overseeing the publication of this valuable summary.

G. Severin also devoted a portion of his activity to our School of Tropical Medicine, where he taught the doctors who were preparing to go to the Congo some ideas of entomology necessary for their mission.

From the moment when he was nominated to the Museum of Natural History, he consecrated himself entirely to his administrative functions and published only some papers on applied entomology as a member of the Superior Council of Waters and Forests.

Gifted with great intelligence, with highly developed practical sense, both artist and musician, of impulsive character, he had the affection of all entomologists. We shall preserve the fondest memories of him.

[This notice is accompanied by a portrait.] (Bull. & Ann. Soc. Ent. Belg. 78 (8-9), pp. 311-314, Sept. 26, 1938.)

We are indebted to Professor Lameere and to the Société Entomologique de Belgique, through its Secretary, M. A. Crèvecoeur, for permission to publish this translation.

The translator went to the Museum at Brussels on July 31, 1895, and "found M. Severin there to whom I delivered the letter of introduction from Baron de Selys and also one from Mr. Blandford of London. There also I met M. Lameere to whom M. Severin introduced me. M. Severin was very attentive and, as the Baron had requested in the letter, showed me the collection of insects, etc., and also the chief feature of this museum—the complete skeletons of the fossil reptiles known as Iguanodons found in Belgium. . . . "

Severin came to the United States on the occasion of the International Congress of Zoology held at Boston, in August, 1907, and subsequently visited museums in a number of cities, seeking support and subscriptions to the *Selys Catalogue*. Appeals which he later wrote for the same object were published in the NEWS for March, 1919 (volume xxx, pp. 84-85) and in *Science* (n. s. 49 (1263) :264-265, March, 14, 1919), in which he incidentally refers to the loss of his son in the great war, "a fine boy of 24 years, a captain of engineers." A later note on "The Cause of the Delay of Publication of the Selys Catalogue" by Severin appeared in the NEWS for October 1919 (xxx, pp. 229-230).

After his retirement from the Museum, in September, 1927, he lived for a while at La Panne, on the Belgian coast, not far from Calais. He came from there to Brussels in July, 1929, when we were at the Museum and gave us much assistance with de Sely's drawings and manuscripts in connection with a study of the Odonate *Palaemnema*. How great a help he was to the late E. B. Williamson is recorded in the latter's papers on American Gynacanthas and on *Heteragrion*.

His passing severs another link in the chain which bound us to the older students in Europe of the Odonata.

PHILIP P. CALVERT.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Chrysalids of Papilio ajax and philenor, cocoons of Rothschildia orizaba and jorulla. Buy or exchange. Newark Entomological Society. Curator, Chas. Rummel, Green Village Rd., R. D. 2, Madison, New Jersey.

Have large list of Lepidoptera wants and offers. Send me yours. Carpenter, Box 1344, Hartford, Conn.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis** or **Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

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ENTOMOLOGICAL NEWS

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Notes on the Behavior of Certain Social Caterpillars (Lepid.: Notodontidae, Arctiidae).

By Phil Rau, Kirkwood, Missouri.

Naturalists today, in their study of societal evolution, realize the importance of gathering behavior data on organisms that have the ear-marks of the beginnings and also of the intermediate stages of socialization. Heretofore, social life among certain Hymenoptera and other highly socially organized insects was accepted without much thought as to the origin of such socialization. With the appearance, during the last decade, of books by Wheeler[1], Alverdes[2], and Allee[3] on the origin and evolution of social life among insects, one's attention is focused on the fact that social habits in one form or other, some weak and some strong, some at one stage of organic development, some at another, appear in insect groups that heretofore were thought to be entirely solitary. Certain beetles, bugs, caterpillars, and other insects have recently attracted attention because of behaviour patterns that indicate conditions of incipient social behavior.

The lepidopterous caterpillars that show a tendency in this direction have been all but neglected; some attention has, however, been given to the problem of the different types of social and sub-social behavior in caterpillars by Harold I. O'Byrne. In his paper entitled "Gregarious caterpillars[4]," he tells us that social behavior in these organisms has arisen independently in certain species belonging to at least twenty-four of the sixty families of Lepidoptera. Most important of all, however, is the service he has rendered us in classifying this behavior. He places the gregarious habit in five distinct categories: (1)

[1] Wheeler, W. M. The Social Insects. 1928.
[2] Alverdes, F. Social Life in the Insect World. 1927.
[3] Allee, W. C. Animal Aggregations. 1931.
[4] Proc. Mo. Acad. Sci. *3*: 103-108. 1937.

those which are gregarious only in early larval life, (2) those which are gregarious in the early stages and remain so until later larval stages, (3) those which remain gregarious through the various stages until the time for hibernation and then, upon awakening, pass the balance of the larval period as solitary caterpillars, (4) those which are gregarious at birth and remain so until ready to pupate, but which become solitary before pupation, (5) those which pupate without separating. He ends his paper with a plea for the acquisition of additional data on this subject and says that since our knowledge of the utility and also the meaning of gregariousness in caterpillars is almost *nil*, a serious need is felt for observational as well as experimental work. With these needs in mind, I paid some attention to a few species of social caterpillars during the summer of 1937, and the results of those observations follow.

DATANA PERSPICUA, Gr. & Rob.[5].

In a large and sunny field at the southwest edge of Kirkwood, grow numerous sumac bushes (*Rhus glaba L.*). There were about two hundred of them, three to four feet tall, growing very close together. On three such plants, (June 30, 1937) within a space of ten square feet, I found three colonies of the caterpillars of *Datana perspicua*. They were smooth-skinned caterpillars, conspicuously colored in black and yellow; each colony was on top of the leaves in the hot sunshine. They were in a somewhat loose mass piled one on top of another. The members of each colony were of one common size indicating that all the members of each colony had emerged at about the same time from one batch of eggs. In two of the colonies the caterpillars were very large, almost full grown, and in the third colony they appeared to be but a little more than half-grown. They were brought into the laboratory and placed in a large tin-can, with earth at the bottom and sumac leaves upon which to feed. In transporting them, they were much shaken up, and were not in close proximity to each other. During the afternoon in the nearly dark laboratory, they fed revenously on the

[5] All caterpillars were identified by Mr. H. I. O'Byrne, and all plants were identified by Dr. Edgar Anderson.

leaves until every bit was consumed. When I examined them at dusk, I found that all of them had formed into one large cluster and were very quiet on the little platform of criss-cross twigs. They remained in this compact position solidly for two days, and absolutely refused to leave the mass or to consume the food that I placed in the can from time to time. When they were examined at 7 p. m., on July 3, I found that they had moulted during the past twenty hours, and whereas they were smooth-skinned caterpillars before moulting, they were now very hairy. There were many shed skins on the floor of the can. During the process of moulting they remained together in the same large mass; but when I examined them next day, I found they had disbanded and had eaten every scrap of sumac leaf in the can, which at the time was badly wilted.

The caterpillars undoubtedly are more or less solitary when feeding but come together at night and also at certain other times for the purpose of moulting. I evidently disturbed this moulting process when I transported them to the laboratory. This theory is strengthened by the discovery of another colony in the same field, on July 5; here a population of about twenty caterpillars were for the most part scattered over two low bushes in the bright sunlight. Since no single individuals could be seen elsewhere on the bushes, it is evident that the caterpillars from one mass of eggs kept close to one another (even though not piled one upon another) in order to form a mass when necessity arose[6].

By July 9, all the caterpillars had pupated either on top of or in the soft moist earth at the bottom of the can. The pupae at first were of a bright yellowish-orange color, but soon changed to a very dark brown. Their bodies were quite flexible when they were in the highly colored stage, and they would awkwardly jerk about in trying to enter the soil. The skin became hard as it darkened, and if individuals did not succeed

[6] The return to this sumac field was for the purpose of studying the population of the caterpillars, but a thorough search revealed no more than the four colonies already mentioned on about two hundred sumac plants.

in entering the earth before hardening of the skin set in, they remained on top and this without any detriment to transforming into adults. The length of time spent in the pupal stage varied from eighteen to twenty-two days, for on July 27, they were beginning to emerge from the earth as adults. The adults spent their time quietly on the twigs in the cage depositing many eggs; these hatched after a period of incubation of two to three weeks.

DATANA INTEGERRIMA, Gr. and Rob.

A large cluster of caterpillars of this species was seen on a walnut tree (*Junglans nigra*) in my garden, on August 15, 1937. They were conspicuous caterpillars with longitudinal stripes of a dull brick color, and were piled one on top of another on the under side of several leaflets. They were very quiet and did not stir, even though the twig was cut and carried into the laboratory; they were just as quiet when, later in the day, they were carried out into the sunshine for photographing. About fifty were in the cluster and had evidently congregated for the purpose of moulting, because, up to the time of my retiring at midnight, not one of them moved from its original position. For the following two days, in fact, they did not move even a little way from the original position that each one held. It was only when I pinned the leaf-stem to the tree for photographing that I noticed with the aid of bright sunlight that some few were moulting. The heads of a few were going through jerky side-to-side movements, and occasionally a complete shed skin would fall to the ground. When I examined the cluster late that night (August 17) I found them to be of a sombre color and covered with long white hairs. Almost all of them had gone through the transformation, and not one had changed its position in the mass on the leaves. In moulting, the skin, that covers the head pops off first, asd very soon after this, the caterpillar works the skin from the body, permitting it to fall. Even though most of them had moulted, they continued to remain in the same quiet position; examinations made at 9 p. m., on the day that they moulted and also at 8 the next morning, found them immobile, limp, and still clinging together. Twelve hours later, however, or about one day after they had moulted, I found my hitherto lethargic caterpillars so active that most of them escaped by wedging themselves under the glass covering of the can. Many of them sought the window through which the light was streaming, and many of them were trapped in spider-webs. I regretted the escape because I was unable to note further the gregariousness of their behavior; this much was, at least, proven clearly: that they do cluster for moulting purposes, and that they do disband later, each going its own way once the process of moulting is completed. The caterpillars were large and seemed to be full-grown after the moult.

In *D. integerrima*, the gregarious behavior continues until time for pupation, when the larvae go to the ground and pupate singly[7]. In their communal movements in the tree, each caterpillar spins a strand of silk, and in large colonies the silk trails become broad enough to support several traffic lanes. Silk spinning in this species is confined to the making of roadways, for the larvae live exposed, making no shelter at any time.

The sense of smell is evidently well developed in these caterpillars, for when they escaped from my cage many of them entered another cage some distance away that contained a jar with fresh walnut leaves. They likewise entered the cage by wdging themselves under the glass sheet on top.

HYPHANTRIA CUNEA, Drury.

I was especially on the outlook for the conspicuous tents of the fall web-worm during a trip in July, through southern Illinois to Reelfoot Lake, Tennessee, and only two such colonies were encountered; one of these was at Reelfoot Lake in a clump of about fifty pecan trees (*Carya pecan* Engl. and Graebn.). These trees were from five to seven feet in height. The other was along the roadside near Tiptonville, Tennessee, in a clump of about a dozen trees of the same species. I spent two days driving about the lake, and was indeed surprised to find only two colonies in the large area covered. The caterpillars were brought into the laboratory on July 13, where many

[7] O'Bryne, Proc. Mo. Acad. Sci. 3: 105. 1937.

of them pupated in their tents. About five weeks later, I found that they had transformed and died within the web. *Hyphantria cunea* larvae feed inside the nest, and enlarge the nest when necessary to enclose fresh leaves.

Atteva punctella Fitch.

Each year I get a rich infestation of these moths in my Ailanthus trees, (*Ailanthus altissima*). This moth spends all of its stages in the very thinly-spun nests that it makes. Silk is merely used to bind leaves together with large open spaces in between as a sort of cradle. The colonies within these aerial cradles are never large and often contain caterpillars of various sizes. In mid-August, for example, I found nests contained the following population:

Nest A. 1 large, 1 medium caterpillar.
Nest B. 1 pupa.
Nest C. 3 empty pupal cases.
Nest D. 5 caterpillars, various sizes, small to medium.
Nest E. 1 large caterpillar in a dead curled leaf.
Nest F. 1 large in a dead curled leaf.
Nest G. 2 small caterpillar, 1 pupa.
Nest H. 1 large, 1 medium, 1 small (large one curled up in leaf).
Nest I. 1 pupa, 2 large larvae.

One often finds (as shown above) the large caterpillars curled up among dead leaves which are fastened together with silk; this may be in preparation for transformation. One also often finds an adult moth in the nest, and oviposition no doubt occurs in the same aerial cradle in which the mother was born.

The caterpillars remain on the ailanthus leaves until the middle of September. The silken cradles at this time often become quite large. A little later the leaves fall to the ground, but by this time the insect is probably safely in hibernation; I do not know, however, in what stage this occurs.

A New Syrphid Fly from Louisiana (Diptera).

By L. Vigé, Lafayette, Louisiana.

Toxomerus jussiaeae n. sp.

This species differs from *T. geminata* Say and *T. occidentalis* Curran in that the process of the hind femur of the male arises more distally, being slightly more than half as long as the distance from its base to the trochanter, and forms a greater angle with the femur; the basal prominence is lacking; the tibiae are not broadly produced apically; the yellow of the front on each side in the female is usually shorter and always more acute superiorly; the female lacks black bands on the hind femora and tibiae; the scutellum is reddish-yellow, and there is a silvery white spot above the front coxa in both sexes.

Length —5.5 mm. to 6.5 mm.

♂. Face yellow, grayish-tinged especially laterally below the antennae and on and about the tubercle, generally covered with silvery pubescence; cheeks black behind. Antennae reddish-yellow, first and second segments with distinct black hairs, third segment ferrugineous above and apically; arista black. Vertical triangle broad, black with rusty pollen and black hairs. Pile of front light; black hairs near the base of the antennae above and laterally. Eyes between vertical and frontal triangles less approximate and for a shorter distance than in either *T. geminata* or *T. occidentalis,* a distinct shining black spot at this point. Posterior orbits gray with white pile below the emargination of eye, rusty pile above.

Thorax greenish-rusty above, median cinerous line distinct throughout, lateral cinerous lines less conspicuous, yellow lateral margins complete; pleura black, gray pollinose, yellow at caudal portion of mesopleura much broader superiorly where it joins the yellow of the anterior superior part of the pteropleura, a silvery white spot on the sternopleura just below the yellow of the mesopleura, a similar but less distinct silvery spot above the front coxa.

Legs: front and middle coxae black, yellow apically; hind coxae mainly yellow, dark basally; all trochanters yellow; first and second femora yellow basally and apically, the main portion dark or black; hind femora arcuate, yellow at base, reddish apically, the main portion dark or black; the process long, dark, more remote from the base of the femur than in *T. geminata* or *T. occidentalis,* lacks the stout base, is distinctly curved and forms a greater angle with the femur; first and second tibiae and tarsi yellow, hairs mainly black; hind tibiae dark-red, normal apically (not dilated); hind tarsus with black hairs dorsally and yellow hairs ventrally, last two segments black.

Wings hyaline; stigma brown, color continued basally between the auxiliary and the first longitudinal veins.

Abdomen predominantly reddish-yellow; first segment black above, edges narrowly yellow; second segment black, a light median fascia broadest at the edges and interrupted; third and fourth segments each with a black fascia apically, semi-interrupted, and a median, black, geminate vitta (this may be reduced to mere spots); fifth segment with anterior median and two caudal lateral black spots (these represented by a median vitta joining a caudal fascia in some specimens and by spots or a median spot only in others). Two males, evidently quite young, lack practically all the black markings.

♀. Face with a black stripe descending from the front around each antenna and tapering on either side of the tubercle to its lower level, infuscate, especially above the oral margins and bordering the eyes. Antennae as in the male, third segment more generally ferrugineous. Front broad, black, black pile; yellow as follows—a usually short, triangular, lateral marking, acute above, ascends on each side from the yellow of the face, the yellow marking usually shorter and always more pointed at the top than in either *T. geminata* or *T. occidentalis.* Posterior orbits lighter than in the male medially.

Legs more yellowish than in the male; hind femora and tibiae less arcuate than in the male and lacking the characteristic black bands of *T. geminata* and *T. occidentalis.*

Abdomenal markings as in the male except on the fifth and sixth segments, each of which has a distinct black fascia apically and usually a single, median, black vitta.

Holotype: male, Evangeline Parish, LOUISIANA, May 8, 1938.

Allotype: female, same locality and date.

Paratypes, 25 males and 25 females, all from Lousiana as follows—Evangeline Parish (May 30, 1937, 5♂, 3♀; June 26, 2♂; July 20, 1♂, 1♀; August 28, 1♀; September 13, 3♀; April, 1938, 1♂ 1♀; April 24, 3♂, 2♀; May 8, 2♂, 2♀). St. Landry Parish (May 15, 1938, 3♂, 2♀). East Baton Rouge Parish (June 16, 1937, 2♂, 2♀; June 27, 2♀; July 3, 1♂, 2♀; July 6, 1♂, 1♀; July 26, 1♀; August 7, 4♂, 2♀).

All the specimens collected by the author. They were all associated with one weed, *Jussiaea diffusa,* which grows in ponds and ditches.

The types were collected while in copulation. They were sent to the American Museum of Natural History, New York, N. Y.

The Mating and Egg-laying of Malacosoma americana (Lepid.: Lasiocampidae).

By Joseph L. Williams, University of Pennsylvania. and Lincoln University, Pennsylvania.

(Continued from page 50.)

Discussion.

In *Malacosoma americana,* one of our American relatives of the European *Lasiocampa quercus,* only one copulation is normal during the reproductive process. This method of copulating differs from that observed by Pictet (1931), for *Lasiocampa quercus.* He says (translated): "The male *Lasiocampa quercus* normally copulates twice with the same female. The first time is by placing himself on her left, which has the power of fertilizing the female through the vaginal orifice, then after detaching himself from her and being slightly distant from her for about twenty minutes, pairs a second time on her right in the egg-laying orifice, which has no other purpose except for causing the immediate laying of the eggs fertilized by the union on the left." Pictet stated further that the second copulation dilates the sphincter of the egg-laying orifice, for if it does not take place, the female must wait for muscular relaxation of the egg-laying orifice for five or six days, before beginning the act of egg-laying.

In *Malacosoma americana,* the penis was observed to be only in the opening leading to the bursa, which corresponds to the vaginal orifice of Pictet. This is normal for this species and is the only copulation performed by it. Mated females of *Malacosoma americana* are generally unable to lay when twigs of certain trees are absent, not because of a necessity for a second copulation. These twigs act largely as a mechanical stimulus; however, chemical stimulation is not entirely lacking, because mated females failed to lay on oak and maple. Pictet claims that females of *Lasiocampa quercus* must wait for five or six days before the act of egg-laying if the second copulation does not take place. Mated females of *Malacosoma americana* even in the presence of males died before five or six days, when twigs which act as a stimulus for egg-laying were absent.

British investigators have observed oviposition of *Lasiocampa quercus* and one of its varieties, *Lasiocampa callunoe.* Some of these agree that immediate oviposition of a fertile female occurs only after she has been on wing, which they consider to be the stimulus for this act, and that the eggs are laid loosely. Bacot (in Tutt, 1900) reports that *Lasiocampa quercus* oviposits in from ten to twenty minutes after pairing, but he makes no mention of double copulation. All agree that the virgin females of *Lasiocampa quercus* lay after they have retained their eggs for several days. In some cases it is reported that the eggs even hatch parthenogenetically (Groom 1868, Laddiman 1878, Mory 1895, Rothschild 1920, and Tutt, British Lepidoptera 1:27, 3:42, quotes also Tardy and Weir).

Virgin females of *Malacosoma americana* generally cannot lay even when twigs are present and those that lay, lay fewer than a dozen eggs. Copulation must take place before they are able to lay. One of Pictet's conclusions is as follows: "A male which has fertilized a first female can copulate with a second (virgin), but no longer has the power of fertilizing her, because he copulates with the second only on the right, and because only the union on the left has the power of fertilizing. The female lays immediately, but her eggs, it is agreed, are not fertilized." Probing with bristle and various kinds of needles into the egg-laying orifice of virgin females of *Malacosoma americana,* to take the place of such a copulation in *Lasiocampa quercus,* failed to cause these virgin females to lay.

Summary.

1. The object of this work was to verify in our American relative, *Malacosoma americana,* Pictet's (1931) observation of double copulation of the European *Lasiocampa quercus.*

2. Caterpillars were allowed to feed freely until they were nearly full grown. They were then captured and raised in captivity to form cocoons. Copulating experiments were conducted upon the moths that emerged from the pupae.

3. Observations for egg-laying were made by placing mated females in half-pint milk bottles. Both mated and virgin females were placed in paste-board boxes and also tried upon

twigs of wild cherry, apple, pear, dead pear, peach, plum, maple and oak.

4. Only mated females were able to lay, but only, except in a very few cases, in the presence of twigs of rosaceous trees noted in no. 3. Oak and maple twigs induced no egg-laying.

5. Virgin females were unable to lay, probably because they did not pair. Probing the egg-laying orifice with bristles and various kinds of needles and injection of liquid expressed from the male reproductive organs to induce egg-laying, as the second copulation is said to function in *Lasiocampa quercus,* failed to make them lay.

6. Only one copulation is normal for *Malacosoma americana,* and the penis is always found in the bursal opening.

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Notes on Melinaea lilis D. & H. With the Description of a New Subspecies. (Lepidoptera: Ithomiinae).

By RICHARD M. FOX, Academy of Natural Sciences of Philadelphia.

The forms of *Melinaea lilis,* distributed from southern Mexico to Bolivia and Venezuela, exhibit strikingly the geographic variation in color and marking so frequently observed among Neotropic Lepidoptera. The various subspecies fall naturally into two categories, so unlike at first glance as to have every appearance of being separate species. However, it is characteristic of this subfamily that examples closely similar are likely to belong to different genera, while forms quite unlike may be but developments of a single species. Hence, maculation and coloring are untrustworthy if used as sole characteristics for classification. One group of subspecies of the species under consideration has on the apical portion of the primaries two rows of large yellow spots forming bands separated by a solid band of black and preceded by another black band which crosses the distal end of the cell. Two black spots, one within the cell and one immediately below it, are sometimes long enough to form a third dark band, or nearly so. The complete pattern of the secondaries exhibits a black, curved, median band running from apex to base like a dark festoon. In contrast, the other group of subspecies, while similar on the secondaries, has the tawny ground-color of the primaries reduced to the basal third of the wing, and the post-median and subterminal light bands are a series of separated chalky-white spots. For convenience these two groups of subspecies are here called respectively the yellow-spotted and the white-spotted forms, the relationship of which was recognized by W. T. M. Forbes, who published a usable key (1). Forbes' grouping was sustained in Bryk's catalogue (2).

Distributional considerations led both Forbes (1) and Godman and Salvin (3) to suggest that Salvin's *scylax* (4) may be a geographic race of *lilis*, but for present purposes *scylax* is recognized as separate.

MELINAEA LILIS PARALLELIS Butler

Melinaea parallelis Butler, Cist. Ent., i, p. 155 (1873)

With the median band of the secondaries complete, and the white markings of the primaries tending to be smaller than those of the next subspecies, this is the Central American representative of the white-spotted forms, being found in Panama.

MELINAEA LILIS MESSATIS (Hewitson)

Mechanitis messatis Hewitson, Exot. Butt., i, Mechanitis 4; pl. 9, fig. 4 (1855)

The median band of the secondaries is obsolete proximally in this Colombian subspecies. It is interesting to note that the Central American forms bear a greater emphasis on black than do the South American counterparts, respectively, yellow- and white-spotted. If *scylax* is admitted as a *lilis* form, its immaculate secondaries and general tendency toward emphasis on the lighter areas would pose a serious zoogeographic problem.

Forbes indicated his disappointment with the genitalia for determining species of this genus, he regarded the slight variation as possibly individual only (5). With *messatis* and *parallelis* agreeing with *lilis* in anatomic respects, and with the unmistakable, though curiously varied, *lilis* pattern present on the wings, it is necessary to accept Forbes' grouping of "perhaps too miscellaneous a series of forms" (6) as being correct.

MELINAEA LILIS DODONA Hopffer

Melinaea dodona Hopffer, Ent. Zeit. Stettin, xxxv, p. 344 (1874)

Lacking examples for study, judgment is here based on the literature. Apparently *dodona* represents a connecting link between the yellow- and the white-spotted forms. In pattern it resembles *parallelis,* but only the marginal series of dots is white, the others being yellow. It is found in Bolivia, to the south of any other *lilis* form.

MELINAEA LILIS IMITATA Bates

Melinaea imitata Bates, Ent. Mo. Mag., i, p. 55 (1864)

Distributed from southern Mexico to Costa Rica, this never has been recorded from as far south as Panama. It is yellow-spotted, but the black markings are more pronounced than in the nymotypic subspecies, and the post-median light band is tawny toward the distal margin, the two median spots nearly joined into a band.

MELINAEA LILIS LILIS (D. & H.)

Mechanitis lilis Doubleday, Hewitson and Westwood, Gen. Diurn. Lep., p. 130; pl. 17, fig. 4 (1847)

The post-median band is of clear yellow, the median band of the secondaries is complete. This subspecies is found in Venezuela and Colombia, the northerly record being Lion Hill, Panama (3). The area in northern Panama between the southern range of *imitata* and the northern limit of *lilis lilis* is neatly filled by *scylax.*

MELINAEA LILIS ezra new subspecies

In every respect, except the maculation of the primaries, this agrees with *lilis lilis.*

On the primaries dorsally the marginal dots are white, two larger ones being located at the apex with a smaller one below them, and two additional pairs, respectively between M_3 and Cu_1, and between Cu_1 and Cu_2. These last dots are small or vestigial and enclosed in black marginal triangles which in *lilis lilis* constitute the termini of the two dark bands. The light sub-terminal band is composed of four yellow spots, each of which is margined with a narrow ring, not always complete, of tawny ground color. The post-median band is composed of a series of yellow angular spots more or less rimmed with tawny. The band separating these two yellow bands is not continuously black from costal to distal margins as in *lilis lilis,* but before reaching the marginal black triangle the black of the band irregularly fades into tawny so that the distal spots in the light bands are separated only by the ground color. The black median band ends at Cu_1, being replaced to the triangle by tawny. (In the male (type) the median band is continued by a faint thread-like streak along Cu_1, while in the female (paratype) by a similarly faint line toward Cu_2. If both of these streaks were on the same wing, they would form the outline of the continuation of the median band in *lilis lilis.*) There is yellow scaling at the anal angle and in the cell costally on the tawny sub-median area. The back spot in the cell and the one between Cu_1 and Cu_2 are as in *lilis lilis.*

Ventrally the primaries repeat the maculation of the dorsal face, exhibiting the same tendency for tawny to replace the black of the two dark bands and to encircle the yellow spots. The marginal white dots are stronger and the yellow spot in the anal angle more clearly defined than dorsally.

This form is affectionately named for Ezra T. Cresson Jr., who has fostered a whole generation of young Philadelphia entomologists.

Type. Male. "Minca, Magdalena, COLOMBIA, 2500 ft., July 24-25, 1920" (J. A. G. Rehn) (A. N. S. P., No. 7782).

One *paratype.* Female. "Hacienda Victoria, Sierra San Lorenzo, Magdalena, Colombia, 4100-4500 ft., July 23, 1920" (J. A. G. Rehn).

At present it is not clear to me whether this is an aberration accidently captured in the same general locality on two successive days, or whether *ezra* is a local race, possibly found along the lower Magdalena valley. Seasonal variation is a third possibility. A larger series of *lilis* forms from the region is essential before these questions can be answered with finality. However, two facts favor a decision that a subspecies is under consideration. First, *ezra* in macular development is consistent with the observation that the southerly *lilis* forms tend to be lighter than the northerly ones. Second, Mr. Rehn, who collected both examples, was primarily interested in Orthoptera and made no special effort to gather a representative butterfly collection, but rather a sampling, during his Colombian trip. This pushes into the realm of extreme coincidence the theory that *ezra* is an aberration.

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A Bibliography of Keys for the Identification of Immature Insects. Part I. Diptera.

By WM. P. HAYES, University of Illinois.

(Continued from page 10.)

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Id. 1926. Stratiomyiden Larven aus dem Salzwasser. *Mitt.*

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DOLICHOPODIDAE, EMPIDIDAE, ASILIDAE, BOMBYLIIDAE, and THEREVIDAE.

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VIMMER, A. 1933. [Keys to larvae and pupae of Czechoslovakian Syrphidae.] *Casopsis* (*Acta Soc. Ent. Czh.*), Vol. 30, pp. 181-187.

CONOPIDAE.

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TRUPANEIDAE (TRYPETIDAE).

GREENE, C. T. 1929. Characters of the larvae and pupae of certain fruit flies. *Jour. Agr. Res.*, 38: 489-504. (Key to larvae and pupae, pp. 490-491.)

AGROMYZIDAE.

(See FROST, in general keys, pp. 37-38; and NEEDHAM, FROST and TOTHILL, p. 239.)

MYIASIS PRODUCING DIPTERA.

(Mostly Cyclorrhapha.)

GREENE, C. T. 1921. Table to separate common larvae (maggots) Diptera. In: Pierce, Sanitary Entomology, Badger Publ. Co., Boston. (Larval key, pp. 142-144. This key also occurs in the Mimeographed edition of the U. S. Bur. Ent., Proceedings of the class to study entomology of disease, hygiene and sanitation, 1918, p. 217.)

ISAACS, I. M. 1923. Key to the identification of larvae of the dipterous families and certain subgroups . . . relating to myiasis. In: Herms, Medical and Veterinary Entomology, MacMillan Co., N. Y. (Larval key, p. 315.)

LAAKE, E. W., E. C. CUSHING and H. E. PARISH. 1936. Biology of the primary screw worm *Cochliomyia americana* and a comparison of its stages with those of *C. macellaria. U. S. D. A., Tech. Bull.* 500. 24 pp. (Tabular differentiation of instars of these two species, pp. 13-14.)

PATTON, W. S. 1921. Notes on the myiasis-producing Diptera of man and animals. *Bull. Ent. Res.,* 12: 239-261. (Larval key, p. 258.)

ID. 1923. Identification of larvae of the Diptera which cause naso-pharyngeal and aural myiasis in man. *Jour. Laryn. and Otol.* 38: 18. (Paper not seen.)

RILEY, W. A. and O. A. JOHANNSEN. 1915. [Dipterous larva causing myiasis.] In: Handbook of Medical Entomology, Comstock Pub. Co., Ithaca, N. Y. (Key to larvae, pp. 136-137.)

ID. 1932. [Myiasis-producing Diptera.] (In: Medical Entomology, McGraw-Hill Co., New York.) (Larval key to families and some genera of aquatic dipterous larvae pp. 194-195 and myiasis-producing genera, based in part on Tao (1927) with keys to all instars pp. 370-376.)

TAO, S. M. 1927. A comparative study of the early larval stages of some common flies. *Amer. Jour. Hygiene,* 7: 735-761. (Larval key to families of first and second instars, pp. 746-747.)

MUSCIDAE, TACHINIDAE and METOPIDAE (= SARCOPHAGIDAE).

GREENE, C. T. 1921. An illustrated synopsis of the puparia of 100 muscoid flies (Diptera). *Proc. U. S. Nat. Mus.* 60: 1-39. (Mostly on Tachinidae.)

ID. 1925. A tentative arrangement of muscoid flies based on the puparia. *Proc. Ent. Soc. Wash.,* 27: 157-163. (A tabulation of characters and pictorial key, p. 10.)

ID. 1925. The puparia and larvae of sarcophagid flies. *Proc. U. S. Nat. Mus.,* 66: 1-26. (Larval key to five species and a long key to puparia.)

OESTRIDAE AND GASTROPHILIDAE.

DOVE, W. E. 1918. Some biological and control studies of *Gastrophilus haemorrhoidalis* and other bots of horses. *U. S. D. A., Bull.* 597, p. 1-51. (Key to larvae, p. 4.)

LUNDBECK, W. 1927. In: Diptera Danica. Vol. 7. G. E. C. Gad, Copenhagen, 558 pp. (Larval key to species of Gastrophilus, p. 79.)

PATTON, W. S. and F. W. CRAGG. 1913. A textbook of medical entomology. Christian Literature Soc. for India, etc. Calcutta, 768 pp. (This is Williston's key to genera of larvae, pp. 317-318.)

SHANNON, R. C. 1922. The bot flies of domestic animals.

Cornell Veterinarian, July 1922, pp. 240-262. (Larvae of horse bots, pp. 261-262.)

RODHAIN, J. et J. BEQUAERT. 1916. Materiaux pour une etude monographique des Dipteres parasites de l'Afrique. Part II. Revision des Oestrinae. *Bull. Scient. France et Belg.*, (7th Ser.) 50: 53-162. (Larval key to genera, pp. 67-68.)

WILLISTON, S. W. 1908. Manual of North American Diptera (3 ed.). Hathaway, New Haven, Conn. 405 pp. (Larval key to genera, p. 347.)

(See also BRAUER, 1883, pp. 36-38, and keys to myiasis- producing Diptera, such as those in RILEY AND JOHANNSEN, 1932.)

Anisoptera Schneider a Homonym (Neuroptera: Mantispidae).

The family Mantispidae is usually divided into a number of subfamilies by present workers and it is unfortunate that one of these is based on *Anisoptera* Schneider [1] which is a homonym of *Anisoptera* Berthold.[2] As a result, the former must be replaced and I propose *Platymantispa* as a new genus with *Mantispa notha* Erichson [=*Anisoptera notha* (Erichson)] as its genotype. Therefore, the portion of the family called the Anisopterinae by Enderlein [3] in his revision of the genera must now be known as the Platymantispinae.[4]

JOHN W. H. REHN, Philadelphia, Pennsylvania.

Mutant Body Colors in a Parasitic Wasp (Hym.: Braconidae).

Wild type individuals of the wasp, *Habrobracon juglandis* (Ashm.), vary from honey yellow to almost black, due primarily to temperature, higher producing more yellow, lower more black, but races under constant temperature may differ consistently in pigmentation. Dr. Anna R. Whiting describes and illustrates in color results of rearing wild and mutant body color types in Proceedings, American Philosophical Society, vol. 80, no. 1, Jan., 1939.

[1] 1843. Monograph Gen. Rhaphidia, p. 32.

[2] 1827. In Latreille, Fam. Thierr., p. 409.

[3] 1910. Stett, Ent. Zeit., 71, p. 342.

[4] *Mantispa notha* Erichson is the genotype of *Anisoptera* Schneider (by designation of Enderlein, 1910) and the genotype of *Platymantispa* (by present designation) and the two genera are as a consequence isogenotypic.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within** ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Allen, N.**—Some applications of mathematics to an insect life-history study. [12] 31:719-722, ill. **Anslijn, N., Nicolaas.**—Obituary by D. MacGillavry. [58] 10:87-88. **Barnes, H. F.**—Recent advances in Science: Entomology. [Science Progress] 33:549-556. **Creighton, J. T.**—Factors influencing insect abundance. [12] 31:735-739. **Curran, C. H.**—On eating insects. [Natural History, N. Y.] 43:84-89. **Daniels, J.**—The dedication of Mexico's Leland Ossian Howard Entomological Laboratory. [12] 31:773-775. **Darlington, P. J.**—Experiments on mimicry in Cuba, with suggestions for future study. [36] 87:681-708, ill. **Derenne, F.**—Professeur Dr. Embrik Strand: Volumes jubulaires III et IV. [Lambillionea] 1938:198-200. **Felt, E. P.**—The literature of American Economic Entomology. [12] 31:353-356. Wind drift and dissemination of insects. [4] 70:221-224. **Flint & Bigger.**—Biological control of insects through plant resistance. [4] 70:244-246. **Gaines & Ewing.**—The relation of wind currents, as indicated by balloon drifts, to cotton flea hopper dispersal. [12] 31:674-677, ill. **Ginsburg, I.**—Arithmetical definition of the species, subspecies and race concept, with a proposal for a modified nomenclature. [Zoologica] 23:253-286, ill. **Harris, K. L.**—Soil conservation versus insect control. [10] 41:20-26. **Hayes & DeCoursey.**—(See Orthoptera.) **Heberdey, R. F.**—Das Herstellen mikropischer Praparate. [79] 24:224-233, ill. **Kennedy, C. H.**—The present status of work on the ecology of aquatic insects as shown by the work on the Odonata. [43] 38:267-276. **Miller, H.**—The genus and species in relation to evolution and to system. [90] 73:93-95. **Patch, E. M.**—Tour to the Entomological Congress [12] 31:775-777. **Rodeck, H. G.**—Type specimens of fossils in the University of Colorado Museum. [Univ. Col. Studies] 25:281-304. **Ronna, A.**—Animaes inimigos da Abelha domestica e de seus procuctos. [Rev. D.N.P.A., Rio de Janeiro] 1937:1-39, ill. **Strong, L. A.**—What is entomology? [Smiths. Report] Publ. 3467:377-383, ill. **Weber, H.**—Grundriss der Insektenkunde. Jena, Gustav Fischer, xii + 258 pp., ill.

ANATOMY, PHYSIOLOGY, ETC.—Ander, K.—Eine neue auffassung uber die tracheisation des insektenflugels. [Opuscula Ent.] 3:83-90, ill. **Beadle, Tatum & Clancy.**—Food level in relation to rate of development and eye pigmentation in Drosophila melanogaster. [92] 75:447-462. **Brightwell, S. T. B.**—A method for investigating membrane permeability. [22] 29:391-403, ill. **Brindley, M. D.**—The metathoracic postcoxal bridge of Heteroptera. [107] A, 13:103-106, ill. **Bruce, W. G.**—Soil moisture and its relation to the mortality of Hypoderma pupae. [12] 31:639-642, ill. **Bryk, F.**—Combinaison du doublement des ailes avec formation d'ailes jumelles chez Perisomena (Lep. Saturniid.). [Lambillionea] 1939:5-7, ill. **Chaboussou, F.**—Un cas de coaptation sexuelle chex Lebia grandis. [Rev. Francaise d'Ent.] 5:57-64, ill. **Cockayne, E. A.**—Supernumerary antennae in insects. [36] 87:385-396, ill. **Crowson, R. A.**—The metendosternite in Coleoptera: a comparative study. [36] 397-416, ill. **Deonier, C. C.**—Effects of some common poisons in sucrose solutions on the chemoreceptors of the housefly, Musca domestica. [12] 31:742-745. **Evans, A. C.**—Studies on the distribution of nitrogen in insects. II.—A note on the estimation and some properties of insect cuticle. [107] A, 13:107-110. **Favrelle, M.**—Etude du Phalces longiscaphus (Orth.: Phasmid.). [24] 107:197-211, ill. **Fraenkel, G.**—The evagination of the head in the pupae of Cyclorraphous flies. [107] A, 13:137-139, ill. **Fraenkel & Harrison.**—Irregular abdomina in Calliphora erythrocephala (Dipt.). [107] A, 13:95-96, ill. **Greenshields, F.**—Whiting's Hypothesis and Pteromalus; a critique of Dozovcera's (1936) study. [90] 73:89-91. **Harris, C. S.**—The anatomy and histology of the alimentary system of the harlequin cabbage bug, Murgantia histrionica (Pentatom.). [43] 38: 316-331, ill. **Hawkins, C. N.**—Insect Teratology. [107] A, 13: 92-94, ill. **Jannone, G.**—Osservazioni sulla presenza, struttura e funzione d'una vesicola ghiandolare confinata nel protorace delle specie mediterranee del gen. Acrotylus, con particolare riguardo all'A. insubricus (Orth. Acridioid.). [R. Lab. Ent. Agrar. Portici] 1938: 41-62, ill. **Khouvine, Ephrussi & Chevais.**—Development of eye-colors in Drosophila: nature of the diffusible substance; effects of yeast, peptones and starvation on their production. [92] 75: 425-446. **Koch, A.**—Symbiosenstudien, III: Die intrazelluare Bakterien-Symbiose von Mastotermes darwiniensis (Isoptera). [46] 34: 584-609, ill. **Korner & Zarapkin.**—Uber Gerichtete Variabilitat, VIII: Die Farbungsvariation bei Bombus lapponicus F.-weinchen. [46] 34: 739-752, ill. **Krause, G.**—Die Ausbildung der Korpergrundgestalt im Ei der Gewachshausschrecke, Tachycines asynamorus. [46] 34: 499-564, ill. **Lawson, C. A.**—Order of differentiation in relation to order of determination in gamic female Aphids (Homoptera). [90] 73: 69-82, ill. **Lucchese, E.**—Contributo alla conoscenza della Leskia aurea (Dipt. Larvaevorid: Dexiinae). [R. Lab. Ent. Agrar., Portici] 1938: 39 pp., ill. **Mather & Dobzhansky.**—Morphological differences between the "races" of Drosophila pseudoobscura (Diptera). [90] 73: 5-25. **Maulik, S.**—The correlation between colour pattern and structure in insects. [75] 3: 230-235, ill. **Potter, E.**—The internal anatomy of the larvae of Panorpa and Boreus (Mecoptera). [107] A, 13: 117-130, ill. The internal anatomy of the order Mecoptera. [36] 87: 467-502, ill. **Pradhan, S.**—Glands in the head capsule of Coccinellid beetles with a discussion of some gnathal glands. [J. Morph.] 64: 47-66, ill. **Roonwal, M. L.**—On a new law of the Bitriangular medial concentration of the cephalic appendages in the Chilopoda and the Insecta. [J. Morph.] 64: 1-8, ill. **Slifer & Uvarov.**—Brunner's organ: A structure found on the jumping legs of grasshoppers (Orthopt.). [107] A, 13: 111-115, ill. **Smith, S. G.**—Thelytokous parthenogenesis in Cephus cinctus (Hymen.): a criticism. [4] 70: 259-260. **Zarapkin, S. R.**—Ueber Gerichtete Variabilitat bei Coccinelliden. V. Die Reihenfolge der Fleckentstehung auf den Elytren der Coccinella 10-punctata in der Ontogenetischen Entwicklung. VI: Biometrische analyse der Gerichteten Variabilitat. [46] 34: 565-572; 573-584, ill. **Zeller, H.**—Blutt und Fettkorper im Flugel der Mehlmotte, Ephestia kuhniella. [46] 34: 663-738, ill.

ARACHNIDA AND MYRIOPODA.—Allen, W. E.—Observations concerning ticks. [Turtox News] 17:9-10. **Bondar, G.**—See under Coleoptera. **Jacot, A. P.**—The Geenton mites of Florida (Grossman Collection—III). [39] 21:49-57, ill., (k*). **Kaston, B. J.**—Notes on a new variety of Black Widow spider from southern Florida. [39] 21: 60-61. **Keifer, H. H.**—Eriophyid Studies II. [Bull. Dept. Agric. of California] 27:301-323, ill. Eriophyid Studies III. [Bull. Dept. Agric. of California] 28:22 pp., ill. **de Mello-Leitao, C.**—Solifugos de Argentina. [Mus. Arg. Cien. Nat.] 40:32 pp., ill. (Sk*). **Roewer, C. T.**—Opiliones aus dem Naturhistorischen museum in Stockholm. [83] 30, (B 10): 1-8. **Savory, T. H.**—Notes on the biology of harvestmen. [J. Quekett Micro. Cl.] 1:89-94.

THE SMALLER ORDERS OF INSECTS,—Banks, N.—New West Indian Neuropteroid insects [105] 9:285-304, ill. **Borror, D. J.**—Additions to the Ohio list of Dragonflies (Odonata). [43] 38:307-310. **Eastham, H.**—Movement of the gills of Ephemerid nymphs in relation to the water currents produced by them. [J. Quekett Micro. Cl.] 1:95-99. **Fraser, E. C.**—A note on the polymorphic venation of Epiophlebia superstes (Odonata) and its phylogenetic importance. [107] A, 13:155-157, ill. **Hood, J. D.**—Studies in Neotropical Thysanoptera, VIII. [105] 9:404-426 (*). **Kennedy, C. H.**—Odonata, see under General. **Lestage, J. A.**—Etudes sur la biologie des Plecopteres, Remarques critiques sur le genre Taeniopteryx (olim Nephelopteryx) et sur la differenciation des larves connues en Europe. [33] 73:439-452, ill. **Moulton, D.**—Thysanoptera from Minas Geraes, Brazil. [105] 9:374-382, (*). **Spieth, H. T.**—Taxonomic studies on Ephemerida, I: Description of new North American spp. [40] no. 1002; 11 p., ill.

ORTHOPTERA.—Favrelle, M.—See under Anatomy. **Folsom & Woke.**—The field cricket in relation to the cotton plant in Louisiana. [U. S. Dept. Agric.] Tech. Bull. 642: 28 pp., ill. **Hayes & DeCoursey.**—Observations of grasshopper parasitism in 1937. [12] 31:519-522. **Rehn, J. W. H.**—Notes on the genus Haaniella with the description of a new species (Phasmatidae). [1] 64:367-371, ill. **Slifer & Uvarov.**—See under Anatomy.

HEMIPTERA.—Beamer, R. H.—Four n. spp. of Leafhoppers and notes on two others (Cicadell.). [103] 12:26-30. Miscellaneous leafhoppers with descriptions of five n.

spp. (Cicadell.). [4] 70: 224-230, ill. **Butler, C. G.**—A further contribution to the ecology of Aleurodes brassicae. [107] A, 13: 161-172. **Caldwell, J. S.**—New Texan Fulgoridae. [43] 38: 304-306. **DeLong, D. M.**—Some n. spp. of Parabolocratus (Cicadell.). [43] 38: 301-303. The genus Phlepsius, a study of the North American spp. with special reference to the characters of the male genitalia (Cicadell.). [Lloydia] 1: 232-252, ill. (k*). Biological studies on the leafhopper Empoasca fabae as a bean pest. [U. S. Dept. Agric.] Tech. Bull. 618: 60 pp., ill. **Essig, E. O.**—Some new and little known Aphididae of California. [12] 31: 780-781. **Ferris, G. F.**—Contributions to the knowledge of the Coccoidea, VIII. Illustrations of thirteen genotypes of the Diaspididae. [Microent.] 3: 57-75, ill. Atlas of the scale insects of North America. Stanford Univ. Press. California. 1938. **Jordan & Wendt.**—Zur Biologie von Salda litoralis. [60] 99: 273-292, ill. **Morrison, H.**—Descriptions of n. spp. of Matsucoccus (Coccid.). [10] 41: 1-20.

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OBITUARY

B. Preston Clark, a Research Associate in the Department of Insects of the Academy of Natural Sciences of Philadelphia, who died January 11, 1939, was born in Boston, October 8, 1860, and graduated from Amherst College in 1881. With an early bent for zoological study, the assumption of business responsibilities compelled him to devote most of his life to a variety of mining, smelting and manufacturing interests. However, during an exceedingly active life in these lines he was able to form the most outstanding collection of the Sphingidae, or hawk-moths, in existence, which in recent years was given to the Carnegie Museum at Pittsburgh. A Life Member of the Academy since 1917, Dr. Clark showed his interest in our institution by building up our collection of hawk-moths to the point where the number of species represented here was exceeded only by that in the collection given by him to the Carnegie Museum, placing us in as representative a position in this respect as any collection in Europe. In the last few years he further assisted the Academy by having his sphingid collectors in various parts of the world collect Orthoptera for our series.

Dr. Clark issued many important studies on the Sphingidae and by his own researches greatly broadened our knowledge of the group.

He was Consul for Haiti at Boston for many years, and also President of the Cambridge Theological Seminary, a trustee of the Massachusetts Homeopathic Hospital and Treasurer of the Massachusetts Bible Society, the Lincoln Home Association and the Newsboys' Reading Room Association.

James A. G. Rehn.

Dr. Wilton Everett Britton, national authority on entomological subjects and State entomologist for Connecticut since 1901, died February 15, 1939, in a hospital at New Haven, Connecticut. He was born at Marlboro, Massachusetts, September 18, 1868, was graduated from the University of New Hampshire in 1893 and took a year of graduate work at Cornell. Yale gave him the degree of Ph.D. in 1903, and New Hampshire the honorary Sc.D. in 1930. It was largely through Dr. Britton's efforts that Connecticut's shores were converted from mosquito-infested marshes into pleasant resorts.

He was the editor of a series on the Insects of Connecticut written by specialists, of which the volumes on Orthoptera, Odonata, Hemiptera and Hymenoptera have appeared. Active in the national entomological societies, he was President of the Association of Economic Entomologists in 1909.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Chrysalids of Papilio ajax and philenor, cocoons of Rothschildia orizaba and jorulla. Buy or exchange. Newark Entomological Society. Curator, Chas. Rummel, Green Village Rd., R. D. 2, Madison, New Jersey.

Have large list of Lepidoptera wants and offers. Send me yours. Carpenter, Box 1344, Hartford, Conn.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis** or **Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

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ENTOMOLOGICAL NEWS

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On the Dimorphism of Cocoons of Sphecophaga burra (Cresson). (Hymenoptera: Ichneumonidae).

By Rudolf G. Schmieder, Zoological Laboratory, University of Pennsylvania.

The ichneumonid parasites that inhabit the nests of hornets and yellow-jackets have attracted considerable attention. In 1828, Curtis described the habits of the European species, *Sphecophaga vesparum* (Curtis), and discussed the problem of the succession of its generations through the year. Since that time this problem has been dealt with by a number of authors, English, German, and French, without, however, receiving a satisfactory solution.

The common American species, *S. burra* (Cresson), has not had so many observers, although it presents the same problems that the European species does. In addition, my own observations show that it exhibits a very striking and very puzzling phenomenon, not recorded for the European species,—the production of two kinds of individuals, morphologically alike but differing from each other in the length of their life history and in the type of cocoon that they spin. It is the purpose of the present paper to call attention to the interesting problem presented by the existence of these two kinds of individuals and to record the data which I have gathered in order that others who may come upon parasitized hornets' nests will, it is hoped, be able to make additional observations and perhaps find a solution for questions here left unanswered.

Securing Nests.

In securing nests of hornets and wasps, I observed certain precautions in order to avoid being stung too badly. I used a bee-veil to protect my face, and tied shut my sleeves and trouser legs. After approaching the nest as quietly as possible, I quickly plugged the nest entrance with a wad of absorbent cotton and poured a generous quantity of chloroform over the nest. The chloroform acted upon those hornets that were still in the nest so that the numbers of the defending host did not become too great. Then I enclosed the nest as quickly as possible in a large sheet of mosquito netting and detached it from its support. At the laboratory, I placed the nests in a large can and etherized the inhabitants, then tore the nest apart, and transferred its contents to a wire insect-breeding cage. (If left too long in the mosquito netting, the hornets chew their way out through the cloth.) The exposures to chloroform and ether do not kill the hornets, their brood, or their parasites. Some nests I secured at night, when, employing the same procedure, I sometimes entirely avoided being stung.

Observations.

Sphecophaga was first encountered in two nests of the white-faced hornet, *Vespa maculata* Linn., taken at West Manayunk, Pennsylvania, September 10, 1922. These nests contained probably fifty to sixty parasites, but no actual record of the number of individuals was made. I did prepare a crude pen sketch to show what I found to be the typical condition of a parasitized hornet's cell with its two very distinct types of parasite cocoons, and I wrote out brief notes on the relative positions of these cocoons within the cell, as well as a description of the cocoons themselves. The series of specimens that I sent to the Bureau of Entomology and that Mr. R. A. Cushman kindly determined were from these nests; they are referred to in a paper by Mr. Cushman (1933). Of other nests secured during the succeeding winter and spring, those that contained parasites were: One from the same locality as above, taken December 27, 1922, and one from Cobb's Creek, Pennsylvania, May 4, 1923. In the years following, additional hornets' and yellow-jackets' nests were secured but not until 1935 was *Sphecophaga* again found. In that year, two *Vespa maculata* nests, taken at Media, Pennsylvania, contained together the small number of five parasitized cells, which yielded only eleven cocoons.

In the Cobb's Creek nest were found several *Sphecophaga* cocoons from which secondary parasites emerged which were kindly determined by Mr. A. B. Gahan as the chalcid *Dimmockia incongrua* (Ashm.). I reared many successive generations of this chalcid upon larvae of mud-dauber wasps but found no features of unusual interest in its life history.

In the yellow-jacket nests taken, I have not found parasites of any kind, although *S. burra* has been recorded (Zabriskie, 1894) from "*Vespa germanica*," no doubt *V. maculifrons* Buy, and the European species is also common in the nests of a number of different species of *Vespa*, including the hornet *V. crabro* as well as the smaller yellow-jackets (Reichert 1911, Schmiedeknecht 1914).

Upon examining the combs of the large and prosperous nests taken in September, I found the paper-cells of the larger combs occupied in part by larvae and in part by the cocoon-enclosed pupae of drones and queens. In the cells containing the hornet larvae no parasites were observed; nor did any appear in the course of the next five or six days. During this time, the larvae continued to live, but they gradually diminished in size as the result of the now completely one-sided trophallaxis from which the adults that were confined with them alone benefitted. This observation does not, however, exclude the possibility that some of these larvae may have contained young endoparasitic stages of *Sphecophaga*. Morley (1900) states that in *S. vesparum* the female oviposits in the body of the hornet larva, that the young parasite larvae feed upon the fat-body of the host without interfering with its development, and that, not until later, after the host has spun its cocoon and has pupated, do the parasites begin to feed externally upon that host pupa.

Only within the cells containing the pupae of hornets were the larvae and pupae of the parasite *S. burra* encountered. The cells containing parasites were scattered among the unparasitized cells and there seemed to be no way of distinguishing them externally. It was necessary to cut off the tops of the hornet cocoons and to expose the pupae. If the then exposed head of a pupa lacked the normal opaque white color and was translucent and watery in appearance, one could be sure that pulling this pupa out of the cell would reveal the presence of a number of *Sphecophaga* larvae or cocoons in the bottom of the hornet cell. If only one parasite were present, the hornet pupa was still almost normal in size and appearance. If, however, six or seven parasites had fed on the hornet pupa, then only the head and anterior part of the thorax had retained their normal shape, while the rest of the host pupa was very much shrunken and tapered, although still appearing fresh and clean.

The number of parasites present in a cell varied from one to seven; the average number was three. For the most part the parasites were already enclosed in their cocoons, and these cocoons, it was immediately evident, were of two totally different kinds. The one sort was tough, parchment-like, light brown or yellowish brown in color and firmly attached to the sides and bases of the host cells. The other was quite delicate, white in color, and loosely attached to the sides of the cells. These two kinds of cocoons are so different that Zabriskie (1894), who found them in *Vespa* nests from New Baltimore, New York, and described them very accurately, believed that they represented two different species of parasites. That author also correctly observed that the tough brown cocoons are always in the very base of the cells and that, when such cells are cleaned out by the wasps, the cocoons of the parasite are not removed but are allowed to remain as the base of the cell.

In the large queen cells of *Vespa maculata* nests, three or four vertically placed brown cocoons often filled the bases of the cells just distal to the excrement discharged by the host larvae. If only a single brown cocoon is present, it also is placed vertically but occupies only one angle of the cell. All these brown cocoons contained larvae; some were still spinning, others were already in diapause. From such cocoons no imagines emerged until the folllowing April. There is no doubt but that these brown cocoons represent the typical form of *Sphecophaga* cocoon, not only because they are twice as numerous as the other form but also because they are entirely like those that have been described and figured (Reichert 1911) for the European *S. vesparum*.

The second form of cocoon does not in any way resemble the typical form but is a delicate structure of white silk with a fluffy texture quite different from that of the brown cocoons. Furthermore, these white cocoons are loosely attached anywhere upon the inner walls of the hornet cell. The larvae in the white cocoons undergo transformation immediately they have finished spinning and emerge as adults about one week later. They never enter into the long diapause characteristic of the larvae in the brown cocoons.

In the first nest from which counts were made of cocoons, the nest from West Manayunk, twenty-three parasitized hornet cells were found and these yielded altogether fifty-one brown and eighteen white cocoons, as shown in the accompanying table. This table also gives the records from the other nests.

Locality of nest	No. of cells in nest	No. of brown cocoons	No. of white cocoons
W. Manayunk	23	51	18
Cobb's Creek	26	41	25
Media (a)	2	5	2
Media (b)	3	2	2
Total	54	99	47

Among the cells examined there were thirty-three that contained only brown cocoons, from one to four per cell. In sixteen cells out of the total of fifty-four, both brown and white cocoons were present in the same cell. In such cells it was usual to find two or three brown cocoons firmly attached to the sides and base of the cell, while two or three white cocoons occupied the space between the brown cocoons and the remains of the host pupa. Rarely only white cocoons, numbering from one to five, are present in a cell to the exclusion of brown ones. This condition was seen in three cells of the Cobb's Creek nest, and in two from a Media nest, but was never encountered in the West Manayunk nest.

Since the white cocoons are nearly always found only in the same cells with brown cocoons, and since in all the nests examined only a small percentage of the host pupae were parasitized, it is necessary to conclude that the same mother may produce both kinds of offspring. Even in the nest designated in the table as "Media (a)," in which only two cells of a large and prosperous hornets' nest were parasitized, these cells contained both brown and white cocoons. It is unlikely that two different females would oviposit in the same two cells out of hundreds of possible cells.

From the position of the *Sphecophaga* larvae in the host cell and from the appearance and the position of the remains of the host, it is evident that the parasites feed only at the posterior end of the host and, furthermore, that those larvae that spin the brown cocoons must have completed their feeding and begun spinning earlier than those that produce the white cocoons.

The imagines obtained from the two kinds of cocoons were identical in appearance except that, to quote from a letter from Mr. Cushman to whom I had sent a series for determination: "The fall-emerging specimens [from white cocoons] appear to be consistently stouter than those emerging in the spring [from brown cocoons]. . . ." All adults which I obtained were females and the species is, like the European one, evidently thelytokous. Males are extremely rare.

From the data that have been presented it is clear that there are two kinds of individuals of *S. burra:* Those that spin brown cocoons and undergo a long larval diapause, and those that spin white cocoons and transform without a diapause. It is also evident that these two forms are not representatives of different generations but that they are really individuals of the same generation and occur as offspring of the same mother.

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Two New Species of Agromyza from South America (Dipt.: Agromyzidae).

By S. W. FROST, The Pennsylvania State College.

Agromyza braziliensis n. sp.

A large species, 4.5 to 5 mm.

♂: Front, face, cheeks, palpi, antennae, scutellum, halteres and legs largely pale yellow. Margin and fringe of calypteres dark brown.

Front and orbits concolorous pale yellow, front together with orbits about as wide as either eye, sides parallel; four pairs of strong fronto-orbital bristles, lower three pairs approximated in their rows, the upper bristles more widely separated, the lower two pairs pointing inward, the other two pairs pointing upward, a few minute hairs on the upper outer angles of the orbits next to the eye margin; frontal lunule not conspicuous; bases of antennae approximated; cheeks yellow more than one-half the eye-height, narrower in front than behind; a strong pair of oral vibrissae accompanied by about six bristles along the lower edge of the cheek; proboscis and palpi yellow, setae on the palpi black, those on the proboscis yellow; antennae entirely yellow, third segment small and rounded, second segment with a short dorsal bristle, arista black, almost bare, distinctly swollen on the basal fifth and about four times the length of the third antennal segment; occiput pale yellow on the sides, brown above towards the middle, ocellar triangle small, shiny brown continuous with the color of the occiput, ocellar bristles long extending to the frontal lunule.

Mesonotum sub-shiny black with a large yellow spot on the posterior margin, the anterior margin of this spot prolonged into a point reaching nearly to the middle of the mesonotum, the black color narrowed on the fore part of the mesonotum so that the presutural bristles are located on the edge of this colored area; scutellum broadly yellow in the middle and below, darkened along the sides; pleura largely yellow, the yellow extending above the base of the wings and including the anterior humeral callosities, the sternopleura bears a large triangular black spot leaving a narrow yellow band across the upper portion, the mesopleura bears a narrow, darkened, transverse band below, the pteropleura has a small, darkened, triangular spot; there is also a small, darkened spot in front of the base of the wing, and a small spot above the suture of the mesopleura; there are four well-developed pairs of dorsocentral bristles, four irregular rows of acrostichals reaching from the anterior to the posterior margin of the mesonotum; two pairs of presutural bristles, outer pair large, inner pair smaller; one strong sternopleural bristle accompanied by numerous smaller setae, 1 strong mesopleural bristle with numerous smaller setae along the upper margin of the mesopleura, humeral bristle strong accompanied by numerous smaller bristles.

Legs largely yellow, coxae and femora entirely yellow, tibia and tarsi slightly darkened, a distinct posterior bristle near the middle of the mid tibia.

Abdomen brown above, yellow on sides and below, incisures minutely and indistinctly yellow, genetalia subshiny brown.

Wings hyaline, slightly smoky, veins brown, base of costa and first vein to and slightly beyond the humeral cross-vein, yellow, fifth vein slightly stronger, auxillary vein faint but separate from first vein and ending separately in the costa, costa extending to the fourth vein, two strong setae on base of the costa, anterior cross-vein at about the end of the first vein and near the middle of the discal cell, veins two and three diverging slightly at their tips, veins three and four nearly parallel at their tips, vein four terminating near the tip of the wing, distal section of the fifth vein about one-and-a-quarter times the length of the penultimate section; halteres pale yellow including the stalk; calypteres gray, margin and fringe dark brown.

♀ similar to the ♂ but darker in color, yellow incisures on edges of abdominal segments more conspicuous, genitalia shiny black.

Holotype ♂ reared August 1937, Sao Paulo, BRAZIL, by Luiz O. T. Mendes. Seven paratypes; six males and one female bearing same date and locality. Holotype will be deposited in the U. S. National Museum.

This species runs close to *quadrata* in Malloch's key to the Diptera of Patagonia and Chile, 1934. It differs in coloration and in the number and position of the acrostichals. In *braziliensis* there are only four rows of acrostichals and they extend the whole length of the mesonotum.

Agromyza ecuadorensis n. sp.

A large species, 4.5 to 5 mm.

♂: Front, face, cheeks, palpi, scutellum and legs largely yellow, margin and fringe of calypteres dark brown.

Front pale yellow; orbits darkened on upper half, front together with orbits as wide as either eye, sides parallel, four strong pairs of orbital bristles, about equally spaced in their rows, the lower two pairs turned inward, the other pairs turned upward, orbital hairs sparse, minute, almost invisible; frontal lunule not conspicuous; cheeks yellow, at narrowest portion less than one-half the eye-height, cheeks narrower in front than behind; a strong pair of oral vibrissae accompanied by a row of strong setae along the lower edge of the cheeks; proboscis and palpi, yellow; setae of palpi black, those on proboscis yellow; antennae entirely yellow, third segment short rounded at the tip; arista black, nearly bare, swollen on the basal one-fifth, about four times the length of the third antennal segment; occiput shiny black continuous with the ocellar triangle and upper orbits.

Mesonotum subshiny black, a large yellow spot on the posterior margin, the anterior margin of this spot prolonged into a point reaching nearly to the middle of the mesonotum; the black area of the mesonotum broader than in *braziliensis* with the result that the presutural bristles are situated well within the dark color; scutellum broadly yellow in the middle and below, darkened on the sides; pleurae largely black, the pteropleura, mesopleura, and sternopleura with large black spots, only the upper edges of these narrowly yellow; four well-developed pairs of dorsocentral bristles, about four rows of acrostichals, these do not extend to the posterior margin of the mesonotum, they terminate before the yellow spot with the exception of one minute pair just before the scutellum, the acrostichals are not as strong as in *braziliensis* and are more sparse; one strong sternopleural bristle accompanied by numerous smaller setae, mesopleura with one strong bristle and numerous smaller setae along the upper edge; humeral bristle strong accompanied by numerous smaller setae.

Legs largely yellow, front femora and tibiae yellow, middle and hind tibiae darkened, all tarsi darkened, coxae yellow with darkened spots at the bases, mid tibia with a distinct posterior bristle near the middle.

Abdomen entirely brown, incisures very indistinctly yellow, last incisure only conspicuously yellow; genetalia dark brown, yellow only in the middle.

Wings hyaline, slightly smoky, base of costa and first vein to the humeral cross vein distinctly yellow, wings rounded at tips, auxillary vein faint but ending separate from vein one in the wing margin, costa extending to the fourth vein, two strong setae on the base of costa, anterior cross vein slightly before the end of vein one and situated in the middle of the discal cell, anterior cross-vein about one-fourth the length of the posterior cross-vein, veins two and three diverging slightly at their tips, veins three and four nearly parallel at their tips, distal section of fifth vein about one and a quarter times the length of the penultimate section; halteres pale yellow including the stalk; calypteres gray, margin and fringe dark brown.

Holotype ♂, Baños, ECUADOR. February 19, 1937. Collected by S. W. Frost. Differs from *braziliensis* in coloration, smaller and more sparse acrostichals and only one pair of presutural bristles. The holotype will be deposited in the U. S. National Museum.

Iridescence.

By Wm. T. M. Forbes, Cornell University, Ithaca, New York.

(Continued from page 44.)

Chlorippe cyane reducta (Peru). 1, purple spot on fore wing oriented, light 30 U 0; viewed at almost any angle, with azimuths under L or 75 R, perhaps best at 45 U 0, and converse.

2, Deep purple edges of hind wing oriented 30 U 90 L; 45 U 0. It also appears at various other angles, such as 30 U 0; 60 U 90 L; but at the majority of orientations is invisible,—e. g. at 45 U 180; 45 U 0 there is no purple on either fore or hind wing, though the blue of hind wing is plain.

3, specular at medium angles, a large blue patch on hind wing,—blue at 45, green at 90, fainter but very green at 30 U 180; 45 U 180; strongest purple at 30 U 0; 30 U 180 and converse, but weak at right angles to this.

4, under side of hind wing shows rather critical purple shades near base of costa in cell and above middle of outer margin at 90 U; 90 U, the angle of light more critical than the angle of sight.

C. cyane (typical, from Columbia). 1, is more critical, best at 30 U; 45 U 0. 2, is intense blue rather than purple at most angles, e. g. 15 U 0; 45 U 45 L, but is purple at 15 U 0; 60 U 90 L. 3, is the same. 4, not distinct.

C. c. burmeisteri (Argentine). 1, same but weaker. 2, at same angles as *cyane,* but matching the specular patch in color, —at 15 U 0; 45 U 45 L only the border is bright, at specular angles only the large patch. 3, specular and blue at almost all angles; not becoming green at high angles or even at 30 U 180; 45 U 180, but purple at grazing angles (15°) regardless of direction. 4, like *reducta.*

C. cherubina (South America). 1, blue, not purple, at same angles. 2, intense green at 15 U 0; 30 U 45 L, where patch is a faint brassy green; changing rapidly to purple at 30 U 0; 45 U 60, at which angle the patch is a brilliant brassy green.

3, yellow green at 90, blue green at 45, blue at 30; purple at grazing, green at other than specular angles. 4, not distinct.[1]

[1] The most distinctive angles for the determination of blue Chlorippes are: 1, 30 U 0; 45 U 0 for the purple of *cyane* and blue of *cherubina* on fore wing (i. e. back to light, head of butterfly to observer, tilted at a low angle). 2, 90; 90 to discriminate specular colors best (blue of *burmeisteri,* blue-green of *reducta,* green of *cyane* and *cherubina*), also extent of specular blue or green on fore wing.

C. pavon (South America). Oriented 45 U 0; 60 U 0. a slightly freakish case, visible from most angles if light and sight are about the same and front or left, but not rear or right.

C. laure (South America) Oriented. 45 U 45 L; 45 U 45 L. A brilliant purple patch, overlapping the orange slightly on fore wing and giving it a salmon tint. This is more critical than the last, but still conspicuous from horizontal angles of 0 to 90 L. At 90; 90 however there is no iridescence.

Apatura iris (Europe). Of the same type as the last but still more critical,—probably best at 45 U 45 L, 45 U 45 L. At 0 horizontal angle the purple is almost lost from the fore wing, but at 30 U 180; 45 U 90 L it is almost confined to the fore wing.

Thanaos lucilius (Eastern U. S.). *T. lucilius* and *baptisiae* are an example of extremely difficult and critical iridescence. It is very faint, best visible under low power of the microscope and with a dark background, but as illumination and vision should be at nearly right angles it is convenient to use a microscope. The color changes under such a narrow range of angles that the color may perhaps be due to striation rather than the usual thin plates.

1, Oriented 15 U 90 R; 75 U 90 L. Green, shading from somewhat bluish to somewhat brassy and strongest close to margin.

2, 30 U 90 R; 60 U 90 L, in a very narrow range a little less rather than more than 30°. Light portions varying from coppery through rose to crimson, dark portions very faintly crimson to violet.

3, 45 U 90 R; 45 U 90 L. Brassy on light portions, very faintly purple on postmedial dark band.

At still deeper angles the iridescence goes through green to copper again at grazing view and perpendicular light.

4, 5 U 90 L; 90 U (grazing from opposite side) copper, the dark parts not distinguishable.

5, 15 U 90 L; 90 U. The best (and a rather decided) green, the dark postmedial stripe well contrasted.

6, 30 U 90 L; 60 U 90 R. Light parts brassy, dark parts with very faint purple and hints of rose.

7, 45 U 90 L; 45 U 90 R. Green again.

At higher angles of illumination and going to grazing angle of sight it goes again through copper before fading out.

T. baptisiae (Woods Hole, Mass., holotype). Essentially the same rapidly changing series of colors but much toned down. 1, faint green at margin, stronger and flecked with copper in fringe; 2, light portions faintly brassy toward margin, shaded with traces of rose along veins; 3, as before but much toned down and dominated by the brown ground color; 4, 5, 6, 7 the iridescenses of T. lucilius can be just divined in the best lighting but are wholly dominated by the pigment browns and buff. The greener or brassy appearance mentioned in the original description of baptisiae is due to the greater dominance of the brown to yellowish pigment colors, which kill the purple but reinforce the brassy tints of the iridescence.

Talanga. (Indo-australian). This is the genus that started the present study.

The iridescence is brilliant, only slightly oriented, but varies enormously with angle. For the discrimination of species[2] the best position seems to be with light and sight both at medium angles from opposite sides.

T. sabacusalis (New Guinea). 30 U 90 L; 60 U 90 R. Oriented and changeable. Ground of fore wing bright rose, except base and borders; postmedial area and outer subterminal stripe the same. Double spot at end of cell, spot below and beyond it and inner st. stripe brilliant blue, specular. Hindwing with a triangular area covering forks of Cu and M_2 and $_3$ the same, shading into brassy and green on basal half, except anal area, the postmedial costal area less brilliantly rose; a short postmedial bar brilliant blue, shading into greenish, specular, but only visible when angles of light and sight correspond closely, also with a slight rose edging; marginal patch mixed copper, brass, purple and green, going to dark bronze at 15 U 90; 90 U.

At 45 U 90 R; 45 U 90 L the same colors show, but not at reciprocal angles (save the blue).

T. tolumnialis (New Guinea) 30 U 90 L; 60 U 90 R. Similar; base with two narrow stripes of silvery iridescence; blue at end of cell as before; pm. area silvery rather than rose, but both st. stripes dull rose, alike, the inner halves of both going to bright blue and outer halves going dull at grazing angle (5 U; 90 U). Hind wing as before, but less brilliant, except for the costo-apical region which is rose and distinctly runs into the metallic marginal patch. I cannot see Janse's key character between the hind wings of these species. Both

[2] See Janse, Pyralidae in Mem. Mus. R. d'Hist. Nat. de Belgique; Resultats Scient. du Voyage Ind. Or.Néer. Leopold, iv fasc. 12, 11-16, pls. 3-5, 1935. He writes me that his descriptions were made with light at right angles from the side.

show the same iridescence in color and position, only the present is less brilliant.

T. sexpunctata (Formosa, Timor). Iridescence on the same plan and visible at the same angles; but with the basal and postmedial areas of fore wing intermediate, blue shading into rose, and hind wing with the rose beyond the p. m. bar stronger, extending to the marginal patch, which latter is almost evenly green.

So far then as these three species are concerned we might modify Janse's key as follows:

4*a*. Basal half of fore wing (viewed at 30 U 90 L; 60 U 90 R or 45 U 90 R; 45 U 90 L) evenly rose to violet except the narrow base and borders; green and brassy iridescence on basal half brighter than rose on outer part of costal area .... *subacusalis*

b. Iridescence of basal half of fore wing interrupted by a broad yellow stripe; largely blue or silvery; rose on outer part of costal area stronger than that on base of hind wing 5

6*a*. Iridescence of basal half of fore wing bright, largely blue; iridescent marginal patch of hind wing green; the black immediately before it in the form of a heavy double crescent corresponding to the two marginal dots, *sexpunctalis*

b. Iridescence of basal half of fore wing pale and silvery; marginal patch of two portions, a small copper one close to margin, and a broader and faintly silvery one before it, bounded on the inner side with a more distant, even and finer brown-black line................. *tolumnialis*

The cordatus-group of Agabus (Coleop.: Dytiscidae).

By MELVILLE H. HATCH, University of Washington, Seattle, Washington.

Agabus bjorkmanae nom. nov.

Anisomera recta LeC., Ann. Mag. Nat. Hist. (4) IV, 1869, p. 375.—Crotch, Trans. Amer. Ent. Soc. IV, 1873, p. 424.

Agabus rectus LeC.*—Sharp, On Aquat. Carn. Col. 1880-82, p. 756.

Agabus (Gaurodytes) rectus LeC.—Seidlitz, Verh. Nat. Ver.

* Preoccupied in *Agabus* by *Colymbetes (Agabus) rectus* Babington, Ann. Mag. Nat. Hist. VI, 1841, p. 53, now considered a synonym of *striolatus* Gyll.

Brünn XXV, 1887, p. 84.—Zimmermann, Col. Cat. 71, 1920, p. 171.

Agabus (Hydronebrius) rectus LeC.—Fall, Rev. N. A. Species Agabus, 1922, pp. 1, 3, 9.—Zimmermann, Kol. Rundsch. XX, 1934, p. 152.

This species is sufficiently distinguished from *cordatus* LeC. by Fall, but the pronotum is very variable. One extreme is represented by specimens in which the width of the base is just visibly greater (about one per cent) or barely less (three or four per cent) than the middle, the sides behind the middle nearly straight, not or very slightly sinuate, the hind angles rectangular or nearly so. At the other extreme are specimens in which the width of the base is distinctly less (six to nine per cent) than that of the middle, the sides behind obliquely convergent, the hind angles somewhat obtuse. Were it not for the existence of intermediates, one would scarcely hesitate to recognize two species. The color is usually black, but in one specimen, perhaps from immaturity, the vertex of the head is faintly bimaculate, the sides of the pronotum, the side pieces of the prothorax, the elytral epipleurae, and the apices of the last four abdominal segments are rufescent.

Distribution. British Columbia: Fernie, Merritt (*Leech*), Van [couver Is.] (*type*). Alberta: Beaver Cr. (*Leech*), Happy Valley (*Lane, Leech*). Washington: Blue Mts. (Coppei Cr., Mill Cr.), Wawawai (*Fall*). Idaho: Troy (*Lane*), Waha. Oregon: Kamela, Meachem.

I am renaming this species after Miss Frances Bjorkman, the collection by whom at Fernie, British Columbia, of a series with extremely obtuse posterior pronotal angles brought the variable nature of the species to my attention.

In view of the extreme form assumed by certain specimens of this species, it will be necessary to insert "usually" between "prothorax" and "narrower" in the first line of Fall's key (l. c., p. 3) so that it reads "Prothorax usually narrower at base than near middle."

Agabus cordatus LeC.

Anisomera cordata LeC., Proc. Acad. Nat. Sci. VI., 1853, p. 226; Col. Kansas 1859, p. 5, pl. 2, fig. 3.—Crotch, Trans. Amer. Ent. Soc. IV, 1873, p. 424.

Agabus (Anisomera) cordatus LeC.—Sharp, On Aquat. Carn. Col. 1880-82, p. 494, pl. xiii, fig. 165.

Agabus (Gaurodytes) cordatus LeC.—Seidlitz, Verh. Nat. Ver. Brünn XXV, 1887, p. 84.—Zimmermann, Col. Cat. 71, 1920, p. 163.

Agabus (Hydronebrius) cordatus LeC.—Fall, Rev. N. A. Species Agabus 1922, pp. 1, 3, 9.—Zimmermann, Kol. Rundsch. XX, 1934, p. 152.

The pronotum of this species is strongly cordate, the width at the base being five-sixths or less that at the middle. The hind angles vary from slightly acute to somewhat obtuse, usually being nearly rectangular, with the sides in front of the hind angles usually subparallel for an appreciable distance before curving out. In one of a pair of specimens from Colorado Springs, Colo., however, the sides curve out almost immediately from the hind angles. The color is usually piceous, as Fall describes, but I have seen a nearly black specimen from Mt. Lemon, Ariz.

Distribution. MONTANA: Missoula (*Fall*); COLORADO: Colorado Springs and Leadville (*Fall*), Morley (*Cal. Acad.*); NEW MEXICO: Santa Fe (*type*), Pecos (*Fall*); ARIZONA: Mt. Lemon (*Cal. Acad.*); UTAH: Ft. Douglas (*Fall*), Salt Lake; WASHINGTON: Longmires = ?Longmire (*Cal. Acad.*).

Fall and Zimmermann have suggested that *cordatus* and *rectus* belong in the subgenus *Hydronebrius* Jakovl., but this subgenus is distinguished in important measure not only by the subcordate pronotum but by the absence of setae from the inner apical angle of the lower surface of the metafemora and the irregularly punctuate lower surface of the metatibiae. As regards the metafemora, both of the species possess the setae said to be absent in *Hydronebrius*. The condition of the metatibiae is more ambiguous, but is nearly similar to a species like *seriatus* Say, which no one would suggest placing in *Hydronebrius*. Furthermore Zimmermann (l. c., pp. 156-158) notes numerous Palaearctic species of the subgenus *Gaurodytes* in which the sides of the pronotum are convergent behind, so that the precise placing of the interesting Nearctic species here considered must await future study.

I am indebted to Mr. M. C. Lane and Mr. Hugh B. Leech for specimens and suggestions used in prosecuting this study.

Mortality of Aquatic Diptera Due to Freezing.[1]

By J. W. Leonard.

Factors influencing the abundance of insects spending all or parts of their life cycles in fresh water are coming to receive a larger amount of attention than formerly, largely because of a better appreciation of the economic importance of such organisms in the food cycle of game fishes. Although the general population level of such insects is in the main regulated by the interaction of recognized and more or less predictable ecological factors, the rare occurrence of a sudden, catastrophic change in some part of the environment may drastically reduce the numbers of a particular species, even though normal conditions may return as rapidly as they were banished.

An example of a catastrophe of this sort was witnessed recently in a small (seven-acre) pond in Livingston County, Michigan. The last two weeks of March, 1938, were characterized by unusually high temperatures, which on one occasion rose above 80°F. The warm weather was broken abruptly on the night of April 4 when the temperature dropped to 24°F. Early the following morning, when a visit was made to the pond, it was found that all save a small protected portion of the pond's surface was covered with ice which, near shore, reached a thickness of one-half inch.

The period of ice formation had obviously coincided with the time of emergence of a great number of midges, *Chironomus plumosus* (Linn.)[2], for around three sides of the pond the ice was thickly dotted with pupae and adults of this species either wholly or partially embedded therein. Mortality appeared to be universal among the pupae and adults that were entirely embedded. One pupa, held to the ice by the extreme tip of the abdomen only, was alive when found, although its ability to have emerged successfully upon release is open to question. A small number of adults which had apparently completed their emergence before the ice formed lay in a numbed condition on

[1] Contribution from Institute for Fisheries Research, Michigan Department of Conservation and University of Michigan.

[2] Determined by Prof. M. W. Boesel.

the surface of the ice until they were warmed into activity by the sun, when they were eaten by a tree swallow, (*Iridoprocne bicolor*), which swooped repeatedly to within a few inches of the ice. By late afternoon, when all the ice had melted, large windrows and rafts of lifeless pupae and adults collected in eddies and shallow embayments around the shore.

Owing to the tendency of an entire age-group of midges to emerge at about the same time, there exists a strong likelihood that the local population of this economically important midge sustained a severe reduction. A few observations made at about the same time for the next two or three years should settle the question definitely. In any event, it is felt that the present case offers an illuminating demonstration of how disaster to an important component of a fauna may strike, do its damage, and disappear, leaving only the briefest record of its nature. It may be that such an occurrence is not uncommon, but goes undetected because no observer is present at the time.

The Usage of the Names Epizeuxis Hübner and Zanclognatha Lederer (Lepidoptera, Phalaenidae, Herminiinae).

By J. G. Franclemont, Ithaca, New York.

At the suggestion of Dr. J. H. McDunnough, of Ottawa, Canada, I am writing this in an attempt to straighten out the usage of the generic names *Epizeuxis* Hübner, *Camptylochila* Stephens and *Zanclognatha* Lederer.

The genus *Epizeuxis* was proposed by Hübner in 1818 (Zutr. z. Samml. exot. Schmett., i, 9) containing two species *Epizeuxis lituralis* Hbn. (figs. 19 and 20) and *Pyralis calvarialis* D. and S.; Grote designated the latter species as type in 1874 (Bull. Buff. Soc. Nat. Sc., ii, 47). Stephens described *Camptylochila* in 1834 (Ill. Brit. Ent., Haust., iv, 21) for two new species *undulalis* and *bistrigalis* which equal respectively *Epizeuxis aemula* Hbn. and *E. lubricalis* Gey.; Barnes and McDunnough 1917 (Contrib. Nat. Hist. Lep. N. Am., iv, 125) designate *Camptylochila undulalis* Steph. (*E. aemula* Hbn.) as type, and the genus thus falls to *Epizeuxis* Hbn. *Helia* Guenée 1854

(Spec. Gen. Lep. viii (Deltoides), 75) nec *Helia* Hübner 1818 (Zutr. z. Samml. exot. Schmett., i, 27) with type *Pyralis calvarialis* D. & S. designated by Guenée (op. cit.) is a synonym also; likewise *Pseudaglossa* Grote 1874 (Bull. Buff. Soc. Nat. Sc., ii, 47) with type *Epizeuxis lubricalis* Gey. designated by Grote (op. cit.).

Lederer proposed the genus *Zanclognatha* in 1857 (Noct. Europas, 211) including six species; Grote 1874 (Bull. Buff. Soc. Nat. Sc., ii, 49) designated the first species *Paracolax tarsiplumalis Hbn.* as type. The following three genera described by Grote are considered synonymous; *Cleptomita* 1873 (Trans. Am. Ent. Soc., iv, 301) with the sole included species *C. atrilineella* Grote automatically becoming the type; *Megachyta* 1873 (Trans. Am. Ent. Soc., iv, 306) with the one included species *Epizeuxis lituralis* Hbn. becoming automatically the type; *Pityolita* 1873 (Bull. Buff. Soc. Nat. Sc., i, 39) including only the species *Herminia pedipilalis* Guenée which thus automatically became the type.

From the foregoing discussion it will no doubt be obvious that we must revert to the Smith (Revision of the Deltoid Moths, 1895) usage of the two names, and reject the usage advocated by Barnes and McDunnough (Contrib. Nat. Hist., Lep. N. Am., iv, 125, 1917) and again by McDunnough (Check List Lep. Can. & U. S. A., pt. i, Marcolep., 1938). The two genera and their synonyms may be cited as follows:

Epizeuxis Hbn.
- *Camptylochila* Steph.
- ‡*Helia* Gn.
- *Pseudaglossa* Grt.

Zanclognatha Ledr.
- *Cleptomita* Grt.
- *Megachyta* Grt.
- *Pityolita* Grt.

substituting *Epizeuxis* Hbn. for *Camptylochila* Steph. and *Zanclognatha* Ledr. for *Epizeuxis* Hbn. as used by McDunnough in his latest Check List (page 129).

I wish to express my thanks to Mr. J. F. G. Clarke of the United States National Museum for consulting the original text of the Zutr. z. Samml. exot. Schmett., which is not in the Cornell University Library.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within ( )**follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Mites from northern Manitoba. I have over 1600 specimens of free-living mites which I would like to have identified. Duplicates may be retained. H. E. McClure, Lewis, Iowa.

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ENTOMOLOGICAL NEWS

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Notes on Pennsylvania Flea Beetles in Tobacco Fields. (Coleoptera: Chrysomelidae).[1]

By Harold C. Hallock, Pennsylvania State College.

This discussion deals with eleven species of flea beetles found in Pennsylvania upon tobacco or upon other plants growing either in the tobacco fields or in adjoining fields. The collections were made by shaking all insects from individual plants into a net and transferring the contents to a killing jar. The material was stored in alcohol until it could be studied. During the seasons of 1937 and 1938 over 6300 flea beetles were collected.

The study was confined to three localities in Lancaster County, Pennsylvania. Approximately 60 percent of the collections were made at the Pennsylvania State College Tobacco Experiment Station where the major portion of the insecticidal tests were conducted. The Tobacco Experiment Station is located about one mile northeast of the city of Lancaster. About 25 percent of the collections were made on the farm of J. Martin Esbenshade, Jr., where additional insecticidal tests were conducted. The Esbenshade farm is about one fourth of a mile east of the Tobacco Experiment Station. Nearly 15 percent of the collections were made on Clyde Eshleman's farm where part of the 1937 flea beetle insecticidal tests were conducted. The Eshleman farm is located at Letort which is about 11 miles southwest of the Tobacco Experiment Station.

It will be noted in Table I that *Epitrix parvula* F. (tobacco flea beetle) and *Epitrix cucumeris* H. (potato flea beetle) were the important flea beetles on tobacco, although *Systena taeniata* var. *blanda* M. (pale striped flea beetle) caused some loss in

[1] Authorized for publication on February 4, 1939, as paper No. 890 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

1937 by feeding on newly transplanted tobacco. The table also points out that wheat was the only plant from which no specimens of *Epitrix parvula* were captured, even though collections were made whenever flea beetles were seen on plants growing in the immediate vicinity of these three tobacco fields. The flea beetles were observed on wheat in May and early June.

TABLE I. FLEA BEETLES COLLECTED IN VICINITY OF PENNSYLVANIA TOBACCO

		Number of Individual Beetles Taken on Each Plant										
Host plant	Month	prv.	cuc.	fus.	con.	pul.	pro.	blan.	fro.	bor.	vit.	bip.[1]
Tobacco	May	11	112									
"	June	62	50					8				
"	July	211	12		3	12		1				
"	Aug.	400	13			2				1		
"	Sept.	1561	8		2	1						
"	Oct.	271				1	1					
Potato	May	3	267	3	1							
"	June	15	759	9		1						
"	July	26	286					2				
"	Aug.	44	30									
"	Sept.	91	149	2								
Tomato	May	13	95			1						
"	Sept. & Oct.	54	4		1	6	1					
Ground cherry		101	134			3	1					
Morning glory		47	7		144							
Jimson weed		62										
Indian mallow		201	6		3		5					
Corn		251	29	1	1	49						
Sweet potato		9	6		33							
Beet		19										
Soy bean		69							5			
Wheat					17	3						
Rape		2	2		3	1					15	1
Artichoke		29	2		7		1					
Peach		56	12									
Zinnia		27										
Plantain		29	18					4		9	2	
Pig weed		6	14		22	9		7				
Canada thistle		37	2					2				
Dock		13										
Burdock		24	12		4							
Hibernating under a grass mat in Sept.		8	1			2	6					

[1] par. = *Epitrix parvula* F. (tobacco flea beetle). cuc. = *Epitrix cucumeris* H. (potato flea beetle). fus. = *Epitrix fuscula* C. (eggplant flea beetle). con. = *Chaetocnema confinis* C. (sweet potato flea beetle). pul. = *Chaetocnema pulicaria* M. (corn flea beetle). pro. = *Chaetocnema protensa* L. blan. = *Systena taeniata* var. *blanda* M. (pale striped flea beetle). fro. = *Systena frontalis* F. bor. = *Dibolia borealis* C. vit. = *Phyllotreta vittata* F. bip. = *Phyllotreta bipustulata* F.

In the case of the non-economic host plants the collections were made chiefly in the fall months to determine whether the flea beetles would feed readily upon weeds, etc., when the preferred food plants were not available, so the month is not given in the table. The number of each species, which is given in the table, shows only the total number of specimens collected. The relative abundance on the host plants will be discussed under each plant. Some of the unimportant host plants will not be discussed.

Tobacco. The 1937-38 observations in Pennsylvania showed seven species of flea beetles feeding on tobacco but only three species were sufficiently abundant during these seasons to cause any economic loss to the growers. Under Pennsylvania conditions *Epitrix parvula* F. is the most important flee beetle on tobacco. Adults of *Epitrix parvula* were seen in the field from April 20 to November 10 yet this species did not cause extensive injury on tobacco leaves until after July 10, 1937 and the middle of August in 1938. When the adults of *Epitrix parvula* became abundant on the tobacco, the leaves were soon filled with characteristic small feeding holes.

There was a heavy migration of *Systena taeniata* var. *blanda* M. from lamb's quarters (*Chenopodium album* L.), pig weed (*Amaranthus retroflexus* L.) and Canada thistle (*Cirsium arvense* L.) to newly transplanted tobacco about the middle of June 1937. The relative abundance of *Systena taeniata* var. *blanda* on tobacco is not indicated in the table as the wilted condition of the freshly transplanted tobacco made it very difficult to collect flea beetles in any numbers.

During May and June 1938 *Epitrix cucumeris* was more abundant on tobacco than *Epitrix parvula.* While the tobacco seedlings were still in the seed beds *Epitrix cucumeris* adults made their way into the seed beds and in some cases caused extensive riddling of the young tobacco foliage. When the tobacco was transplanted in 1938 there was a heavy migration of *Epitrix cucumeris* to the newly set tobacco plants. The feeding of *Systena taeniata* var. *blanda* in 1937 and *Epitrix cucumeris* in 1938 on newly transplanted tobacco caused heavy loss to the Pennsylvania growers as the flea beetles riddled the leaves and destroyed the growing tip of the young tobacco plants. As a result of this feeding many young tobacco plants died and the growers were forced to reset a larger number of plants than usual and in some cases secured a rather uneven stand of tobacco.

Published records fail to show that *Systena taeniata* var. *blanda* has previously caused severe injury to the tobacco crop. Although Duckeet (1920) did not mention tobacco in his list of food plants of *Systena taeniata* var. *blanda* he gave a wide variety of food plants. These facts lead to the conclusion that *Systena taeniata* var. *blanda* is likely to attack tobacco only when it is unusually abundant in the vicinity of tobacco fields as occurred in June 1937.

Morgan and Gilmore (1924) and Schoene and Underhill (1937) pointed out that *Epitrix parvula* is the important flea beetle pest of tobacco in the south. Lacroix (1935) stated that *Epitrix cucumeris* is one of the most important tobacco pests in Connecticut.

Potatoes. It has been pointed out in the table that six species of flea beetles were observed on potatoes during the 1937-38 seasons, but only *Epitrix cucumeris* and *Epitrix parvula* were abundant. Adult beetles of *Epitrix cucumeris* were observed upon potatoes nearly as soon as the potato tops appeared above ground in the spring and remained an important pest until fall. It is interesting to note that *Epitrix parvula* was scarce on early potatoes but became more common during July and continued numerous during August and September. It was not unusual in these fields during the period from August 20 to September 15 to find that 50 to 70 percent of the flea beetles on the potatoes were *Epitrix parvula.*

(To be continued)

The Significance of the Two Types of Larvae in Sphecophaga burra (Cresson) and the Factors Conditioning Them (Hymenoptera: Ichneumonidae).

By Rudolf G. Schmieder, Zoological Laboratory, University of Pennsylvania.

In the ichneumonid wasp, *Sphecophaga burra* (Cresson), eggs laid upon the same host presumably by the same mother and under the same conditions of the physical environment may develop into either one of two distinct types of larvae. One of these spins only a delicate, white cocoon within which it develops forthwith into the imago; the other spins a tough, brown cocoon, and, before transforming, undergoes an extended diapause, normally lasting through the fall and winter, before it too pupates and finally emerges.

These facts, recorded in a recent paper (Schmieder 1939), raise the question of the significance of these two types of individuals and also the question of the nature of the determining factors that condition their production.

Significance in Survival

The idea that the individuals that spin the brown cocoons represent the typical form of the species (loc. cit. p. 94) finds further support from the fact that, of the two kinds, they are better adapted to survive the winter and therefore it is they, that could, if present to the exclusion of the other sort, still preserve the existence of the species.

The larvae that spin the white cocoons represent then a special type of individual with a shorter life history. Their significance, at least in regard to the survival of the species, is quite evident. They represent forms that emerge within about a week after spinning and can, no doubt, immediately give rise to another generation. A succession of such short generations occurring through the summer will effect a great increase in the numbers of the parasite.

In many insects, a succession of short summer generations is followed by a long, overwintering generation. In *Sphecophaga*, however, each generation produces larvae that transform immediately as well as larvae that undergo a diapause, so that we have to do with an even more effective device for ensuring survival of the species. If, let us say, a single parasite finds a hornet's nest in which to oviposit, that parasite will, of course, have daughters (in white cocoons) which emerge forthwith and in turn give rise to several generations of the same kind through the summer. However, this same original parasite will also have other daughters (in brown cocoons) which will not emerge until the following summer. These ensure that our parasite will be represented by offspring in the following season even if conditions during the present season should become unfavorable and the "white" daughters die without progeny.

There is still another device assuring the survival of *Sphecophaga*. In *S. vesparum,* some of the larvae occupying brown cocoons remain in diapause only until the following spring, when they transform to emerge as adults; others remain in diapause through a second and even through a third winter before transforming (Semichon 1908). Thus the offspring are distributed in time of emergence through several seasons, increasing the probability that some at least will encounter a favorable season.

Determining Factors.

In regard to the determining factors that condition the production of larvae that spin white cocoons rather than larvae that spin brown cocoons, nothing is as yet known. In the years since my first observations were made I have frequently sought to obtain additional material with which I hoped to breed these parasites in the laboratory and possibly discover the factors involved. Of many nests taken only the two from Media, Pennsylvania, yielded any parasites at all, and those only seven cocoons. Of four parasites that emerged, two were lost. From the remaining two I attempted to secure offspring in the hope of developing some practical method of breeding the species for experimental purposes. I confined the two female *Sphecophaga* in large Comstock vials together with parts of combs containing pupae of yellowjackets, *Vespa* sp., from an underground nest; also with exposed pupae from the same nest and with exposed and with cocoon-enclosed diapause larvae of the mud-dauber, *Sceliphron caementarium* Drury. In no instance was oviposition observed or were any parasitic larvae seen.

In the absence of workable experimental procedures, there remains only the possibility of attempting an analysis of the observational data at hand. The following table records the contents of each parasitized hornet's cell studied.

TABLE I

No. of parasites per host cell	No. of cells	No. of cocoons in each cell	
		brown	white
1	10	1	0
	2	0	1
2	14	2	0
	2	1	1
3	8	3	0
	3	2	1
	1	1	2
	1	0	3
4	1	4	0
	1	3	1
	2	2	2
	1	0	4
5	4	2	3
	1	3	2
	1	0	5
6	1	3	3
7	1	3	4
Totals	54	99	47

From it certain generalizations can be made regarding the occurrence of the white cocoons: 1) They occur least frequently in those cells that harbor less than three cocoons. For example, there were twenty-eight cells that contained only one or two cocoons each. In these twenty-eight cells there was a total of forty-four cocoons of which only four were white cocoons, that is 9%. 2) The white cocoons occur more frequently in cells having more than three cocoons each. Five cells with four parasites each yielded nine out of twenty, or 45% white cocoons. Six cells with five parasites each yielded nineteen out of thirty, or 63% white cocoons.

From these generalizations and from a further study of the cells containing four or more cocoons we may be justified in concluding that: In cells harboring two or three brown cocoons, any additional cocoons present are more apt to be white cocoons than we should expect on a purely chance basis. Or, to put it another way: After several "brown" larvae have fed upon a given host, any additional larvae present are more apt to spin white cocoons.

Several years after first encountering *Sphecophaga* I began to study the biology of the chalcid-fly *Melittobia chalybii* Ashmead, and discovered in that species polymorphic forms which differed from each other not only morphologically but also, as do the two larval types of *Sphecophaga*, in the length of their life-histories (Schmieder 1933). In *Melittobia*, the larva of the type-form individual undergoes, even if kept at 25°C., a diapause lasting more than two months while the larva of the second-form adult, in the absence of a diapause, transforms immediately into the imago. The fact that in both *Melittobia* and in *Sphecophaga* there occur larvae with, as well as larvae without, an obligatory diapause suggests that a comparison of the phenomena encountered in these two insects may possibly yield evidence as to whether the determining factors that are known to be operative in *Melittobia* are also effective in *Sphecophaga*.

In *Melittobia* it has been shown (Schmieder 1933) that the production of one or the other of the two forms is determined by the trophic conditions obtaining during the larval growth period. A single host (e. g., *Trypoxylon* or *Sceliphron*) provides sustenance for from 500 to 800 larvae of this minute parasite. Not more than twenty of these, the first twenty, give rise in two weeks to "second-form," brachypterous females and eyeless males. All the hundreds of larvae that develop after these first twenty give rise, after a long diapause, to adults of the type-form.

In other Hymenoptera also, and indeed, among insects generally, trophic factors more frequently than any others are found to be the mechanism that conditions polymorphism. Upon *a priori* grounds it is then most probable that in *Sphecophaga* likewise trophic differences will be found decisive.

It may be that the mechanism for determination resembles that found in *Melittobia* and depends upon some quality in the food ingested by the larvae. The first few *Sphecophaga* larvae that feed upon a given host may take up largely the blood of that host while those that are somewhat retarded will have to ingest more of the fat-body and the urates stored therein. This view, which seems quite plausible, finds support in observations made by Reichert (1911) on *S. vesparum.* Reichert alone of those who have written on this species reports finding thin white cocoons along with the typical brown ones. From one nest he records seventy-eight brown cocoons and five white ones. The white ones, the "Kümmerformen," he believes result from undernourishment of the larvae and give rise to dwarf imagines. The dwarfs he obtained were only 2.25 mm. long compared with the largest giants, 8.5 mm. in length, from the brown cocoons. He also found cocoons intermediate in appearance between the normal and the starved kinds.

The dimorphism in *S. vesparum* in which absolute under-nourishment produces white cocoons and in which intermediates between brown and white cocoons exist, would seem to represent an earlier evolutionary stage that finds its full development in the more definite dimorphism of cocoons, without evident undernourishment and without intermediate forms, in *S. burra.* In other words, the dimorphism in *vesparum* is imperfectly developed and differentiation is in proportion to the food supply; in *burra,* differentiation depends, probably, on which one of two inherently possible lines of development is stimulated by a difference in some quality of the food encountered by the larva at some critical period.

In regard to *S. vesparum,* it should be mentioned that, at least in England (Morley 1911), it exhibits a true dimorphism. In addition to the usual winged forms there occur brachypterous individuals. The latter, Morley suggests, represent a summer generation that emerges and oviposits in the same, still fully tenanted wasps' nest. Morley's descriptions of the cocoons also differ from those of continental authors, as does the absolute size of his specimens.

The sub-optimum trophic conditions that, as has been suggested, act at some critical period upon the larva to direct development along that alternative path leading to a white rather than to a brown cocoon may, of course, be due to other factors than the effect of the depletion of food by sister parasites. They may be due to differences in the parts of the body of the host upon which the individual parasites feed resulting, for example, in some individuals ingesting more urates than others. Or, if we consider that, in at least a few cells, white cocoons only were found, they may be due, occasionally, to the stage of development of the host, or to some other condition that affects all parasites in a given host cell equally.

Finally, it should be kept in mind that differentiation into one of the two possible types of individuals may take place as early as the ovarian egg. That differentiation may occur so early in ontogeny is shown in *Melittobia,* in which of the many eggs obtainable from unmated females ordinarily only 3% are capable of development (Schmieder 1938). In *Sphecophaga,* the observation that white cocoons appear more commonly in host cells containing a larger number of parasites would suggest that rapid egg-production yields a larger number of "white" individuals, while a slower egg-production, or longer retention of eggs in the ovary, has the opposite effect.

As long as we know nothing at all of the oviposition habits of *Sphecophaga,* and so very little of the life of the early larva, it is not possible to come to any definite conclusion as to the conditioning factors responsible for the dimorphism of the cocoons. More observations are needed and experimentation will also be necessary. It is desirable that anyone wishing to contribute to our knowledge of *Sphecophaga* have the entire problem clearly in mind so that when a populous and well parasitized hornets' nest becomes available the necessary observations can be made immediately and appropriate experiments undertaken without delay while the early stages of the parasite, including the eggs, are still available. Meanwhile, on the basis of the observations presented in this paper and the comparisons made between the conditions encountered in this insect with those obtaining in such polymorphic species as *Melittobia,* I feel justified in proposing the tentative hypothesis that: Trophic factors acting upon the larvae condition the determination of *S. burra* individuals into brown cocoon - and white cocoon-spinning forms, of which only the former undergo a diapause.

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Terias palmyra Poey (Lepid.: Pieridae).

Terias palmyra Poey, has not as yet been included in any list of North American butterflies. In Seitz, Vol. V. page 84, is this statement. "*Palmyra* Poey, (= lydia, Fldr.) from Cuba and the Gulf States," etc., etc.

In August 1908 I received from the late W. S. Dickinson, of Miami, Florida, who sent me his season's catch for several years, a male specimen of *Terias* which Mr. Watson, of the American Museum of Natural History, identified as *T. palmyra* Poey. He dissuaded me from announcing it on the grounds that I had not taken it myself.

I have recently received from Mrs. L. E. Forsyth, of Florida City, Florida, a female specimen of *palmyra,* taken by her on Key Large. Both specimens are in my collection.

W. C. WOOD, Mahopac, New York.

Conostethus americanus new species from Colorado, Montana and South Dakota (Hemiptera, Miridae).

By Harry H. Knight, Iowa State College, Ames, Iowa.

The genus *Conostethus* has not before been reported from North America, although four species are known in Europe. The genus is peculiar in having the third antennal segment permanently curved downward, also in the anteriorly curved front tibiae. The relative lengths of the antennal segments appear to give distinctive characters for separating the species. In the present study the writer has given careful consideration to descriptions of the European species, also having a specimen of *C. salinus* Sahlb. for comparison.

Conostethus americanus new species.

Allied to *salinus* Sahlb., but distinguished by structure of the antennae; segments II and III subequal in length, the male with long hairs on the ventral surface of segment III.

♂. Length 4 mm., width 1.1 mm. Head: width .82 mm., vertex .43 mm.; vertex twice the dorsal width of an eye. Rostrum, length 1.12 mm., just attaining base of hind coxae, pale, the apex black. Antennae: segment I, length .39 mm., thickness .13 mm., black, finely pale pubescent; II, .99 mm., thickness .08 mm., slightly thicker apically, black, pale pubescent; III, .99 mm., thickness .06 mm., distinctly decurved, ventral surface with long pale pubescence, length of hairs exceeding diameter of segment, black; IV, .48 mm., black. Pronotum: length, .47 mm., width at base .99 mm.; basal margin slightly sinuate, lateral margins strongly sulcate sinuate, basal angles produced and slightly reflexed; disk moderately convex, glabrous, black, margins and median line pale, calli distinctly convex. Scutellum fuscous to black, median line pale; mesonotum exposed, fuscous, a pale area on each side.

Hemelytra reaching beyond apex of abdomen, pale translucent, corium and clavus shaded with fuscous, membrane uniformly pale fuscous. Thorax chiefly fuscous, venter fuscous to black, lateral margins greenish yellow. Legs pale to dusky, base of coxae blackish, hind femora with fuscous above, front and middle femora with a few fuscous dots on posterior aspect; tibiae pale, spines black, front pair strongly curved, the convexity on the dorsal side; tarsi fuscous, pale on basal half.

♀. Length 3.9 mm., width 1.2 mm. Head: width .82 mm., vertex .45 mm.; vertex more than twice the dorsal width of an eye. Antennae: segment I, .30 mm., fuscous to black; II, .86 mm., cylindrical, black; III, .86 mm., more slender than II, slightly curved, black; IV, .47 mm., black. Pronotum: length .47 mm., width at base .95 mm., margins sinuate as in the male. Slightly more robust than the male and paler in color. Head pale, frons with transverse dark lines, base of head, sinuate line on vertex between eyes and spot on base of tylus and apex of frons, blackish. Hemelytra fully developed, paler than in the male, the fuscous shading nearly obsolete. Ventral surface pale to greenish; legs pale, a few dusky points evident on posterior aspect of femora, tips of tarsi black. Front tibiae only very slightly curved.

Holotype: ♂ May 20, 1899; Fort Collins, COLORADO (E. D. Ball); author's collection. *Allotype:* June 2, 1899, Fort Collins, COLORADO (E. D. Ball). *Paratypes:* ♀ May 24, ♂ ♀ May 20, 1899, Fort Collins, COLORADO (E. D. Ball). 2♂ "Colo. 4421." MONTANA—2♂ 9♀ June 20, 1938, Huntley (Wm. Forsyth). SOUTH DAKOTA—♂ 3♀ June 1, 1921, Capa; 2♂, 2♀ May 12, 1922, Capa (H. C. Severin).

Why Study the Senses of Insects?

By CYRIL E. ABBOTT, Harding College, Searcy, Arkansas.

If, tomorrow, someone should discover an eyeless butterfly that frequents flowers, it would be possible to describe, without even seeing a specimen, certain pecularities of the species. It would be found to possess large and peculiarly modified antennae and palpi. One, perhaps both of the sexes, would have well developed scent glands. It might have tympana. It would be modest in coloring. It would fly on dull days as well as sunny ones; it might even fly at night. Mating would take place as a result of olfactory stimuli, and there would be no elaborate courtship. For the bionomics and behavior of a given species of insect depends upon its sensory equipment, so that the insect lacking in one sense has at least one of the others highly developed. At least this is true of terrestial and aerial insects.

For example, insects which have high visual acuity generally have poorly developed chemical senses and *vice versa*. Although, generally speaking, the Diptera and many Hymenoptera are exceptions to this statement, there are exceptions even to these exceptions. Thus the Asilidae give little evidence of olfactory powers, while the poor eyesight of ants is well known. Insects with auditory powers often have weaker vision than those that do not. The Noctuidae, which have tympana, have lower visual acuity than the deaf Sphingidae. Thus one is entirely justifiel in making the statement that, given a complete analysis of the senses of a given insect, he can, within reasonable limits, predict the behavior of that species.

The extent to which behavior may be analyzed is excellently illustrated by predatory insects with binocular vision. Because it is necessary for the compound eyes to be simultaneously in use to fix the position, and especially the distance of its prey, the predator must be able to move its eyes, its head, or its entire body very quickly. Since the eyes of insects are fixed, predatory insects either have highly mobile heads (mantids, dragonflies, and certain Hymenoptera) or are able to move the whole body very quickly.

Incidentally, the necessity of binocular vision for the capture of prey is easily demonstrated by covering one eye of a mantis with opaque varnish. Although the animal so treated will "strike" at flies and other moving objects, its "aim" is so poor that any success it enjoys is the result of accident, so that unless relieved, it will starve to death in the midst of plenty.

The behavior of predators without mobile heads is illustrated by the behavior of the Cincindelidae. These beetles make their captures by means of a "head on" rush. When pursued, the tiger beetle generally alights facing its pursuer, for it is in this way only that it can determine the distance of its enemy.

A study of insect senses enables one to interpret behavior complexes. Why is it practically impossible to induce butterflies to mate in captivity? Because butterflies, depending as they do upon vision for the majority of their sensuous stimuli, mate during, or soon after, flight. Moreover their mating is preceded by a complex courtship which seems to depend, again, chiefly upon visual stimuli. This probably accounts in part for the brilliantly distinctive markings of butterflies. Mating involves not only recognition of the opposite sex, but also of the appropriate species. That this recognition is imperfect is revealed by the frequency with which males of one species attempt to mate with females of a similar species. Moths, on the other hand, perhaps because they are mostly nocturnal, depend upon their chemical sense for the selection of mates. All this indicates that one need invoke neither "instinct" nor a "physico-chemical mechanism" to describe and interpret behavior; a knowledge of the senses involved, combined with a little common sense, are all that are required.

A knowledge of insect senses enables one to indicate the origins of such behavior. For countless generations dragonflies have started life as aquatic animals. Even the adults are sensitive to water vapor, while their great eyes are doubtless responsive to the light reflected from extensive water surfaces. Is it any wonder, then, that the female dragonfly, in spite of her aerial habit, deposits her eggs in the water? The adult cabbage butterfly (*Pieris rapae*) does not feed upon cabbages, but that does not prevent the female from being sensitive, both visually and chemically, to cabbages, to the extent of depositing her eggs thereon.

Even developmental processes may be interpreted on the basis of changes in the sensory equipment of the insect. The larvae of *Gyrinus* have filamentous antennae, while in the adult the antennae are highly modified, "shoe-shaped" structures. The submerged larva depends upon vision plus, possibly, a chemical sense, for the capture of its prey. The adult beetle seldom leaves the surface of the water excepting to escape enemies. It depends upon vibrations of that surface both for the capture of prey and the avoidance of enemies; vibrations transmitted through specialized chordotonal organs located in the antennae. The antennae of the adult also warn it of its approach to any large object projecting from the water, so that it may avoid collision with the same.

Obviously senses are correlatel with the morphology, physiology, and ecology of the insect. The eyes of dragonfly larvae which inhabit the muddy river bottom are rather different from the eyes of those clinging to water plants. Some surface-inhabiting Hemiptera have the ommatidia on the dorsal surfaces of the eyes smaller and more numerous than those on the ventral surface. Doubtless the visual acuity of the dorsal area is greater than that of the ventral portion.

A study of insect senses enables one to help control noxious species. The destruction of the Japanese beetle through traps baited with geraniol and the killing of houseflies through the attractive yet toxic action of formaldehyde are familiar proofs of the efficacy of such knowledge. On the other hand, I have seen blowflies alight upon meat dipped in a formalin solution strong enough to prove irritating to the onlooker.

The possible effects of irritants upon insects has not received sufficient attention. It has been my observation that mosquitoes are repelled chiefly by irritants. It is a recognized fact that heat radiation alone is sufficient to initiate the feeding responses of mosquitoes. In view of this, a great number of substances which are noisome merely, and which have been generally reccommended as repellent, are totally inadequate as protection against mosquito attacks. (The best repellent to date appears to be pine tar mixed with an equal quantity of tallow. Though slightly irritating to the human skin, it is not dangerous or unduly uncomfortable to use. Besmeared with this substance I have slept unannoyed and safe although surrounded by mosquitoes!)

In contrast to the mosquitoes, the stable fly, (*Stomoxys calcitrans*) does not respond to heat radiation, but to the odor of perspiration, so that a merely malodorous repellent may prove effective against this species.

In answer, then, to the query as to value of the study of insect senses, one might reply: "He who is thoroughly acquainted with the morphology anl physiology of the sense organs of a given species of insect, is thoroughly acquainted with that species of insect."

Observations on Parasitism and Superparasitism (Lepid.: Sphingidae; Hymen.: Braconidae, Chalcididae).

By C. Brooke Worth, Swarthmore College, Swarthmore, Pennsylvania.

In September, 1938, I found a catalpa tree (*Catalpa bignonioides* Walt) at Swarthmore, Pennsylvania, infested with caterpillars of the catalpa sphinx, *Ceratomia catalpae* Boisduval. More than half of the caterpillars were doomed, bearing variable numbers of cocoons of the braconid wasp, *Apanteles congregatus* Say.

At random, I collected twenty-three caterpillars fourteen of which already bore braconid cocoons. Subsequently five more "broke out" with braconid larvae, so that only four of the original twenty-three were unparasitized. This survival rate for the sphinx caterpillars, 17%, might have been still lower, had the four unparasitized ones not been protected from wasps during their last caterpillar days in my vivarium.

The nineteen parasitized caterpillars brought forth a total of 1346 braconid cocoons. These were distributed among the host caterpillars as follows:

Host No.	No. Cocoons	Host No.	No. Cocoons
1	2	11	57
2	10	12	59
3	11	13	59
4	19	14	60
5	23	15	64
6	38	16	65
7	42	17	83
8	45	18	113
9	51	19	295
10	52	Dropped off	198
		Total	1346

These cocoons yielded approximately equal numbers of braconid wasps (kindly identified for me by Mr. Hopper at the Academy of Natural Sciences) and superparasites belonging to the family Chalcididae.

The average degree of infestation is 71 cocoons per caterpillar, but the mean, in the actual cases, falls closer to 60. I suspect on the basis of these figures that the average *A. congregatus* female lays about sixty eggs within the sphinx caterpillar. If this be so, caterpillar No. 18 was parasitized by two wasps, while No. 19 was the victim of no less than five.

The cocoons were usually disposed laterally on the caterpillar, the larvae boring their way out along the line of the spiracles. In cases of very heavy infestation, the dorsal surface of the host also bore an abundance of cocoons. The ventral surface was always free of them.

The emergence of the larvae was always attended by great loss of "blood" in the hosts. They seemed never to recover from the shock, becoming very sluggish, and appearing weak and deflated. About half died before their burden of cocoons hatched; the other half were still alive, technically speaking, at this time but were unable to move. All the caterpillars died *in situ,* that is, clinging to a midrib or large vein on the ventral surface of a leaf; this circumstance is probably essential to the successful hatching of the cocoons.

The cocoons hatched about a week after the wasp larvae had emerged from the caterpillars. The hatching wasps cut the tops off the cocoons very neatly, producing perfect hemispherical lids which remained attached at one point by a few silken strands. Once able to lift the lid, a wasp would fairly burst out of its cocoon, running actively about the vivarium at once and very shortly taking flight.

Among the *Apanteles* wasps there were equal numbers of males and females. One could therefore expect 336 females to be on the look-out for young catalpa caterpillars in the summer of 1939. The chalcids, however, were all females, presumably experiencing a parthenogenetic generation in September. There would therefore be twice as many females of this species (that is, 673) on the look-out for *parasitized* young catalpa caterpillars in the summer of 1939. We may suppose, casually, that it is twice as hard for this species of chalcid to fulfill its life cycle as it is for the braconid species, for the chalcid's search for a properly prepared place to lay its eggs is more highly specialized.

The four unparasitized catalpa caterpillars in my vivarium died. Had they lived, and had half of them been females (which is the most reasonable assumption), each of the two potential mothers would have to lay 202 eggs in 1939 (for 336 would fall prey to braconids, and only 17%, or 69, would survive).

But if these two females left 69 surviving descendants in 1939, the population of caterpillars would be increasing at the rate of 1625% per year. The same reasoning would account for a similarly great increase of braconids and chalcids. It is safe to predict that no such thing will occur.

We have assumed that all the wasps will be on hand next summer and that for this reason the moths will have to lay a large number of eggs. If we were to eliminate some of the wasps, the moths would not have to be so reproductive. During the winter the wasps conceal themselves in crevices of the bark of trees and in other such hiding places. A brown creeper, the stomach of which I examined in midwinter, contained an abundance of fresh insect remains; it is likely that hibernating wasps will be consumed by creepers, nuthatches, titmice, and other small insectivorous birds. In Fall and Spring many are probably caught in flight by swallows, flycatchers, and swifts, while some undoubtedly end their lives miserably in spiders' webs. A few others may fail to find a suitable colony of caterpillars to parasitize, or they may not find mates at the proper time.

The question arises: how extensive is this decimation of braconids and chalcids? Returning to the catalpa moths for the answer, let us stabilize their population by allowing them neither to increase nor decrease during the coming season—this time next year there must be only four surviving caterpillars from any four pupae which are safely underground now. If the braconids parasitize the same percentage of larvae next summer as in 1938, the four surviving larvae in 1939 will have to witness the parasitization of 19 of their siblings. This means that each female pupa in the ground at present will have to lay 12.5 eggs next Spring in order to ensure the production of one female descendant which will survive the onslaughts of braconids.

Allowing this figure to stand for a moment, we see that this is only 5.7% of the number of eggs the moths would have had to lay to satisfy the braconids, had *they* all survived. This means that 94.3% of the 1938 braconids will have to be destroyed before the summer of 1939 if the populations of both moths and wasps are to remain constant.

The moths, however, will lay more than 12.5 eggs apiece. It must be presumed, therefore, that the race of *C. catalpae* experiences lethal environmental factors other than parasitism by braconids. An excess of individuals must be provided for destruction by other agencies, which might include parasites of the eggs, eaters of eggs and caterpillars (such as birds), bacterial and other diseases of the caterpillars, shortage of food supply (as when a tree becomes defoliated), accidents to the pupae, and destruction of imagines before mating or completion of egg laying has occurred.

It would be interesting to count the exact number of eggs laid by *C. catalpae,* to find what proportion of their reproductivity is essential to sustaining the braconid population. This figure is represented by the fraction:

$$\frac{12.5}{\text{Number of eggs}}$$

CONCLUSIONS.

1. In a single case, caterpillars of *Ceratomia catalpae* were parasitized by *Apanteles congregatus* to the extent of 83%.

2. In a single case, larvae of *Apanteles congregatus* were parasitized by a species of Chalcididae to the extent of 50%.

3. *Apanteles congregatus* usually lays about 60 eggs.

4. The mortality of *Apanteles congregatus,* before completing the reproductive cycle, is estimated at 94.3%.

5. The species of Chalcididae mentioned is estimated to a)

experience a mortality twice as great as that of the braconid, or b) lay only half as many eggs, or c) lay half its eggs in caterpillars which have not been parasitized by braconids, or d) be partially eliminated in some other way.

6. The braconid scourge is only a small part of the mortality experienced by *C. catalpae* in the various stages of its metamorphosis.

A Note on the Fabrician Species lycaste (Lepidoptera: Ithomiinae).

By Richard M. Fox, Academy of Natural Sciences of Philadelphia.

Recently I was confronted with the perplexing problem of the identity of the species *lycaste* Fabricius[1]. Since this name has been a source of uncertainty and controversy, it might be well to review here its history and synonymy, and to record my conclusion regarding the form which Fabricius intended to describe.

The original description is ambiguous and, as Dr. Holland pointed out[2], "might apply to a number of species." The following is my translation of the Latin text:

> "P(apilio) H(elliconius lycaste). The elongated wings completely tawny to the black apex: forewing with a golden yellow maculation. Figured by Jones, II, pl. 7, fig. 1 as Papilio lycaste. Habitat (unknown). In Drury's private collection (*Mus. Dom.*). Small. Head black, spotted with white. Thorax tawny. Abdomen ashen. Forewings tawny at the base with a black median spot, followed by bright yellow, the black apex with several yellow spots. Hindwings tawny with a black apex."

According to Butler[3] South American specimens from Mr. Milne's collection were associated in the British Museum with the name *lycaste*. Reference again is made to the Jones drawing, "This species is figured in the unpublished 'Icones' of Mr.

[1] Fabricius, Ent. Syst., III, p. 161 (1793).
[2] Holland, Butterfly Book, revised edition, p. 72 (1931).
[3] Butler, Cat. Fab. Diur. Lep. B. M., p. 126 (1869).

Jones, now in the possession of F. Dawtry Drewitt, Esq., Christ's College, Oxford." In the preface to the same work, J. E. Gray said[4], "The Museum, also contains, by purchase at Milne's, Strothard's and other sales, several specimens which originally formed parts of Mr. Drury's collection and are types from which Fabricius described other species . . . Fabricius described some hundred species from a series of drawings made chiefly from his own collection by the late Mr. Jones of Chelsea . . . Fabricius always quoted these drawings as Jones's 'Icones.' They were formerly lent to the Museum and Mr. Doubleday named part of the Museum collection from them . . . notes and sketches were made from them for the use of this 'Catalogue,' thus enabling the Museum specimens to be named from a comparison of the original drawings."

To that time there seemed to be little doubt in the minds of students as to the identity of *lycaste*. But as collections grew, the Ithomiinae came to be recognized as a confusing complex of similarly marked species, and the brief Latin descriptions by the early workers no longer were sufficiently precise. Reakirt attempted to further illuminate *lycaste* and to throw into relationship with it various forms then recently described by continental authors[5]. His description of "typical *lycaste*," however, is that of a male *panamensis* Bates[6]. Subsequent authors, including Kirby, Scudder, Haensch and others, followed Reakirt in his error.

Dr. Holland published on plate VIII of the "Butterfly Book" a figure concerning which he says in the revised edition[2]: "In the first edition of this book this insect was named "*Ceratinia lycaste* Fabricius." At the time I hastily accepted Reakirt's determination as correct, but long since discovered my mistake. The insect which Reakirt called *lycaste* Fab. and attributed to California, is undoubtedly *Ithomia anaphissa* H.-S.[7], a Central American insect." It is curious to note that Reakirt's determination did not agree with his own description.

[4] Butler, op. cit., pp. iii-iv.
[5] Reakirt, Proc. Ent. Soc. Phila., V, pp. 218-222 (1865).
[6] Bates, Proc. Zool. Soc. Lond., p. 244, pl. 29, f. 5 (female) (1869).
[7] Herrich-Schaeffer, Coord. Regensburg, XVIII, p. 177 (1864).

The revised edition of the "Butterfly Book" includes a reproduction of the Jones 'Icones' figure[8]. While the Fabrician description applies to it perfectly, both the picture and the description resemble the eight forms named below:

Phyciodes quintilla (Hewitson)[9].
Heliconius clara Fab.[1].
Heliconius metaphorus Weym.[10].
Ithomia panamensis Bates[6].
Mechanitis macrinus Hew.[11].
Ceratinia azara (Hew.)[12].
Hypothyris philetaera (Hew.)[13].
Hypothyris megalopolis (Fld.)[14].

Most of these can be eliminated promptly. The position of the cubital on the primaries in the Jones figure, as well as the lack of marginal dots on the secondaries precludes *P. quintilla*. *H. clara* has too many black median spots, while the marginal dots of the primaries are placed differently from the Jones figure. Also the cells of the secondaries of *Heliconii* are far shorter than the cell of the 'Icones' drawing. *H. metaphorus,* further, has a narrower black marginal area on the hindwing. *I. panamensis* differs in that there are always yellow streaks in the black apical region of the primaries, the marginal dots are white, those at the apex being far smaller than the analagous marks of the Jones figure. In *M. macrinus* the female resembles the Jones illustration, but the marginal black of the secondaries is narrower and the marginal dots at the apex of the primaries are fused into a streak. *C. azara* has three median black marks on the primaries, and a single large yellow apical spot, while the colors are greyer and more transparent than the opaque Jones figure. *H. philetaera* closely resembles the Jones figure, the secondaries and the marginal dots being nearly identical; but the distal edge of the yellow area is more irregular than the Jones figure, and is placed nearer the apex.

[8] Holland, op. cit., pl. LXXII, f. 2.
[9] Hewitson, Exot. Butt., V, p. 30; pl. XV, f. 23 (1872).
[10] Weymer, Ent. Zeit. Stett., XLV, p. 24; pl. 2, f. 1 (1864).
[11] Hewitson, op. cit., II, p. 29; pl. 15, f. 11 (1860).
[12] Hewitson, op. cit., 1, p. 26; pl. 13, f. 23 (1853).
[13] Hewitson, op. cit., V, p. 24; pl. 12, f. 230 (1875).
[14] C. & R. Felder, Reise Nov., Lep., III, p. 360; II, pl. 44, f. 9 (1865).

Also *philetaera* has three median spots which are sharply angular rather than roundish.

It will be noted that the above elimination is based on the assumption that the 'Icones' figure of *lycaste* is an accurate representation of the specimen which Fabricius called *lycaste*,—accurate with respect to pattern and wing shape.

There are before me six examples of *Hypothyris megalopolis* which are remarkably similar to the Jones drawing of *lycaste*, except for the body length, which Holland suspected was misdrawn[2]. This is the one point at which I am willing to concede inaccuracy on Jones' part, for the shape of the wings, the length of the antennae and such venation as is indicated in the figure certainly belong to an Ithomiine. In all of these respects, as well as in maculation and coloring. the figure agrees with *megalopolis*. One specimen, a male sent to me by R. Q. Bliss and collected July 11, 1937 at Ft. Kobbe, Panama Canal Zone (this example is now in the A. N. S. P. collection), is nearly identical with the Jones' figure. Of the six specimens, the one just mentioned has no trace of yellow, except the marginal dots, in the black apical area; the other five are marked only very slightly with tiny points of yellow, never approaching the large streaks of *panamensis*.

Because of this close agreement with the 'Icones' illustration, in addition to the fact that the Fabrician description fits, I am convinced that Fabricius had before him when he described *lycaste* an example of the form later described by C. and R. Felder as *megalopolis*. Consequently the Felder name falls as a synonym before *lycaste* Fabricius. Of the names applied to the group of forms which Reakirt wrongly associated with *lycaste*, *iphianassa* Doubleday and Hewiston[15] is the oldest and becomes the specific name.

[15] Doubleday, Hewitson & Westwood, Gen. Diurn. Lep., p. 127; pl. 18, f. 3 (1847).

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )**follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Anon.—Entomological origin of the fleur-de-lis. [Ward's Ent. Bull.] 6, No. 5: 1. Department of Entomology. [Ann. Rep. Colo. Mus. Nat. Hist.] 1938: 39-40. Conseils pour la preservation des collections. [Lambillionea] 1939: 36-38. **Beckdorf, M.**—In den Pilzgarten der Atta. [Das Flussmeer] 1939: 62-74, ill. (S). **Britton, W. E.**—Additions to the check-list of the Insects of Connecticut. [Conn. Geol. & Nat. Hist. Surv.] Bull. No. 60: 169pp. **Carpenter, F. M.**—The lower Permian insects of Kansas. Part 8. [Pro. Amer. Acad. Arts & Sci.] 73: 29-70, ill. **Cockerell, T. D. A.**—Natural history of Santa Catalina Island. [Sci. Monthly] 1939: 308-318, ill. **Costa Lima, A. da.**—Insectos do Brasil. 1: 470 pp. ill. (K). **Debauche, H.**—Nouvelle méthode d'imprégnation des cellules nerveuses par le nitrate d'argent. [Ann. Soc. Sci. Bruxelles] 59: 23-27, ill. **Geary, N.**—Some habits of an assassin bug (Ptilocnemus femoralis). [Australian Mus. Mag.] 6: 351-353, ill. **Hatch, M. H.**—A bibliographical catalogue of the injurious arachnids and insects of Washington. [Univ. Wash. Publ. Biol.] 1: 163-224. **Hetrick, L. A.**—Preserve life history specimens in this gelatin-formaldehyde preparation. [Ward's Ent. Bull.] 6, No. 5; 4. **Holdhaus, K.**—Verschiedenartige Verbreitungsbilder unter den borealpinen insekten Europas. [Forsch. und. Fortschritte] 15: 81-83. **Holloway, J. K.**—An agar preparation for feeding adult parasite insects.

[12] 32: 154. **Hyslop, J. A.**—Giving meaning to the terms, brood and generation. [12] 31: 557-559. **Kurz, H.**—Opportunities for research in Florida [Proc. Fla. Acad. Sci.] 1: 7-16. **Lal, K. B.**—Parasitism in insects. [Current Sci., Lahore] 8: 55-59. **Martynov, A. B.**—Fossiles Insectes. [Trav. Inst. Paleontolog. Acad. Sci. USSR] 7: 7-80, ill. (Russian with English summary). **Maulik, S.**—A method of storing small specimens in alcohol. [Mus. Jour., London] 38: 570-574, ill. **Mohr, C. E.**—I explore caves. [Natural History] 43: 190-204, ill. **Nuttall, G. H. F.**—Obituary. By V. L. Yakimov. [Priroda] 1938, No. 11-12: 169-171. **Pough, F. H.**—The spider and the fly. [Natural History] 43: 220, ill. **Smith, R. C.**—Annual insect population records, with special reference to the Kansas Summary. [12] 31: 618-622. Some phases of entomological writing from the viewpoint of the reader. [12] 31: 563-565. **Swezey, O. H.**—Misidentity of immigrant insects in Hawaii. [Pro. Hawaiian Acad. Sci.] B. P. Bishop Mus. Sp. Publ. 33: 6-7. **van der Vecht, J.**—Het bewaren van insectenverzamelingen in de Tropen. [Ent. Med. Ned.-Indie] 4: 58-62, ill. **Vickery, R. A.**—Obituary. By O. I. Snapp. [12] 31: 637, ill. **Weiss & Carruthers.**—Insect enemies of books. [N. Y. Public Library] 1937: 63 pp., ill. **Whitehead, F. E.**—A proposed national contest for entomology students. [12] 31: 566-568.

ANATOMY, PHYSIOLOGY, ETC.—**Ancona, H. L.**—Histologia de la glandula venenosa de Crypsidromus breyerii. [Ann. Escuela Nac. Cien. Biol.] 1: 107-118, ill. **Balli, A.**—Longevita e perdita in peso negli adulti del Bombyx mori. [Mem. Soc. Ent. Italiana] 16: 115-123. **Becker, W. B.**—Larval development of the native elm bark beetle, Hylurgopinus rufipes in Massachusetts. [12] 32: 112-121, ill. **Berry, R. O.**—Observations on chromosome elimination in the germ cells of Sciara ocellaris. [Pro. Nat. Acad. Sci. U. S. A.] 25: 125-127, ill. **Chadwick, L. E.**—The axillary and subalar muscles in certain families of Lepidoptera. [Jour. Colo.-Wyom. Acad. Sci.] II: 47. **Debaisieux, P.**—Organes sensoriels de la tete d'asticots (Lucilia sericata). [Ann. Soc. Sci. Bruxelles] 59: 9-22, ill. **Debauche, H.**—See under general. **DeJong, J. K.**—The influence of the quality of the food on the egg-production in some insects. [Treubia] 16: 445-468. **Duncan, C. D.**—See under Hymenoptera. **Fischer-Wasels, B.**—Die Bedeutung der Erblichkeits-Faktors in der Geschwulstentwicklung. [Forsch. und

Fortschritte] 15: 83-84. **Heuser, R.**—Die kulturbedingte Parzellierung der Landschaft und das häufigere Auftreten melanotischer Formen bei Schmetterlingen. [Mitt. Saarp. Ver. fur Nat. & Naturs. Pollicbia] 7: 261-266. **Hoh, H.**—The abnormal and characteristic behavior of the sex-chromosome in Locusta migratoria. [Trans Sapporo Nat. Hist. Soc.] 15: 247-253, ill. **Jacobi, E. F.**—Ueber lebensweise, auffinden des wirtes und reguliering der individuenzahl von Mormoniella vitripennis. [Arch. Néerland. Zool.] 3: 197-282, ill. **List, G. M.**—The effect of temperature upon egg deposition, egg hatch and nymphal development of Paratrioza cockerelli. [12] 32: 30-36. **Maneval, H.**—La ponte ovovivipare de Chrysochloa viridis. [Misc. Ent.] 39: 99-101, ill. **Omura, S.**—Studies on the reproduction system of the male of Bombyx mori. II. Post-testicular organs and post-testicular behaviour of the spermatozoa. [Journ. Fac. Agr. Hokkaido Imp. Univ.] 40: 129-170, ill. Structure and function of the female genital system of Bombyx mori, with special reference to the mechanism of fertilization. [Jour. Fac. Agr. Hokkaido Imp. Univ.] 40: 111-128, ill. **Paramonow, S. J.**—See under Diptera. **Reichensperger, A.**—Bemerkungen über den geschlechtsdimorphismus der Paussiden. [Decheniana] 97 (B): 126-131, ill. **Savitskaya, Z.**—The dynamics of the water and fat in insect body in connection with its cold-resistance. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 5: 159-160. (Russian with English summary). **Schnell, R.**—Les divers degrés de l'action cécidogène dun insecte, Adelges abietis. [Bull. Mensuel Soc. Linn. de Lyon] 7: 201-202. **Taranukha, M.**—The feeding rates of Porthetria dispar in natural conditions. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 5: 99-102. (Russian, English summary). **Treyman, F.**—The number of caterpillars hatched from eggs of gypsy-moth and their survival at an early age, depending on the feeding conditions of the maternal generation. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 5: 138-144. (Russian with English summary). **Wieting & Hoskins.**—The olfactory responses of flies in a new type of insect olfactometer. [12] 32: 24-29, ill. **Woodhill, A. R.**—Salinity tolerance and pH range of Culex fatigans, with notes on the anal papillae of salt-water mosquitoes. [Pro. Linn. Soc. N.S.W.] 63: 273-281. **Yemchuk, E.**—Catalase dynamics in Porthetria dispar and Dendrolimus pini during development. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR]

No. 5: 177-180. (Russian with English summary). **Zavrel, J.**—Geechlechtsdimorphismus der Chironomidenlarven und-puppen. [Publ. Fac. Sci. Univ. Masaryk] Cis. 257: 23 pp., ill.

ARACHNIDA AND MYRIPODA.—Anon.—Insect-infesting mites. [Ward's Ent. Bull.] 6, No. 5: 2. **Ewing, H. E.**—A revision of the mites of the subfam. Tarsoneminae of North America, the West Indies, and the Hawaiian Islands. [U.S.D.A.] Tech. Bull. No. 653: 66 pp., ill. (K*). **Exline, H.**—The Araneida of Washington: Agelenidae and Hahniidae. [Univ. Wash. Pub. Biol.] 9: 1-44, ill. (K*). **Jacot, A. P.**—New mites from the White Mountains. [Occ. Pap. Boston Soc. Nat. Hist.] 8: 321-332, ill. (*). **Kaston, B. J.**—Check-list of the spiders of Connecticut [Conn. Geol. & Nat. Hist. Surv.] Bull. No. 60: 175-201. **Langeron, M.**—Repertoire d'espèces et de genres nouveaux Acariens. [54] 17:95. **Remlinger & Bailly, J.**—Contribution a l'etude experimentale des accidents determines par la tique du Chien (Rhipicephalus sanguineus). [54] 17: 1-3.

THE SMALLER ORDERS OF INSECTS.—Ghidini, G. M.—La presumibile funzione delle spugne legnose nei nidi dei Metatermitidi. [Riv. Biol. Colon., Roma] 1: 261-267, ill. **Hoppe, G. N.** —Plecoptera of Washington. [Univ. Wash. Publ. Biol.] 4: 139-174, ill. (K*). **Robert, A.**—Notes sur les Odonates de nominigue. Lestes eurinus et Enallagma vesperum dans le Québec. [Le Natur. Canadien] 66: 47-64. **Townsend, L. H.**—Lacewings and their allies. [Sci. Monthly] 1939: 350-357, ill.

ORTHOPTERA.—Alexander, G.—Morphological variations in Acrididae correlated with altitude. [Jour. Colo-Wyom. Acad. Sci.] II: 46. **Ebner, R.**—Orthopterorum Catalogus. Pars 2. Tettigoniidae. Subfam. Hetrodinae, Acridoxeninae. p. 73-94. **Günther, K.**—Revision der Acrydiinae I. [Mitt. Zool. Mus. Berlin] 23: 299-437, ill. (K). **Hebard, M.**—An ecological survey of the Orthoptera of Oklahoma. [Okla. A. & M. Coll. Agr. Exp. Sta.] Tech. Bull. 5: 31 pp., ill. **Schiuma, R.**—Informe sobre "Tucuras." [Minist. Agric. Rep. Argentina] Publ. Misc. 43: 117 pp., ill. (S). **Urquhart, F. A.**—The American locust (Schistocerca americana) in Ontario. [Can. Field-Nat.] 53: 24-25.

HEMIPTERA.—Blött, H. C. —Catalogue of the Coreidae in the Rijksmuseum van Natuurlijke Historie. Coreinae. [Zool. Mededelligen, Leiden] 20: 275-308, ill. (*S). **Davidson & DeLong.**—Studies of the genus Empoasca (Cicadell.). [Ohio Jour. Sci.] 39: 110-118. (*). **Drake & Poor.** —Los Tingitidae. [Notes Mus. de la Plata] 3 (Zool.): 103-109, ill. (*). **Ferris & Usinger.**—The family Polyctenidae (Heteropt.). [Microent.] 4: 50 pp., ill. (K*). **Palmer, M. A.**—Some aphid puzzles. [Jour. Colo.Wyom. Acad. Sci.] II: 80.

LEPIDOPTERA.—d'Alemida, R. Ferreira Revisão do genero Anteos (Pierid.). [Mem. Inst. Oswaldo Cruz] 33: 567-579, ill. (S). **Bates, M.**—Notes on Cuban butterflies. [115] 13: 4 pp. **Chadwick, L. E.**—See under Anatomy. **Forbes, W. T. M.**—Sex differences in Lepidoptera. [Ward's Ent. Bull.] 6, No. 6: 1-2, ill. **Heuser, R.**—See under Anatomy. **Knowlton, G. F.**—Lepidoptera. [Utah Agr. Exp. Sta.] Mimeog. Ser. 200: 14 pp. **Schwanwitsch, B. N.**—On the stereoeffect of cryptic colour-patterns in Lepidoptera. [Comptes Rend. Acad. Sci. USSR] 21: 179-182, ill.

DIPTERA.—Adamson, A. M.—Observations on biting sandflies (Ceratopogonid.) in Trinidad, British West Indies. [Trop. Agric., Trinidad] 16: 79-81. **Bartlett, K. A.**—The dung rolling beetle as a host of a Sarcophagid parasite. [12] 32: 150. **Dampf, A.**—Un nuevo Phlebotomus (Psychod.) procedente de Texas. [Ann. Escuela Nac. Cien, Biol.] 1: 119-132, ill. (*). **Debaisieux, P.**—See under Anatomy. **Huckett, H. C.**—Descriptions of new North American Anthomyiidae belonging to the genus Pegomyia. [1] 65: 37 pp., ill. **James, M. T.**—The evolution of a dipterous wing. [Jour. Colo.-Wyom. Acad. Sci.] II: 79. **Lopes, H. deSouza.** — Sobre um Rhinophoridae e varios Sarcophagidae da collecão do "Deutsches Entomologishes Institut" em Berlin-Dahlen. [Mem. Inst. Oswaldo Cruz] 33: 555-565, ill. (S). **Paramonow, S. J.**—Kritische uebersicht der gegenwartigen und fossilen Bombyliiden-gattungen (Dipterder ganzen welt. [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 23: 48-86. (Russian with English summary.) Ein grundriss der biologie, der verbreitung und der ökonomischen bedeuting der Bombyliiden (Diptera). [Rep. Inst. Zool. & Biol. Acad. Sci. Ukrainian SSR] No. 23: 87-100, ill. (Russian with English summary).

Rogers, J. S.—Two larval crane-fly members of the Neuston Fauna. [Pro. Fla. Acad. Sci.] 1: 154. **Sturtevant, A. H.**—On the subdivision of the genus Drosophila. [Pro. Nat. Acid. Sci U. S. A.] 25: 137-141. **Zavrel, J.**—See under Anatomy.

COLEOPTERA.—Benick, L.—Brasilianische Steninen (Staph.) [74] 16: 146-164, ill. (*K). **Chagnon, G.**—Contribution a l'étude des Coléoptères de la Province de Québec. [Le Natur. Canadien] 66: 38-46, ill. (K). **Fisher, W. S.**—New neotropical Buprestidae. [74] 16: 111-145. (*). **Hatch, M. H.**—Coleoptera of Washington: Carabidae: Cicindelinae. [Uni. Wash. Pub. Biol.] 1: 225-240, ill. (K*). **Hustache, A.**—Erodiscus Schonh. Sud-Américains. (Curculion.). [Bull. Mensuel Soc. Linn. de Lyon] 7: 192-200. (K*). Ceratopinae Sud-Americains (Curculion). [Misc. Ent.] 39: 89-99. (SK*). Zygopinae de L'Amerique Meridionale. [74] 16: 58-82. (*S). **Larsson, Sv. G.**—Der Lebenszyklus der Carabiden Statistik als Hilfsmittel biologischer untersuchungen. [34] 125: 87-90.

HYMENOPTERA.—Anon.—Ueber den Parasitismus der Hymenopteren. [Verh. Schwiezer. Naturf. Gesell.] 119: 11-27, ill. **Bequaert, J.**—The oriental Vespa analis and its color forms with a note on the synonymy of Vespa esakii and Vespa formosana. [1] 65: 37-42. **Duncan, C. D.**—A contribution to the biology of North American Vespine wasps. [Stanford Univ. Pub. Biol. Sci.] 8: 272 pp., ill. **LeVeque, N.**—Experiences with taxonomic studies of carpenter bees. [Jour. Colo.-Wyom. Acad. Sci.] II: 44. **Marelli, C. A.**—Un microhimenóptero Proctrotrupoideo Telenomus almanzoii n. sp., de la fam. Scelionidos parasito de los desoves del bicho quemador, Hylesia nigricans. [Mem. Jardin Zool.] 7: 161-174. (*S). **Moczar, L.**—Beobachtungen über den Nestbau einiger Odynerus-Arten. [34] 125: 70-80, ill. **Statz, G.**—Neue Funde parasitischer Hymenopteren aus dem Tertiär von Rott am Siebengebirge. [Decheniana] 98 (A): 71-144, ill. **Weyrauch, W.**—Wie ein Wespennest entsteht (Nach versuchen und beobachtung en an Vespa vulgaris & V. germanica). [88] 27: 73-77. **Zirngiebl, L.**—See under Special in ENT. NEWS for June, 1939.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Mites from northern Manitoba. I have over 1600 specimens of free-living mites which I would like to have identified. Duplicates may be retained. H. E. McClure, Lewis, Iowa.

RECENT LITERATURE

COLEOPTERA

1044.—**Robinson** (M.).—Studies in the Scarabaeidae. (64: 107-116, figs., 1938) .... .20

1053.—**Blaisdell** (F. E.).—A study of the species of Hispinae belonging to the genus Stenopodius, with descriptions of new species (Chrysomelidae). (64: 421-447, 3 pls., 1939) .... .60

DIPTERA

1047.—**Fisher** (E. G.).—North American fungus gnats (Mycetophilidae). (64: 195-200, pl., 1938) .... .20

1050.—**Cresson** (E. T., Jr.).—The Neriidae and Micropezidae of America north of Mexico. (64: 293-366, 3 pls., 1938) 1.50

HYMENOPTERA

1045.—**Pate** (V. S. L.).—Studies in the Nyssonine wasps (Sphecidae). IV. New or redefined gen. of the tribe Nyssonini, with descr. of n. sps. (64: 117-190, 2 pls., 1938) 1.50

1049.—**Krombein** (K. V.).—Studies in the Tiphiidae. II. A revision of the Nearctic Myzininae (Aculeata). (64: 227-292, 1938) 1.30

1052.—**Pate** (V. S. L.).—Studies in the Pemphredonine wasps. II. Records and descriptions of new forms in the Ammoplanoid complex from the southwestern U. S. (Sphecidae). (64: 373-420, 2 pls., 1939) 1.00

ORTHOPTERA

1042.—**Rehn and Rehn.**—The post-oak locust (Dendrotettix quercus) in the eastern U. S., with notes on macropterism in the species (Acrididae). (64: 79-95, 2 pls., 1938) .45

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JUNE, 1939

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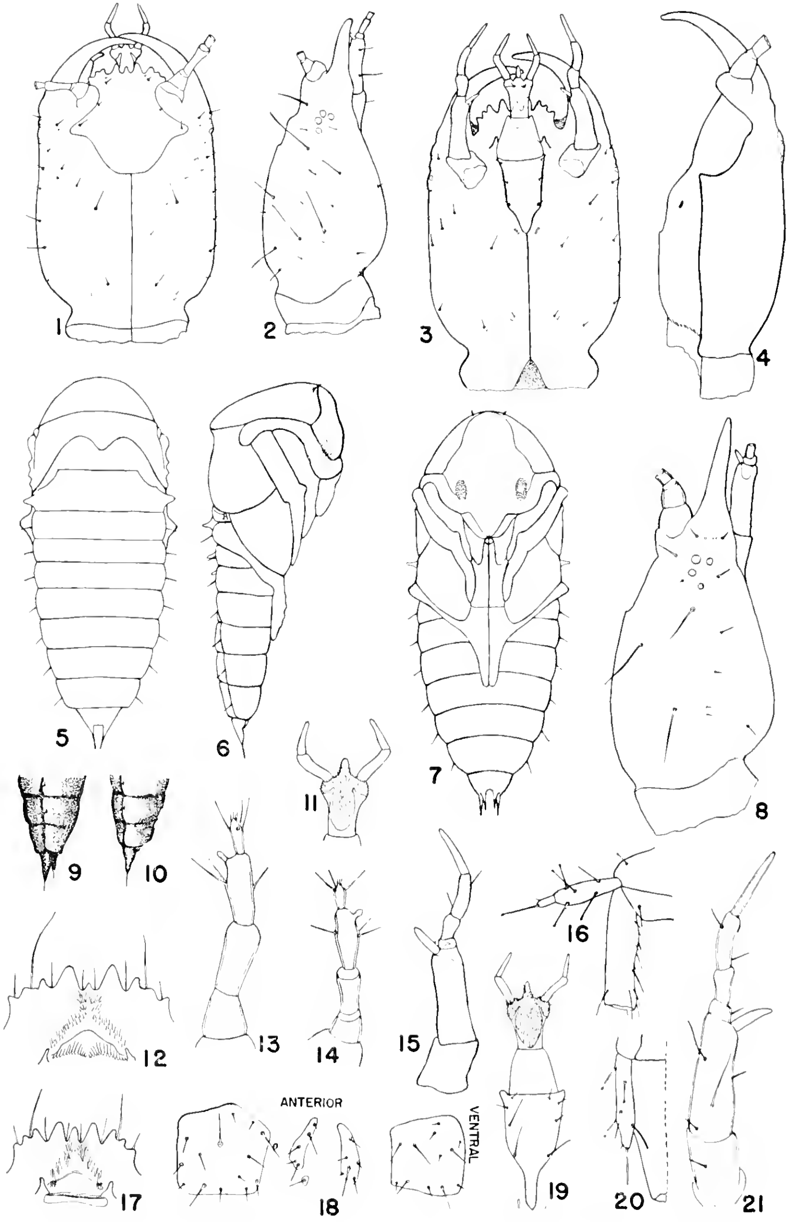

IMMATURE STAPHYLINIDS, GENUS QUEDIUS.—VORIS.

ENTOMOLOGICAL NEWS

VOL. L. JUNE, 1939 No. 6

Immature Staphylinids of the Genus Quedius (Coleoptera: Staphylinidae*).

By RALPH VORIS, Southwest Missouri State Teachers College Springfield, Missouri.

(Plate I.)

The larvae of the genus *Quedius* are small to medium sized, campodeaform; urogomphus short, confluently not more than twice as long as pseudopode, of one or two segments, second segment when present short and fleshy; maxillary palps three; labial palps two; ocelli four or absent.

Key to the known larvae.

1. Urogomphus of one segment; clypeo-labral margin with median tooth very short, clypeal teeth forming an angle of 30° .... *Q. molochinus*.
   Urogomphus biarticulate .... 2.
2. Clypeo-labral margin with median tooth nearly as long as lateral, clypeal teeth forming an angle of 40° to 45°. *Q. capucinus*.
   Clypeo-labral margin with median tooth one-half length of first laterals, clypeal teeth forming an angle of 30°. *Q. spelaeus*.

QUEDIUS Stephens.

Quedius Stephens, 1832, Ill. British Ent. 5:214. acc Bernhauer & Schubert, 1916, Junk, Coleop. Cat. pars 67:417.

Egg. Known only in *Quedius molochinus* (Gravenhorst).

Larva. Cylindrical, head and thorax dark testaceous to brownish-rufous, abdomen dirty-gray to dirty-brown.

Head rectangular, sides parallel; not exhibiting a microscopic coriaceous appearance; frontal suture a smooth arc to very slightly flattened at point of union with epicranial suture, gula subtriangular to nipple shaped, reaching one-half distance to neck. *Clypeo-labral* margin with nine prominent teeth, median tooth short, first lateral long, conical, median clypeal

* Entomological Contribution No. 6, Department of Science, Southwest Missouri State Teachers College, Springfield, Missouri.

very distinct. *Ocelli* four except in *Quedius spelaeus* where they are absent. *Antennae* short, stubby, third segment widest near middle and from this point sloping anteriorly and posteriorly. *Maxillae* with palps of three segments, second segment longer than first, slightly curved, bearing one spine on inner surface and one on outer surface; third long, slender, conical. *Labium* with most of the slightly chitinized portion of the dorsal surface of the stipulae, the palpigers and the posterior portion of the ligula covered with small spines; palpigers prominent, not globular; ligula conical; palps of two segments, first long cylindrical, second long, slender conical. Spines below mouth opening may or may not be present, if present in the form of a single row or parts of a row. Spines above the mouth opening arranged in two rather large confused groups extending from a median position towards the corners of the mouth opening. Mouth opening angular.

Abdomen with urogomphus of one or two segments, clothed with a few bristle-like spines; terminal spine long bristle-like and a very short spine on inner angle of apex.

Pupa. Anterior margin of prothorax may or may not bear spines; lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments each bearing spines; terminal segment bearing two spines in the male and four in the female pupa. (see figs. 9 & 10).

QUEDIUS MOLOCHINUS (Gravenhorst).

Staphylinus molochinus Gravenhorst, 1806, Monogr. Coleopterorum Micropterorum 46.

Quedius molochinus Erichson, 1840, Genera et Species Staphylinorum 535. Horn, 1878, Trans. Amer. Ent. Soc. 7:163. Xambeu, 1910, L'Echange 26:47.

(See figs. 4, 8, 12, 13, 19, 20 & 21).

Egg. Oval, yellowish white; surface faintly granular; length 1.2-1.5 mm., width 0.9-1.1 mm.; emergence opening a lengthwise slit.

Larva. Head and thorax dark brownish-rufous, abdomen dirty-gray never becoming yellow. Length mature larva 11.-13. mm., width 1.5-1.7 mm.

Head rectangular, one-half longer than wide, hind angles obtusely rounded; arc of frontal suture not deep but slightly flattened at point of union with epicranial suture; gula slightly nipple shaped; scar located opposite base of nipple. *Clypeolabral* margin with median tooth short, one-fourth length of first lateral; clypeal and labral teeth not forming a smooth arc as the first clypeal tooth is below the line formed by the third clypeal and first laterals; clypeals forming an angle of 30°. *Ocelli;* second ocellus superior to line between first and third and slightly nearer third than first; second and fourth equidistant from third; fourth ventral and posterior to third; second, third and fourth subequal in diameter and slightly larger than first. *Antennae* with second segment two-fifths longer than first; third widest near middle, as long as second; thumb slender, two and one-half times as long as wide; fourth segment only slightly longer than first; two-thirds as wide as base of third. *Maxillae* with stripes as long as cardo; lacinia nearly as long as palpifer and first segment of palps, four times as long as wide; palps with second segment two-fifths longer than first, spine on inner surface four-fifths anterior, third segment slightly longer than second. *Labium* with band separating posterior half of dorsal surface of palpigers from stipulae narrow; spines on dorsal surface covering posterior two-thirds of the ligula as well as the slightly chitinized portion of the stripes and the dorsal surface of the palpigers; ligula less than one-half as long as first segment of palps; palps with second segment slender, nearly as long as first segment. Spines below mouth opening present, median portion of row depressed so as to appear as two short arcs, median and terminal spines in row shorter. Spines above the mouth opening in two groups extending from a median position to the corners of the mouth opening, spines sparse, confused, and irregular, not arranged as if combed. Mouth opening angular.

Abdomen with urogomphus of one segment; fleshy, not as long as pseudopode, constricted four-fifths posterior but constriction not enough to allow the posterior portion to be called a second segment.

Pupa. Length 7. mm., width 2.6 mm.; spines on anterior margin of prothorax lacking; spines on lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments short, sharp; terminal spines short, sharp; female accessory sharp, slightly longer than terminal spines.

Adult determined by Howard Notman.

The mature and immature individuals both occur under old hay and vegetable debris. They occur with *Q. capucinus* but they are never as abundant. Pupation occurs both above and below the surface of the ground and the place of pupation is relatively deeper than *capucinus*.

One egg was collected at Bloomington, Indiana, 11.14.26 from under old hay. The egg hatched eight days later and in a few days the larva fed readily on *Drosophila* larvae. Death occurred before the first molt, probably because of the daily variation in the temperature of the laboratory which is abnormally high at night when the building is closed.

In only four cases is the exact age of the pupa known. In these cases the length of the pupal period varied from eleven to fourteen days. All were collected in early spring at Bloomington, Indiana, and were reared inside where they may have been affected by the temperature of the building. No conclusion can be drawn from these figures as to the variation in length of the pupal period of this species.

The material available for study includes four larval exuviae, twenty-two pupal exuviae, and twenty-one reared adults. The immature forms were collected at Bloomington and Charlestown, Indiana and Springfield, Missouri.

QUEDIUS CAPUCINUS (Gravenhorst).

Staphylinus capucinus Gravenhorst, 1806, Monographia Coleopterorum Micropterorum 40.

Distichalius capucinus Casey, 1915, Memoirs on the Coleoptera 6:405.

Quedius capucinus Erichson, 1840, Genera et Species Coleopterorum 531. Horn, 1878, Trans. Amer. Ent. Soc. 7:160. Leng, 1920, Cat. Coleop. Amer. N. of Mexico 109.

(See figs. 1, 2, 3, 5, 6. 7, 9, 10, 11, 14, 15, 16, 17 & 18).

Egg. Unknown.

Larva. Head and thorax brownish-rufous; abdomen dirty-gray, never becoming yellow. Length of mature larva 9. - 11. mm., Width 0.8 - 1.0 mm.

Head rectangular, one-third longer than wide, hind angles prominent, well rounded; neck three-fifths as wide as head; frontal suture forming a deep arc, only slightly flattened at the point of union with the epicranial suture; gular suture subtriangular to very slightly nipple-shaped; posterior tip of scar located lateral to the posterior tip of gula. *Clypeo-labral* margin with median tooth two-thirds as long as first lateral; clypeal and labral teeth forming a rather smooth arc; clypeal teeth forming an angle of 40° - 45°. *Ocelli;* second ocellus very slightly superior to the line between the first and third; fourth almost directly ventral to third; all about equidistant and subequal in size; together they form almost a right angle. *Antennae* with second segment one-half longer than first; third widest slightly anterior to middle, as wide as and one-half longer than second segment; thumb slightly longer than wide; fourth segment as long as first and as wide as base of third. *Maxillae* with stipes twice as long as cardo; lacinia as long as palpifer and first segment of palps, four times as long as wide; palpifer twice as wide as long; palps with second segment almost twice as long as first, spine on inner surface three-fourths posterior, spine on outer surface three-fourths anterior, third segment long, slender, longer than second. *Labium* with the band separating the posterior half of the dorsal surface of palpigers from the stipulae broad, triangular; ligula one-half as long as first segment of palps, posterior four-fifths of dorsal surface covered with small spines; palps with second segment slightly shorter than first. Spines below the mouth opening absent except at the angles of the mouth. Spines above the mouth opening arranged in two confused groups extending from a median position to the corners of the mouth opening and so arranged in small groups as to appear as if they had been combed transversely with a coarse comb. Mouth opening angular.

Abdomen with urogomphus biarticulate, fleshy; confluently three-fourths as long as pseudopode; second segment short but definitely formed, naked except for terminal spines, twice as long as wide, two-fifths as wide as and one-third as long as first segment.

Pupa. Length 5. - 6. mm., width 2. mm.; anterior margin of prothorax bears one pair of very short stiff spines; lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments each bear a single short sharp spine; terminal spines long, sharp; female accessory spine long, sharp.

Adult determined by Howard Notman.

The larvae, pupae and adults are extremely common under old hay or vegetable debris which is decaying. They are to be found all winter (near Bloomington, Indiana) in such habitats in both the immature and adult stages. The length of the pupal period varies from ten to sixteen days. (For a detailed account see Voris, 1934, Table II.) The larvae form nest-like cavities either above or just below the surface of the ground. As in *P. tetragonocephalus* Notman, the amount of moisture seems to influence the place of pupation.

The material available for study includes 118 slides of larval exuviae and larvae, 143 slides of pupal exuviae and pupae, 138 reared adults and many preserved (alcoholic) specimens of larvae and pupae. All material was collected either at Bloomington, or Charleston, Indiana.

(To be continued.)

Notes on Pennsylvania Flea Beetles in Tobacco Fields (Coleoptera: Chrysomelidae).

By Harold C. Hallock, Pennsylvania State College.

(Continued from page 124.)

It is interesting to note that Jewett (1929) found that *Epitrix cucumeris* was largely replaced on potatoes in Kentucky by *Epitrix fuscula* as he reported 82 percent of the flea beetles were *Epitrix fuscula*. Although *Epitrix fuscula* was abundant on eggplant in Pennsylvania only a few specimens were found in the potato experimental fields. Lacroix (1935) reported *Epitrix parvula* as a rare insect in Connecticut. It is apparent, that *Epitrix cucumeris* is a northern insect and that *Epitrix parvula* is largely southern in its distribution, yet they are both injurious pests in Lancaster County, Pennsylvania.

Tomatoes. Conspicuous flea beetle feeding was observed upon tomato plants in seed beds and upon plants that had recently been transplanted to the field during May and June 1938. Collections made in late May showed an average of 88 percent *Epitrix cucumeris* and 12 percent *Epitrix parvula*. Very little flea beetle feeding on tomatoes was apparent during the remainder of the 1938 season in the 3 acre tomato field on the Esbenshade farm, although it joined the tobacco field which was heavily infested with *Epitrix parvula* from the middle of August until late October. The September and October figures, which are given in the table, represent collections from a large number of mature tomato plants while the May collections were from about a dozen small plants.

Corn. Five species of flea beetles, which are named in table I, were found moderately plentiful on corn from May until September. The corn was grown adjoining the tobacco fields at the Tobacco Experiment Station and on the Esbenshade farm. Although the flea beetles were observed to feed upon the leaves and the corn silk they never were sufficiently numerous to cause any crop injury. When the corn silk was young 10 to 15 flea beetles were often found burrowing in the silk of each ear. The young corn silk appeared especially attractive to *Epitrix parvula* and their abundance on corn increased at that time.

Ground cherry. Whenever ground cherry (*Physalis* sp.) was found in the vicinity of the three tobacco fields the leaves were always riddled by the flea beetle feeding. The injury to these weeds was caused by the feeding of *Epitrix cucumeris* and *Epitrix parvula.*

Jimson weed. Very little jimson weed (*Datura stramonium* L.) was allowed to grow in the vicinity of the three experimental tobacco fields. When jimson weed plants were found they always had the characteristic flea beetle feeding which was caused in this case by *Epitrix parvula.*

Morning glory. Although wild morning glory (*Convolvulus sepium* L.) generally shows considerable flea beetle foliage injury it can not be classed as a favored host plant of *Epitrix parvula.* During September 1937 wild morning glory, which was growing at the edge of Esbenshade's tobacco field, had a considerable number of *Epitrix parvula* feeding on its leaves. Collections were made again in May and October 1938 and the flea beetle population on wild morning glory was found at that time to be over 95 percent *Chaetocnema confinis.*

Indian mallow. After the old tobacco stumps had been entirely destroyed by plowing in the fall of 1938 a large number of *Epitrix parvula* were found on indian mallow (*Abutilon theophrasti* M.) which remained growing along the edge of the tobacco field at the Tobacco Experiment Station. The flea beetles were found feeding only on the under surface of the indian mallow leaves and they did not eat holes clear through the leaves as in the case of all other host plants observed.

When the tobacco and potato crop remains were destroyed by plowing in early September at the Tobacco Experiment Station the flea beetles congregated upon any small portion of the tobacco plants, which was not completely covered, and upon weeds along the border of the field. These small crop remnants were rapidly destroyed by the flea beetle feeding. The few remaining weeds, which were not destroyed, along the sides of the field were inhabited for a short time but the flea beetle population rapidly decreased in September and October at the

Tobacco Experiment Station. It is interesting to compare this condition with the tobacco field upon the Esbenshade farm that was disced in October instead of the earlier plowing. There was a large amount of tobacco plant remnants left in the field, which had been disced, and a heavy flea beetle population continued in this tobacco field during October.

Summary.

There is considerable variation in the relative abundance of the different species of flea beetles found in the vicinity of tobacco at different periods of the growing season. The most abundant species during April, May and June was *Epitrix cucumeris*. This species caused severe injury to the foliage of tobacco plants that were growing in seed beds and that had been recently transplanted. During the same period heavy feeding by *Epitrix cucumeris* was also observed in potatoes and young tomato plants.

A heavy infestation of *Systena taeniata* var. *blanda* occurred on weeds in June 1937. When the tobacco was transplanted into the field *Systena taeniata* var. *blanda* migrated to the tobacco in large numbers and caused severe injury. This flea beetle was scarce in Lancaster County in 1938.

Although *Epitrix parvula* adults were present on plants in Lancaster County from April until November they did not become sufficiently abundant to cause plant injury until July 1937 and August 1938. This species was the predominating species in tobacco fields during July, August and September. *Epitrix parvula* was scarce on early potatoes but increased in abundance in August. It was often more abundant on potatoes in late August and early September than *Epitrix cucumeris*.

When the tobacco crop had been harvested *Epitrix parvula* continued to feed upon the tobacco suckers which sprouted from the tobacco stumps. The destruction of the tobacco suckers forced *Epitrix parvula* to feed on weeds and other plants along the sides of the tobacco field. When all tobacco crop remains and other favorite food plants of *Epitrix parvula* were destroyed in the early fall this flea beetle soon became scarce in the vicinity of the tobacco field which had been properly cleaned. When tobacco crop remains were present in the field *Epitrix parvula* continued to feed abundantly until early November in 1938.

It is apparent that *Epitrix parvula* prefers to feed upon tobacco when that plant is present. This flea beetle was also observed to feed readily upon potato, ground cherry, jimson weed, indian mallow, corn, tomato and many other plants to a lesser degree during the fall months.

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A New Juniper Midge (Diptera: Cecidomyiidae).

By E. P. Felt, Bartlett Tree Research Laboratories, Stamford, Connecticut.

The insect described below caused serious injury last summer to Juniper twigs in the midwest. Specimens were received in 1938 from Prof. Leonard Haseman, Columbia, Missouri, Prof. George A. Dean, Manhattan, Kansas, Prof. Raymond Roberts, Lincoln, Nebraska, and Lee H. Townsend, Instructor in Zoology, Lexington, Kentucky. Evidently the insect was abundant over a considerable area.

Contarinia juniperina n. sp.

Male. Length 1.5 mm., antennae one-fourth longer than the body, thickly haired, dark brown, 14 segments, the fifth with stems each with a length two and one-half times the diameter; the terminal segment having the basal stem with a length three times its diameter, the distal enlargement broad with a length about twice its diameter and broadly roundel apically. Palpi; the first segment short, quadrate, the second and third approximately equal and the fourth one-half longer than the third, greatly flattened and broadly rounded. Mesonotum, dark reddish brown, the scutellum reddish brown, the postscutellum fuscus yellowish, abdomen dark reddish brown, wings hyaline, halteres and legs mostly dark straw. The claws simple, the pulvilli as long as the claws. Genitalia; basal clasp segment moderately stout, terminal clasp segment rather short, stout, dorsal plate deeply and triangularly emarginate, the lobes broadly rounded apically; ventral plate deeply and roundly emarginate, the lobes moderately long and irregularly rounded apically; style rather short.

Female. Length 1.5 mm., antennae one-third the length of the body, dark straw, the fifth cylindrical with the enlargement one-half longer than the diameter, the stem one-fourth the length of the enlargement, the terminal segment broad, broadly rounded and with a length one-half greater than the diameter. Mesonotum dark reddish brown, scutellum dark yellowish, postscutellum dark reddish, abdomen reddish brown, ovipositor yellowish, about one-half the length of the body, the terminal lobes with a length six times the width, slender and tapering to an acute point, halteres pale straw, slightly fuscus apically, coxae and femora pale straw, tibiae and tarsi mostly dark straw, otherwise as in the male.

Described from dry specimens reared at Columbia, Missouri, April 1939. This species approaches in general characters the smaller and different *C. balsamifera* Felt. Type deposited in the U. S. National Museum.

New Name for a Genus of the Group Melanopli (Acrididae: Orthoptera).

Necaxacris new name.

This is a new name for the genus *Necaxa* Hebard, Trans. Amer. Ent. Soc., LVIII, p. 290, 1932, which is preoccupied by *Necaxa* Baker 1930 (*Mollusca*). The above name is proposed at this time in order to anticipate any author possibly proposing a name for the genus before my studies on the Mexican Melanopli have been published, since type labels, etc., and manuscript have been already completed for this group.

H. R. Roberts.

An Annotated List of the Ants of Maine (Hymenoptera: Formicidae).

By Merle W. Wing, 35 Bradbury Street, Old Town, Maine.

Concerning the extent of Maine's formicifauna, Dr. W. M. Wheeler[1] states: "I believe that there can be hardly more than 35 or 40 species, subspecies and varieties in the whole State." In this paper 54 forms are listed for Maine. Only those forms which have been specifically determined are included. Approximately 13 species, subspecies, and varieties not fully determined have been omitted. It would seem that ultimately more forms will be added to this list, in that the collecting to date has not been intensive throughout the State. Of the 54 forms listed, the following have been taken for the first time: *Formica vetula* Wheeler and *F. rubicunda* Emery.

The annotations while few and brief have been made only on forms collected by the writer. The works of W. M. Wheeler, C. W. Johnson, and William Procter have been used freely. Local names followed by Wheeler refer to the Casco Bay Region, while those followed by Johnson, Procter, or Brower refer to the Mt. Desert Region. From these works, further annotations on species listed herein can be obtained together with information on the climate and geography of Maine.

The writer acknowledges the valuable assistance rendered by the late Dr. W. M. Wheeler in guidance during the early stages of this investigation; to Dr. M. R. Smith and Dr. Neal A. Weber thanks are due for their determinations, verifications, and valuable assistance of a general nature. In addition various unpublished records have been supplied by Dr. M. R. Smith and Mr. H. B. Peirson, State Entomologist.

Subfamily Ponerinae.

1. Ponera coarctata subsp. pennsylvanica Buckley. Casco Bay Region (Wheeler); Bar Harbor, Tremont (A. E. Brower); Oakland (D. S. Fink); Orono (G. W. Simpson). Enfield (A. W. Berrie); Old Town, Orono (Wing).

Many small colonies under stones along edge of clearings near Old Town.

[1] The Ants of Casco Bay, Maine, with Observations on Two Races of *Formica sanguinea* Latreille. Bull. Amer. Mus. Nat. Hist. 24, Art. 33, 1908, p. 619.

Subfamily MYRMICINAE.

2. MYRMICA BREVINODIS Emery. Casco Bay Region (Wheeler); Hodgdon Brook, Station F181 (Procter); Enfield (A. W. Berrie); Presque Isle, Lamoine (Wing).

Forming medium-sized colonies under stones and bits of wood in open places.

3. M. BREVINODIS subsp. SULCINODOIDES Emery. "Maine" (Emery); Ogunquit (Pratt).

4. M. LOBICORNIS subsp. FRACTICORNIS Emery. Lower Goose Island, Sebascodegan Island (Wheeler); S. W. Harbor, Green Mt., Long Pond (Johnson, Procter); Station F 173, Eden-Town Hill Road (Procter); Presque Isle, Old Town (Wing).

5. M. SABULETI subsp. AMERICANA Weber (M. S.) Mt. Desert (Hagen, McAtee); Old Town (Wing).

6. M. SCABRINODIS SCHENCKI var. EMERYANA Forel. "Maine" (Emery); S. W. Harbor, Witch Hole Pond (Johnson, Procter); Robinson Mt. (Procter); Orono (I. H. Blake); Ash Point, Old Town (Wing).

7. STENAMMA BREVICORNE (Mayr). Dikes Peak (A. E. Brower); Ash Point, Presque Isle (Wing).

Forming small colonies under moss-covered bark of rotted stumps in coniferous growth near Presque Isle.

8. S. BREVICORNE DIECKI var. IMPRESSUM Emery. Orono (I. H. Blake).

9. APHAENOGASTER FULVA AQUIA var. PICEA Emery. South Harpswell, Sebascodegan Island (Wheeler); Old Town (Wing).

One colony nesting in rotted stump in moist woods.

10. CREMATOGASTER LINEOLATA (Say). South Harpswell, Ragged Island (Wheeler); Robinson Mt., Cadillac Cliffs, Salisbury Cove (Johnson); Eden (Procter); Old Town (Wing).

11. C. LINEOLATA var. CERASI (Fitch). "Maine" (Emery).

12. LEPTOTHORAX CURVISPINOSUS Mayr. South Harpswell (Wheeler); Paris (Frost).

13. L. CURVISPINOSUS subsp. AMBIGUUS Emery. Mt. Desert (McAtee).

14. L. ACERVORUM subsp. CANADENSIS Prov. Stover's Point, near South Harpswell, Ragged Island (Wheeler); S. W. Harbor (Johnson, Procter); Paris (Frost); Orono (Severin, Wing); Ash Point, Old Town, Presque Isle (Wing).

15. L. EMERSONI Wheeler. Stover's Point, near South Harpswell (Wheeler); Lamoine (Wing).

Subfamily DOLICHODERINAE.

16. DOLICHODERUS TASCHENBERGI Mayr. Robinson Mt. (Procter).

17. D. TASCHENBERGI var. GAGATES Wheeler. South Harpswell, Sebascodegan Island (Wheeler).

18. D. PLAGIATUS Mayr. Section 26 (Procter); Ash Point, Old Town (Wing).

One colony nesting under stone in blueberry field at Ash Point.

19. D. PLAGIATUS var. INORNATUS Wheeler. S. W. Harbor (Johnson); Break Neck Pond (Procter).

20. D. PLAGIATUS subsp. PUSTULATUS Mayr. South Harpswell, Sebascodegan Island (Wheeler).

21. TAPINOMA SESSILE (Say). Prince's Point, Lower Goose Island (Wheeler); S. W. Harbor (Johnson Procter); Station F173 (Procter); Ash Point, Old Town, Orono, Presque Isle (Wing).

Subfamily FORMICINAE.

22. BRACHYMYRMEX HEERI subsp. DEPILIS Emery. South Harpwell, Lower Goose Island, Prince's Point (Wheeler); Orono (I. M. Burgess, Wing); Old Town (Wing).

23. CAMPONOTUS HERCULEANUS (L.). Harpswell Neck, Lower Goose Island, Prince's Point, Sebascodegan Island (Wheeler).

24. C. HERCULEANUS var. WYMPERI Forel. South Harpswell (Wheeler); Bar Harbor, Narrows (Johnson, Procter); Section 15 (Procter); Reeds Island, Penobscot Bay (A. C. Burrill); Heald Pond, near Jackman (F. A. Jones); Orono (J. F. Whitney); Ash Point, Lamoine, Presque Isle (Wing).

25. C. HERCULEANUS subsp. PENNSYLVANICUS (Degeer). Bar Harbor (Johnson); Mt. Desert Region (Procter); Mt. Katahdin (Hamlin, I. H. Blake); Bethel (Mus. Comp. Zoöl, I. H. Blake); Orono, Presque Isle (Wing).

26. C. HERCULEANUS LIGNIPERDA var. NOVAEBORACENSIS (Fitch). Harpswell Neck, Lower Goose Island, Prince's Point, Sebascodegan Island, Ragged Island, Haskell Island (Wheeler); Mt. Desert Region (Johnson, Procter); West Beach (Mus. Comp. Zoöl.); Lincolnville (Heald); Orono (C. O. Dirks, I. H. Blake, Wing); Ash Point, Old Town, Presque Isle (Wing).

27. C. HERCULEANUS LIGNIPERDA var. RUBENS Wheeler. Norway (S. J. Smith); Bethel (A. M. Edwards).

28. C. CARYAE (Fitch). Robinson Mt. (Procter); Orono (Wing).

A single stray worker taken.

29. LASIUS NIGER var. SITKAËNSIS Pergande. Long Pond, Bar Harbor (Johnson, Procter); Corfield (Procter); Penobscot Bay (A. C. Burrill); Presque Isle (Wing).

Nesting at base of rotted stump in moist woods.

30. L. NIGER var. NEONIGER Emery. South Harpswell, Ram Island, Haskell Island, Ragged Island, Lower Goose Island, Sebascodegan Island (Wheeler); Matinicus Island (U. S. Biol. Surv.); Norway (S. J. Smith); Bethel (Mus. Comp. Zoöl.); Ash Point, Lamoine, Old Town, Orono, Presque Isle (Wing).

31. L. NIGER var. AMERICANUS Emery. Casco Bay Region (Wheeler); Mt. Desert (McAtee); Stations F150 and F173 (Procter); Bridgeport (Miss Edmonds); Oakland (D. S. Fink); Enfield (A. W. Berrie); Ash Point, Old Town Presque Isle (Wing).

32. L. BREVICORNIS Emery. Northern portions of Casco Bay, Haskell Island (Wheeler).

33. L. UMBRATUS MIXTUS var. APHIDICOLA (Walsh). "Maine" (Emery); S. W. Harbor, Green Mt. (Johnson, Procter); Pretty Marsh, Bubble Pond (Procter); Elms (Deane); Orono (I. H. Blake).

34. L. UMBRATUS subsp. MINUTUS Emery. "Maine" (Emery).

35. L. UMBRATUS subsp. SUBUMBRATUS Viereck. Bar Harbor (Johnson); Mt. Desert (Procter); Penobscot Bay (A. C. Burrill); Ash Point (Wing).

Three winged queens were captured on August 5, 1938 as they were dropping down from their nuptial flight in the late afternoon.

36. L. (ACANTHOMYOPS) INTERJECTUS Mayr. Corfield (Procter).

37. L. (A.) CLAVIGER Roger. Deer Brook, Station F218 (Procter).

38. L. (A.) CLAVIGER var. SUBGLABER Emery. Sebascodegan Island (Wheeler).

39. FORMICA NEOGAGATES Emery. South Harpswell, Prince's Point, Lower Goose Island, Sebascodegan Island (Wheeler); S. W. Harbor, Bar Harbor (Johnson, Procter); Oakland (D. S. Fink); Ash Point, Old Town, Orono (Wing).

40. F. NEOGAGATES LASIOIDES var. VETULA Wheeler. Aroostook No. 1, Ash Point, Old Town, Presque Isle (Wing).

This form makes rather small colonies under stones in open dry fields.

41. F. PALLIDE-FULVA subsp. SCHAUFUSSI Mayr. Ogunquit (Pratt).

42. F. FUSCA L. South Harpswell, Lower Goose Island (Wheeler); Mt. Desert Region (Johnson, Procter); Monmouth (Frost); Presque Isle (Wing).

43. F. FUSCA var. SUBSERICEA Say. South Harpswell, Sebascodegan Island, Lower Goose Island, Prince's Point (Wheeler); New Mill Pond, Jordan Pond, Seal Cove. (Procter).

44. F. FUSCA var. ARGENTEA Wheeler. South Harpswell, Sebascodegan Island, Lower Goose Island (Wheeler).

45. F. FUSCA var. SUBAENESCENS Emery. Lower Goose Island (Wheeler); Tremont (Procter); Norway (S. J. Smith); Bethel (Mus. Comp. Zoöl.); Orono (I. H. Blake); Aroostook No. 1, Ash Point, Old Town (Wing).

46. F. FUSCA var. ALGIDA Wheeler. Kittery Point (R. Thaxter); Robinson Mt. (Procter).

47. F. FUSCA var. GLACIALIS Wheeler. South Harpswell, Casco Bay Region generally (Wheeler); Presque Isle (Wing).

48. F. TRUNCICOLA subsp. OBSCURIVENTRIS Mayr. Doughty's Point on Sebascodegan Island (Wheeler); Mt. Desert (Procter).

49. F. TRUNCICOLA subsp. INTEGRA Nylander. Lower Goose Island, Prince's Point (Wheeler); Salisbury Cove (Johnson); Eden, Corfield, Bar Harbor (Procter); Monmouth (Frost).

50. F. EXSECTOIDES Forel. South Harpswell, Prince's Point (Wheeler); Ogunquit (Pratt); Pittston, Jefferson, Augusta, Vassalboro, China (H. B. Peirson); Old Town (H. B. Peirson, Wing).

Numerous colonies of this species occur near Old Town. All colonies seen by the writer were rather small.

51. F. SANGUINEA subsp. ASERVA Forel. Harpswell Neck, Ash Point, Prince's Point, Lower Goose Island, Sebascodegan Island (Wheeler); Bar Harbor, S. W. Harbor, Green Mt. (Johnson, Procter); Section 26 (Procter); Oakland (D. S. Fink); Enfield (A. W. Berrie); Aroostook No. 1, Ash Point, Old Town, Presque Isle (Wing).

52. F. SANGUINEA subsp. RUBICUNDA Emery. Aroostook No. 1 (Wing).

One populous colony under stone near woods.

53. F. SANGUINEA subsp. SUBINTEGRA Emery. Harpswell Neck, Ash Point, Prince's Point, Lower Goose Island, Sebascodegan Island (Wheeler).

54. F. SANGUINEA subsp. SUBNUDA Emery. South Harpswell (Wheeler).

Aphids of the Genus Kakimia Infesting Ribes (Homoptera[1]).

By G. F. Knowlton and M. W. Allen.[2]

This report deals with seven species of the aphid genus *Kakimia* H. and F.[3] which attack currants and gooseberries, one species being here described as new. The following key serves to separate available material to species.

Key to Species

A. Cornicles at least 4 times hind tarsi in length.
  B. Sensoria present on antennal IV of alate *muesebecki* n. sp.
  BB. Sensoria absent on antennal IV of alate
    C. Rostral IV + V at least 0.17 mm. long........*ceri*
    CC. Rostral IV+ V less than 0.17 mm. long, *ribe-utahensis*
AA. Cornicles less than 4 times hind tarsi in length.
  B. Unguis not exceeding 1.25 times antennal III.
    C. Sensoria rarely present on antennal IV of alate *ribifolii*
    CC. Sensoria on antennal IV usually exceeding 2 in number *houghtonensis*
  BB. Unguis usually exceeding 1.25 times antennal III.
    C. Aptera without sensoria on antennals IV and V. *cynosbati*
    CC. Aptera possessing sensoria on antennals IV and V. *thomasi*

Kakimia ceri G.-P.

Gillette and Palmer, Ann. Ent. Soc. Amer. 26: 354, 1933.

Collections: Specimens from Colorado, taken on native red currant at Rocky Mountain National Park and Nederland, August 23, 1935 (Knowlton); not yet taken in Utah.

Taxonomy: K. ceri differs from *K. muesebecki* in lacking sensoria on antennal IV of alates. It differs from *K. ribe-utahensis* in lateral hairs of cauda being slender and pointed at tip.

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station, Logan.

[2] Research associate professor of entomology and graduate research assistant, respectively.

[3] The writers are indebted to M. A. Palmer, E. O. Essig, C. F. W. Muesebeck, H. B. Mills and L. G. Strom for the loan of berry aphid material.

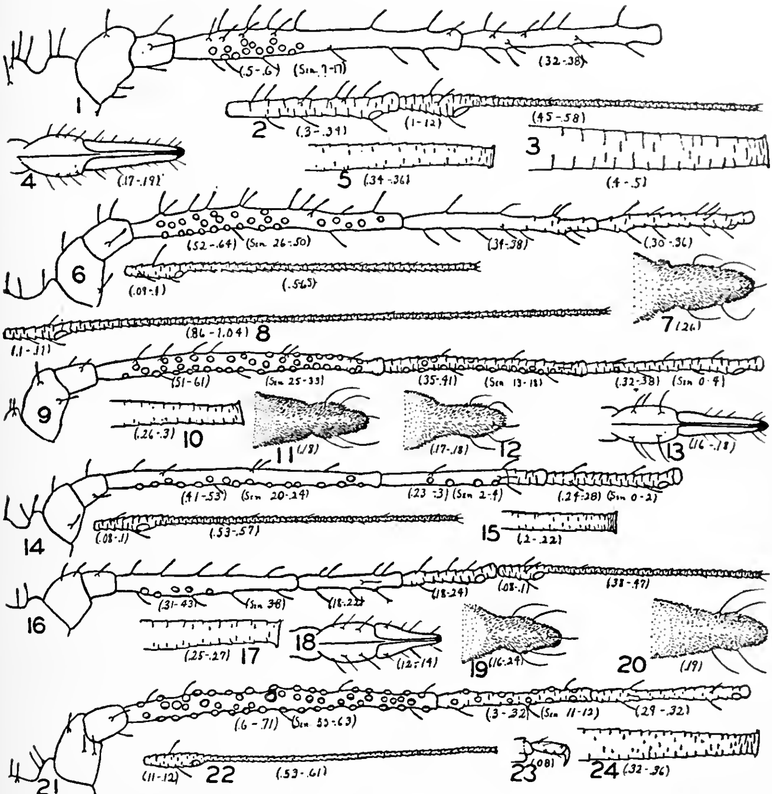

Figure A. *Kakimia ceri* G.-P. Aptera 1-4, 7: alate, 5-6. *K. cynosbati* (Oest.). Alate 8-11, 13. *K. houghtonensis* (Troop). Alate 12, 14-15; aptera 16-19. *K. muesebecki* n. sp. Alate 20-22, 24; aptera 23.

Kakimia cynosbati (Oest.)

Oestlund, Geol. and Nat. Hist. Surv. Minn. Bul. 4:81, 1887.

Alate vivipara: Color green; body 1.84 to 1.94 mm. long; antennae 2.45 to 2.66, dusky entire length; hind tibiae 1.64 to 1.76; hind tarsi 0.1; cornicles 0.26 to 0.3, pale; cauda 0.18 mm., pale.

Collections: On wild gooseberry south of Woodruff, Utah, July 5, 1938 (Knowlton); on *Ribes,* Milwaukee, Wisconsin, June 8, 1933 (L. G. Strom); on ornamental gooseberry, Moline, Illinois, May 16, 1931 (Ross-Mohr); and on *Ribes,* Bozeman, Montana, August 30, 1912 (J. R. Parker).

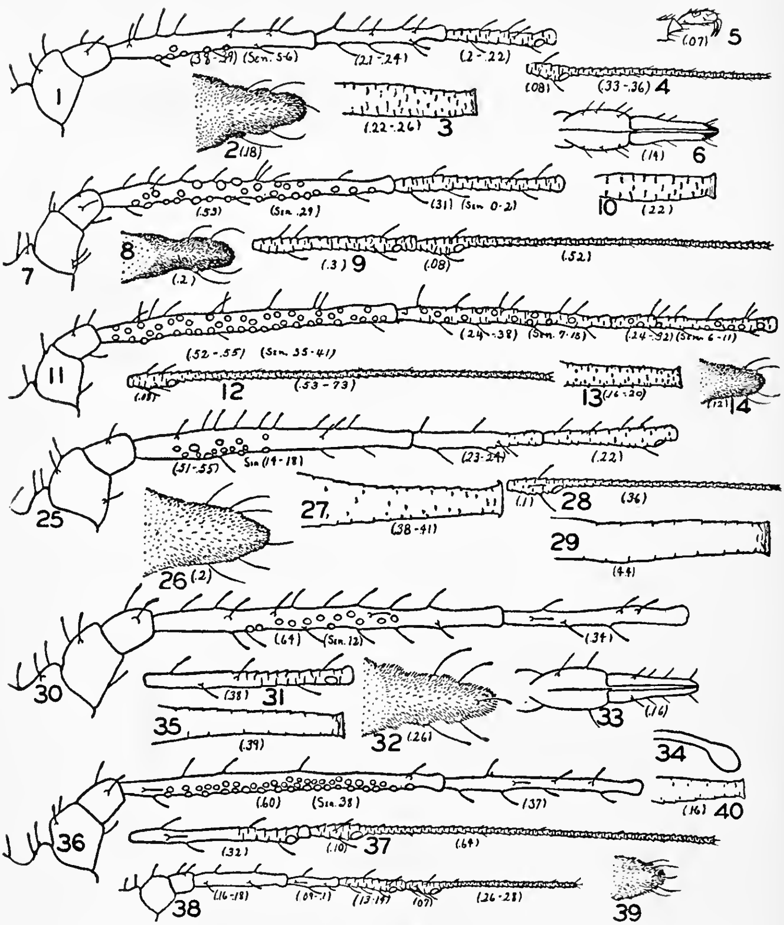

Figure B. *Kakimia ribifolii* (Davidson). Aptera 1-6; alate vivipara 7-10; alate male 11-14. *K. muesebecki* n. sp. Aptera 25-28. *K. ribeutahensis* Knlt. Aptera 29-33, 34 enlarged apex of caudal hair; alate vivipara 35-37; ovipara 38-40.

Taxonomy: K. cynosbati differs from *K. thomasi* in having fewer secondary sensoria on antennals III, IV and V of alates and aptera.

Kakimia houghtonensis (Troop).

Troop, Ent. News 17:59, 1906.

Alate vivipara: Body 1.33 to 1.49 mm. long; antennae, 1.76 to 1.88, dusky; rostral IV + V reaching second coxae; hind tibiae 1.1 to 1.27, distal end dark; hind tarsi, 0.08 to 0.1; cornicles 0.2 to 0.22, pale; cauda 0.17 to 0.18, pale.

Apterous vivipara. Color yellow; body 1.43 to 176 mm. long; antennae 1.31 to 1.66, pale to slightly dusky; rostral IV + V exceeding second coxae; hind tibia 0.79 to 0.94; hind tarsi 0.08; cornicles 0.25 to 0.27, pale, lightly imbricated.

Apterous ovipara: Body 1.37 mm. long; antennae 0.79 to 0.32, pale; antennal III, 0.16; IV, 0.1; V, 0.1; VI, 0.06 + 0.25; rostral IV + V, 0.1; hind tibiae 0.53; hind tarsi 0.08; cornicles 0.14 to 0.16, pale; cauda, 0.1 to 0.11, pale.

Collections: Aptera extremely abundant on *Ribes grossularia* in Utah at Logan, June 21, 1926 (Knowlton); alates, Dayton, Ohio, May 20, 1925 and males and ovipara, Columbus, Ohio, October 21, 1924 (Knowlton); Milwaukee, Wisconsin, July 2, 1935 (L. G. Strom); Joliet, Montana, July 14, 1915.

Taxonomy: *K. houghtonensis* differs from *K. ribifolii* in having more sensoria on antennal IV.

Kakimia muesebecki n. sp.[4]

Alate vivipara: Body 1.74 mm. long; antennae 2.05 mm., dusky; antennal III, 0.6 to 0.64 mm. long with 55 to 63 tuberculate sensoria; IV, 0.3 to 0.32 with 11 to 12 sensoria; V, 0.29 to 0.32; VI, 0.11 to 0.12 + 0.53 to 0.61; rostral IV + V, 0.16 to 0.17; hind tibiae 1.37; hind tarsi 0.08; cornicles 0.32 to 0.36, dusky; cauda 0.19, dusky.

Apterous vivipara: Body, 1.84 mm. long; antennae 1.64, pale entire length; antennal III, 0.51 to 0.53 with 14 to 18 sensoria; IV, 0.23 to 0.24; V, 0.22; VI, 0.1 + 0.36; rostral IV + V, 0.17; hind tibiae 1.16; hind tarsi 0.07 to 0.08; cornicles 0.38 to 0.41, pale; cauda, 0.2 mm. long.

Collections: Alate and apterous vivipara collected on *Ribes* at Redwood Canyon, CALIFORNIA, April 12, 1916 (W. M. Davidson).

Taxonomy: This species runs to *K. ceri* G.-P. in Gillette and Palmer's key (Annals Ent. Soc. of Amer. 27:160, 1934) from which it differs in having sensoria on antennal IV of alate vivipara and shorter antennals IV and V. This species was apparently collected from near the type locality of *K. ribifolii* (Dvds.) from which species it differs in the alate form having more sensoria on antennals III and IV, longer cornicles and base of antennal VI.

[4] The writers name this species in honor of C. F. W. Muesebeck of the U. S. Bureau of Entomology and Plant Quarantine. Types are returned to the U. S. National Museum.

KAKIMIA RIBE-UTAHENSIS Knlt.

Knowlton, Ann. Ent. Soc. Amer. 28: 281, 1935.

Alate vivipara: Antennae 2.3 mm. long; rostrum reaching 3rd coxae; hind tibiae 1.47 mm.; cornicles 0.39, slightly dusky; cauda pale.

Apterous vivipara: Body 2.29 mm. long; hind tibiae 1.47; hind tarsi 0.09; cornicles 0.44; cauda 0.26, pale.

Apterous ovipara: Body 1.5 mm. long; antennae 0.9; hind tibiae swollen, 0.53; hind tarsi 0.09; cornicles 0.16 mm., pale; cauda pale.

Taxonomy: Kakimia ribe-utahensis runs to *K. ceri* in Gillette and Palmer's key (Ann. Ent. Soc. Amer. 27:160) from which it differs in having shorter rostral IV + V, more definitely knobbed lateral hairs on cauda, a different seasonal life history, and smaller apterous ovipara.

Collections: Summer vivipara, males and ovipara of *K. ribe-utahensis* were taken at Cedar City, Utah, July 18, 1925, on native black currant (Knowlton).

KAKIMIA RIBIFOLII (Dvds.).

Davidson, Jr. Econ. Ent. 10:294, 1917.

Alate vivipara: Body 1.37 mm. long; antennae 1.98, dusky; cornicles dark, imbrications minutely setulose; cauda dark, 0.2 mm. long.

Apterous vivipara: Body 1.39 to 2.05 mm. long; antennae 1.39 to 1.45, dusky; hind tibiae 0.98 to 1.02; hind tarsi 0.07; rostral IV + V, 0.14 mm.; cornicles and cauda dark.

Alate male: Body 1.55 mm. long; antennae 1.84, dark; antennal III, 0.53 mm. long with 35 sensoria; IV, 0.24 with 7 sensoria; VI. 0.08 + 0.55; cauda 0.1, dark; other characters as in alate vivipara.

Collections: Two slides lent by Professor E. O. Essig were collected on *Ribes* at Berkeley, California, March 18, 1937(W. Sampson); 3 slides from the type locality were secured through C. F. W. Muesebeck from the U. S. National Museum, curling leaves of *Ribes glutinosum* at Redwood Canyon near Walnut Creek, California, May 7, 1914 and March 26, 1915; also a metatype slide, Redwood Canyon May 7, 1914 (W. M. Davidson), was lent by Professor M. A. Palmer.

Taxonomy: K. ribifolii (Dvds.) is close to *K. houghtonensis* (Troop) but differs in having fewer sensoria on antennal IV of alate and shorter unguis in aptera.

KAKIMA THOMASI H.-F.

Hottes and Frison, Ill. Nat. Hist. Surv. Bul. 19: 343, 1931.

Described from specimens collected on *Ribes* at Rock Island, Illinois, July 9, 1929 (Frisom-Hottes).

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )follows; then** the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Abrams, L.—Entomological collections. [14th Ann. Rep. Nat. Hist. Mus. Stanford Univ.] 1937-38: 3-4. **Bartlett, K. A.**—A search in the Guianas and Trinidad for predatory beetles of the bamboo scales. [Jour. Agric. Univ. P. R.] 22: 493-495. **Beaulne, J. I.**—Liste des parasites et predateurs recoltes au Laboratoire d'Entomologie a Quebec. [98] 66: 95-96. **Bovien, P.**—Some types of association between Nematodes and Insects. [Vidensk. Medd. fra Dansk naturh. Foren.] 101: 1-114, ill. **Brues, C. T.**—The mimetic resemblance of flies of the genus Systropus to wasps. [5] 46: 20-22. **C. H. D. C.**—A new "Nomenclator Zoologicus." [Can. Field-Nat.] 53: 62. **Davis, J. J.**—The necessity of a changing world. [12] 32: 1-10. **Goidanich, A.**—Il deperimento primaverile del Sorgo zuccherino in Piemonte nei suoi rapporti congli insetti e in particolare con gli Afidi. [Boll. Inst. Ent. Bologna] 10: 281-315, ill. **Henze, Dr.**—Köninginnen in einem Hornissenschwarm. [Kosmos] 36: 116-117, ill. **Holloway, J. K.**—An agar preparation for feeding adult parasite insects. [12] 32: 154. **Johnson & Mellanby.**—Bedbugs and cockroaches. [107] A, 14:50. **Jones, M. P.**—4-H Club Insect Manual. [U. S. D. A.] Misc. Publ. 318: 63 pp., ill. **Liu, Gaines.**—Some extracts from the history of entomology in China. [5] 46: 23-28. **Parks et al.**—Agencies utilized in dessеminating information on insect control. [12] 32: 11-21. **Philip, C. B.**—Ticks as vectors of animal diseases. [4] 71: 55-65.

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COLEOPTERA.—Balfour-Browne, J.—On Copelatus and Leiopterus (Dytisc.) with descriptions of n. spp. [36] 88: 57-88, ill. **Bartlett, K. A.**—The dung rolling beetle [Canthon pilularius] as a host of a Sarcophid parasite [Carcophaga alcedo]. [12] 32:150. **Benick, L.**—Die Steninen Mittelamerikas (Staph.) [Mitt. Munchner Ent. Gesell.] 29: 12-42, ill. (*). **Blaisdell, F. E.**—Studies in the relationships of the subfamilies and tribes of the Tenebrionidae based on the primary genital characters also descriptions of new species. [1] 65: 43-60, ill. **Brown, W. J.**—Some American spp. of Ludius (Elateridae). [4] 71: 44-49, ill., (*). **Bruch, C.**—Miscelaneas Entomologicas. [Notas del Museo de La Plata] 3: 155-173, ill. (s*). **Buchanan, L. L.**—Changes of names in Carabidae and Rhynchopophora. [10] 41: 79-82. **Cazier, M. A.**—Two new California Acmaeodera. (Buprestid.). [Bull. So. Calif. Acad. Sci.] 37: 137-140. (*), **Darlington, P. J.**—West Indian Carabidae. New forms from the Dominican Republic and Puerto Rico. [Mem. Soc. Cubana Hist. Nat.] 13: 79-101. **Dodge, H. R.**—The bark beetles of Minnesota (Scolytid.). [Univ. Minn. Agric. Exp. Sta.] Tech. Bull. 132: 60 pp. (k) **Knull, J. N.**—Four new Arizona Coleoptera (Cleridae, Corynetidae & Buprestidae). [7] 32: 27-31, ill. **Plank, H. K.**—See under Hemiptera. **Roberts, A. W. R.**—On the taxonomy of Erotylidae with special reference to the morphological characters of the larvae. [36] 88: 89-118, ill., (k). **Ruffo, S.**—Studi sui Crisomelidi. [Boll. Ist. Ent. Bologna] 10: 178-222, ill. **Saylor, L. W.**—Two new California Phyllophaga (Scarab.) [10] 41: 88-91, ill. (k). **Schedl, K. E.**—Some new neotropical spp. of Scolytidae in the collection of the British Museum. [107] B, 8: 12-16, ill. **Smith, F. K.**—Amphizoidae and Haliplidae of Colorado. [Jour. Colo.—Wyom. Acad. Sci.] 2: 37-38. **Straneo, S. L.**—On the genus Abaris (Carab.). [5] 46: 38-41, ill., (Sk*).

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SPECIAL NOTICES. — Beobachtungen uber das schwarmen und die kopulation einiger Empididen. By R. Tuomikoski. [Ann. Ent. Fennici] 5: 1-30, ill.

SPECIAL NOTICES.—The British Mosquitoes.—By J. F. Marshall. London. 1938. 341 pp., ill. **Entomologische Mededeelingen** van Nederlandsch-Indie. A comparatively recent new journal published by the Entomological Society of the Netherland Indies, Buitenzorg, Java, under editorship of Dr. J. van der Vecht. Published to date: Deel I, 1935: deel 4, no. 4 Dec. 1938. **Zur Kenntnis der** Dryinidae (Sphecoid.) Haupt, H. [Zeit. Naturwissensch.] 92: 13-35, ill. **Die Legewerkzeuge der** Blattwespen (Tenthredinoidea). Zirngiebl, L. [Beit. Naturk. Forsch. Sudwestdeutschland] 3: 39-65, ill. **Pieris bryoniae O.**—und Pieris napi L. By Muller & Kautz. 191 pp., ill. Wien 1938.

A CONTRIBUTION TO THE BIOLOGY OF NORTH AMERICAN VESPINE WASPS. By CARL D. DUNCAN. Stanford University Publications, Biological Sciences, vol. VIII, No. 1, 1939. 272 pp., 54 plates. This elaborate and valuable monograph of the western yellow jacket, *Vespula pensylvanica,* with occasional references to other species, covers three main topics. Two of these are studied in the first section (pp. 13-84), which is a detailed and profusely illustrated account of external morphology, combined with a description of the musculature and its mechanism. The homologies appear to have been worked out with the utmost care. This section should provide the taxonomist with the correct terminology of sclerites, sutures and areas, not only for the Vespidae but also for most other Aculeata. A brief chapter (pp. 85-97) is devoted to subfamily and generic characters. The bulk of the book (pp. 98-176) is a fascinating account of the biology of *V. pensylvanica*, with frequent glimpses of other species. Among other topics, it discusses hibernation, food and feeding behavior, building activities, life-history and metamorphosis. There is a good description of larva and pupa (pp. 162-166). Instincts and other psychological aspects of wasp behavior are not touched upon. As shown by the "Literature Cited" (pp. 177-184), American writings have been fully considered, European publications (particularly of recent years) very little. As a comprehensive account of one species of social wasp, the book ranks quite high and, it is hoped, will set a standard for other students. Two observations seem to record novel features, at any rate to the reviewer. On two occasions colonies were observed which survived the mild winter of California, being active for part of a second season. One of these was of *V. vulgaris*, the other of *V. pensylvanica*. (pp. 140-141 and 159). Some evidence is also given (p. 170) that *V. maculifrons* might occasionally overwinter as a colony in Florida. The author observed rather frequently that the face of older, unused combs of the nest may be papered over (p. 149). The biological differences pointed out between *Dolichovespula* and *Vespula* (pp. 94 and 96) are essentially the same as those found in Europe by Weyrauch, although both observers reached their conclusions quite independently.—J. Bequaert.

Doings of Societies

The Puget Sound Entomological Society.

Entomological workers in western Washington gathered at the University of Washington, Seattle, on Friday, March 10, 1939, and organized The Puget Sound Entomological Society. The objectives of the society are to promote the study of insects, arachnids, and terrestrial arthropods in western Washington, and to promote the mutual welfare of the members through the exchange of ideas at meetings and field trips. Membership is open to persons of good character who are engaged in entomological activities. The society will hold two regular meetings annually, in February and October, the precise time and place to be determined by the Executive Committee which is composed of three elective officers. The present officers are: Professor Trevor Kincaid, University of Washington, president; Mr. S. E. Crumb, Entomologist, Bureau of Entomology and Plant Quarantine, vice-president, and Dr. E. P. Breakey, Entomologist, Western Washington Experiment Station, secretary-treasurer. Special meetings may be called by the Executive Committee at such time and place as it may determine.

The organization of the Puget Sound Entomological Society was the result of a movement initiated in the fall of 1938 by Dr. Breakey. Thirty-two persons with entomological interests, both professional and hobby, gathered in Puyallup on November 18, 1938. Many spent the afternoon visiting the Western Washington Experiment Station, and the U. S. Bureau of Entomology and Plant Quarantine Field Stations in Puyallup and Sumner. In the evening the group gathered for dinner, after which a discussion was held on the desirability of forming a permanent organization. Dr. Breakey was elected provisional chairman and Mr. Charles F. Doucette, Bureau of Entomology and Plant Quarantine, Sumner, provisional secretary. The chairman appointed a committee on organization: Prof. Melville H. Hatch, University of Washington, chairman, to present a constitution and by-laws for discussion and approval at the next meeting. A nominating committee, Mr. W. W. Baker, Bureau of Entomology and Plant Quarantine, chairman, was also appointed.

The October meeting is to be held in Puyallup.

E. P. Breakey, Secretary-Treasurer.

Leptothorax manni Wesson synonymous with L. pergandei Emery (Hymenoptera: Formicidae).

In 1935 (Ent. News vol. 46 pp. 208-210) I described *Leptothorax (Dichothorax) manni* (name preoccupied by *L. manni* Wheeler) from Tennessee and distinguished it from *L. (D) pergandei* Emery to which it was closely allied. Since publication, I have had opportunity to examine much more material in this group, and conclude therefrom that *L. manni* Wesson is synonymous with *L. pergandei* Emery.

L. G. Wesson, Jr.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Geometers Wanted from all parts of United States and Canada, for cash or in exchange for butterflies. Noctuids or other Geometers. Edwin I. Guedet, P. O. Box 305, Napa, California.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Mites from northern Manitoba. I have over 1600 specimens of free-living mites which I would like to have identified. Duplicates may be retained. H. E. McClure, Lewis, Iowa.

SEE SECOND PAGE OF COVER FOR NEW ADDRESS OF EDITOR

ENTOMOLOGICAL NEWS

JULY, 1939

Vol. L No. 7

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Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

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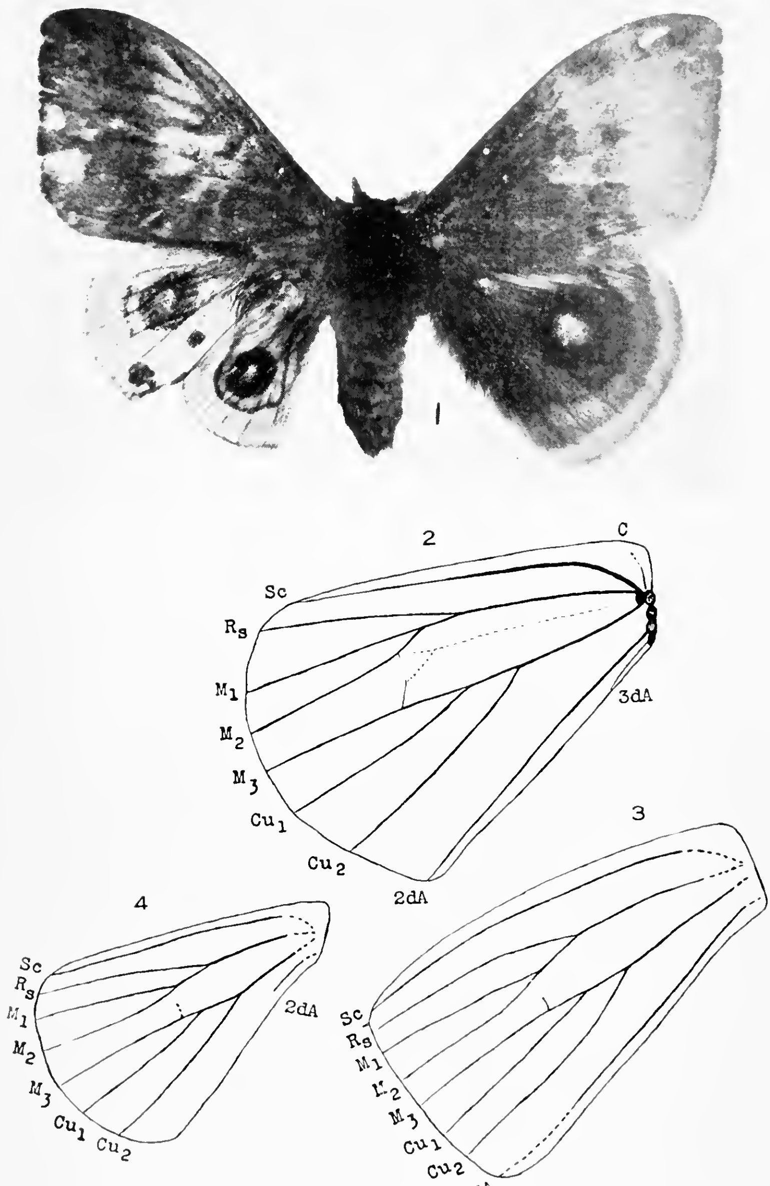

ABNORMAL IO MOTH, AUTOMERIS IO.—Phillips.

ENTOMOLOGICAL NEWS

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A Male Io Moth (Automeris io) with Two Hind Wings on the Left Side (Lepid.: Saturniidae).

By ROBERT G. PHILLIPS, Norwood, Pennsylvania.

(Plate II.)

This abnormal male Io Moth was collected at Dalmatia, Northumberland County, Pennsylvania, on July 13, 1937, between 9:00 and 9:45 p. m. It was attracted to the lights of the gasoline station operated by H. K. Agnew and R. E. Cleaver, and was captured by one of these men. Previously, I had left a cyanide killing jar and an insect net with them so that insects which were attracted to these lights might be captured. Two other male Io Moths and a Big Poplar Sphinx Moth *(Pachysphinx modesta)* were captured this same evening. I did not observe the abnormal moth until the next morning while mounting these and other insects. It is most unfortunate that the abnormality was not seen before the insect was killed so that its flight might have been observed.

The hind wing shown in figure 2 was drawn from a normal specimen especially prepared to show wing veins, in the Entomological Laboratory of the University of Pennsylvania. There was some question about the presence of the third anal vein (3dA) and the closed cell on this specimen, to which Forbes (1923) refers. Further, there seemed to be a possibility that a rudimentary costa might be present. Consequently, the hind wings of three other normal male Io Moths were studied. These wings were prepared as follows: (a) the wings from one were removed and placed in cedar oil on microscope slides; (b) the wings from another moth were heated for a brief period in a ten per cent solution of potassium hydroxide, washed, spread until dry, descaled with a camel's hair brush, and then placed in cedar oil as in (a); and (c) the third pair of wings were descaled as much as possible with a camel's hair brush and then placed in cedar oil as in (a). The wings prepared according to method (c) were superior to any used for the study of venation. Study of these wings verified the presence of a rudimentary third anal vein and a rudimentary costa. This costal (?) vein did not seem to be the humerus which is present in some Lepidoptera. The cell was not closed as Forbes (1923) states. There is present, however, a fairly long piece of the lower discocellular projecting anteriorly from M_3 and a shorter piece of the discocellular projecting posteriorly from M_2, but they do not meet. When the wings which were prepared according to method (c) were lifted out of the celar oil, or moved so that no oil covered them, a faint line became visible in the chitin between the radius and the cubitus. This line corresponds to the media in position, although it appears as a slight ridge and is not a vein. The location of this ridge is indicated by the dotted line in figure 2.

Figure 3 illustrates the venation of the anterior hind wing from the left side of the abnormal moth. Neither of the abnormal wings was removed and as a result not all the veins could be seen. The dotted lines indicate the probable locations of veins, or parts of veins, the presence of which could not be determined because something (many scales, etc.) may have obscured them. The third anal vein and the discocellular projection from M_2 could not be seen in this wing, which otherwise seemed to have venation corresponding to the normal wing. The wing is a little smaller than a normal wing and differs somewhat in shape as the figures show. A small projection which appears to be chitinous extends outward on the outer margin from between the subcosta and the radial sector. This peculiar structure is .4 mm. long.

In figure 4 the venation of the posterior hind wing can be observed. The venation corresponds to that of the anterior hind wing except that only a small part of the second anal vein could be seen. The anal edge of this wing is slightly folded and that makes it very difficult to see the second anal vein. Since no part of it could be seen at the distal end there is no dotted line to indicate its probable existence. This wing is somewhat smaller than the anterior abnormal wing but corresponds more closely to the normal wing in shape. The costal margin of this wing fits under the anal margin of the wing anterior to it. The relationship between the abnormal wings seems to be similar to the relationship which exists between a normal hind wing and a normal fore wing, the wings being entirely separate.

The two abnormal wings vary somewhat from the normal in both shape and size. In color and venation they seem to be almost duplicates of each other and to resemble the normal wing very closely. The third anal vein and the costal vein could not be seen on the abnormal wings but it is easily possible that scales and hairs obscured them completely. The lower discocellular projections were probably hidden in the same manner since only one piece, the anterior projection from M_3 on the anterior hind wing, could be seen.

The complete condition of the veins in these two abnormal hind wings differs, in this case, from those described by Hering (1926): "Ein Übergang zu den monstra per defectum bilden die Fälle, in denen das Auftreten eines überzähligen Flügels beobachtet wurde. So ist berichtet worden von einer *Macrothylacia rubi* L. mit einem überzähligen Hinterflügel; eine *Lasiocampa quercus* L. soll auf der linken Seite zwei Vorderflügel besessen haben. In Wirklichkeit erfolgt hier nicht die Neubildung eines überzähligen Flügels; untersucht man die geschilderten Fälle genauer, so kann man feststellen dass sich der sogenannte fünfte Flügel auf Kosten eines andern entwickelt hat; in Wirklichkeit ist nämlich kein neuer Flügel ausgebildet worden, sondern einer der normalen hat sich geteilt (natürlich in einem sehr frühen Stadium, wahrscheinlich schon in der Imaginalscheibe), so dass aus einem Flügel zwei geworden sind, die aber nur zusammen das Geäder etwa eines Flügels besitzen." (p. 435, lines 13-25).

The wing veins were identified according to Forbes (1923) who shows a figure (415) of the venation of a male *Automeris io*. Comstock (1918) illustrates the venation of *Citheronia* *regalis* which corresponds closely to that of *Automeris io*. These two authorities agree on all veins of the hind wing of *Citheronia regalis* except that Comstock labels the most anterior vein as Sc + R_1 (subcosta + first branch of the radius), and Forbes recognizes it as Sc (subcosta). It follows, therefore, that if the wing drawings were labeled according to Comstock the most anterior vein would be labeled Sc + R_1 instead of Sc.

The photograph of the moth (Fig. 1) shows that the abnormal wings are not as well covered with scales as is the normal hind wing. It is possible that some of these scales may have been rubbed off. Two dark spots can be seen posterior to the eyespot on the anterior abnormal wing. These spots are visible on both upper and lower surfaces because of the dearth of scales, and seem to be due to foreign matter which adheres to the ventral surface of the wing. The wing spread of this abnormal specimen is 61 mm., and the wing spread of the normal moth which was used for figure 2 is 58 mm.

This article was written at the suggestion and under the supervision of Dr. Philip P. Calvert, Professor of Zoology, at the University of Pennsylvania.

Literature Examined.

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Explanation of Plate II.

Figure 1. Photograph of abnormal *Automeris io*, male. Dalmatia, Northumberland County, Pennsylvania; July 13, 1937; by Mr. Herman A. Walters.

Figure 2. Venation of a normal hind wing of *A. io*, ♂. (maximum length — 23 millimeters; maximum width — 17 millimeters.)

Figure 3. Venation of the anterior hind wing of the abnormal *A. io*, ♂. (maximum length—22.5 mm.; maximum width—12.5 mm.)

Figure 4. Venation of the posterior hind wing of the abnormal *A. io*, ♂. (maximum length — 17 mm.; maximum width — 11 mm.)

C, costa; Sc. subcosta; Rs, radial sector; M_1, M_2, M_3, branches of media; Cu_1, Cu_2, branches of cubitus; 2dA, second anal vein; 3dA, third anal vein.

A Questionable Practice in the Bureau of Entomology and Plant Quarantine.

By HENRY FOX, Department of Biology, University College, New York University.

It is apparently not a matter of general knowledge that an editorial policy exists in, at least, one of the professedly scientific bureaus of the Government which, as applied in the instance here under review, would appear to have highly questionable ethical implications. In 1935, in response to a request from C. H. Hadley for information desired for an article then being written, I prepared a brief outline of the results to date of a personal study of the conditions likely to influence the distribution of the Japanese beetle on this continent. This paper, which was written after the termination of my employment in the Bureau, was furnished Mr. Hadley upon the strength of an agreement on his part to accord full recognition to the source.

The published article by Mr. Hadley entitled "Progress of Japanese Beetle Investigations" appeared last year (1938) in the June number of the Journal of the New York Entomological Society. An entire paragraph in this article devoted to the question of the ultimate distribution of the beetle is a virtually verbatim transcript of the paper referred to above as furnished Mr. Hadley upon his agreement to accord recognition to the source. In his article as published this recognition is withheld.

Shortly after his attention was called to this evident violation of his agreement, I received a note from Mr. Hadley in which he disclaimed personal responsibility for the omission, charging that it lay with the Editorial Office of the Bureau of Entomology and Plant Quarantine. He claimed that the original draft of his article contained a footnote in which an unpublished "manuscript" of mine was cited as the source and that this had been deleted by the Editorial Office against his protest.

Inquiry addressed to the Editorial Office elicited from the Chiefs of the Bureau, Lee A. Strong and S. A. Rohwer, information which substantiated the charge made by Mr. Hadley. As justification for the deletion from the latter's article of reference to my contribution, Mr. Strong merely stated that it is the general practice of the Editorial Office of the Bureau to delete references to unpublished reports, giving as a reason the fact that such reports would not be available to the readers of the article. Later, in reply to a letter in which I called his attention to a retention of references to unpublished reports in another article[1], Mr. Rohwer stated that this rule applied only to reports upon officially assigned projects.

By way of comment upon the assumption made by the heads of the Bureau that the paper utiiized by Mr. Hadley was a "report" upon an officially assigned subject, I need first to emphasize the fact that the so-called report was written when I was not employed in the Bureau and when, in consequence, I was under no obligation to submit a report upon a study which *officially* came to an end with the terminatiin of my employment. It was prepared, as previously stated, in direct response to a request from Mr. Hadley, was never intended to be a report, or as more than a purely personal contribution to his article. Hence, the assumption that it was an official report, as implied by the Bureau officials, is without justification in fact.

As an additional reason for challenging the right assumed by the Bureau to disregard the obligation of an author to acknowledge the source of his material, I may state that, even during the period of my employment in the Bureau, my study of the conditions likely to influence the ultimate distribution of

[1] Hawley, I. M. and G. F. White. Preliminary Studies on the Diseases of Larvae of the Japanese Beetle. Jour. N. Y. Ent. Soc. 43: 405-412. 1935.

the Japanese beetle was conducted for the most part unofficially, the speculative nature of the inquiry impressing me as unsuitable for an official project. It was only near the close of the period in question that the subject was officially recognized as a formal project of investigation. This came about as a result of repeated inquiries for information received by the Bureau, and referred to me for reply, upon the chances of establishment of the beetle in more or less remote sections of this continent.

At the termination of my official employment this study had not reached a stage at which, in my judgment, publication of the indicated results was desirable. Accordingly, as opportunity offered, it was continued independently, as a matter of personal interest, and the results are embodied in an article written during the past year and since accepted for publication as a contribution from the Department of Biology of New York University. Some of the earlier results of this unofficial extension of the study were included in the outline furnished Mr. Hadley in 1935.

The implied claim of the head officials of the Bureau of Entomology and Plant Quarantine that my brief outline of 1935 represented an official report would thus appear to rest upon a very questionable basis. Nevertheless, the sole reason which those officials have offered to justify the inclusion of the material of that outline in Mr. Hadley's article, without acknowledgment of the source, is the existence in the Bureau of an editorial practice which precludes the citation in publications by its staff of unpublished reports upon officially assigned subjects. It is clear that in the application of this rule some provision needs to be made to guard against possible plagiarism in cases where a writer utilizes material supplied by others, but no hint of the existence of any check of this kind is given in the available official correspondence. Neither is any evidence submitted in the same documents to show that, in the present instance, due consideration was given to the obvious fact that means exist, other than direct citation of unpublished papers, whereby an author can record his obligations.

Immature Staphylinids of the Genus Quedius (Coleoptera: Staphylinidae*).

By Ralph Voris, Southwest Missouri State Teachers College Springfield, Missouri.

(Continued from page 155.)

Quedius spelaeus Horn.

Quedius spelaeus Horn, 1871, Trans. Amer. Ent. Soc. 3:332. Acc Horn, 1878, Trans. Amer. Ent. Soc. 7:158. Blatchley, 1926, 21st. Ann. Rep. Ind. Geol. & Nat. Resources 196. larva.

Egg. Unknown.

Larva. (acc. Blatchley) Length 15. mm.

Head with sides parallel, hind angles rounded; exuviae (in alcohol), testaceous to castaneous. *Clypeo-labral* margin with median tooth one-half length of first lateral; first lateral extremely long, conical; clypeal teeth all distinct, not forming with first lateral a smooth arc as first clypeal is below the arc formed by the third clypeals and the first laterals; clypeal teeth forming an angle of less than 30°. *Ocelli* absent. Antennae with second segment much longer than first; third shorter than second, "gibbous beyond the middle, the gibbosity with an external and an internal long bristle." (Blatchley 96:196); thumb present; fourth segment shorter than third. *Maxillae* with stipes about twice as long as cardo; lacinia slender; palps with three segments subequal in length; second segment with spine on inner surface near base and spine and outer surface near apex; third segment rapidly narrowed near middle continuing slender to the tip. *Labium* with dorsal surface of stipulae, palpigers, and posterior half of ligula densely covered with small spines; palpigers prominent; ligula small; palps with first segment much larger than second.

Abdomen with urogomphus biarticulate, confluently not as long as pseudopode; second segment short, distinct. *Pupa.* Undescribed.

The larvae and adults are said to occur in the caves of southern Indiana and northern Kentucky. Not represented in my collection.

Quedius iracundus (Say).

Staphylinus fulgidus Fabricius, 1787, Mantissa Insectorum, Hafniae 1:22. acc Erichson, 1840, Genera et Species Coleopterorum 526.

Staphylinus iracundus Say, 1834, Trans. Amer. Phil. Soc. 4:449. Erichson, 1840, Genera et Species Coleopterorum 526.

Quedius fulgidus Erichson, 1840, Genera et Species Coleopterorum 525. Horn, 1878, Trans. Amer. Ent. Soc. 7:158. Blatchley & Wickham, 1896, 21st. Ann. Rep. Ind. Geol. and Hat. Res. 195. Banta. 1907, Carnegie Inst. Washington, pub. 67:31, fig. 3, pupa. Casey, 1915, Memoirs on the Coleoptera 411, 416.

Micrasaurus iracundus Casey, 1915, Memoirs on the Coleoptera 411, 416.

Quedius iracundus Leng, 1920, Cat. Coleop. Amer. N. of Mexico 110.

Egg. Unknown.

Larva. Unknown.

Pupa. Length 7.1 mm., Width 2.8 mm.; anterior margin of prothorax not bearing spines; lateral margins of the fourth, fifth, sixth, seventh, eighth and ninth abdominal segments each bearing one sharp, stiff spine; terminal spines of medium length, sharp; female accessory spines long and sharp.

The material available consists of one exuvia (female) and two adults, loaned by A. M. Banta. The adults were originally identified by H. F. Wickham as *Quedius fulgidus* Fabricius. The material is all from Mayfield's Cave, Bloomington, Indiana, being part of the material on which Banta's "The Fauna of Mayfield's Cave" was based. The adults have the eye and antennal characters mentioned by Casey.

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Voris, Ralph 1934. Biologic investigations on the Staphylinidae (Coleoptera). Trans. Acad. Sci. St. Louis 8: 233-261.

Xambeu, C. 1910. Moeurs et metamorphosis des Staphylinidae. L'Echange 26:47.

Explanation of Plate I.

Fig. 1. *Quedius capucinus,* dorsal view head. Larva.

Fig. 2. *Quedius capucinus,* lateral view of head. Larva.

Fig. 3. *Quedius capucinus,* ventral view of head. Larva.,

Fig. 4. *Quedius molochinus,* dorsal view right half of head. Larva.

Fig. 5. *Quedius capucinus,* dorsal view. Pupa.

Fig. 6. *Quedius capucinus,* lateral view. Pupa.

Fig. 7. *Quedius capucinus,* ventral view. Pupa.

Fig. 8. *Quedius molochinus,* lateral view head. Larva.

Fig. 9. *Quedius capucinus,* lateral view seventh, eighth and ninth abdominal segment of female. Pupa.

Fig. 10. *Quedius capucinus,* lateral view seventh, eighth, and ninth abdominal segment of male. Pupa.

Fig. 11. *Quedius capucinus,* dorsal view labium. Larva.

Fig. 12. *Quedius molochinus,* ventral view clypeo-labral margin and the arrangement of spines around the mouth. Larva.

Fig. 13. *Quedius molochinus,* antenna. Larva.

Fig. 14. *Quedius capucinus,* antenna. Larva.

Fig. 15. *Quedius capucinus,* dorsal view right maxilla. Larva.

Fig. 16. *Quedius capucinus,* lateral view urogomphus and pseudopode. Larva.

Fig. 17. *Quedius capucinus,* Ventral view clypeo-labral margin and the arrangement of spines around the mouth. Larva.

Fig. 18. *Quedius capucinus,* dorsal, lateral and ventral plates of fourth abdominal segment. Larva.

Fig. 19. *Quedius molochinus,* gular suture and labium. Larva.

Fig. 20. *Quedius molochinus,* lateral view urogomphus and pseudopode. Larva.

Fig. 21. *Quedius molochinus,* ventrolateral view left maxilla. Larva.

A Preliminary Study of the Superfamily Papilionoidea in the Northern Portion of Pine County, Minnesota. (Lepidoptera).

By G. N. Rysgaard, Museum of Natural History, University of Minnesota.

A three year study of the Papilionidea of Sturgeon Lake, Pine County, Minnesota was made by the author during the summer months of 1936, 1937, and 1938. The period of observation during each summer extended from late June to late August.

The chief objective of the study was to establish locality dates and records for the area, since little work has been done in plotting the distribution of the lepidopteran fauna of this state. The secondary objective was to study the periodicity of abundance and scarcity in order to determine the life cycle periods. Thirdly, it was hoped that information as to local distribution according to habitat areas might be gained.

The area under study embraced many different habitats. A small tract of aged Norway and white pines stands as a nucleus of the area and represents sub-climax conditions; surrounding this and extending over a great proportion of the area is the jack pine forest which represents a still earlier stage of ecological succession. There are hardwood areas of basswood, maple, and oak that nearly equal the coniferous expanses and represent the climax vegetative type for this region. Large tracts of cleared land are maintained in short grass and small floral forms by grazing and recreational activities. Also fields of alfalfa are cultivated. There are two small lakes included in the area, both surrounded by swampland, one being chiefly a cat-tail marsh with an adjoining meadowland slough, while the second consists chiefly of wire grass with a surrounding growth of alder and willow. In addition, a small cranberry bog and an extensive tamarack-spruce swamp are to be found within the borders of the studied area. The shoreline of Sturgeon Lake is sandy, representing the pioneer stage of succession which rapidly dovetails into alder-willow brush succession and thence into both coniferous and deciduous succession stages. Certain small areas along the beach are low and usually are extremely damp and contain standing water; here cat-tails, swamp milkweed, boneset, sun dew, and other helophytic forms are to be found.

The large number of varied habitats and environmental areas give support to a similar large number of Papilionoidea, forty-two species and three subspecies having been observed during the three year period. Two of this number, the Gulf Fritillary (*Dione vanillae*) and the Macoun's Arctic (*Oeneis macounii*), may be considered stragglers and not indigenous forms.

Following is an annotated list of those species taken during the period of study:*

4. Black Swallowtail (*Papilio ajax L.*), July 3, 1937.
15. Tiger Swallowtail (*Papilio glaucus turnus L.*), June 9, 1937.
41. Orange Sulphur (*Colias eurytheme* Bvd.) August 18, 1937.
42. Clouded Sulphur (*Colias philodice* Godt.), July 11, 1938.
45. Little Yellow (*Colias interior* Scud.), July 15, 1937.
75. Dainty Sulphur (*Nathalis iole* Bvd.), August 20, 1937.
82. Checkered White (*Pieris protodice protodice* Bwd. & Lec.), July 31, 1937.
82. Checkered White (*Pieris protodice vernalis* Edw.), June 9, 1937.
83. Gray-veined White (*Pieris napi* L.), August 4, 1937.
86. Cabbage Butterfly (*Pieris rapae* L.), August 18, 1937.
89. Monarch (*Danaus plexippus* L.), August 18, 1937.
96. Pearly Eye (*Enodia portlandia* Fabr.), July 14, 1937.
103. Little Wood-satyr (*Megisto eurytus* Fabr.), July 2, 1937.
106. Eyed Brown (*Satyrodes eurydice* Joh.), July 13, 1937.
117c. Grayling (*Minois alope nephele* Fabr.), July 14, 1937.
125. Macoun's Arctic (*Oeneis macounii* Edw.), July 2, 1935.
158. Gulf Fritillary (*Dione vanillae* L.), July 23, 1936.
159. Variegated Fritillary (*Euptoieta claudia* Cram.), July 23, 1938.
166. Great Spangled Fritillary (*Argynnis cybele* Fabr.), July 30, 1938.
167. Silver-spot Fritillary (*Argynnis aphrodite* Fabr.), July 14, 1938.

*Classification reference: Check List of the Lepidoptera of Canada and the United States, J. McDunnough, Memoirs of the Southern California Academy of Sciences, Part I, Macrolepidoptera, June 15, 1938.

167a. Silver-spot Fritillary (*Argynnis aphrodite alcestis* Edw.), July 15, 1938.
171. Mountain Silver-spot Fritillary (*Argynnis atlantis* Edw.), July 13, 1938.
200. Silver-bordered Fritillary (*Brenthis myrina* Cram.), July 31, 1937.
212. Meadow Fritillary (*Brenthis bellona* Fabr), July 12, 1937.
263. Silver Crescent (*Phyciodes nycteis* Dbdy. & Hew.), June 29, 1937.
265. Pearl Crescent (*Phyciodes tharos marcia* Edw.), July 2, 1937.
265. Pearl Crescent (*Phyciodes tharos* Dru.), July 29, 1938.
285. Violet Tip (*Polygonia interrogationis* Fabr.), August 1, 1938.
286. Hop Merchant (*Polygonia comma* Harris), July 29, 1937.
288. Green Comma (*Polygonia faunus* Edw.), July 24, 1938.
294. Gray Comma (*Polygonia progne* Cram.), July 19, 1937.
295. Compton's Tortoise-shell (*Nymphalis j-album* Bvd. & Lec.), July 31, 1937.
297. American Tortoise-shell (*Nymphalis milberti* Godt), August 12, 1938.
298. Mourning Cloak (*Nymphalis antiopa* L.), August 12, 1938.
299. Red Admiral (*Vanessa atalanta* L.), August 3, 1938.
300. Painted Beauty (*Vanessa virginiensis* Dru.), July 31, 1937.
301. Cosmopolite (*Vanessa cardui* L.), August 4, 1936.
303. Buckeye (*Junonia coenia* Hbn.), August 12, 1937.
321. Banded Purple (*Basilarchia arthemis* Dru.), August 4, 1937.
325. Viceroy (*Basilarchia archippus* Cram.), August 4, 1937.
435. American Copper (*Lycaena hypophlaeas* Bdv.), August 5, 1938.
447. Tailed Blue (*Everes comyntas* Godt.), June 26, 1938.
449. Scudder's Blue (*Plebeius scudderi* Edw.), June 27, 1938.
450. Spring Azure (*Plebeius melissa* Edw.), June 29, 1938.
473. Silvery Blue (*Glaucopsyche lygdamus* Dbdy.), June 26, 1937.

The occurrence of the Gulf Fritillary may be accounted for by the fact that a boys' camp is located in the center of the area, and tourists from the South are not uncommon. Possibly this specimen was carried by a car from the South, the specimen was badly damaged. It is now in the University of Minnesota collection on the Agricultural College campus. The Macoun's Arctic is found on the northern shore of Lake Superior in the Dominion of Canada, and one was taken by the author on Isle Royale, Lake Superior, in 1934. The Macoun's Arctic is a northern species with its southern limits in lower Canada. Both of these species are first records for Minnesota.

Habitat Areas.

An attempt is here made to ascribe habitat areas to the different species. This is a difficult task, for butterflies are so very active and wander over large areas of varying environmental conditions. In some instances, however, rather definite habitats may be associated with them.

Communities.

Basswood-Maple Climax: No species found commonly in this area, although at its boundaries facing open areas many Nymphalidae are to be observed.

Norway-White Pine Sub-Climax: Nearly devoid of all Papilionoidea.

Jack Pine Forest: The Compton's Tortoise-shell (*Nymphalis j-album*) specimens were all collected in the dense jack pine tracts where there appeared a scattering of birch. This species may be considered the predominant in this habitat; it is practically the sole species of Papilionoidea inhabiting the dense forest. However, where small clearings are made in the jack pine and such plants as blazing star (*Liatris*), wild bergamot (*Monarda fistulosa*), and certain Compositae had appeared, the fritillaries and swallowtails were present in considerable numbers.

Alfalfa Fields: The *Pieridae,* as would be expected, predominate in this habitat, being represented by the Clouded Sulphur (*Colias philodice*), Orange Sulphur (*Colias eurytheme*), Cabbage (*Pieris rapae*), Checkered White (*Pieris protodice* sp.), and Gray-veined White (*Pieris napi*) in order of their abundance. Where thistle was found infesting the alfalfa fields, especially along its borders, the Painted Beauty (*Vanessa virginiensis*) and the larger fritillaries were frequently seen. The greater abundance of the *Colias philodice* and *Colias eurytheme* probably is explained by the greater amount of available food, clover and vetch, both abundant to excess, being the food plants of the two aforementioned species. The other three Pieridae depended upon the much scarcer Cruciferae, found chiefly in the form of bulbous cress (*Cardamine bulbosa*).

Willow, Alder, and Hazel Brush: In areas of brush bordering open expanses or areas of loose brush, the Grayling (*Minois alope nephele*), Pearly Eye (*Enodia portlandia*), Eyed Brown (*Satyrodes eurydice*), and the Little Wood-satyr (*Megisto eurytus*) were common as were also the *Lycaenidae* represented by the Silvery Blue (*Glaucopsyche lygdamus*), Scudder's Blue (*Plebeius scudderi*), Spring Azure (*Plebeius melissa*), and the Tailed Blue (*Everes comyntas*). This latter group shows preference for the loose brush areas with interspaces of grass and clover. This same type of habitat appeals to the Silver Crescent (*Phyciodes nycteis*) and the Pearl Crescent (*Phyciodes tharos* sp.). The few Meadow Fritillaries (*Brenthis bellona*) taken were all captured here. The large fritillaries should be placed in this group, for it is in the brush country of this type that they are found most abundantly; and it is here that the larvae find food in the numerous violet plants. Their strong wings and wanderlust spirit lead them into nearly all environmental situations, and they may be expected to appear almost anywhere. The large fritillaries may be annotated as the Silver-spot (*Argynnis aphrodite* and also variety *alcestis*), Mountain Fritillary (*Argynnis atlantis*), Great Spangled Fritillary (*Argynnis cybele*), and the Variegated Fritillary (*Euptoieta claudia*). The Banded Purple (*Basilarchia arthemis*) and the Mourning Cloak (*Nymphalis antiopa*) should also be mentioned. Although the larvae of the Mourning Cloak feeds on the willow and may be found in abundance on the willow brush, the adult prefers the open beaches. It must be remembered that many types of willow, which also serve as food, are found growing along the lake shore.

Wire-grass Bog Bordering Interior Lake: The predominant species in this community is the Silver-bordered Fritillary (*Brenthis myrina*).

Cat-tail, Wire-grass, Willow Swamp Surrounding Interior Lake: The Viceroy (*Basilarchia archippus*) is the outstanding species inhabiting this community.

Sand-beach Community: This community is perhaps one of the most interesting of all those studied. An expanse of some thirty yards of scantily vegetated sandy shore surrounds Sturgeon Lake in the area studied and shows progressive succession from the pioneer community at the lake shore to the climax hardwood forest or sub-climax coniferous forest which lies about one hundred yards from the present shoreline and represents the original shoreline. A large portion of this shoreline supports typical sand dune community forms such as the Mutillidae, Bembecidae, Lycosidae, Cicindelidae. In this dry sand area are found the Buckeye (*Junonia coenia*), American Tortoise-shell (*Nymphalis milberti*) and the several *Polygonia*. In the more moist and more advanced areas supporting richer vegetation, the Mourning Cloak (*Nymphalis antiopa*), Red Admiral (*Vanessa atalanta*) and the Painted Beauty (*Vanessa virginiensis*) predominate; and each, in the height of its abundance, swarms on the beach. Low areas near the lake shore have resulted in growths of swamp milkweed, cat-tail, and sedge. Among these are found the diminutive American Copper (*Lycaena hypophlaeas*) and the Dainty Yellow (*Nathalis iole*).

This general distribution of the Papilionoidea as to habitat includes all those forms or species of common occurrence. Others were observed, of course, but not in sufficient numbers to warrant any conclusions being drawn.

(To be continued.)

The Biological Photographic Association.

The ninth annual Convention of the Biological Photographic Association will be held September 14th-16th, at the Mellon Institute for Industrial Research, Pittsburgh, Pennsylvania. The program will be of interest to scientific photographers, scientists who use photography as an aid in their work, teachers in the biological fields, technical experts and serious amateurs. It will include discussions of motion picture and still photography, photomicrography, color and monochrome films, processing, etc., all in the field of scientific illustrating. Up-to date equipment will be shown in the technical exhibit; and the Print Salon will display the work of many of the leading biological photographers here and abroad.

The Biological Photographic Association was founded nine years ago because of the growing need for expert illustrative material for scientific research and teaching. Many workers were solving their problems in their own way. But obviously they were wasting time and effort in individually repeating experiments that had been worked out elsewhere. The B. P. A. was formed to act as a clearing house for new ideas, to pool experiences, record standard procedures and disseminate information. Its aims were scientific and all services have been volunteered by officers and members on a non-profit basis.

Further information about the Association and the Convention may be obtained by writing the Secretary of the Biological Photographic Association, University Office, Magee Hospital, Pittsburgh, Pennsylvania.

The Nomenclature of Categories Lower than Species.[1]

By Curtis W. Sabrosky, Michigan State College.

A series of recent papers (1936-1938) has served to demonstrate the present uncertainty in the basic principles of the nomenclature of categories lower than species. The various interpretations of the nomenclatorial rules relating to this problem are so conflicting that it seems desirable to review them and to point out the complications into which they are leading us.

Prevailing Interpretations of the Rules.

The International Rules of Zoological Nomenclature actually mention only "subspecies" as lower than species, with no indication of the meaning and scope of the term. It is also stated that scientific names are "trimonial for subspecies".

[1] Journal Article No. 356 (n. s.) from the Michigan Agricultural Experiment Station.

These brief references appear to be interpreted in four principal ways among contemporary taxonomists, as follows:

1. *"Subspecies" includes all categories of lower rank than species;* therefore, all properly proposed names for such categories are valid and available.

One can infer that many taxonomists believe this, for in practice they propose infra-specific names—polynomials as well as trinomials—in proper Latin form, designate them as new, and accompany them with description and designation of type. Others use them, literature references pile up, biological data accumulate, changes of status are made, and soon the name is firmly entrenched in our voluminous literature.

2. *"Subspecies" in the Rules designates a definite concept, and is trinomial in form;* therefore, names of lower categories and polynomials are invalid and unavailable under the Code (e. g., Krombein, 1938, pp. 185, 186: "a varietal name has no status in nomenclature").

Like Krombein, Riley (1938, p. 31) maintains that names of categories lower than subspecies have "no status in scientific nomenclature". A trinomial form validates a name under the Rules, but only if it is definitely stated to be a subspecies, or in the absence of any statement to the contrary. If an author published a trinomial with the third name designated as "n.ab.", therefore, it would be rejected by Riley, although accepted by Hovanitz (see no. 3) with both claiming the correct interpretation of the Rules. Riley's deductions may not entirely bar the acceptance of names proposed as new races and varieties, if those names are regarded as *coequal* with and not *lower* than subspecies.

3. *The Rules recognize only one "subspecific" category, but trinomials are available regardless of their original rank.* (Hovanitz, 1938, p. 40: "Names proposed as bi- or trinomials are unaffected as to availability by reason of their having been originally described as of a biological category not generally considered of taxonomic significance.").

Thus the numerous names, particularly in Lepidoptera, which appear as new forms, aberrations, etc., are regarded as valid if proposed in trinomial form, but unavailable if not. Riley (1938) has pointed out some objections to this conception.

4. *"Subspecies" of the Rules is the name for a concept regarded as an incipient species,* i. e., one stage in the process of speciation during which, by natural selection, isolation, or other factors, certain populations gradually assume a homogeneous distinctiveness from the parent stock.

This interpretation would accept the names of races, varieties, etc., when these are regarded as evolutionary elements [2], but would reject names for aberrations, color forms, seasonal forms, etc., as contrary to the spirit of the Code. One must admit that it might be difficult to agree upon "evolutionary stages."

The viewpoint is more selective than Hovanitz' (3), and shows a broader recognition of terminology than that of Krombein and Riley (2). Most taxonomists who habitually use the terms variety (in one sense at least) and race in proposing new names undoubtedly believe that these names are valid under our system of nomenclature. In many orders of insects the term "subspecies" seldom appears, whereas variety (Diptera, Hymenoptera in part) and race (Orthoptera, Odonata) are frequently used for the third rank in a trinominal combination.

PROBLEMS.

Among these diverse conceptions, certain problems can be recognized as of paramount importance.

Problem 1. What is the meaning of "subspecies"? Should the Rules be construed to mean *one* category which must be designated "subspecies", or should a more inclusive interpretation prevail?

In actual practice, I believe we shall find that the discarding of all names other than definitely designated "subspecies" would overthrow a vast amount of valuable taxonomic work, both past and present, and would contribute far more to confusion than a strict interpretation could hope to counterbalance. A few prominent examples from current usage may be adduced to illustrate the point.

[2] Bates, 1935, p. 71: "The term subspecies . . . might well be applied to any partially independent population considered to represent an evolutionary stage in the development of species."

(a). In his highly valued monograph on the genus *Cynips* (1930), Kinsey recognized the lack of uniformity in terminology, and adopted the term "variety" for his trinomial combinations. He pointed out, especially with maps, the geographical isolation of these "varieties", showing that they correspond indeed to race, subspecies or choromorph of other authors. In view of the possible doubt on the validity of names proposed as "varieties" (cf. Krombein), it is interesting to note that Kinsey later (1936) abandoned his use of the term and proposed to use *species* for all of his units previously called *varieties!* It may also be mentioned that his elevation of varieties to the rank of species thereby made trinomials of his quadrinomial names for the bisexual and agamic forms.

(b). It is significant that a widely quoted book, "The Species Problem" by G. C. Robson (1928), uses the word *variety.* I find only two mentions of "subspecies" in the entire book: one is a mere reference (p. 198) to a Pleistocene form of a modern species; the other is a footnote on p. 26 to the effect that "the term 'subspecies' is often used instead of 'variety' to denote well-marked subdivisions of species". The preference to the use of "variety" in this notable work by an English zoologist is but one more strong indication that we should not generalize too arbitrarily on names other than "subspecies".

(c). The difficulty of applying rules of nomenclature to the terminology of older works is illustrated in Creighton's discussion of the development of infra-specific ranks in Formicidae. As he points out (p. 4), the early use of "variety" (Emery, about 1885) was equivalent to the term "race" of Forel (1874). Emery introduced the name "subspecies" in the early 1890's, and the latter eventually supplanted the term "race". Within the past few years the term choromorph has also been used. Creighton closes the matter very neatly in these words (p. 9): "If most subspecies and varieties are choromorphs why need we longer attempt to distinguish between the two ranks? *Such a separation has always rested on an auctorial basis which cannot be subjected to analytical evaluation*". (italics are mine).

Problem 2. What is namable? Do all the named categories really deserve formal Latinized designations which would enter into nomenclature?

The question of whether various forms (aberrations, etc.) deserve names is a moot problem. The viewpoint of a body of Lepidopterists, in America at least, is that these should be named; the opposing view is concisely set forth by Ferris and Doudoroff (1936).

Problem 3. Should polynomials (quadrinomials, etc.) and names for categories lower than subspecies (sensu lato) be recognized in nomenclature?

An affirmative answer to this question would probably involve changes in the Rules, or at least a much broader interpretation than many would grant at present. In part, the question would be answered by settling the other problems.

It cannot be denied, as Riley has pointed out, that polynomials are names for things; the problem of nomenclature is what to do with the names. One Lepidopterist (Bates, 1935, p. 74) has remarked: "It seems to me that the Linnean nomenclature, if it is not to become hopelessly unwieldy, is best restricted to the classification of populations. The classification of individuals within the population — of seasonal forms, aberrations, dimorphic female forms, and the like—is essentially a separate problem." Although Bates definitely opposes the acceptance of such forms as nomenclatorial units, it is evident from his reference to unwieldiness that he considers the names already proposed as available under the Rules.

If we agreed with Hovanitz that polynomials are unavailable under the Code, what would prevent subsequent authors from proposing aberrations, etc., as trinomials, thus fulfilling his requirement for nomenclatorial status? But it seems incongruous to insist that a name is acceptable if proposed as *Erebia ligea* ab. *subcaeca* (trinomial), but unavailable if proposed as *Erebia ligea carthusianorum* ab. *subcaeca!* In both cases, the name, the "ab.", the concept, and the intent of the author are the same. Can one be rejected but the other accepted?

The position taken by Ferris and Doudoroff appears to be a fair one, meriting the considered thought of all who deal with infra-specific categories. It may be summarized, perhaps a bit too bluntly, in three points:

(a). If you name any form, then consider the name in nomenclature.

(b). If a name is not to be recognized in nomenclature, don't name it.

(c). If you don't name it, and still wish to designate it in some way, then construct another system which will *not* enter into and complicate nomenclature (e. g., symbols in genetics, terminology of aphid life history, use of common names such as spring form, etc.).

CONCLUSIONS.

Whatever step is chosen, the whole situation points to the following *needs* of modern systematic zoology, especially in entomology:

1. A ruling as soon as possible on what names enter into nomenclature, defining the terms with fairness to all authors, with consideration for difference of usage, and with a view to avoiding confusion wherever possible.

2. Agreement on what is namable, and how to handle the remaining categories.

3. Acceptance of all past properly proposed names, of whatever rank, as entering into nomenclature and establishing priority. If we declare polynomials unavailable, repropose some, validate more recent names because of trinomial form, etc., etc., our taxonomy cannot help but be more or less confused. The literature will contain publications from authors with opposing views of validity. The tangle of available and unavailable, of valid and validated, of proposed and reproposed and unreproposed names, will be a morass of nomenclature for future taxonomists.

In the meantime, why assume that any one interpretation is the correct one, and make revisions accordingly? In the absence of an official opinion or interpretation, Riley, Hovanitz, Krombein, and others speak positively of their correct understanding of the Rules, and publish accordingly. But is all this scientific?

Must we pile error upon error, and revise errors with further errors, only to have to revise the whole situation again when a ruling finally becomes available? Can we not bide our time, seek a ruling which will clarify the entire situation, and thereby avoid further contributions to confusion? I believe in that way we can contribute far more to taxonomy than can be done either by insistence on one's own interpretation or by the complacent assumption of most taxonomists that their customary procedure is valid.

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Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.
The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within ( )**follows; then the pagination follows the colon :
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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Mites from northern Manitoba. I have over 1600 specimens of free-living mites which I would like to have identified. Duplicates may be retained. H. E. McClure, Lewis, Iowa.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

SEE SECOND PAGE OF COVER FOR NEW ADDRESS OF EDITOR

ENTOMOLOGICAL NEWS

OCTOBER, 1939

Vol. L No. 8

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Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

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ENTOMOLOGICAL NEWS

Vol. L. OCTOBER, 1939 No. 8

Subspecific Names and the Use of the Term interligata by the late Canon Cabeau.

Editor, Entomological News:

I have read in your esteemed journal what Mr. Hovanitz has published on the interpretation of the term subspecies (Feb., 1938) as well as the communication by Mr. Riley on the same subject (Feb., 1939), especially on the denomination "interligata" which the late Canon Cabeau employed to designate an aberrant character found in a goodly number of *Argynnis* and of *Melitaea*.

I permit myself to bring forward a contribution to this question which, I believe, will furnish the proof of the correctness of Mr. Riley's opinion.

In the Revue Mensuelle Sociéte Entomologique Namuroise, 1919, page 49, Canon Cabeau described for the first time this character *interligata* observed in *Argynnis selene* Schiff. Following is a copy of this description: "Anticis insuper alis secus limbum medium maculae nigrae ambae per lineam nigram ligantur. Au recto des ailes antérieures, les deux taches noires au-dessus de la partie mediane du bord interne sont réunies par un trait noir."

At the end of this description the author adds that he has observed this aberrant character equally in *Argynnis euphrosyne* L. and in *A. lathonia* L.

In the same *Revue*, 1922, page 18, this aberrant *interligata* character is mentioned as existing in *A. dia* L. and on page 46 in *A. ino* Rott. and in *A. pales* Schiff. var. *arsilache* Esper, Finally the same indication is furnished in *Lambillionea,* 1932, page 201, for *A. aphirape* Hb.

Not wishing to encumber the literature with a multitude of diverse names, Canon Cabeau has simply repeated the same very characteristic word to designate the same aberrant character in species of the *Argynnis* and *Melitaea* group.

But Canon Cabeau has not been the only one to notice this aberrant character. Vorbrodt (Schmett. Schweiz. 2. p. 611. figure Bull. Soc. Lepid. Geneve. vol. IV. fasc. 3 and 4, pl. 6, no. 3) had pointed it out before him in *A. pales* Schiff. var. *arsilache* Esp., terming it ab. *guedati.* I ought to add that in var. *arsilache* Esp. this ligature can be considered as constituting a second normal form of the type: more than 50 percent of the spceimens show this character.

Tutt (Ent. Rec. XXI, p. 225, 1909) had also pointed it out in *A. lathonia* L., terming it ab. *j-nigrum,* and Culot (Soc. Lepid. Geneve, Vol. I, p. 69) had in his turn remarked it in *A. amathusia* Esp. under the name of ab. *tramelana.*

If Canon Cabeau had followed these three authors, Vorbrodt, Tutt and Culot, in employing each time a different name even without any indicative meaning as Vorbrodt, Tutt and Culot have done, Mr. Hovanitz's remark would, doubtless, never have seen the light; he would have understood that is was a question of aberrations and not of subspecies.

[Translated]

F. Derenne-Meyers, Editor of the Revue d'Entomologie Lambillionea.

[Mr. Derenne-Meyers enclosed with his letter a photographic copy of a plate accompanying an illustrated supplement to No. 2 of Lambillionea for 1931, showing in figures 1 and 2 this aberrant *interligata* character in *Argynnis ino* Rott. and *A. dia* L. Figure 3 shows it in *A. lathonia* L. under the name ab. *j-nigrum* Tutt. We regret that we are unable to reproduce this plate in the News.—Editor.]

Death of Professor Karny.

Prof. Dr. Heinrich Karny, distinguished student of the Orthoptera and Thysanoptera, died at Graz, Austria, August 7, 1939. Dr. Karny was privatdozent at the University of Graz, and author of *Biologie der Wasserinsekten,* a text and reference book of 320 pages, with 160 text-figures, published by Fritz Wagner at Vienna in 1933.

Notes on Oeneis katahdin and semidea with Designation of Types (Lepid.: Satyridae).

By Richard M. Fox, Academy of Natural Sciences of Philadelphia.

In discussing *O. katahdin,* Mr. H. H. Newcomb did not designate a type specimen, but says in his first notice[1] "Described from a number of specimens taken by the writer on Mt. Katahdin. A detailed description and account of the species will appear in the October News." From the "detailed description and account"[2] the following quotations are pertinent:

"*Hab.* — Mt. Katahdin, Maine, at an elevation of 4250 to 5000 ft. above sea level. Described from forty-three males and twenty females taken by the writer at the above locality in the latter part of June of this year."

"I did not realize that I had discovered a new species . . . it was not until I had submitted specimens to Dr. Skinner and other entomologists that I felt sure that I had been so fortunate."

"I wish to thank . . . Dr. Henry Skinner for his kindness in helping me to determine that I had a new species in *Chionobas katahdin.*"

These statements by Newcomb led me to compare the series of *katahdin* in the collection of the Academy of Natural Sciences of Philadelphia with the excellent plate accompanying the "detailed description," and to check the dates of capture. Newcomb records that on June 28, 1901, he captured eleven specimens, on June 29, forty nine and on June 30, three. These are the sixty-three examples upon which the description was based.

Four specimens in the A. N. S. P. series bear the data "Mt. Katahdin, Me., June 29, 1901, collected by H. H. Newcomb," of these, two were figured by the author of the species[2] and are the originals of the two ventral surface views. One is a male (lower left corner of Newcomb's plate) and it is hereby designated lectotype of *katahdin* Newcomb, catalogued

[1] Newcomb, Ent. News. xii, p. 206 (1901).
[2] id., ibid, pp. 225-231, pl. viii (1901).

as type number 7783 A. N. S. P. As a consequence, the other sixty-two specimens of Newcomb's series collected in 1901 all become paratypes and may be so labelled by the various institutions having them.

In his description of the now famous Mt. Washington, New Hampshire, *semidea*,[3] Thomas Say remarked "Mr. Charles Pickering of Salem has recently presented me with an individual in an excellent state, from which the accompanying plate had been taken." The "accompanying plate," plate 50, was drawn by T. R. Peale.

Box 1A of the Peale collection, in the Academy of Natural Sciences of Philadelphia, contains sixteen specimens listed in Peale's handwriting as "Collected by T. R. Peale in the vicinity of Philadelphia." The statement is probably true of all the specimens except number twelve, which is *semidea*. In Dr. Henry Skinner's hand appears the note "No. 12 is Say's type of *Chinobas semidea*." This specimen exhibits remarkable similarity to the Peale drawing. Undoubtedly it was one of the two specimens before Say when he described *semidea*, specifically the one to which reference is made in the above quotation. Apparently it had been turned over to Peale so that the drawing could be made, after which Peale retained the specimen.

Of the Peale drawing, Scudder remarked[4]. "In this figure the secondaries are represented broader than in Nature, and in the coloring it is not very accurate; the upper surface is not dark enough, and should not have the nervures so reddish as given there; the under surface of the secondaries never has so marked an infusion of ochraceous colors in the outer half, and when it is at all conspicuously present, it also exhibits it somewhat on the basal half; the character also of the markings on the basal half is an unusual one, not representing the norm."

A check on measurements reveals that the Peale specimen exactly agrees with the drawing of the dorsal surface in Say; however the drawing of the ventral surface is disproportionate.

[3] Say, Am. Ent., iii, pl. 50 (1828).

[4] Scudder, Proc. Ent. Soc. Phila., v, p. 23 (1865).

This may have been what Scudder meant by "broader than nature." As to color, the agreement between the drawing and the Peale specimen is remarkable in that the markings are, as Scudder pointed out, "unusual . . . not representing the norm." Particularly the reddish cast of the veins actually exists in the Peale specimen, as does the ochraceous infusion of the distal half of the secondaries ventrally, as contrasted to the lack of ochre basally.

This evidence leads me to designate as lectotype of *semidea* Say the specimen in the Peale collection. It is catalogued, accordingly as A. N. S. P. type number 7000.

In July, 1937, I was one of a party of four which spent several days on the Alpine Meadows of Mt. Washington in search of *semidea*. Throughout the 17th and during the morning of the 18th the weather had been wet and cold. Mrs. Fox accidently had found one specimen clinging in a crevice between two boulders, and a search under rocks revealed several other examples. At one thirty that afternoon the clouds dissipated and the Gardens promptly swarmed with *semidea;* they sprang up from the crevices like nothing else than popcorn in a pan. During the next half hour, without leaving a quarter acre tract on Bigelow's lawn, the three of us netted one hundred and forty-nine specimens. Mr. Ted Fowler, one of our party, caught four of the butterflies with one sweep of his net. At the end of thirty minutes we ceased collecting, but the whole of the Alpine Gardens was alive with *semidea,* and the flash of sun on wings could be seen for some distance.

The series collected during that brief interval is before me, arranged according to intensity of color. Only eighteen specimens agree with the type; six specimens are darker, of which three, all females, are the aberration *nigra* Edwards. The remaining examples are all lighter than the type, the extreme specimens having the outer half of the hind wing ventrally only very slightly mottled with dark color. There were captured in all eighty-nine males and sixty females. In this series the females tend to be darker than the males, while light specimens tend to be larger than dark specimens, sex for sex; that is, dark females are slightly smaller than light females, and so with males. Variation in size is very slight, however, not more than two millimeters in any dimension.

Comachara cadburyi, A New Genus and New Species (Lepidoptera, Phalaenidae, Sarrothripinae).

By J. G. Franclemont, Ithaca, New York.

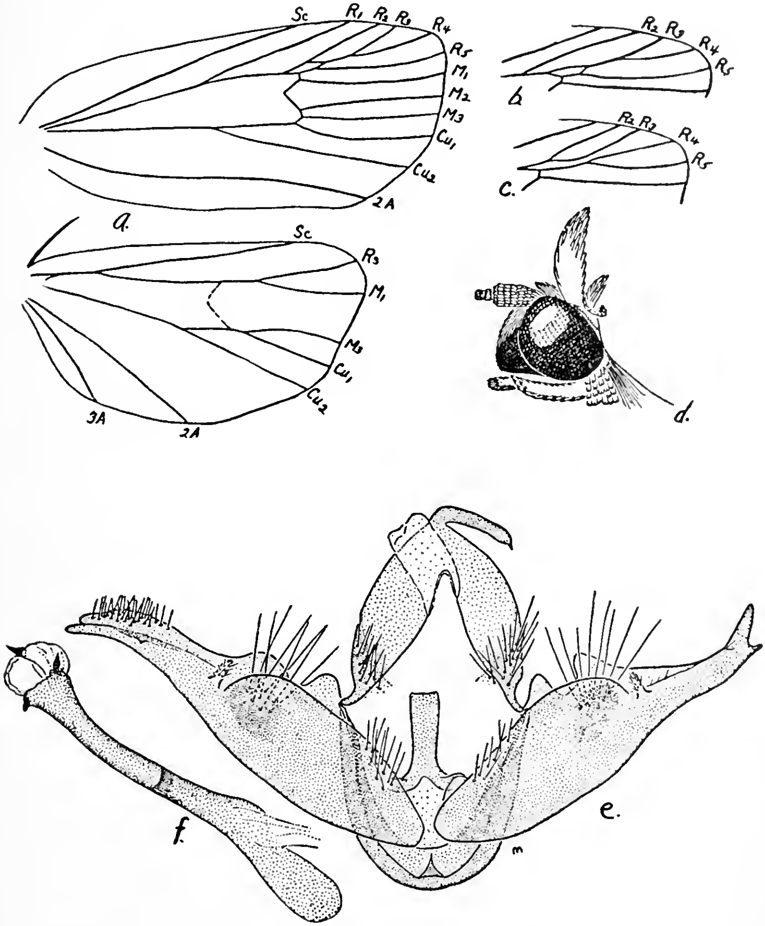
COMACHARA new genus.

Proboscis moderate; palpi moderate and porrect, not exceeding the front, clothed with scales; eyes large and round; antennae of both sexes simple; vertex and front, which is swollen and rounded out, clothed with flat scales. Thorax clothed with large flat scales; legs clothed with short hair-like scales. Abdomen without tufts, clothed with flat scales and some hair. Fore wing moderately long and narrow, highly arched near base, the costal and inner margins almost parallel, the apex rounded, the outer margin evenly curved; R_2 from accessory cell, R_3 and R_4 stalked from accessory cell, R_5 from accessory cell, M_1 from upper angle of discal cell, M_2, M_3 and Cu_1 from lower angle of discal cell; hind wing with Rs and M_1 stalked from upper angle of discal cell, M_3 and Cu_1 stalked from lower angle of discal cell, M_2 obsolete.

Genotype: *Comachara cadburyi* n. sp.

Comachara cadburyi n. sp.

Head, thorax and fore wings silver gray overcast with brownish black; fore wing with the basal area to the antemedial line pale, median and marginal areas darker with the median the darkest, basal line indistinct, black, angled outwardly on Cu, antemedial line vague, double, black, outwardly curved to Cu then inwardly curved to 2A, then outwardly curved to inner margin; postmedial line irregular, double the inner part dark the outer pale, angled outwardly from outer third of costa to $R_3 + R_4$, then curved in and out to M_3, then incurved to inner margin; subterminal line indicated by a series of black dots increasing in size towards inner margin, reniform and orbicular obsolete, a black dot is generally present at the end of the discal cell; hind wing glistening gray. Underside of wings gray, the hind wing lighter and crossed by a vague, irregular, darkish median shade.



Comachara cadburyi n. sp. *a*. Normal venation of fore and hind wings. *b*. & *c*. Variation in the radial system of the fore wings. *d*. Head showing the short palpi and bulging front. *e*. Genitalia of male holotype. *f*. Aedoeagus of same.

Genitalia: Tegumen broad, the uncus moderate and tapering towards tip; vinculum moderate; the valves somewhat assymetrical especially at the distal ends, sacculus large with a prominent thickening in the middle towards the end, clasper reduced to a short prominence; aedoeagus long and slender with a stout spine on the apical end, vesica with two moderate cornuti.

Holotype.—♂ Homebrook, Lower Merion Township, PENNSYLVANIA, June 3, 1920, [in Coll. U. S. N. M.]. *Allotype.*—♀, U. S. Route 1 and St. Mary's River, Boulogne, FLORIDA, April 1, 1936 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes.*—1 ♂, Philadelphia, PENNSYLVANIA, May 23 (Haimbach); 1 ♂, Lakehurst, NEW JERSEY, May 20 (O. Buchholz), [in Coll. U. S. N. M.]. 1 ♀, same data as Allotype. [in Coll. Cornell Univ.]. 6 ♂ ♂ 2 ♀ ♀, Nantucket, MASSACHUSETTS, June (C. P. Kimball) [in Coll. Kimball and Franclemont].

This genus may be distinguished from all other North American Sarrothripine genera by its shorter and porrect palpi; it likewise differs from *Characoma* in that Rs and M_1 of the hind wing are stalked for one-third their distance from cell to margin; it also differs from the other three genera, *Sarrothripus, Casandria* and *Baileya* by the loss of M_2 from the hind wing. The differences given for the genus will serve to differentiate the species.

This species is named for my very obliging friend, Mr. John W. Cadbury, III, who was my companion on the trip to Florida when the species was first taken by the author, who mistook it for a Tortricid.

I wish to thank Mr. J. F. Gates Clarke of the United States National Museum for the loan of the material of this species in that institution. I also want to express my sincere thanks to Dr. May K. Gyger for making the drawings.

The synonymy of Isosargus (Diptera, Stratiomyidae).

In establishing the generic name *Isosargus* for *Chrysonotus nigricornis* Loew and three related Nearctic species (Canad. Ent., LXVII, p. 273, 1935), I overlooked the Old World genus *Cephalochrysa* established by Kertész (Trans. Linn. Soc., London, XV, p. 99, 1912) for *Sargus hovas* Bigot, from Madagascar. A comparison of the genotypes indicate that the two are synonymous. *Cephalochrysa* must, of course take priority.

The name "*Chrysochroma atriventris* Loew" given by Graenicher (Bull. Wis. Nat. Hist. Soc., X, p. 176, 1913) is evidently an error for *C. nigricornis* Loew. MAURICE T. JAMES.

A Preliminary Study of the Superfamily Papilionoidea in the Northern Portion of Pine County, Minnesota. (Lepidoptera).

By G. N. Rysgaard, Museum of Natural History, University of Minnesota.

(Continued from page 196.)

The records of 1937 and 1938 on periodicity of abundance and scarcity of the more common species indicate that *Papilio glaucus turnus* is single-brooded in this region as are many of the others here shown. *Pieris protodice* is found in two forms, *protodice* and *vernalis*. The latter form is that which appears early in the spring, emerging from over-wintering chrysalids. This form, in turn, gives rise to the form *protodice* which occurs later in the season in greater numbers. *Pieris rapae* is double-brooded, but the broods over-lap and the species is found commonly throughout the entire season. *Phyciodes tharos* sp. is two-brooded as are *Basilarchia arthemis, Basilarchia archippus, Nymphalis milberti,* and *Nymphalis antiopa.*

Junonia coenia is many-brooded in the South, but in Minnesota it is undoubtedly single-brooded. There are indications of two broods; the first of these is likely composed of southern migrants as they appear in tattered condition. The specimens appearing in late August are large and perfect.

As the author was not in the study area the entire faunal season, it seems useless to mention here first and last dates of observance. For date records, the dates of collection for the specimens in my private collection will serve, and they may be found in the annotated list. Preceding the names in the list are the check list numbers.

Notice of Possible Suspension of the Rules of Nomenclature in Certain Cases (A. (n. s.) 1).

In accordance with a Resolution adopted by the International Zoological Congress at their Ninth Meeting held at Monaco in 1913, prescribing that not less than one year's notice is to be given by the International Commission on Zoological Nomenclature of all applications received for the "Suspension of the Rules," the attention of the zoological profession is hereby invited to the fact that requests for the "Suspension of the Rules" have been received by the Commission in the undermentioned cases:

(a) ECHINODERMATA. — *Diadema* Humphreys, 1797 (type *Echinometra setosa* Leske, 1778) to be added to the Official List of Generic Names (see Mortensen, 1937, Ann. Mag. Nat. Hist. (10) 19: 463-469) (reference Z. N. (S.) 52).

(b) INSECTA, Neuroptera.—To be added to the Official List of Generic Names with types as shown in brackets:—*Hemerobius* Linnaeus, 1758 (*Hemerobius humulinus* Linnaeus, 1758); *Chrysopa* Leach, 1815 (*Hemerobius perla* Linnaeus, 1758) (see Cowley and others, 1937, Generic Names of British Insects, Pt. 4) (reference Z. N. (S.) 42).

(c) INSECTA, Lepidoptera.—To be added to the Official List of Generic Names with the type as shown in brackets: — *Actinote* Hübner, 1819 (*Papilio thalia* Linnaeus, 1758) (see Hemming, 1936, Proc. R. Ent. Soc., Lond. (B) 5:56-57) (reference Z. N. (S.) 63).

(d) REPTILIA.—*Bitis* Gray, 1842 (type *Vipera* (*Echidna*) *arietans* B. Merrem, 1820) to be added to the Official List of Generic Names, and *Cobra* Laurent, 1768, to be suppressed (Stejneger, 1936, Copeia, 3:140) (reference Z. **N**. (S.) 121).

2. In adopting the Resolution referred to above, the International Zoological Congress expressly stated that their object was thereby to render it possible for zoologists, particularly specialists in the group in question, to present to the Commission arguments for or against the suspension of the rules proposed. Any such representations should be furnished to the Secretariat to the Commission (British Museum (Natural History), Cromwell Road, London, S. W. 7) as soon as possible and in any case within one year of this day's date. Every such communication should be clearly marked with the Commission's reference number as given above.

By Order of the Commission.
(Signed) FRANCIS HEMMING,
Secretary to the Commission.

Secretariat of the Commission,
British Museum (Natural History),
Cromwell Road, London, S. W. 7.
27th June, 1939.

On Two Species of Neotiphia from Arizona (Hymenoptera: Tiphiidae).

By V. S. L. Pate, Cornell University.

In the Hymenoptera collected by Messrs. James A. G. Rehn, John W. H. Rehn and myself in the summer of 1937, in the southwestern United States, is a series of specimens of the interesting genus *Neotiphia.* A study of this material indicates that there are two new species represented in the lot. Specimens of *Neotiphia* are apparently relatively rare in collections and the species of this genus hitherto described have been recorded originally as a rule from unique specimens or from but one sex. It is interesting, therefore, that the two forms described below are known from both sexes and that one, *Neotiphia pima,* is represented by a short series.

The terminology of Allen and Jaynes[1] has been employed in the main in the following descriptions.

Neotiphia chiricahua[2] new species.

The present distinctive species is most closely related to *Neotiphia sulcata* (Roberts) from which it may be differentiated by the larger size, the tawny wings, the tegulae which are margined only along the posterior edge, the non-sulcate labium, the parallel-sided median areole of the dorsal face of the propodeum and the differently sculptured lateral faces of the median segment. The sixth abdominal sternite of the males of this species is of the same general distinctive shape as that of *sulcata* but, in addition to the lateral carinae, *chiricahua* has a strong median longitudinal carina extending from the base to the apex. The females of *chiricahua* have a minute and indefinite stigma in the fore wings in sharp contrast to the large and definite one possessed by *sulcata.*

Type.— ♂ ; Two miles southwest of Chiricahua, San Bernardino Valley, Cochise County, Arizona. Elevation, 4650 feet. August 27, 1937. (Rehn, Pate and Rehn; at flowers of a white mustard.) [Academy of Natural Sciences of Philadelphia, Type no. 4198.]

[1] Proc. U. S. Nat. Mus., LXXVI, Art. 17, (1930).

[2] After the Chiricahua Indians of southeastern Arizona.

♂.—13 mm. long. Black; mandibles very dark red; tarsal segments dark fulvous apically. Wings clear light fulvous; stigma and subcosta dark brunneous, remaining veins fulvous.

Head suborbicular in anterior aspect, subfulgid; front clothed with long reclinate silvery pubescence, with fine separated acupuncturation upon which is superposed a series of coarse punctures of first to second degree of density, immediately in front of median ocellus with a nitidous glabrous region whose area is about the size of the ocellus. Vertex laterad of hind ocelli nitidous halfway to dorsal margin of the compound eye, otherwise covered with punctures of the second degree of density; ocellocular line about one and one-half times the length of the postocellar line. Temples with a fine acupuncturation upon which is superposed a series of larger punctures of the second degree of density. Antennocular line five sixteenths the length of the compound eye. Clypeus coarsely semiconfluently punctate, length medially three-eighths that of eye, produced medially into a broad arcuate lobe, the disc of which is tumid and the apical margin furnished with a wide deflexed glabrous nitidous semilunate bevel, without a medio-apical rostrate extension or acute point. Labium not longitudinally sulcate. Mandibles punctate basally; median longitudinal groove present.

Thorax fulgid dorsally, subopaque on pleura and sterna. Pronotum, save for a broad arcuate nitidous band posteriorly, with fine moderately close acupuncturation upon which is superposed an irregular series of large coarser punctures of the first to second degree density; anterior dorsal margin with a strong transverse carinula; lateral faces nitidous to microscopically clathrately aciculate above and with fine oblique rugulae below; transverse groove absent. Mesonotum almost devoid of acupuncturation but rather uniformily covered with larger, coarser punctures of the third degree of density. Scutellum with irregular close marginal punctures and with a discal patch of large close punctures; no acupuncturation. Postscutellum with fine acupuncturation and larger punctures of second to third degree of density. Tegulae about as long as wide, margined along posterior edge only. Mesopleura and sternum anteriorly with a strong epicnemium, covered with fine acupuncturation upon which is superposed a series of moderately close larger punctures. Propodeum fulgid; dorsal face with median areole rectangular, one and one-third times as long as broad, the lateral carinae parallel, bisected on basal half by a low carinula, the surface within areole inconspiculously and finely irregularly rugulate, laterad of lateral carinae half way to lateral margin the surface is subfulgid, obliquely aciculate and microscopically punctate, the posterior margin furnished with a strong transverse carina which at the dorsolateral angles breaks up abruptly into a small fan of oblique rugulae; posterior face subfulgid, finely microscopically punctate discally, becoming finely and irregularly rugulate marginally, without a median longitudinal carinula, the lateral margins strongly carinate; lateral faces perfulgid, glabrous, dorsal and posterior half strongly horizontally lineate, the lower anterior half with a horizontal subrectangular area with horizontal arcuate striae abruptly marked off from remainder of surface. Hind tibiae with the sensorium elongate-cuneate and distinctly impressed. Hind metatarsi with a single row of five short stout spines above.

Abdomen fulgid, without acupuncturation. First five tergites with large punctures of the second to third degree density; penult tergite with larger, coarser and very close punctures; ultimate tergite with coarse, subconfluent, rugulose puncturation. First two tergites with short, sparse, decumbent, subaeneous pubescence becoming progressively longer, more abundant and reclinate to suberect on each succeeding tergite. First sternite subfulgid, with a strong high transverse angulate carina separating the flat escutcheon from the disc which on its anterior half is furnished with a strong high median longitudinal carina emanating from the angle of the anterior transverse carina, and whose surface is largely rugulose. Second to fifth sternites with fine acupuncturation superposed on which is a coarser puncturation largely of the second degree of density; clothed with a sparse pubescence similar in general to that of first two tergites and apically with transverse marginal fimbriae. Sixth sternite concave medially at base; lateral carinae distinct on apical half, median carina present and well developed from base to apex and separated from the lateral carinae by a single row of small punctures; medioapically the sternite is produced into a subrectangular lobe which is emarginate apically and separated laterally on each side from remainder of segment by a deep rounded notch.

Allotype.—♀; Topotypical; same data as type. [Academy of Natural Sciences of Philadelphia.]

♀.—14 mm. long. Similar to male except as follows:

Head perfulgid; practically devoid of acupuncturation, the larger puncturation coarser, more scattered, with large nitidous intervals and in general with a tendency toward third degree of density. Ocellocular line about one and one-half times the length of the postocellar line. Scapes with a loose pencil ot long sordid light aeneous hairs apically.

Thorax with the mesonotum in general more sparsely punctate than the male. Tegulae as broad as long, much more weakly margined along the hind edge than in the males. Propodeum with the dorsal and posterior faces more delicately sculptured than in male; the median areole of dorsal face without a median carinula and the surface not finely rugulose within; posterior face without a median longitudinal carinula; lateral faces as in male. Hind tibia with the sensorium elongate-cuneate and moderately impressed. Hind metatarsi with the longitudinal groove linear, elongate, deeply impressed, and with a double row of four short stout spines above. Fore wing with the stigma minute, indefinite, inconspicuous, extending less than one-half the distance from the origin of the radial vein at its apex to the basal vein.

Abdomen with puncturation and pubescence essentially the same as in male. Last tergite very coarsely and rugosely striatopunctate on basal three-fourths and well clothed with long suberect light hairs, the punctate portion not abruptly elevated above the impunctate apical coriaceous portion. First sternite with the transverse carina separating the escutcheon from the disc not as strong nor as conspicuous as in male, the median longitudinal carina on basal half of disc wanting or very inconspicuous, the disc covered with fine, well separated acupuncturation. Sixth sternite with the apical three-fourths of the sides of its median impunctate shagreened triangle straight and inclined at much more than 45° to the median line.

Remarks.—Despite certain disparities, as noted in the above description of the female, I believe the two specimens I have before me represent merely the opposite sexes of the same species inasmuch as they were taken together, although not as I recall in copula.

(To be continued.)

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )follows**; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Anon—El mas feroz y sanguinario de los insectos. [El Agric. Venezolano] 4: 91-93, ill. **Bruce, W. G.**—Some observations on insect edaphology. [103] 12: 91-93. **Brues, C. T.**—Some adaptive responses of taxonomy to a changing environment. [6] 47: 145-154. **Daviault, L.**—Notes sur l'action des parasites de la chenille a tente du cerisier: Cacoecia cerasivorana. [Le Natur. Canadien] 66: 179-187, ill. **Flanders, S. E.**—The role of arrhenotoky in the adaptation of insects [68] 90: 82. **Gemignani, E. V.**—La Seccion Entomologica del Museo Argentino de Ciencias Naturales. [VII Internat. Congr. Ent. pp. 133-143. **Glick, P. A.**—The distribution of insects, spiders and mites in the air. [U. S. Dept. Agr. Tech. Bull.] no. 673; 150 pp., ill. **Kellogg, V. L.**—Biographical Memoir. By C. E. McClung. [Biogr. Mem. Nat. Acad. Sci. U. S. A.] 20: 245-257, ill. **Lahille, F.**—Estabilidad, evolucion, adaptacion y progreso. [104] 10: 81-86. **Meyrick, E.**—Obituary. By K. J. Hayward. [104] 10: 87-89. **Petersen, A.**—Keys to the orders of immature stages (exclusive of eggs and pronymphs) of North America insects. [7] 32: 267-278. **Smith, C. C.**—Method of embalming large insects. [68] 90:116. **Vesey-Fitzgerald, D.**—Colour-pattern resemblances between wasps and other insects in Trinidad. [107] A, 14: 103-105. **Wade, J. S.**—A contribution to a bibliography from 1909 to 1936 of Henry David Thoreau. [6] 47: 163-203. **Weiss, H. B.**—Insect food habit ratios of North Carolina, and Mt. Desert Island, Maine [6] 47: 155-157.

ANATOMY, PHYSIOLOGY, ETC.—Ancona, H. L.—Histologia de la glandula venenosa de Crypsidronus breyerii (Arachnida). [An. Escu. Nac. Cien. Biol., Mexico City] 1: 107-118, ill. **Banks, C. J.**—Cephalic glands in the Corixidae. [107] 14: 83-85, ill. **Becker & Plagge.**—Uber das die Pupariumbildung ausloesende Hormon der Fliegen. [97] 59: 326-341, ill. **Boving & Henriksen.**—The developmental stages of the Danish Hydrophilidae. [Vidensk. Medd. Dansk Nat. Hist. Forening] 102: 27-162, ill. **Deane, C.**—Eyes of insects.—Notes on facet dimensions. [Victor. Nat.] 56: 28-31; 42-48, ill. **Dethier, V. G.**—Taste thresholds in lepidopterous larvae. [92] 76: 325-329. Prothoracic glands of adult Lepidoptera. [6] 47: 131-144, ill. **Dobzhansky & Sokoloff.**—Estructura y varacion de los cromosomas en Drosophila aztecta. [An. Escu. Nac. Cien. Biol., Mexico City] 1: 37-66, ill. **Ehlers, M.**—Untersuchungen ueber Formen aktiver Lokomotion bei Spinnen. [89] Abt. Syst. 72: 373-499, ill. **Gäbler, H.**—Häufigkeit der farbvarietäten der nonne (Lymantria monacha). [94] (A) 152: 1-11, ill. **Gerould, J. H.**—Structure and action of the heart of Bombyx mori and other insects. [Acta Zool.] 19: 297-352, ill. **Graham, J. F.**—The external features of the early stages of Spathiophora hydromyzina (Dipt., Cordy-luridae). [107] B, 8: 157-162, ill. **Hackbart, W.**—Der einfluss Kurz fristig Wirkender Temperaturen auf die Entwicklung und Fortpflanzung von Schadinsekten. [46] 35: 468-534, ill. **Hagan, H. R.**—Diploptera dytiscoides, a viviparous roach with elongate pleuropodia. [7] 32: 264-266, ill. **Hilton, W. A.**—Nervous system and sense organs, LXXVIII: Homoptera. [13] 31: 36-38, ill. LXXIX: Hemiptera. [13] 31: 39-41, ill. **Kato, Mutsuo.**—The diurnal rhythm of temperature in the mound of an ant, Formica truncorum var. yessensis, widely distributed at Mt. Hakkoda. [Sci. Repts. Tohoku Imp. Univ.] 14: 52-64, ill. Body temperatures of the strawberry weevil, Anthonomus bisignifer, and its limiting factors. [Sci. Repts. Tohoku Imp. Univ.] 14: 11-19, ill. **Koonz, C. H.**—Spermatogenesis of a haploid parthenogenetic Hymenopteron, Spilocryptus extrematus. [Trans. Amer. Micros. Soc.] 58: 292-303, ill. **Levereault, P.**—The morphology of the Carolina mantis (Orth.). [Univ. Kansas Sci. Bull.] 25: 577-634, ill. **Mellanby, K.**—The function of insect blood. [Biological Reviews, Cambridge] 14: 243-260. **Nielsen, E. T.**—Temperatures in a nest of Bombus hypnorum. [Vidensk. Medd. Dansk Nat. Hist. Forening] 102: 1-6, ill. **Piepho, H.**—Uber den Determinationzustand der Vorpuppenhypodermis bei der Wachsmotte, Galleria mellonella. [97] 59: 314-326, ill. **Seamans & Woodruff.**—Some factors influencing the number of molts of the german roach. [103] 12: 73-76. **Smith, H. W.**—The blood of the cockroach (Periplaneta americana). Cell structure, degeneration and cell counts. [New Hamp. Exp. Sta. Tech. Bull.] no. 71, 23 pp., ill. **Stiles, K. A.**—The time of embryonic determination of sensoria and antennal color and their relation to the determination of wings, ocelli and wing muscle in aphids. [92] 76: 442-447, ill. **Varela, G.**—El cloruro de calcio en la intoxicacion por la toxina del alacran de Guerrero (Centruroides limpidus). [An. Escu, Nac. Cienc. Biol., Mexico City] 1: 133-134. **Varela & Sanchez Posada.**—Anaponzonas del veneno del alacran de Guerrero (Centruroides limpidus) [An. Escu. Nac. Cienc. Biol., Mexico City] 1: 135-137. **Varley, G. C.**—Unusual methods of stridulation in a cicada (Clidophelps distanti) and a grasshopper (Oedaleonotus fuscipes) in California. [107] A, 14: 97-100, ill.

ARACHNIDA AND MYRIOPODA.—Chamberlin, R. V.—A new arachnid of the order Pedipalpida. [95] 52: 123-124, ill. **Chamberlin & Ivie.**—New tarantulas from the southwestern states. [Bull. Univ. Utah] Biol. Ser. 5: 17 pp., ill. **da Fonseca, F.**—Notas de Acaralogia, XXV: Os Laelaptidae gigantes, parasitas de roedores Sul Americanos; generos e especies novos. [73] 12: 8-102, ill. (S*). XXVI: Novos estudos sobre o genero Laelaps. 12: 103-145, ill. (S*). XXVII: Liponissus brasiliensis sp. n., parasita habitual de roedores e acidental do homen. 12: 147-160, ill. XXVIII: Ocorrencia de Dermanyssus gallinae no Brasil (Dermanyssid.). 12: 161-163. **Gertsch & Mulaik.**—Report on a new Ricinuleid from Texas. [40] no. 1037, 5 pp., ill. **Hilton, W. A.**—A preliminary list of pycnogonids from the shores of California. [13] 31: 27-35, (*). **Jacot, A. P.**—New mites from western North Carolina. [Jour. E. Mitchell Sci. Soc.] 55: 197-202, ill. **Mello-Leitao, C. de.**—Algumas Aranhas de S. Paulo e Santa Catarina. [73] 12: 523-531, ill. (S*). Some new Argiopid spiders from British Guiana taken by Mr. O. W. Richards from the nests of fossorial wasps. [15] 11: 105-112, (S*).

THE SMALLER ORDER OF INSECTS—Andre F.—A synopsis of the American spp. of Chirothrips (Thysanoptera). [10] 41: 192-204, ill. (k*). **Bailey, S. F.**—The Mullein thrips. [55] 15: 111-116, ill. (k). **Bueker, E. D.**—Springtails (Collembola) of the St. Louis area. [Trans. Acad. Sci. St. Louis] 30: 30 pp., ill. (*). **Carpenter, F. M.**

—Records and notes of Nearctic Mecoptera and Raphidiodea. [19] 34: 162-166, ill. **Hemming, F.**—Neuroptera. [See under Special]. **Kennedy, C. H.**—The female of Aeshna biliosa (Odonata). [7] 32: 344-348, ill., (S). **Mills, H. B.**—Remarks on the geographical distribution of North American Collembola. [19] 34: 158-161. **Thompson, G. B.**—The Piaget Collection of Mallophaga. Part VII. [75] 4: 139-144, cont. **Wagner, K.**—Bemerkungen uber die Fam. Malacopsyllidae und Beschreibung der neuen arten (Siphonaptera). [Zeit. Parasitenk.] 11: 58-67, ill. (S*). **Wilson, F. H.**—The life-cycle and bionomics of Lipeurus caponis (Mallophaga). [7] 32: 318-320. **Wright, M.**—Argia fumipennis in Ohio. [43] 39: 155-156.

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of Stenelmis (Dryopid.). [Univ. Kansas Sci. Bull.] 25: 635-720, ill. (k*). **Schedl, K. E.**—Scolytidae und Platypodidae. [104] 10: 21-28, ill. (s*). **Wallis, J. B.**—The gen. Graphoderus in North America north of Mexico (Dytiscid.). [4] 71: 128-130, (k). **Wenzel, R. L.**—A n. gen. and several n. spp. of North American Histeridae. [7] 32: 384-394, ill.

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SPECIAL NOTICES.—**Notice of possible** suspension of the rules of nomenclature in certain cases (Neuroptera and Lepidoptera). **Hemming, F.**—[107] B, 8: 151. **Katalog der palaearktischen** Tabaniden nebst bestimmungstabellen und zusatzen zu einzelnen arten sowie neubeschreibungen. By O. Krober. [Acta Ins. Mus. Zool. Univ. Atheniensis] 2: 57-245. **Nomenclator** Zoologicus. By S. A. Neave Volume 1. A-C. 1939. 957 pp.

Die Staaten der Ameisen. By Wilhelm Goetsch, Professor in the University of Breslau and Director of the Zoölogical Institute and Museum. vii + 159 pp., 84 figs. Published by Julius Springer. Berlin. 1937. Price, RM 4.80, bound. This small book is primarily intended for the general reader who has at least some biological background. It is especially well adapted for supplementary reading in a course in general entomology, as it gives a well rounded picture of the life of the ant. The book is divided into seventeen major sections which treat: morphology, development, castes, nuptial flights, colony foundation, guests, wars, foraging, nests, care of brood, grain chambers, fungus gardens, aphid attendance, departure from nest and return, recognition, morphology and division of labor, psychic capacities, origin of soldiers, sex determination, evironment and racial inheritance, and seasons and fate. Following these is an appendix which contains a short bibliography and control measures against the ants which cause damage. Besides the usual general material which is found in most books of its type, "Die Staaten der Ameisen" presents a digest of many interesting observations on various species which have been made recently by Dr. Goetsch and published as journal articles. The book is definitely sound in its myrmecological philosophy. There are no teleological explanations or anthropomorphic implications—these are not always absent from general books. Dr. Goetsch has written in a most charming style of which his delightful humor is an integral part. The author reproduces many figures showing the involved trails of ants to and from their nests and when alarmed. Their intricacy and the apparent going around in circles seem to bear out Mark Twain's remark that "die Ameise ist das dümmste Tier." Then Dr. Goetsch reproduces a figure showing a similar roundabout way of getting from one point to another, apparently again bearing out Mark Twain, but he adds, with probably a quiet chuckle, that he is here reproducing a man-made mountain road, as it appears from an airplane. It all depends on the viewpoint, M. T.! As for binding, printing, illustrations, etc., this little volume is exceptionally well done. The book can well be recommended to the general reader and to the myrecologist alike as it has much in the way of interest for both.—Merle W. Wing.

Of Ants and Men. By Caryl P. Haskins, Director, Haskins Laboratories; Research Professor, Union College; Research Associate, Harvard University; Research Associate, M. I. T. Prentice-Hall, Inc., New York, 1939. Pp. vii + 244. 15 full-page photographs. Price, $2.75. Interest in ants has been present among men for a long time. It has taken various forms of which the gastronomic, surgical and general economic interest, not to mention others, appear to be outstanding. The most enduring interest in ants, however, is the philosophical one shown by the countless naturalists of all ages. Dr. Haskins is a recent addition to this group. He has observed the social life of ants for a number of years. Out of these observations several journal articles and the present volume have evolved. This book appears to be one of the best of its kind. The author's long acquaintance with living rather than dead ants is perhaps first in importance. Furthermore, Dr. Haskins brings to his readers a thorough knowledge of biology and sociology in the broader sense. The aim of the present volume is to show that perhaps in certain of the superficial parallels between the social life of these insects and that of man there may be a more fundamental significance than is commonly realized. "An attempt is made in this book to point out some of the more obvious of these analogies and to suggest bits of evidence and trends of thought in connection with them." A survey of the chapter headings will give the reader a partial insight into the scope of the work: Earth Dwellers; I. The Dawn; II. The Ants of Today; III. Ants and Men as Individuals; IV. The Rise of the City; V. The Ties That Bind; VI. The Ant Colony as a Multicellular Organism; VII. Fascism or Communism; VIII. War; IX. Slavery; X. The Tributary Peoples; XI. The Fate of the Primitives; XII. In the Future; Epilogue. The chapter headings are not the usual ones, but neither is the book. Its style is unusually lucid and entertaining; its subject matter is stimulating. Throughout the book comparisons between ant and human society abound. These are philosophically sound and do not possess the rancor of anthropomorphism, or serve unjustly as a medium for the airing of personal views. The reader will discover that ant society had almost stopped its evolution over fifty millions of years ago, whereas the society of man is, relatively speaking, in its infancy. Ants and men can be compared in many ways socially, but not to such an extent individually. Due, however, to the difference in the relative ages of the two groups, many social comparisons cannot be made in their entirety (*teste* Chapter IX, Slavery). The last chapter, "In the Future," asks a number of questions that only future workers, with a more complete background, can answer. This chapter serves to show the layman and general reader that our present knowledge of ants is incomplete. The book is attractively bound. The paper is of good quality. There are fifteen full-page original photographs (twelve of which were taken by Dr. D. M. Gallagher, the others by the author). Finally, a well compiled index enhances the value of the book. To all general readers and biologists who wish a different and stimulating book on ants, "Of Ants and Men" is heartily recommended. — MERLE W. WING.

The FULGORIDAE OF OHIO, by HERBERT OSBORN, Ohio State University Studies, Bulletin 35, July 1938. — Dr. Osborn has been giving the students of the Homoptera many helpful treatises on groups of this order, particularly as regards Ohio species. The present one follows the author's usual style; giving keys to the subfamilies, genera and species; generally brief descriptions of the species, with well delineated figures showing the whole insects or their characteristic parts. Several new forms are described. Students of this order will find this bulletin an important addition to their libraries.—E. T. CRESSON, JR.

OUR SHADE TREES, by EPHRAIM PORTER FELT. New York Orange Judd Publishing Co., Inc., 1938, 187 pp., 31 half-tone plates, 1 text figure, $2.00. "The purpose of this book is to outline the relation of trees to suburban life, the needs of shade trees under prevailing conditions, and to advise methods which will permit the owner to offset, in some measure at least, the present day perils or hazards of shade trees." The insect perils, as Dr. Felt sees them, are the gypsy moth, elm leaf beetle, European elm bark beetle, beech scale insect, European spruce sawfly and Japanese beetle. Means of recognizing them are left to other books or sources of information, but their control by spraying, by borer control and by parasites is described in a later chapter.—P. P. CALVERT.

The Principles of Insect Physiology, by V. B. Wigglesworth, London School of Hygiene and Tropical Medicine. 434 pp., 316 illustrations. 1939. London, Methuen and Company. New York, E. P. Dutton and Company. Price, $8.00. To the entomological reader who may have been trying to keep up with the rapidly increasing literature on the physiology of insects, including the results of experimental work in embryology and metamorphosis, this book will be a most welcome relief. Though the science of insect physiology is of comparatively recent development, the very number of papers now published on the subject is discouraging, and the often inconclusive or frequently contradictory results of the writers must leave the average entomologist with a feeling of bewilderment. The author of "The Principles of Insect Physiology," therefore, is to be highly commended on the fact that he has been able to construct an orderly and straightforward text without being lost in a maze of controversial opinion. The treatment of the subject is everywhere convincing that the probable truth has been well sifted from experimental error and unwarranted deductions. The book is not written for the professional physiologist, but clearly presents the subject in a manner suited to the student or teacher who has been brought up on the ordinary entomological curriculum. The 15 chapters deal principally with the purely physiological phases of insect functions, physical mechanisms being in general treated briefly, the apparatus of ingestion entirely omitted. The illustrations, on the other hand, are largely anatomical, since structure is necessarily the basis of function, and they contribute much to the elucidation of the text. To each chapter are appended the pertinent literary citations, from 48 to 265 for individual chapters, probably over 2000 in all. Though titles are not quoted literally, the nature of the subject is given with each reference. The book commends itself on sight by the quality of the typography, the paper, the illustrations, the binding.

The first chapter, perhaps too briefly, treats of the physiological phases of development in the egg. The second and third chapters on the integument and growth are particularly instructive because of the up-to-date description of the structure and composition of the cuticula, the physical and physiological processes of moulting, the physiological factors of metamorphosis, determination of characters in postembryonic development, regeneration, and diapause. Chapter IV deals with the structure and physical properties of insect muscles, and discusses the various modes of locomotion practised by insects. In Chapter V the general properties and functions of the nervous system are reviewed, and two chapters follow on the sense organs and sensory reactions, in which the text is illustrated with anatomical figures and explanatory diagrams of functional processes. Chapter VIII is devoted to behavior, a large subject necessarily much condensed, but the leading facts of insect activity are classified and described under the three main headings of kinesis, orientation, and coordinated behavior. Chapter IX, on respiration, is one of the important chapters in the book: in it is condensed the results of a great mass of recent experimental work on insect respiration and the chemical and nervous control of breathing movements and the action of the spiracles, besides which it contains a general account of the structure and development of the tracheal system, the mechanism of breathing, and the respiratory adaptations of aquatic and parasitic insects. Chapter X deals with the circulatory mechanism, the blood and haemocytes, the nephrocytes, the fat body, oenocytes, and light-producing organs. Chapter XI is devoted to digestion and nutrition; it includes a general account of the anatomy of the alimentary canal, and discusses the histology and physiology of the digestive processes. Excretion is the subject of the next chapter, in which the histophysiology of the Malpighian tubules is an important part. Chapter XIII, on metabolism, discusses the chemical transformation of food products desposited in the fat body, chemical substances produced by insects, pigment metabolism, and respiratory metabolism. Water and Temperature are the associated subjects of Chapter XIV, since temperature and humidity, the author points out, are the most important factors in the environment that influence the physiology of insects. The final chapter treats of the reproductive system and associated functions, describing briefly the anatomy and histology of the genital organs, and discussing the subjects of mating, impregnation, fertilization, spermatophores, factors controlling fertility and fecundity, modes of reproduction, sex determination, and the transmission of symbiotic micro-organisms.

Though probably it is not possible at present for most schools to give a laboratory course in experimental physiology on insects, "The Principles of Insect Physiology" now furnishes the teacher a well-organized basis for class instruction, and as a reference book it will be indispensable wherever entomology is taught or the biology of insects is studied.—R. E. SNODGRASS.

INSECTS OF CITRUS AND OTHER SUBTROPICAL FRUITS by HENRY J. QUAYLE. Ithaca, New York, Comstock Publishing Co., Inc. 1938. Pp. vi, 583. 377 figs. $5.00. The preface states: "An attempt is made in the present volume to discuss fairly adequately the insects that attack, in different parts of the world, a rather limited range of fruits. The title emphasizes the citrus group because that group dominates the field of strictly subtropical fruits; likewise the insects which attack citrus dominate the field of subtropical fruit insects. The list of citrus fruit insects, consequently, is as complete as it has been possible to make it for all the important citrus fruit sections of the world," and the same is said for the avocado insects. The important insects of other subtropical fruits, particularly in the United States, are likewise included. The subtropical fruits dealt with are the citrus group (oranges, lemon, grape-fruit), avocado, vinifera grape, Persian walnut, almond, pecan, fig, olive, date, oriental persimmon, pomegranate and sweet cherry. A key to the principal citrus fruit insects and mites in the United States is arranged under I. Identification by general appearance of the insects and mites, with four subdivisions according to whether they occur on the fruit, leaves, twigs or trunk, and II. General identification by types of injury to the same four parts of the plants. The second and third chapters on the major insects and mites that attack citrus fruits occupy 231 pages, the minor (chapter V) 81 pages, the fourth chapter being devoted to predacious and parasitic insects that attack these fruit pests (8 pages). The citrus section of the book thus constitutes somewhat more than half. It lists 73 major and 470 minor species of insects and mites that attack citrus fruits, belonging to the following groups, the first figure after each name being the major, the second the minor species: Mites 4, 21, Thysanoptera 6, 5, Psyllids 1, 0, Aphids 3, 8, Scale insects 29, 129, Aleyrodids 6, 22, Pentatomid bugs 2, 18, Beetles 4, 112, Butterflies 1, 32, Moths 8, 53, Fruit flies (Trypaneidae) 5, 5, Ants 4, 1. The remainder of the minor species is composed of the following groups not represented in the major list: Spiders 1, Orthoptera 9, Termites 10, Cicadas 1, Cercopids 1, Heteroptera other than Pentatomids 28, Diptera other than Trypaneids 12, Chalcid wasps 1, Bees 1. Each of the sixth to the thirteenth chapters is concerned with the insects and mites that injure one of the next eight fruits above listed, the fourteenth with the last three. Each, excepting the thirteenth and fourteenth, begins with a key to the principal insects that attack the fruit in question. The fifteenth is a brief account of rodents, nematodes and snails that attack the subtropical fruit trees. The sixteenth, seventeenth and eighteenth are devoted to fumigation, spraying and dusting, and quarantines respectively.

The major and some of the minor insects throughout the book are described at varying length, their areas of distribution, life history, parasites, predators and methods of control are given, with numerous illustrations. The book, therefore, is not merely a treatise on economic entomology; it is a contribution to ecology as well. From the latter standpoint the Introduction, pp. 1-8, is particularly interesting. Numerous references to the literature are given throughout the volume in connection with each group of insects and often with single species. As the authors' work has been mainly in California, that State, its subtropical fruits and their insects receive greater attention than any other area. This is an important and valuable book.—P. P. CALVERT.

THE INSECTS OF NORTH CAROLINA. Being a list of the Insects of North Carolina and their close relatives. By C. S. BRIMLEY, LL. D. North Carolina Dept. of Agriculture, Division of Entomology, Raleigh, N. C. 1938. 560 pp. It is gratifying to the entomologist to see each new state list of insects appear: New Jersey, New York, Connecticut (incomplete) and now North Carolina. Primarily, Dr. Brimley tells us, the credit for the insect survey of the state and for this list belongs to Franklin Sherman, Jr., first State Entomologist of the North Carolina Department of Agriculture, who held the position for a quarter century, 1900-1925. Dr. Brimley was placed in charge of the insect survey in 1919 "and has been doing mainly that sort of work ever since." Statistics of the list are given on pages 12, 13, 506 and 513, according to which the total number of species of insects is 9610, ranging from 2959 Coleoptera to 3 Isoptera; 637 "near insects" are also listed (Arachnida, Diplopoda, Chilopoda, Protura and land and fresh water Crustacea). A comparison with the numbers of species in the New York list of 1928 is included. The typography is rather more like that of the New Jersey list of 1910.—P. P. CALVERT.

ATLAS OF THE SCALE INSECTS OF NORTH AMERICA By GORDON FLOYD FERRIS. Series II, Numbers 137-268. Stanford University Press, Stanford University, California. London: Humphrey Milford, Oxford University Press. Published November, 1938. In the NEWS for May, 1937, page 150, we noticed the beginning of this comprehensive attempt to figure and describe all the North American species of the Coccoidea. As was then and there set forth, each genus and each species is treated in a separate serial number, usually consisting of four unnumbered pages. Single numbers in any combination or quantity may be had at prices ranging from 15 cents for a single copy to 7 cents each for 50 or more copies. The first series of 136 pieces in loose- leaf form costs $8.00, the bound volume $9.00. Corresponding prices for the second series are $7.75 and $8.75. The first series deals with 34 genera and 100 species, all belonging to the Tribe Diaspidini, Subfamily Diaspidinae, Family Diaspididae. The genera were issued in alphabetical order from *Andaspis to Xerophilaspis.* Under each of these genera the species also were issued alphabetically. The second series, now under consideration, begins with serial number 137, the first 17 numbers comprise 10 additional species of 4 genera included in series I and four species of three additional genera of the tribe Diaspidini. Then follow 19 numbers (4 genera, 15 species) of Tribe Odonaspidini, 2 numbers (1 genus, 1 species) of Tribe Xanthophthalmini, and 94 numbers (22 genera, 72 species) of Tribe Aspidiotini, bringing the end of the series with No. 268. As before, the genera, and under each genus the species, have been published in alphabetical order. The Stanford University Press has issued a circular in connection with series II containing four lists of species for the (*a*) eastern and central U. S., (*b*) gulf states, (*c*) Rocky Mountain, Great Basin and Northwestern States and Northern California and (*d*) Southwestern States (Western Texas, New Mexico, Arizona, Southern California) with a list of those numbers of the Atlas thus far issued which illustrate the scale insects of these respective areas. We congratulate the author and the Stanford Press on the progress made and reiterate our wishes for the successful completion of the Atlas.—P. P. Calvert.

The Fulgorina of Barro Colorado and Other Parts of Panama. By Z. P. Metcalf. Bulletin of the Museum of Comparative Zoology at Harvard College, vol. 82, No. 5. Pp. 277-423, 23 pls. October, 1938. This work has already been noticed by a specialist on this group, Prof. Herbert Osborn (Annals Ent. Soc. Amer. 32: 43). It will therefore be of greater value to readers of the News to quote from Dr. Metcalf than to express an opinion on its value. The material on which it is based are collections in the M. C. Z. (by Banks, 1924), the American Museum of Natural History, the U. S. National Museum and that of the author. The general classification used is that of Muir, 1930. An attempt is made to rehabitate the genera established by Stål, and to settle certain genotypes, using as a basis a card catalog of about three-quarters of a million items dealing with the Homoptera, Copious Keys to subfamilies, tribes, genera and species are given, after having used them repeatedly on a large amount of material in the effort to make them as clear cut and concise as possible. "However, after all care is taken, the use of a key is largely a matter of interpretation. The worker must use all diligence in attempting to get the meaning which all language conveys so imperfectly. . . . The present study further confirms the writer's belief that the genitalia, especially the male genitalia, furnish the most reliable taxonomic and systematic characters. Eventually I believe that the phallic characters will take rank equal to, if not ahead of, chrotic characters in determining the taxonomic and systematic status of the Homoptera." As far as one may judge from the keys in this paper, genitalic characters have been used chiefly for distinguishing species rather than higher taxonomic groups. We looked for the term "chrotic" in Torre Bueno's *Glossary* but found it not. However, the Century Dictionary gave us "*chrotic* pertaining to the skin." Why *chrotic* rather than the more familiar *dermal,* and what is the difference between the Fulgorina (in the title of the paper) and Fulgoroidea at the top of the principal key on page 281?—P. P. CALVERT.

Two Interesting Nests of Tapinoma sessile (Say) in Maine (Hymenoptera: Formicidae).

During the summer of 1938 at Ash Point, Maine, two interesting and rather unusual nests of *Tapinoma sessile* (Say) were encountered. According to myrmecological literature, this ant is noted for its diversity of nesting sites.

The first nest was in a cavity of an old Black Knot canker *(Dibotryon morbosum* (Sch.) T. & S.) which occured at a height of about 4 feet on the dead trunk of a Pin Cherry tree *(Prunus pennsylvanica* L. f.). The small colony after being disturbed several times left the nesting site permanently. The second colony was in the lower part of an abandoned nest of the Northern Yellow Throat Warbler[1] (*Geothlypis trichas brachidactyla* (Swainson)) which was situated about 2½ feet from the ground in a Bayberry bush *(Myrica pensilvanica* Loisel.). This colony was somewhat larger than the former, but did not approach the populous condition of many of the nests of more frequent construction.

MERLE W. WING.

[1] Determination by Mr. H. L. Mendall, Wildlife Dept., Univ. of Maine.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1939, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December.

Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

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ENTOMOLOGICAL NEWS

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Nymph of the Protoneurine Genus Neoneura (Odonata).

By James G. Needham, Cornell University.

Among some dragonflies that were sent me for determination in 1935 by Brother Roberto of the Colegio de La Salle, Vedado, Havana, Cuba, were a number of specimens of *Neoneura carnatica*. Having been unable, on two collecting trips to Texas, to find any living specimens of the one species of *Neoneura* known from the United States (*N. aaroni*), and desiring to know what the nymph of the genus is like, I followed up this clue and went to Cuba, to search for it, and got it. In company with Dr. J. C. Bradley, I spent the last ten days of March, 1939, collecting insects in Cuba. We were greatly aided by Dr. S. C. Bruner and his colleagues of the Entomological staff of the Estacion Experimental Agronomica at Santiago de las Vegas, Dr. J. Acuña and Mr. F. de Zayas. The latter took us to see Brothers León and Roberto at the above named college, and from them we received information, and a cordial invitation to *Las Animas,* a retreat maintained for the staff of the college on the summit of a ridge in the Rangel Mountains of Piñar del Rio.

A fine road led westward to the City of Piñar del Rio, and a branch of it northward into the mountains at Viñales. A passable dirt road continued on to El Retiro (where we left it) and northward across the ranges to the north coast. Along the six-mile trail leading from El Retiro to Las Animas I found *N. carnatica* nymphs in abundance.

The very first dragonfly I encountered at El Retiro was a nymph of this species in transformation. It was clinging to the wall of an artificial spring-fed pool a few inches above the surface of the slowly flowing water. I could not then tell that it was a *Neoneura;* it looked like an *Argia.* I sat by it until the wings were expanded and then popped it and its empty skin inside a little paper bag (a supply of which is ever ready in a pocket of my collecting jacket) and left it to mature its colors. Then with Dr. Acuña's aid, I went collecting adults, among which were a few Neoneuras.

The next place I found it was also at El Retiro, on the cobblestones at the edge of the first ford that the dirt highway crosses going northward. This proved to be the place of greatest abundance of the nymphs. They were found clinging to the stones in the swiftest water and not at all in the slack water at the edges. They cling firmly to the stones when these are lifted and are easily picked off by hand.

A few cast skins were seen sticking to surfaces exposed above the water and two more specimens were taken in transformation. Most of the nymphs were well grown. Evidently the season of transformation was just opening. This was on March 25th.

The next day we went afoot up the rocky six-mile trail to Las Animas, taking most of the day for it, and enjoying the beautiful mountain scenery along the way. I collected a little at every crossing of the stream whose course the trail follows, and found some nymphs of Neoneura in nearly all of them. Always they were clinging to the under surfaces of stones, where they were regularly associated with nymphs of *Scapanea frontalis.* Another lotic species, *Macrothemis celeno,* was more commonly seen on the wing. Its nymph lives in the more quiet places among the rocks of the riffles. Among the weeds at the edges in quieter waters the damselfly *Enallagma cardenium* was ever present, and the adults of that species were far more abundant than the Neoneuras. Dr. Acuña collected several adults of *Protoneura capillaris* along the way but I did not find the nymph.

Description of the Nymph.

The nymph of *Neoneura carnatica* may be characterized as follows:

It measures in length 12 mm. with the gills 5 mm. additional; hind femur 3; width of head 3.5; of abdomen 3.

It is a short stout blackish nymph, in form, widest across

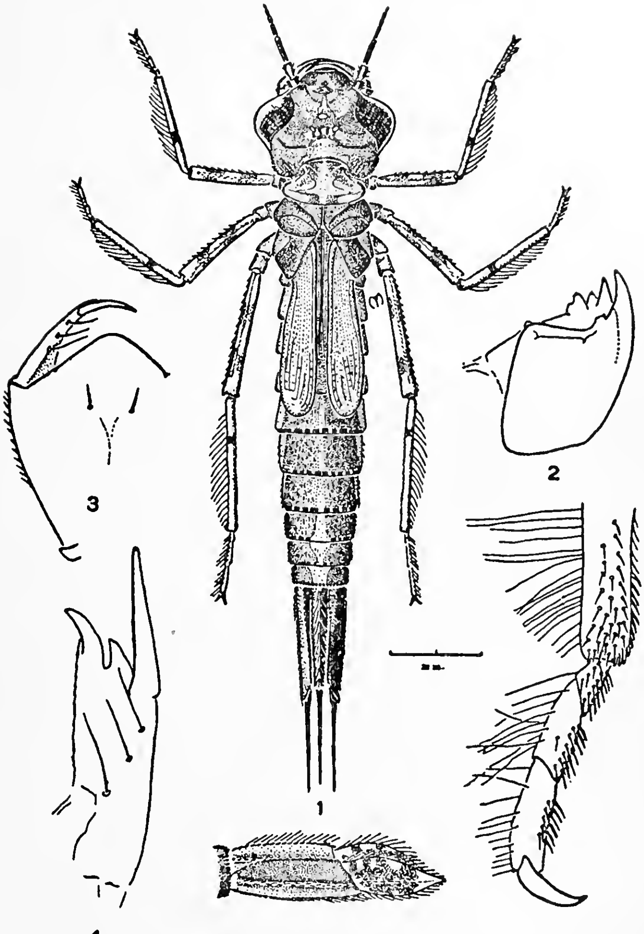


Figure 1. Nymph of *Neoneura carnatica*. 2. Left mandible of nymph. 3. Labium of nymph. 4. Lateral lobe of labium. 5. Lateral view of gills. 6. Tip of tibia and tarsus of mesothoracic leg. (Drawings by Dr. May K. Gyger.)

the head, and tapering rather regularly backward to the tip of the caudal gills. The pale ground color of the body is heavily overlaid with blackish-brown pigment on the dorsum. This appears in a mottled pattern on the frons, in a crossband between the eyes, on the sides of the prothorax, all over the dorsum of the synthorax and along the sloping sides of the abdomen, on the gills, and as blackish rings on the legs. The abdomen is pale at the sides below the wings, and in a mid-dorsal line from wings backward, the stripe widening on the terminal segments.

The head is broad and flat, widest across the very large eyes, rounded behind the eyes and excavated in the rear. The hind angles are densely spinulose. The antennae are brownish, paler at the joinings of the segments, and seven-jointed. The joints are proportioned in length from the base outward as 5:6:10:6:5:4:3. The labium is short and wide. Its middle hinge lies entirely underneath the prothorax. The mentum is semioval. Its front margin is produced in a broadly rounded entire middle lobe, and there is a single pair of slender minute setae near the middle line. Lateral lobe narrow stout, armed with three lateral setae and a stout incurving movable hook. On the distal end above the stout end hook there is an elongate triangular tooth that is also a little incurved and hook-like. The inner border of the lateral lobe is almost smooth and the usual prominence at its outer end is scarcely discoverable being appressed closely to the end hook.

Prothorax flat above, with its disc rather narrower than the body is below it, and rounded at both its sides and its ends. The anterior end fits closely into the occipital excavation of the head. The synthorax is little depressed. Legs pale; femora with two rings of brown and with touches of the same color on the anterior face at both ends. Tibiae with a single ring of brown at one-third their length; all heavily fringed with long hairs on the posterior margin, and densely beset with sharp spinules on the inner surface toward the tip, as are also the tarsal segments. Those spinules at the extreme tip of the tibiae are spur-like and the others are serrately margined or sub-plumose. The slender wing sheaths reach rearward to the middle of the fifth abdominal segment.

Abdomen slightly depressed basally, regularly tapered from front to rear, becoming cylindric at the tip. The terminal segments decrease successively in length, and the last one bears an apical ring of sharp brown marginal spinules. Gills thick at base and tapering to thin lamellae at the tip, obliquely divided at two-fifths their length into two parts: a thick blackish laterally carinate basal segment that is longer on its ventral margin; and a thin, pointed, apical leaf-like portion, that is paler at margins and apex.

The genitalia are unusually prominent: in the male a pair of stout brown submedian spines on segment 9 that project rearward beyond the apical margin of that segment; in the female the two upcurving ovipositor blades, and their sharp-pointed covering sheaths extend beyond the apex of the 10th segment half the length of that segment.

Specimens are in the Cornell University collection.

On Two Species of Neotiphia from Arizona (Hymenoptera: Tiphiidae).

By V. S. L. Pate, Cornell University.

(Continued from page 224.)

Neotiphia pima[3] new species.

The present species is somewhat intermediate in character between *Neotiphia cockerelli* Allen and *N. conspicua* Allen, agreeing with the former in the cylindrical non-flattened hind metatarsi and with the latter in the conspicuously hirsute margins of the oral cavity, but is readily distinguished from both by the clear hyaline wings, the presence of a low median longitudinal carinula bisecting the median areole of the dorsal face of the propodeum and by a continuous groove about the lateral and posterior margins of the tegulae. In addition, *pima* is separable from *conspicua* by the strongly lineate lateral faces of the propodeum and the differently constructed first abdominal sternite, while from *cockerelli* the present species may be differentiated by the absence of a median longitudinal carina on the sixth abdominal sternite. The female recorded below as the provisional allotype of this species is apparently most closely related to *Neotiphia novomexicana* Allen from which it may be distinguished by the tawny wings, the nitidous clypeal bevel, the complete uninterrupted transverse pronotal carina and the differently shaped median areole of the dorsal face of the propodeum.

Type.—♂; Wilmot, seven miles southeast of Tucson, Pima County, Arizona. Elevation, 2600 feet. August 25, 1937. (Rehn, Pate and Rehn; at flowers of *Acacia.*) [Academy of Natural Sciences of Philadelphia, Type no. 4199.]

♂.—8 mm. long. Black; mandibles dark red apically; tarsal segments dark fulvous apically. Wings clear hyaline; stigma and veins brunneous.

[3] After the Pima Indians of southern Arizona.

Head fulgid; vertex and upper half of front without acupuncturation, with moderately large punctures of second to third degree density and with a large transverse glabrous nitidous area just before anterior ocellus. Ocellocular line slightly longer than the postocellar line. Occiput and temples with moderate puncturation of second to third degree density and clothed with long suberect light hairs. Margins of oral cavity and ventral aspect of head densely clothed with rather long erect white pubescence. Labium with a median longitudinal groove on basal half to two-thirds. Clypeus and lower half of front opaque and with fine close acupuncturation; the front with larger and coarser superposed punctures of the second degree of density and sparsely clothed with suberect light pubescence; antennocular line one-fourth the length of the eye. Clypeus transverse, subadamantiform, length medially one-half that of eye, with superposed larger puncturation of the first degree of density and clothed with short light aeneous reclinate pubescence; tumid discally and produced medio-apically into acute point, laterad of which the apical margin is oblique and abruptly inflexed. Mandibles punctate on basal half; median longitudinal groove obsolescent or absent.

Thorax fulgid; pronotum dorsally, save for a broad transverse nitidous glabrous arcuate apical band, with sparse scattered puncturation largely of third degree density, acupuncturation absent, anterior dorsal margin with a strong uninterrupted transverse sublaminate carina, lateral faces narrowly above with sparse puncturation of second degree density and with fine very inconspicuous minute microscopic clathrate aciculation below and with an oblique subfoveolate groove paralleling the lower margin. Mesonotum with an irregular row of large coarse close punctures along the anterior edge and the inner margins of the notauli, disc with a large patch of large punctures of second degree density and posterior margin with a small semilunate patch of smaller punctures medially. Scutellum with anterior half, save for a few scattered punctures, practically impunctate, the posterior half with moderately sized punctures of third degree of density. Postscutellum with scattered punctures of second degree of density. Tegulae broader than long and with a groove continuous about lateral and posterior margins. Mesopleura clothed with long suberect white pubescence; anteriorly with a strong epicnemium which is not continued onto mesosternum, devoid of acupuncturation but covered with large coarse punctures of second to third degree density. Propodeum fulgid, glabrous; dorsal face with median areole about as long as broad at base, the lateral carinae strongly convergent posteriorly, bisected for its entire length by a median longitudinal carinula, the surface minutely rugulose within, laterad of lateral carinae the surface is finely rugulose halfway to the lateral margin beyond which it is sublaevigate, posterior margin of dorsal face furnished with a strong transverse biangulate carina which is foveolate on both sides; posterior face finely rugosopunctate, more coarsely so marginally, without a median longitudinal carinula, lateral margins rather weakly carinate; lateral faces horizontally to obliquely strongly lineate. Hind tibiae with the sensorium elongate, cuneate and moderately impressed. Hind metatarsi cylindical, devoid of short stout spines above.

Abdomen fulgid, without acupuncturation. First five tergites with large coarse punctures of third degree density discally grading to second degree laterally; penult tergite with closer puncturation throughout; ultimate tergite coarsely, closely rugosely punctate, not carinate longitudinally. Tergites with short sparse inconspicuous suberect light subaeneous pubescence, with a transverse subapical row of longer stronger aeneous setulae along the anterior margin of the transverse nitidous apical band. First sternite subfulgid, with a V-shaped carina separating the escutcheon from the disc which is bisected on its anterior half by a high median longitudinal carina emanating from the angle of the anterior V-shaped carina, the disc anteriorly and laterally with large coarse semiconfluent punctures, posteriorly and medially with fine acupuncturation. Sternites with close puncturation of second degree of density and with a transverse row of subapical setulae as on tergites. Sixth sternite with the lateral carinae distinct on apical two-thirds and separated from the median shagreened stripe by a single row of punctures, no median longitudinal carinula present, not produced medio-apically into an emarginate lobe separated laterally by deep rounded notches.

Allotype.—♀; Topotypical; same data as type. [Academy of Natural Sciences of Philadelphia.]

♀.—12 mm. long. Similar to male except as follows: Wings clear hyaline, strongly tinged with fulvous; stigma brunneous, veins fulvous.

Head with puncturation in general similar to male but practically devoid of acupuncturation. Clypeus transverse, semilunate, length medially about one-half that of eye, closely rather finely punctate and with a transverse submarginal carinula which is obsolescent medially on the flat disc, produced medio-apically into a broad transverse arcuate lobe which is provided with a broad gently deflexed arcuate subnitidous bevel apically. Margins of the oral cavity not densely hirsute as in male. Labium with a median longitudinal sulcus basally.

Thorax with the punctate portion of the dorsal face of the pronotum with the punctures very large, coarse and of the first to second degree of density; lateral faces of pronotum impunctate, save for a marginal row of coarse punctures along the dorsal and anterior edges, the median oblique groove faint and present only medially, the lower half subhorizontally lineate. Mesopleura without an epicnemium anteriorly, punctate as in male. Scutellum with a marginal row of large punctures, otherwise nitidous save for one or two discal punctures. Tegulae broader than long, with a marginal impression continuous about the lateral and posterior edges. Propodeum glabrous, fulgid; dorsal face with the median areole rectangular, one and three-fourths as long as broad at base, the lateral carinae subparallel, bisected for its entire length by a strong median longitudinal carina, finely closely acupunctate within, laterad of the lateral carinae halfway to lateral margins the surface is subopaque and finely closely microscopically acupunctate, the remainder sublaevigate, posterior edge of dorsal face furnished with a strong transverse marginal carina; posterior face with fine microscopic acupuncturation upon which is superposed laterally a stronger scattered puncturation, without a median longitudinal carinula discally, the lateral margins sharply carinate; lateral faces perfulgid, strongly horizontally to obliquely lineate throughout. Hind tibiae with the sensorium cuneate, about twice as long as broad at its widest point and deeply impressed. Hind metatarsi with the longitudinal groove elongate, linear, deeply impressed, and with a double row of three short stout spines above. Fore wing with the stigma small but distinct and definite, extending less than one-half the distance from the origin of the radial vein, which arises distinctly before its apex, to the basal vein.

Abdomen fulgid, without acupuncturation. First four tergites with large punctures of third degree density discally grading to second degree laterally; fifth tergite with large close puncturation; last tergite with the basal two-thirds very coarsely closely rugosely punctured and abruptly elevated above the apical impunctate shagreened thin and foliate portion which is thickly clothed with long sordid light aeneous coarse pubescence basally immediately following the abruptly elevated anterior portion. First five tergites with a transverse subapical row of long aeneous setulae along the anterior margin of the transverse nitidous apical band; the first four tergites otherwise sparsely clothed with light suberect hairs, the last two tergites more heavily and thickly clothed with similar but more conspicuous pubescence. First sternite with an obtuse tubercle but not with a transverse carina separating the escutcheon from the disc, which is devoid of a median bisecting carina but is finely closely microscopically acupunctate with coarser punctures superposed on the vertical lateral portions and along the anterior margins of the horizontal portion, along the posterior margin of which and the lateral margins posteriorly as well is an impressed submarginal groove. Second sternite with coarse puncturation of second to third degree density, the remaining sternites with similar puncturation of first to second degree density. Sixth sternite with a broad transverse shagreened band on basal third which bears a few moderately large scattered punctures of third degree density laterally, the lateral portions of the basal band abruptly elevated above the distolateral coarsely punctate portions of the sternite and confluent medially with the customary impunctate shagreened median stripe, the lateral margins of which are oblique, bisinuate and convergent apically; the distolateral margins of the sternite furnished with a thick brush of long coarse sordid yellowish hairs.

Paratypes.—7; 6 ♂, 1 ♀, as follows: Arizona: 5 ♂; Wilmot, seven miles southeast of Tucson, Pima County, elevation, 2600 feet; August 25, 1937; (Rehn, Pate and Rehn; at flowers of *Acacia*). 1 ♂; Twin Buttes, near Indian Well, Navajo County; elevation, 5850 feet; July 29, 1937; (Rehn, Pate and Rehn; swept from flowers of *Cleome serrulata* [Rocky Mt. Bee-plant]). New Mexico: 1 ♀; Road pass south of Cienaga Peak, Peloncillo Mts., Hidago County; elevation, 4500 feet; August 27, 1937; (Rehn, Pate and Rehn). [All A. N. S. P.].

Remarks.—The female described above and recorded as the provisional allotype of the present species may eventually prove to be a form discrete from the male in view of the fact that it differs markedly from the type in a number of characters, notably in the much larger size, the tawny wings, the longer parallel-sided median areole of the dorsal face of the propodeum, and the quite differently formed and sculptured first abdominal sternite. However, I attribute these differences largely to the usual antigeny customarily exhibited by the various species of this general complex. I base this association of the sexes of *pima* upon the fact that both were swept from the flowers of an *Acacia* and taken together in the net, although not in copula.

New Species of Stelis from California (Hymenoptera, Megachilidae).

By E. GORTON LINSLEY, University of California.

The species of *Stelis* described below belong to an interesting group characterized by small size, robust form, large red tegulae, and a characteristic pattern of eburneous abdominial fasciae. They are best represented in southwestern United States and appear to be parasites of *Ashmeadiella.*

Stelis (Stelidium) hemirhoda new species.

♀ : Small, robust; black, tegulae red, abdomen dominantly red, mouth parts and legs partially red; pubescence white with some brownish hairs on vertex and mesoscutum.

Head wider than thorax; antennae black, flagellum brownish beneath; vertex moderately finely, distinctly punctured punctures very close, interspaces shining, pubsecence dominantly brownish with an intermixture of white; face densely clothed with moderately long, depressed, white hairs which obscure the surface; labrum nearly one and one-half times as long as broad, red to reddish piceous, more coarsely punctured apically, apex broadly truncate; mandibles tridentate, red, base and apex black; cheeks densely clothed with long, depressed, white hairs.

Thorax robust; pronotal tubercles black or obscurely reddish, densely clothed with white hairs which obscure the surface; mesoscutum a little more finely punctured than vertex, punctures mostly less than one puncture diameter apart, pubescence whitish and brownish, sparse on disk, more dense at sides and anterior margin; tegulae large, red, finely and not closely punctured, sparsely clothed with very short, fine, obscure, pale hairs; axillae black, densely clothed with white hairs; mesoscutellum a little more coarsely punctured than mesoscutum, pubescent only along lateral and posterior margins; metanotum densely clothed with moderately long white hairs which obscure the surface; propodeum with triangular area subglabrous, moderately coarsely, closely, distinctly punctured; mesepisterna and mesosternum compressed antero-posteriorly, a little more coarsely punctured than mesoscutum, densely clothed with long white hairs which obscure the surface; legs black, knees, apex of tibiae, and apex of tarsal segments reddish, pubsecence white, denser on lower side of femora and outer face of tibiae; wings lightly infuscated, first recurrent nervure usually received by second submarginal cell near base, second recurrent received before apex.

Abdomen broad at base, red, tergites clouded with black at sides; first tergite with a narrow, transverse, subapical eburneous fascia, entire or very narrowly interrupted at middle, nearly attaining the lateral margins where it is slightly expanded, eburneous fasciae of tergites two to four successively a little more widely separated at middle and broken sublaterally to form a lateral eburneous spot, the lateral fascia narrower than the break on tergite two, as wide as and wider than the break respectively on tergites three and four, fifth tergite with a pair of short, transverse, dorsal fasciae only; tergites moderately closely punctured, punctures on tergites two to five about as large as those of mesoscutum, a little larger on posterior portion of tergite one, the segments margined apically and laterally with a dense fringe of white, depressed hairs, the margin tending to disappear at middle of tergites one and two; sternites red, closely, distinctly punctured, sparsely pubescent except for lateral and apical margins, sixth sternite subtriangularly rounded, not swollen, apex scarcely prejecting beyond tip of sixth tergite. Length: 4-4.5 mm.

♂ : Black, only the tegulae, labrum, mandibles in part, knees, apex of tibiae, apical margin of tergites, and rarely the abdominal sternites reddish; lateral face marks not present; eburneous abdominal fasciae as in female. Length: 4-4.25 mm.

Holotype female (No. 4810 Calif. Acad. Sci., Ent.), *allotype male* (No. 4811 Calif. Acad. Sci., Ent.) and twenty-eight *paratypes,* six male and twenty-two female, collected by the writer at flowers of *Prosopis juliflora* var. *glandulosa,* near Furnace Creek, Death Valley, CALIFORNIA, April 8, 1939, in the company of several species of *Ashmeadiella.* Three additional specimens were taken at the same locality visiting *Pluchea sericea* (Nutt.). Paratypes will be deposited in the collections of Dr. T. D. A. Cockerell, Mr. P. H. Timberlake, Mr. C. D. Michener, Mr. G. E. Bohart, the Academy of Natural Sciences of Philadelphia and the writer.

This species is apparently to be considered as a *Stelidium* and is related to *S.* (*S.*)*cockerelli* (Hicks), but differs at once from that species in color, arrangement of the eburneous abdominal fasciae, punctation of vertex, and in the form of the sixth abdominal sternite which, in the female, is not swollen and does not project beyond the apex of the sixth tergite. From *S.* (*S.*) *permaculata* (Ckll.) it differs in the absence of lateral face marks in the male, red tegulae, and the arrangement of the eburneous fasciae on the abdominal tergites. In *hemirhoda* there is a single fascia on the first tergite (sometimes narrowly broken at middle) which extends across the segment and nearly attains the lateral margin, and lateral fasciae are present on tergites two to four. In *permaculata*, according to the description, there are four fasciae on the first tergite and the lateral fasciae are not present beyond the third segment.

Stelis (Stelidium) acutiventris new species.

♀ : Small, robust; black, tegulae reddish, abdomen, legs, and mouth-parts in part rufo-testaceous; pubescence white.

Head a little wider than thorax; antennae black, flagellum obscurely brownish beneath; vertex moderately finely, closely, distinctly punctured, sparsely clothed with pale hairs; face densely clothed with long depressed, white hairs which obscure the surface; labrum about one and one-half times as long as broad, black, narrowly margined with rufo-testaceous, punctation moderately fine, close, apex truncate; mandibles tridentate, testaceous, base and apex black; cheeks moderately densely clothed with depressed white hairs.

Thorax robust; pronotal tubercles obscurely reddish, densely clothed with white hairs; mesoscutum less closely punctured than vertex, thinly clothed with depressed white or vaguely brownish hairs, denser along lateral and apical margins; tegulae large, red, finely punctured, sparsely clothed with very short, fine, obscure, pale hairs; axillae black, densely clothed with white hairs; mesoscutellum more closely punctured than mesoscutum, clothed with long, white hairs which are sparse on disk and anterior margin; metanotum clothed with white hairs; propodeum with triangular area subglabrous, moderately coarsely, closely punctured; mesepisterna moderately coarsely, closely punctured, clothed with dense, long, white hairs, legs black, knees, apex of tibiae, and apex of tarsal segments rufo-testaceous, pubescence whitish, denser on lower margin of femora and outer face of tibiae; wings lightly infuscated, first recurrent nervure received by second submarginal cell near base, second recurrent received just before apex.

Abdomen broad at base, black, tergites one to five with a narrow apical brownish testaceous band, tergites one to three with a lateral rufo-testaceous area; first tergite with a transverse, subapical eburneous fascia which nearly attains the lateral margin where it is slightly expanded, tergites two to four with a median dorsal fascia, constricted but unbroken at middle and a small lateral fascia, tergite five with a pair of short, scarcely separated, dorsal fasciae only, sixth tergite produced at apex as a subtriangular, apically rounded, vaguely longtudinally carinate process; tergites moderately closely punctured, punctures a little larger than those of mesoscutum, margined apically and laterally with a dense fringe of white depressed hairs, broadly interrupted at middle on tergites one and two; sternites black, apical margin of segments one to four rufo-testaceous at middle, one to three broadly reddish at sides; sixth sternite acutely produced beyond apex of sixth tergite. Length: 4.5 mm.

Holotype female (collection G. E. and R. M. Bohart), from Borego Valley, San Diego County, CALIFORNIA, April 8, 1939, collected by R. M. Bohart, to whom the writer is indebted for the privilege of studying the specimen.

This species differs at once from other members of the subgenus *Stelidium* in the remarkable structure of the sixth abdominal tergite and sternite. It is apparently related to the larger *S.* (*S.*) *cockerelli* (Hicks) which has these same segments modified in a different manner. From both *cockerelli* and *hemirhoda* it also differs in color and the arrangement of the eburneous abdominal fasciae.

Stelis (Stelidium) micheneri new species.

♀ : Small, robust, moderately elongate; black, tegulae red; pubescence white, with some brownish hairs on vertex, mesoscutum, and abdomen.

Head a little wider than thorax; antennae, including underside of flagellum, black; vertex moderately coarsely, closely punctured, sparsely clothed with erect brownish hairs; face and cheeks densely clothed with long depressed, heavily plumose, white hairs which obscure the surface.

Thorax robust; pronotal tubercles black, densely clothed with white hairs which obscure the surface; mesoscutum very closely punctured, the punctures a little less coarse than those of vertex, pubescence very sparse, mostly brownish; tegulae large, red, moderately finely but distinctly punctured; axillae black, subglabrous, punctures similar to those of mesoscutum; mesoscutellum punctured as mesoscutum, subglabrous, with a fringe of plumose white hairs along posterior lateral margins; metanotum moderately coarsely, closely punctured, moderately clothed with white hairs; propodeum with triangular area subglabrous, moderately coarsely, closely but somewhat irregularly punctured at base; mesepisterna and mesosternum a little less closely, more coarsely punctured than mesoscutum, densely clothed with long, white hairs; legs black, clothed with white hairs; wings dusky, nervures and stigma nearly black.

Abdomen concolorous black except for eburneous fasciae; tergites one to four with an oval eburneous fascia on each side near lateral margin, rarely with a very small spot on tergite five, dorsal fasciae absent on first and second tergite, usually present as small, obscure, widely separated spots on tergites three and four, integument moderately coarsely, closely punctured, sparsely clothed with erect brownish hairs and with fringe of depressed, white, heavily plumose hairs along lateral posterior margins of segments; sternites one to five coarsely, closely punctured, sixth sternite finely, closely punctured, more or less evenly and feebly convex, not tumid, extending beyond apex of sixth tergite, apex broadly, subtriangularly rounded. Length: 4.5 — 5 mm.

♂: Abdominal tergites with slightly larger, more conspicuous eburneous fasciae, lateral fasciae present on tergites one to five, dorsal fasciae present and distinct on tergites three to five, rarely represented by a small spot on tergite two, dorsal fasciae widely separated, usually slightly transverse. Length: 5 mm.

Holotype female and *allotype* male (Michener collection) from Eagle Rock, California, May 9, 1936, and four male *paratypes,* two with the same data as the types and two from Altadena, California, June 11, 1933, all captured at flowers of *Cryptantha* by Mr. Charles D. Michener. Additional *paratypes* include four females from near Rock City, Mt. Diablo, California, May 9, 1939 (G. E. Bohart) and ten females from the same locality, May 12, 1939 (G. E. Bohart and J. W. MacSwain). Paratypes are deposited in the collections of G. E. and R. M. Bohart, C. D. Michener, T. D. A. Cockerell, P. H. Timberlake, the Academy of Natural Sciences of Philadelphia, and the writer.

This species is more elongate than the two described above and differs in the coarser punctation of the integument, structure of the sixth sternite of the female, and arrangement and number of abdominal fasciae. It is apparently most closely related to *S.* (*S.*) *cockerelli* (Hicks), but may be distinguished by the feebly convex, non-tumid sixth sternite and the absence of dorsal fasciae on tergites one and two. The following table will separate the females in this group of species:

1. Abdomen black or with very little reddish, sixth sternite projecting beyond apex of sixth tergite........... 2
   Abdomen dominantly reddish, sixth tergite more or less evenly rounded, not produced at middle, sixth sternite not projecting beyond apex of sixth tergite. 4 — 4.5 mm. Inyo County, California......*hemirhoda*
2. Sixth abdominal tergite distinctly produced at middle, dorsal eburneous fasciae of tergites one to four distinct 3
   Sixth abdominal tergite not produced at middle, apex more or less broadly rounded, dorsal eburneous fasciae, if present, represented by two small, widely separated spots on tergites three and four only. 4.5 — 5 mm. Contra Costa County to Los Angeles County, California ....*micheneri*
3. Sixth sternite swollen, apex rounded; dorsal eburneous fasciae of tergites one to four distinctly separated; vertex and mesoscutum with an intermixture of black hairs. 6 mm. Los Angeles County, California ....*cockerelli*
   Sixth sternite not swollen, apex very acute, dorsal eburneous fasciae of tergites one to four unbroken; vertex and mesoscutum without black hairs. 4.5 mm. San Diego County, California............*acutiventris*

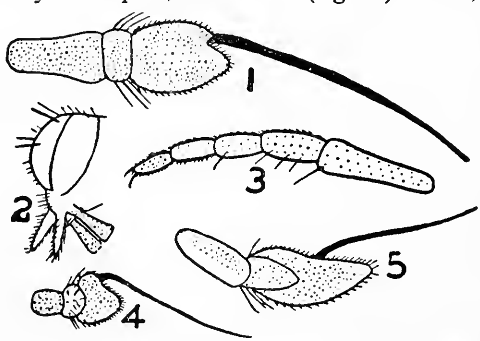
New Utah Dolichopodidae (Diptera).[1]

By F. C. Harmston and G. F. Knowlton[2]

The following three species of apparently undescribed Dolichopodidae are present in the Utah Agricultural Experiment Station insect collection.

Parasyntormon hendersoni n. sp.[3]

♂. Length 2.8 mm.; of wing, 3 mm. Face very narrow, the eyes nearly contiguous below, covered with silvery pollen not hiding the greenish ground color; front blackish dusted with whitish pollen; proboscis and palpi yellowish, covered with minute yellow pile; antennae (fig. 5) black, first joint



1. *Sympycnus utahensis,* antenna, male; 2. *Parasyntormon hendersoni,* hypopygium, male; 3. *Peloropeodes jamesi,* fore tarsi, male; 4. *Peloropeodes jamesi,* antenna, male; 5. *Parasyntormon hendersoni,* antenna, male.

long, yellowish on lower half, second joint overlapping third on inner margin, third joint black, about twice as long as wide, densely pubescent, evenly rounded below, arista inserted near middle of joint.

Thorax shining green; dorsum dulled with brownish pollen; pleurae dulled with white pollen, bristles black.

All coxae, femora, tibiae and basitarsi yellow; fore coxae entirely pale yellow with minute yellow hairs on anterior surface and several black bristles at tip; middle coxae slightly infuscated on outer surface; hind coxae pale yellow, a strong

[1] Contribution from the department of entomology, Utah Agricultural Experiment Station.

[2] Research assistant and research associate professor of entomology, respectively.

[3] Named in honor of Dr. W. W. Henderson, research professor of entomology, Utah Agricultural Experiment Station, who has spent many years in the study of Utah insects.

black bristle at center on outer surface; fore femora without noticeable bristles on lower outer edge; tips of hind femora brown above; fore basitarsi yellow, with three bristles below, second joint less swollen than usual in this genus; third joint hollowed at base with a short, hooked bristle; fifth joint dark brown, hairy, a little widened; middle tarsi infuscated from tip of second joint, hind ones from middle of second joint; first and third joints of hind tarsi two-thirds the length of second. Calypters and halteres yellow, cilia of the former yellowish, appearing brownish in certain lights.

Wings of usual shape, greyish.

Abdomen black, sub-shining, venter yellow on second to fourth segments, this color extends nearly to dorsum on second and third segments; hairs and bristles black. Hypopygium (fig. 2) black, its lamellae small, narrow, fringed with yellowish hairs; the inner appendages black, enlarged and truncate at tips.

Collections. Male taken at Monticello, UTAH, July 28, 1938, by G. F. Knowlton and F. C. Harmston. *Type* in the insect collection of the Utah Agricultural Experiment Station.

Taxonomy. This species is nearest to *P. flavicoxa* V. D. to which it runs in the Van Duzee table of species (The Canadian Entomologist, Vol. LIV, 1922), but differs from that species in the following points: The first antennal joint of *flavicoxa* is entirely black, in *hendersoni* the corresponding antennal joint is yellow on the ventral half; the middle tibiae of *flavicoxa* bears a row of delicate black hairs on the apical half of ventral surface, whereas, the middle tibiae of *hendersoni* are plain, without noticeable hairs.

Peloropeodes jamesi n. sp.[4]

♂. Length 1.8 mm., of wing 2 mm. Face moderately wide, narrowed below, blackish, covered with dark gray pollen; front greenish, dulled with brownish pollen; proboscis and palpi blackish with black hairs; upper orbital cilia black, the lower cilia white; antennae (fig. 4) black, second joint with bristles above and below, third joint scarcely longer than wide, densely pubescent.

Thorax dark shining green, dorsum dulled with brownish pollen; pleurae green, the pollen covering it more white.

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[4] This species is named in honor of Dr. M. T. James.

Coxae, trochanters and femora black, tips of the latter brownish; all tibiae brownish yellow; fore tarsi (fig. 3) yellow; infuscated from tip of third joint, its joints as 20-10-7-7-6. Halteres dark yellow, calypters yellow, cilia of the latter black, appearing brownish in certain lights.

Wings grayish, third and fourth veins parallel beyond the cross-vein.

Abdomen black with faint dark coppery reflections; hairs of thorax and abdomen entirely black; hypopygium black with minute whitish hairs at apex, its appendages mostly imbedded.

♀ Length 2 mm. Agrees with male in general body color and color of legs but differs in third antennal joint being shorter and more rounded at tip and in fore tarsi being of plain structure.

Collections. Described from *male holotype, female allotype,* and four *paratypes* all taken at Blue Creek, UTAH, March 30, 1939, by H. E. Dorst, M. W. Allen and F. C. Harmston; 2 males and 2 females taken same locality April 4, 1939, by H. E. Dorst and M. W. Allen and one male and one female taken at Bear River City, Utah, April 4, 1939, by G. F. Knowlton and F. C. Harmston.

Taxonomy. This species is nearest *fuscipes* V. D. but differs from that species in the shape of the third antennal joint which is acutely pointed and about twice as long as wide in *fuscipes,* whereas in *jamesi* the third antennal joint is distinctly rounded at tip and is hardly as long as wide; the abdomen of *fuscipes* is greenish and in *jamesi* is black with faint coppery reflections.

Sympycnus utahensis n. sp.

♂. Length 2.3 mm., of wing 2.5 mm. Face narrow, dark brown, nearly black, lightly covered with silvery pollen; front dark brown, lightly dusted with golden pollen; palpi dark brown; upper orbital cilia black, inferior orbital cilia white; antennae (fig. 1) black, third joint longer than wide, triangular.

Thorax black, with delicate golden-greenish reflections, the dorsum dulled with brownish pollen, the pleurae dulled with whitish pollen; acrostichal bristles small, in a zigzag row before the flattened space on dorsum; a single pair of large, black scutellar bristles and several small hairs on margin of disk.

Coxae and all of legs black; fore coxae clothed on front surface with white hairs, their tips with white bristles; front femora with two, middle and hind femora each with one pre-apical bristle; all tarsi plain, first joint of fore tarsi as long as second and third joints combined, the joints of middle tarsi as 11-5-4-3-3, of hind tarsi as 8-7-5-3-3; calypters yellow with black tip, fringed with long black cilia; halteres dark brown becoming lighter near apical portion.

Wings grayish, tip of fourth vein distinctly before apex of wing, wings narrowed at base, fringed along anal margin with prominent, light-colored cilia, sixth vein indistinct, not reaching wing margin.

Abdomen black with greenish-bronze reflections; first segment with a row of black bristles on dorsal and lateral surfaces; hair of abdomen dense and black; hypopygium black, its black appendages of moderate length, fringed with light hairs.

Collections. Described from two males, the *holotype* taken at Cedar Breaks and the *paratype* from Panguitch Lake, UTAH, August 3, 1938 by G. F. Knowlton and F. C. Harmston.

Taxonomy. This is the only North American species of the genus *Sympycnus* known to the writers which is entirely black in color of legs, antennae and body.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )follows; then** the pagination follows the colon :

Papers published in the Entomological News are not listed.

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ANATOMY, PHYSIOLOGY, ETC.—Abeloos, M.—

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SPECIAL NOTICES.—Neue untersuchungen uber die fossilen insekten mit erganzungen und nachtragen sowie ausblicken auf phylogenetische, palaeogeographische und allgemein biologische probleme. By A. Handlirsch. [Ann. Naturhist. Mus. Wien] 49: 240 pp., ill.

The Rockefeller Foundation. A Review for 1938, by Raymond B. Fosdick, its President, New York 1939, devotes several pages to jungle yellow fever, vaccination therefor and the spread of the African *Anopheles gambiae* in Brazil. The Annual Report of the International Health Division of the same Foundation states progress made in control and investigation of the arthropod-carried diseases yellow fever, Rocky Mountain spotted fever, sylvatic plague and malaria.

202 Common Household Pests of North America. By Hugo Hartnack. Hartnack Publishing Company, Chicago, Illinois, 1939, 319 pages, many illustrations.—A compact octavo volume, full of worthwhile information on the more common household pests, this little book seems destined to be of real value for professional and layman alike. Its subject matter, on the whole is concise and simply presented in a fresh and informal manner. Copious photographs and diagrams illustrate nearly every pest discussed. The illustrations, often original, but mostly from German sources, offer a pleasant change from more familiar figures, some of which have been in use thirty or forty years. In scope the book includes much that is not found in any other single American work on this subject. Many of Dr. Hartnack's statements are made from information furnished by German authors, who have recently done painstaking work in this field and anyone wishing to go deeper into the subject is advised to consult the originals, of which the present volume gives only excerpts. In addition to the German sources, several American works have been consulted, but the author does not seem to have seen those of Howard or Herrick. Far from limiting his text to insect pests of the household, the author includes other arthropods, as well as the common mammals and even birds. Moreover, his arrangement is systematic, rather than by food materials, as, for example, it is in Herrick's works. Much might be said for both systems of arrangement, but Dr. Hartnack has at least minimized the necessity of knowing the food material of a given pest before his book can be of ready use. Moreover, the author outlines salient structural inter-relationships of the animals discussed, and although the book can in no sense be considered a treatise on the taxonomy of household pests, it does give important taxonomic characters wherever these will clarify identification. The subject matter is limited to the animal kingdom of which two major phyla are discussed, namely the chordata and arthropoda. Under chordata he includes the various house-infesting rats, mice, squirrels, bats, the English or House sparrow and common pigeon or Rock-dove. These alone occupy 22 pages of the text, but the bulk of the work naturally is given to insects of which species belonging to 14 orders are treated in 217 pages. Additional arthropods mentioned include sowbugs, millepedes, centipedes, pseudo-scorpions, harvestmen, true spiders, jumping spiders, mites and ticks. Finally there are chapters on keratin pests, Incinerator fauna, Carcass decomposition, Insect bite statistics, Insectaphobia, Extermination, The household pest problem and

Natural Control. So much for the bare outline of the book's contents. It would be an oversight for any reviewer to overlook the many innovations contained in the volume. Among these may be mentioned the final chapters enumerated above, which are interesting and full of information which the public should have. Dr. Hartnack is at some pains to educate his readers and points out serious, but largely ignored, political injustices and Federal short-sightedness in dealing with the problems of household pests and their control. In many ways he strives to awaken recognition of situations in the United States which should be regarded as well nigh intolerable, but which are actually encouraged, through ignorance, political control, or public indifference. In additional to the essential facts of life history, habits, foods and control measures for the pests, or groups of similar pests discussed, the author often includes interesting accounts of their history, quoting from and even reproducing in facsimile old documents and illustrations of past centuries. The text is adorned with small margin cuts, depicting embarrassing and amusing situations encountered by persons harassed by their insect tormentors. While not contributing to the scientific value of the book, they provide a light and entertaining touch which certainly does not detract from its essential worth. In fact the very absence of the usual "dryness," which this volume happily avoids, and which to some degree at least is responsible for the lack of public interest and intelligence on this subject, is, we feel, one of the many outstanding qualities of the book. The author has made a traditionally uninteresting subject come to life and thereby has made it possible for the layman to inform himself and enjoy the process. Perhaps more remarkable than this, is Dr. Hartnack's whole approach to the problem. It is one which may not be unique but certainly is unusual, and yet constructively advanced over more widely accepted theories. He points out that for centuries, man has labored under the illusion that he was the purpose and center of the universe, and that therefore all things which interfered with his will or well being were his enemies and should suffer destruction or be brought to serve his purpose. The author, however, makes clear that existence on this planet is competitive and that all life has an equal right with man to be established on the earth. He does not, of course, sentimentally infer that we should suffer pests and vermin to flourish at our expense, but recommends that we justify our superiority by using the brains which give it to us. He suggests that in order to control pests, we remove the materials which attract them to inaccessible places, and that we apply our knowledge of their habits when constructing buildings to build them out. The author contends that if we are so careless as to provide food and shelter for various pests and then find the pests in action, the fault is not theirs but our own. Yet, he concludes, we have always blamed the pests and not ourselves for the depredations they occasion. It is with admitted reluctance, therefore, that he recommends the use of gases and poisons at all—as it were taking unfair advantage of animals which are actually innocent of any crime. Any proponent of this viewpoint would have to recommend practical measures to make it effective. This Dr. Hartnack does not fail to do and stresses the importance of proper organization, local, state and federal, in combating pests, pointing out what has already been done abroad in many specific instances. As an educational theory, as well as in practical application, his point of view would seem to have unlimited possibilities which ultimately could bring us closer to the solutions of our problems than we have ever been before. In the foreword to his work the author asks that his critics judge it on two scores: 1. "Does it give worthwhile information on household pests? Does it make information that is already available more usable Does it stimulate research? 2. Does the work stimulate — thinking about the solution of the household pest problem by organization Or should the field of household pests stay abandoned or nearly so?" To some of these questions, we have already given an answer in the foregoing remarks. Whether or not the work will stimulate research remains to be seen, but the stimulus is there. If we were to criticise any feature of the work unfavorably it would be, perhaps, the index which is not as full as it might be, and could be expanded with greater specific citations. Its use is not made easier by the liberal interpolation of many symbols, explanation of which appears at the beginning of the index, but which are too numerous to remember, and necessitate frequent reference to their key. In the past few weeks several opportunities for practical use of the work have arisen in answering inquiries at the Academy of Natural Sciences, regarding household pests. In every case both text and illustrations have furnished adequate information quickly and this experience though brief, leads us to feel that the work will fully justify its existence. Not only to the professional exterminators is this book of value, but it should be a useful reference work in the household and even the layman will find it interesting reading.

John W. Cadbury, 3rd.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis** or **Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

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THIS NUMBER COMPLETES THE 50th ANNUAL VOLUME

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TO CONTRIBUTORS. The receipt of all papers will be acknowledged and if they are accepted they will be published as soon as possible. If not accepted, authors will be so advised and postage requested for return of manuscripts. Articles longer than six printed pages will be published in two or more installments, unless the author is willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division. Proof will be sent to authors.

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The making of blocks and printing of all illustrations will be charged to authors. The editor will furnish cost of same when requested.

Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1939, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December.

Communications on observations made in the course of your studies are solicited; also exhibits of any specimens you consider of interest.

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ENTOMOLOGICAL NEWS

Vol. L DECEMBER, 1939 No. 10

The Seventh International Congress of Entomology at Berlin.

By J. Chester Bradley, Cornell University, Ithaca, New York.

On the twenty-fourth of June, 1938, a group of American entomologists, some with their families and joined for the trip by friends until the party numbered in all twenty-one souls, sailed down the St. Lawrence on the Duchess of Atholl, bound for the Seventh International Congress of Entomology at Berlin, but intent upon a program of travel and sightseeing before and after that Congress. Intense heat at Montreal gave way to the bitter cold of iceberg-laden seas off the coast of Labrador, and from there for the balance of the summer, we seemed always to be having too much cold for complete comfort or too much rain, or both.

Landing at Belfast on the first of July, we were met by enterprising Irish reporters, who for some reason got the idea that we were hot on the trail of the yellow fever mosquito, and published a notice of our arrival under the heading "Meet public insect enemy number one," disclosing that said mosquito is the culprit. They further informed the wondering Ulstermen that we had no insects with us, that it was not necessary, since a good collection exists in Berlin!

Followed a two-weeks' tour by chartered motorcoach of Ulster, Donegal, the more northern parts of the Irish Free State, Wales and southern England, a week in London, and thence to Newcastle and over the North Sea to Bergen, Norway. Days on the Hardänger, Näro and Aurlands Fjords among the snow clad mountains of Norway, at Oslo, Lake Mjosa and Lillehammer, at Gothenborg in Sweden and Copenhagen in Denmark strongly contrasted in every respect with those which, just preceding the Congress, were spent in northern Germany, at Hildesheim, in the Hartz Mountains, and in viewing the Wartburg, where Luther was once imprisoned.

The evening of Sunday the fourteenth of August we reached Berlin. Too late we were for the less energetic members of the party to attend the presession social gathering at the University. The apparently limitless and very imposing buffet at that event, at which the congressionists were the guests of the Congress committee, set a standard of lavish hospitality which was maintained if not exceeding at every event of the following week. On this occasion the Reichsnährstand provided the wines, and it afforded opportunity for those curious about such matters to sample wine of Germany's finest and most celebrated types.

On Monday morning the solemn opening session of the Congress took place in the Aula-Gebäude of the University with great eclat and pomp. After an orchestra concert of classical music, the Under Secretary of State in the Ministry of Education addressed the gathering and declared the Congress open. Addresses of welcome were spoken by the Assistant Secretary of State, by His Magnificence, the Rector of the University of Berlin, and by the Chief Burgomaster and President of the City of Berlin; to these Dr. Jordan, Permanent Secretary of the Congress, responded, and then Dr. Jeannel on behalf of the foreign delegates. The President of the Congress, Dr. Eric Martini, Director of the Institute for Tropical Diseases at Hamburg, addressed the session upon the subject of medical entomology. This address was dramatically interrupted by the arrival of a military orderly with a message which he presented to Dr. Martini. The president tore the envelop open; glancing it over he drew himself up and almost barked it out to the assembly—a message of felicitation and good will to the Congress from Adolf Hitler.

General sessions were held on Monday, Tuesday, Thursday and Saturday mornings. The afternoons of Monday, Tuesday, Thursday and Friday were devoted to meetings of sections. Of these the subjects were: Systematic entomology and zoogeography; nomenclature and bibliography; morphology, physiology and embryology; genetics; ecology; medical and veterinary entomology; apiculture and sericulture; forest entomology; viticulture, fruit crops and horticulture; field crops and vegetables; the potato beetle; storage pests; pest control; conservation and teaching; and the cockchafer. Potato beetles are now a serious problem in France; they have migrated into Germany but the infestation there is not yet serious. All Europe is awake to the menace of these beetles, as was evidenced by posters we had noticed throughout England and Scandinavia warning anyone who found any to forward them to an experiment station.

More than eleven hundred persons were registered at the Congress, three hundred and fifty of whom came from outside of Germany. About thirty Americans present were registered as full or associate members. Sixty of the members were from England, thirty-five from France, twenty-five from Holland, twenty from Sweden; in all around fifty countries were represented.

Of more than three hundred papers read, one hundred thirty were on economic entomology, seventeen on medical entomology, sixteen on apiculture, the balance on non-applied phases of the science. Seventeen per cent of the papers were read in English, the same in French, four per cent in Italian, forty-two in German. They covered, of course, a very wide range, and the most that can be done here by way of review, is to select, more or less at random, some ideas, suggestions, or facts presented that are of a broad or general interest.*

Dr. Rudolf Heberdey of Graz suggested criteria* by means of which the phylogenetic age of species might be determined from exact knowledge of their distribution, manner of life, and systematic position, as well as of the geological history of the area in which they live, on the ground of certain distributional peculiarities, namely: discontinuous distribution of a

[* Those of the following papers summarized by Prof. Bradley which have been published in full in Band I of the Verhandlungen of the Congress (dated Weimar, April, 1939, and received in the United States in July, 1939, by some members at least) are marked with a star*.—EDITOR.]

form establishes minimum age; discontinuous distribution of closely related forms establishes maximum age for the forms in question, and minimum age for the next higher systematic category; common discontinuous distribution of nearly related forms makes the minimum age of both the forms in question and of the next higher category very probable.

The thoroughgoing analysis of the highly plastic Holarctic species group of *Papilio machaon,** presented at Munich by Dr. K. Eller was a distinct contribution to and illustration of the principles underlying specific and subspecific differentiations of significance to every thoughtful taxonomist: there are sixty-two races of *P. machaon,* twelve of which, according to Dr. Eller, are "refugial races," that is forms which in retreat from the cold of the glacial period, found refuge in as many isolated "refuge areas," and which in postglacial times became in turn centers of dispersal, from which the balance of the races have been subsequently derived.

Along parallel lines was a paper by S. R. Zarapkin, a geneticist of Berlin, entitled "The principal of divergence in the determination of the lesser systematic categories."* In answering the question as to whether we are yet in position to define such categories through divergence and convergence coefficients, he laid down three provisional conclusions, as applying to the Epilachna forms of which he was speaking: The variation of the median character differentiation of one "population" from another, is similar to that of the individuals within the population, and gives the standard deviation Sp and $\pm$ s; the variation of the median character differentiation of a "race" is similar to that of a foregoing population, and gives Sr that fluctuates perhaps from $\pm$ 1 to $\pm$ 2 s; the variation of the median character differentiation of a species remains insufficiently studied, and we can not as yet lay down a formula.

Dr. R. Jeannel presented some of the zoogeographical results emanating from his long study of the Adephaga,* primitive suborder of Coleoptera: to him it appears that the fauna of heterometabolous insects developed in Laurasia (the land masses of the northern hemisphere), and had for the most part disappeared by the end of the Paleozoic, before the irruption of the Holometabola, which came from Gondwana (land masses of the southern hemisphere); all that we know of the phylogeny and biogeography of beetles accords with this notion of the Gondwanian origin of the Heterometabola. In all of the beetles which the speaker had studied, of which the history extends sufficiently far into the geologic past, there are two categories of lines: the first still occupy the remnants of Gondwana, and represent the survival of species and species groups which evolved on the fragments of that continental mass during the Mesozoic; the others occupy the Holarctic region, and their evolutionary expansion appears to have occurred during the Tertiary. Of the Gondwanian lines of Carabidae there exist three types of distribution: 1) Antarctic Australo-American, illustrated by the very isolated Migadopidae, living in New Zealand, the Auckland Ids., the south of Australia and Tasmania, the south of America and the Falkland Islands; these doubtless date from the Cretaceous, when according to Köppen and Wegner, Patagonia, the western Antarctides, Australia were assembled around the 60°-70° lat. S., and life could be sustained up to 75° lat. S., as under the present antarctic climate; 2) Africano-Brazilian, exemplified by the Hiletidae, as by many other lines, all strictly tropical; the speaker found a more accentuated divergence of characters between the American and African species (distinct genera) than between those of Africa and Madagascar in comparison with Indo-Malaya (subgenera); those of Africa and Madagascar are of the same subgenera, and it is evident that the separation of Madagascar from Africa is subsequent to the separation of the latter from Brazil, contrary to what is generally believed, further it occurred during the Tertiary, even later than the separation from Indo-Malaya, which is not in accord with the theory of an Indo-Malagasy continent "Lemuria"; 3) Godwanian-Oriental, that of the great majority of Godwanian lines. The present day species populated all the borders of the Indian Ocean, Australia and sometimes

New Guinea, Indo-Malaya, even Hawaii, Africa, especially eastern, and Madagascar; some have migrated into the Mediterranean Region; from whence they have even spread to the Antilles, a passage which caused Scharff to assume the existence of an Eocene transatlantic land-bridge, although such a supposition is not supported by a single geological fact. According to Köppen and Wegner the north pole during Eocene times was situated at what is now 45° N, south of Alaska and the equator passed through the Antilles and Mediterranean. The North Atlantic was closed by the union of Greenland with Labrador and Norway forming a continuous continent at latitudes of 20° to 35° N, *i. e.* with a climate which would permit and did permit the interpassage of tropical forms, between the Mediterranean and the Antilles, and vica versa; the subsequent cooling of the North Atlantic climate has completely obliterated the intermediate steps of these species.

In the same field was a paper by E. Voss of Berlin on intercontinental distribution of Rhynchitinae, Attalabinae and Apoderinae,* in which after giving the present distribution of each tribe he discussed the origin and subsequent changes of the continental masses from their beginning to the present time; he outlined the tremendous forces which started the continental shifts in the sense of Wegner; and he pointed out the way in which the actuating causes of the changes in the surface of the globe are based on processes inherent in the structure of the earth. In contrast with the statements previously made by Dr. Jeannel as to distribution of Adephaga, the distribution given for the tribe Trachelophorini is of particular interest, for that tribe does not occur in Africa, but is represented by 25 species in Madagascar, and by over fifty in the Oriental Region.

Dr. Kjell Ander spoke on the phylogeny and classification of the Grylloidea and Tettigonioidea, which he considers as together forming the Ensifera. By reason of primitive characters of musculature and of the tracheal system he does not derive the Grylloidea from either fossil or recent Tettigonioidea, but places them as a primitive side-branch. They comprise two families: Gryllidae and Gryllotalpidae; Tettigonioidea six: Raphidophoridae, Schizodactylidae, Gryllacrididae, Stenopelmatidae, Prophallangopsidae, and Tettigoniidae. By reason of many primitive characters the Raphidophoridae form the second side-branch of the order, the very isolated Schizodactylidae the third, and the Gryllacrididae the fourth. The three remaining families build a well circumscribed group within which the Tettigoniidae are the most highly specialized family and probably arose from fossil Prophalangopsidae. The author believes that the superfamilies Tridactyloidea and Acridoidea, which form the group Caelifera, may be derived from the fossil families Elcanidae and Locustopsidae, which are true Ensifera.

In a paper on the distribution of the Mantodea* the mantids, Max Beier emphasized the strong divergence between the fauna of the old world and that of the new. He considers the Ethiopian Region as being the center of the distribution, lacking but few of the major groups, with many endemic genera, one subfamily and one tribe. It also has the greatest number of species. Its closest relation is with the Oriental and Australian. The Nearctic fauna is an attenuated offshoot of the rich and highly distinctive Neotropical, but the three endemic Nearctic genera are not so, their nearest relatives being Palearctic.

The relations of Corduliinae to other dragonflies* was discussed by Dr. Douglas St. Quentin of Vienna, with the conclusion that the Corduliinae, Cordulegasterinae and Gomphidae form a natural phylogenetic group which possess in common all characters which in reality separate the Corduliinae from the Libellulinae, with which they have long been associated. These characters lie in the primary antenodal cross-veins, the brace-vein of the pterostigma, the anal triangle, the anal angle, the emargination of the hind margin of the compound eyes, the tibial carinae, the stark differentiation of the male anal appendages and in the auricles. The Corduliinae lack the "oblique vein" characteristic of all Libellulinae, and of them only; both groups differ fundamentally in the structure of the male genitalia, in the proportinate length of abdomen and hind wing, in color pattern, and in choice of biotope of both larval and imaginal stages. He showed why the dissimilarity of the triangles of fore and hind wing, characteristic of both Corduliinae and of Libellulinae (but also occurring in Petalurinae, Petaliinae, and many Gomphidae) has come about in different ways in the two groups, and is therefore no mark of relationship, and that the "genital lobes," occurring only in these two groups, are also convergent structures. Finally he showed that the labium of Corduliine nymphs can be derived from a stadium similar to that of Cordulegasterinae and Gomphinae, indicating probable relationship to those groups; the labium of the adult shows no such relation, but is on the other hand similar to that of the Libellulinae, whether by relationship or convergence remains still uncertain.

Tea served in the garden of the university each afternoon between three and five afforded a pleasant opportunity to relax from the sessions, to meet one another and to chat.

At six Monday afternoon a scheduled visit to the Biologische Reichsanstalt für Land und Forstwirtschaft at Dahlem, a suburb of Berlin in which many scientific undertakings are housed, afforded opportunity to become acquainted with the official organization of plant research and its application in Germany. The Biologische Reichsanstalt is an institution of the Ministry of Food Stuffs, and works in cooperation with the plant protection offices of the Reichnährstand. The Reichsanstalt is responsible for the research side of the work, and for carrying on experiments to determine the best methods of pest control. The Reichsnährstand is responsible for carrying control measures into effect. The Biologische Reichsanstalt consists of five divisions: Plant Protection; Insecticide and Fungicide laboratory; Botanical division; Zoological division; and the division of Microbiology which includes both bacteriology and mycology. There is no division of entomology, but entomologists are attached to the staff of three of the divisions. In addition to the headquarters in Berlin, the Reichsanstalt maintains eight branch experiment stations, situated in various parts of Germany, with particular objectives relative to special types of crops.

The Institute of Biology, the Institute of Anthropology and the Botanical Gardens, all located in Dahlem, were also on the program for visiting on Monday afternoon.

A reception was given at the Carl Schurz house on Monday evening to the Americans attending the Congress. Named after the most illustrious of German Americans, the Carl Schurz House is dedicated to the fostering of good relations between the intellectual circles of Germany and America.

On Tuesday afternoon the ladies of the Congress were entertained at a tea, fashion parade and musicale at the Hotel Adlon. Later the Deutsches Entomologishes Institut of Dr. Walther Horn at Dahlem was opened for the inspection of Congressionists; interesting exhibits illustrative of the biology of insects had been prepared for inspection.

A social evening at the Harnack Haus, near Dr. Horn's Institut in Dahlem followed. We were learning by this time a distinction between American and German receptions. In the latter no receiving line is formed, nor do the guests circulate and assemble in groups to chat. Instead one immediately finds a table, sits down, and the eating and drinking continues more or less throughout the evening. Later on every one begins to move about to chat with friends at other tables, or to gather in groups and talk. This same evening the Hymenopterists attending the Congress assembled at one of the city restaurants, and drank some beer together in good fellowship.

Wednesday the paper-reading sessions were replaced by field trips. Bus after bus was filled with congressionists. Then all in a long, long line they drove out into the country into forest lands. There they stopped; we were told to alight, and started off on an almost endless walk through the forest, to which indeed, there seemed little point, for we were too hurried for collecting specimens, and there was nothing in particular to see, except a forest experiment station which we passed with neither stop nor explanation. Again we boarded the buses, and followed one of the famous Reichsautobahnen—government auto highways—until we turned off and drew up at a restaurant on the shores of Lake Werbellin, where our great number sorely taxed the capacity; there we enjoyed a delicious luncheon. Afterwards the party was split into four, some to visit the forestry college at Eberswalde where Dr. Schwerdtfeger lectured on the control of forest pests; some to visit a former hunting box of the ex-kaiser at Hubertusstock and listen to a lecture on parasites of native game animals by Dr. Ullrich; others to visit the Cloister Chorin and the great barge-lift at Niederfinow; and some just to ride around Lake Werbellin, with perhaps a dip in its waters.

On Wednesday evening the Zoological Museum of the University was open for inspection. The same evening we were tendered an elaborate formal reception by the Minister of Science, Education and Instruction on behalf of the government. This was given in the great festival room of the "Kroll" and was a very colorful occasion. It might better be termed a banquet than a reception. While seated at tables, eating, the audience listened to several addresses.

On Thursday evening another very elaborate reception was given to the Congressionists at the City Hall, or as they call it "Rathaus," by the Chief Burgomaster and City President of Berlin.

On Friday morning there was a choice of excursions to the Biological Station and reserve at Bellinchen; to Oderberg-Liepe for collecting; or to Potsdam to see the palaces of former royalty. In the evening the Grand banquet and ball in the Marmorsaal of the Zoological Gardens formed the climax of the week's social events. As a charming and appropriate souvenir, a piece of Baltic amber containing a fossil insect was attached to each menu card. A memorable feat of the president on this occasion consisted of repeating an address in quick succession in each of six different languages.

About two hundred and fifty members of the Congress made the trip to Munich Saturday night and the final events of the Congress were held in that city. The committee wished the members to see the rich treasures of art and science amassed in that old Bavarian capital, for centuries the intellectual center of Germany.

The Burgomaster gave a reception to the Congressionists on the evening of their arrival; the atmosphere of Munich is quite different from that of Berlin, and the reception was less formal; many of the University faculty and leading townspeople had been invited, so that there was opportunity for the Congressionists to become acquainted with Germans in other walks of life. There was an address by Professor Escherich, and entertainment in the way of folk dancing and ballet dancing.

The attractions of greatest interest in Munich were really notable exhibits provided at the library and at the Zoological Museum illustrative of the use of insects in art; these were visited on Monday morning, and in the afternoon a session was held at the Zoological Institute of the University, at which Dr. von Frisch exhibited films dealing with the physiology of the senses and language of bees, and Dr. Eller displayed under biological-ecological headings the complete racial relationships of *Papilio machaon*.

The group of excursionists from America did not continue to Munich, but after the close of the Congress in Berlin, went to Czestochowa, a great pilgrim shrine in Poland where we saw very colorful processions of pilgrims in their beautiful peasant costumes thronging as they have for centuries to the monastery of the Black Madonna. Then we visited Cracow, ancient center of Polish culture, and former Capital, one of the rare old medieval towns of Europe, and so to Banska Bystrica, a typical town among the hills of central Moravia; and from there we went to Budapest where there was a great deal of interest. Certainly outstanding in our memories of Hungary will be the sight of peasants dressed in their gorgeous finery, going to church, at villages on the great Hungarian Plain, far to the east.

Following a stop in Vienna, rest and contrast after a strenuous summer was afforded among the forested Alps of Upper Austria, at the Almsee, lovely lake, nestled deep within the mountains, rarely visited by foreigners, and with only a single primitive hostel where guests may be accommodated.

After a few days in Munich, and a week among the high Alps in Switzerland, including a day of cold glorious sunshine spent at the Jungfraujoch overlooking the incomparable glaciers and snowfields on the south of the Jungfrau, we reached Paris, where we were rejoined by some members of our party who had left us in Austria to visit Italy; so the summer passed, and soon the party was again at sea, this time on the swift Empress of Britain, swiftly, if not too steadily, speeding homeward to Quebec.

In the light of more recent events, one can publish this paper only with a feeling of great sadness. Since our visit the evil shadow of Germany has spread over Moravia, and the long night has descended upon Poland. Our German hosts are at war with our French and English colleagues and no man can forsee the outcome, except that the torches of learning will be dimmed. Perhaps not again in our time can we foregather for such a congress; but the tragic experience of our generation may teach those yet to come that the path of mankind must be lighted by the torches of science, of knowledge, and of human experience, and that neither the democratic masses, deep within the shadows far in the rear of the light, nor unbalanced theorists holding false lures over treacherous side-paths, nor dictators, without light of their own, but following self-interests, shall be allowed to determine the paths which mankind shall tread.

A New Entomological Publication.

The Entomological Society of Washington has recently carried out the plan conceived long ago, of beginning publication of its memoirs. "The North American Bees of the Genus Osmia," by Grace A. Sandhouse, constituting memoir number 1, has been received recently from the press of the Monumental Printing Company, Baltimore, Maryland. This memoir can be obtained at $3.00 by addressing the Corresponding Secretary of the Society at the Bureau of Entomology and Plant Quarantine, Washington, D. C.—D. J. Caffrey.

A Black Widow Spider in a Minnesota Winter (Araneae, Theridiidae).

By John P. Turner, University of Minnesota.

The possibility of being bitten by a black widow spider during a snow storm in zero weather in Minnesota is not very great, but my recent experience indicates that it probably can happen here. The unusual circumstances seem worth recording.

On December 28, 1938, while purchasing provisions at a grocery store near the University of Minnesota campus in Minneapolis, I was presented with an iced tea-size advertising glass with an aluminum top which fitted on like a small cocktail shaker top. Inside the glass was an advertising leaflet. Without removing the top I placed the glass along with my purchases in a paper bag, drove four miles home through the snow-filled air which had warmed up to 15° from the day's low of 5° F. below zero. Shortly after reaching home my wife and I were opening the packages and she removed the lid from the glass, started to reach inside for the advertising folder when the telephone distracted her and she set the glass down on the table in front of me. As I reached for it, a spider crawled from between the leaves of the folder and started scrambling around in the glass. I lost no time in recapping the glass as I recognized the intruder as *Latrodectes mactans*. My identification was confirmed by Dr. Harold Shepard of the Division of Entomology and Economic Zoology of the University of Minnesota. The red ventral spots were connected in a nearly perfect hourglass. There was a row of orange-red spots running down the mid-dorsal line of the abdomen, and three short, oblique, yellow bars on the dorsal-lateral surface of the abdomen, (an indication of its immaturity. The legs were marked with lighter colored bands on the proximal ends of each tibia, but otherwise the spider was black. After shrinkage in 70% alcohol the abdomen measured about 4 mm. long, 3 mm. high and 2½ mm. wide, and was obviously an immature female.

Where did the spider come from? The grocery people were sure that the tops had not been removed from the shaker glasses. The company advertising the product said the gift glasses were packed, with the tops on, in West Virginia not later than October. Therefore, either the spider survived a nearly air-tight confinement in the glass for two months and a freight journey half way across the country in freezing weather, or else the spider got into the glass after reaching Minnesota in mid-winter. The latter alternative seems unlikely, especially as no black widow spiders have been reported from this immediate locality even in summer.

In either case this record indicates that even the zero weather of a Minnesota winter is not absolute protection against the dissemination of, nor the possible injury from, this dangerous spider.

Corrections and Additions to the Clemson List of Scarabaeidae and Other Records from South Carolina (Coleoptera: Scarabaeidae).

By O. L. Cartwright, Clemson, South Carolina*

In the five years since publication of a list of Scarabaeidae collected at Clemson, South Carolina (Entomological News, XLV, 1934, pp. 237-240, 268-269), sixteen additional species have been taken in the same small area, bringing the total to 163 species of 51 genera of the family. These additions have been as follows:

Aegialia blanchardi Horn—March 20, 1935.
Ataenius lecontei Har.—July 28, 1937.
A. alternatus (Melsh.)—August 17, 1935.
A. schwarzi (Linell)—July 20, 1935.
A. erratus Fall—July 19, 1934.
A. brevis Fall—July 28, 1937.
Psammobius interruptus Say—May 12, 1936.
Pleurophorus batesi Arrow—September 10, 1937.
Saprosites ventralis (Horn)—April 14, 1938.
Odontaeus liebecki Wallis—October 13, 1934.

* Technical Contribution No. 70 from the South Carolina Experiment Station, Clemson, South Carolina.

BOLBOCEROSOMA TUMEFACTUM (Beauv.)—June 1, 1937.
TROX SORDIDUS Lec.—March 16, 1936.
PHYLLOPHAGA CERASINA (Lec.)—July 24, 1931.
P. KNOCHI (Gyll.)—July 9, 1936.
HOPLIA TRIFASCITA Say—April 21, 1933.
ANOMALA KANSANA H. & McC.—June 10, 1936.

In the original list two species were listed incorrectly. *Aegialia conferta* Horn should have read *Aegialia conferta* var. *punctata* Brown and the species erroneously determined as *Aphonus tridentatus* (Say) should have been *Aphonus variolosus* Lec.

Other records, which may add to the known distribution of Scarabaeidae, have furnished interest and some surprise in studying the fauna of South Carolina. Unless stated otherwise, the following were collected and determined by the writer:

PHANAEUS NIGER d'Ols., Walterboro, September 12, 1933, Geo. Johnson.

COPRIS TULLIUS Oliv., two mountain localities: Jocassee, July 13, 1936, J. A. Berly, and Cashier's Valley Road, Oconee Co., October 3, 1934.

ONTHOPHAGUS POLYPHEMI Hubbard, in burrows of gopher turtle, Tillman, August 15, 1931.

AEGIALIA HUMERALIS Brown, Chatooga Fish Hatchery, Oconee Co., April 26, 1935. (Compared with type by W. J. Brown).

APHODIUS TROGLODYTES Hubbard, in burrows of gopher turtle, Tillman, August 15, 1931.

A. VESTIARIUS Horn, Tillman, September 27, 1938.

A. PHALERIOIDES Horn, Ocean Drive Beach, August 20, 1934.

ATAENIUS CAROLINUS Van Dyke, Sassafras Mountain, June 16, 1937.

PSEUDATAENIUS SOCIALIS (Horn), Charleston, June 15, 1930, Summerville, July 9, 1936, Monck's Corner, July 7, 1936.

South Carolina males of this species show an extreme development of the terminal spur of the anterior tibia. The spur is quite long, half as long as the inner margin of the tibia, gradually twists to the right and doubles its width at two-thirds its length, then curves inward to an acute incurved tip. Examination of a series of specimens in the U. S. National Museum from various localities from South Carolina to Kansas shows a gradual change in the length and shape of the spur to the normal short spur of the mid-western specimens.

Dialytes striatulus (Say), three mountain localities: Long Creek, Cashier's Valley Road and Sassafras Mountain, July 20 to October 24.

Serica delicata Dawson, Blackville, April 1, 1938, trap light.

Phyllophaga arkansana Schffr., Florence, St. Paul, and Columbia, April 21 to July 12.

P. postrema Horn, Florence, Summerton, and Georgetown, June 3 to July 19.

P. calceata Lec., Saluda, May 8, 1931, F. Sherman.

P. cupuliformis Langston, Meredith, April 29, 1927, and Conway, May 17, 1932.

P. mariana Fall, Blackville, June 8, 1938.

P. floridana Robinson, Monck's Corner, August 17, 1931, F. Sherman.

Dichelonyx elongata (Fab.), Sassafras Mountain and Chatooga Hatchery (Oconee Co.), May 20 to June 3.

D. diluta Fall, Sassafras Mountain and Chatooga Hatchery, May 18, 20, 1937.

D. albicollis Burm., CCC Camp F-2, Oconee Co., June 4, 1937, F. Sherman.

Anomala mendica Csy., White Pond, June 8, 1939.

A. parvula Burm., Florence, Manning, and Blackville, May 29 to July 14.

Cyclocephala parallela (Casey), Summerville, Florence and Charleston, June 2 to July 12.

C. nigricollis Burm., Columbia and Summerville, June 20 and July 5.

C. puberula (Lec.), Charleston, June 9, 1934, J. P. DeVeaux. Georgetown, June 13, 1937, C. B. Eaton.

Psilocnemis leucosticta Burm., Clarendon Co., near Santee River, August 1-9, 1896. Specimens in H. C. Fall collection.

Cremastocheilus castaneae Knoch., Sassafras Mtn., May 15, 1931, F. B. Whittington, and Chatooga Hatchery (Oconee Co.), April 26, 1938, J. N. Todd.

Osmoderma eremicola Knoch., Greenville, May 17, 1930, H. K. Townes, Jr., and York Co., Louetta Youngblood.

Nitidulid Notes and Descriptions (Coleoptera).

By H. R. Dodge, Clintonville, Wisconsin.

Epuraea flavomaculata Mäklin is a distinct species and not closely related to *terminalis* Mann., or *immunda* Sturm, with which it was considered synonymous by Reitter in 1873. It is easily distinguished from the latter by its quadrimaculate elytra and the two structural characters, namely, middle tibiae of the male unmodified and intercoxal process of abdomen broad and obtuse; characters which apparently neither Reitter nor Horn could observe in their examination of Mäklin's types. This species therefore belongs to Group II of Horn's key, among the species with abdominal intercoxal process broad and obtuse. A key for these species is proposed below.

The type specimens were taken from the Kenai penninsula, Alaska, under the bark of trees. There is in the U. S. National Museum a series of this species determined by the late E. A. Schwarz and collected by Mr. Hubbard at Beaver Mine, Algona, Ontario, Sept. 14 and 16, 1889. Other records of this species are Detroit, Michigan, Itasca Park, Minnesota, Mt. Washington, New Hampshire and Cloudcroft, New Mexico.

Key to *flavomaculata* and allies

1. Elytra not spotted ....(2)
   Elytra spotted ....(4)
2. Elytra very broadly truncate behind, apex subequal in width to base; male first ventral with 2 longitudinal rows of hairs ....*alternas* Grouvelle
   Elytra narrowing to the truncate apex; male first ventral not modified ....(3)
3. Elytra narrowly margined; pubescence above grey, not conspicuous ....*ovata* Horn
   Elytra more widely margined; pubescence above long, conspicuous due to silvery luster ....*populi* sp. nov.
4. Disc of pronotum uniformly dark colored; posterior male femora simple; body oblong, depressed....*flavomaculata* Mäklin
   Pronotum with a median longitudinal pale stripe; posterior male femora obtusely subangulate; body form more oval and convex ....*peltoides* Horn

Epuraea populi sp. nov.

♂ *Holotype.* Oval, subdepressed. Body piceous, under surface with brownish tinge. Moderately shining, sparsely clothed with prostrate, silvery hairs, which often are not directed straight backwards. Body above and below with uniform, close, moderately coarse punctures with the following exceptions: mesosternum, prothorax below the basal angles and on a space external to the coxae and extending anteriorly, impunctate; prosternum sparsely, indistinctly punctate.

Labrum not deeply bilobed. Antennal joints 3-5 elongate, equal in length to club, 3 and 5 subequal in length, 4 shorter, 5-8 moniliform, club elongate, 1½ times longer than wide.

Thorax 2.23 times broader than long, broadest at basal third, thence narrowing slightly to the square basal angles and hardly arcuately converging to the rounded anterior angles, base very feebly bisinuate, apex broadly emarginate, lateral margins explanate. Elytra conjointly slightly longer than broad, lateral margins explanate, feebly arcuate and narrowing posteriorly to the truncate apical margin. Upper surface of body slightly irregular due to three feeble transverse impressions on disc of each elytron one at basal and apical fourths and one just before the middle, and an inward extension of the depressed lateral thoracic margin at the basal third. Tarsi dilated; tibiae slender, not modified.

Intercoxal process of abdomen broad and obtusely angled. Male with the extra anal segment.

Dimensions: length 2.81 mm., width 1.74 mm., pronotum .71 mm. long, 1.6 mm. wide at widest point, elytra 1.74 mm. wide, 1.79 mm. long.

♀ *Allotype.* Quite similar to the male in all respects but lacking the dorsal anal segment. Dimensions: length 2.86 mm., width 1.79 mm., pronotum .7 mm. long, 1.53 mm. wide, elytra 1.89 mm. long, 1.79 mm. wide.

Specimens vary from 2.2 to 3.32 mm. in length, and are 1.6 to 1.64 times longer than wide. The under surface is usually slightly browner in color than the upper, though from above the lateral margins of pronotum and elytra are also brownish. There are minor variations in the squareness of the truncature of the elytral apex, width of pronotum in comparison to the elytra, and position of the widest point of the thorax (in some this is appreciably behind the basal third), but none of these characters can be correlated with sex. The tip of the abdomen is deflexed in most specimens, and therefore usually completely concealed from above.

This species is most closely allied to *flavomaculata,* from which it is distinguished by its uniform dark color, oval shape and more conspicuous vestiture. From *ovata* it is distinguished by the vestiture, broader form, more widely margined elytra, and thorax scarcely constricted at base.

Holotype and allotype were collected at Itasca Park, MINNESOTA, June 15, 1937, and July 9, 1936, respectively; 11 paratypes were collected at the same locality, May 17 to June 15, 1937; 2, Ramsey County, Minn., July 25, 1936; 1, Olmsted County, Minn., C. N. Ainslie Collection; 2, Cheboygan County, MICHIGAN, June 30 and July 5, 1935, collected at light by Milton Sanderson.

The holo- and allotype are deposited in the United States National Museum ; other specimens are in the collection of the American and Field Museums of Natural History, University of Minnesota, University of Kansas, K. M. Fender, Academy of Natural Sciences, Philadelphia, and the author.

All but three of the specimens were taken by myself upon the bark of aspen, *Populus tremuloides,* in a recently dead or dying condition. These trees emit a yeasty odor due to fermentation and are usually infested with ambrosia beetles. The beetles are semi-active during the day.

NITIDULA FLAVOMACULATA Rossi is a European species not previously recorded from this continent. There are before me specimens from Oakland and Almeda County, California, Oct. 1933 and March 1934 respectively, collected by J. E. Blum, and one specimen in the U. S. National Museum is labeled "Washington, D. C., 13-4-34". This species is piceous, with the legs, antennal stem, sides of pronotum, and epipleura, humeral region and discal spot of each elytron yellow. The discal spots are nearly contiguous, being separated by a very narrow sutural dark stripe, and are joined to the humeral spot by a narrow stripe of yellow.

NITIDULA CARNARIA Schäll. was first recorded in this country in 1926, in Leonard's "A List of the Insects of New York," from "N. Y." and West Point, N. Y. I later recorded it from Madison, Wisconsin, and Oakland, California. Other records are New England, Aurelius, Michigan, Marion County, Indiana, Urbana, Illinois, Easton, Pennsylvania, and New Foundland, New Jersey. The Pennsylvania specimen was collected May 7, 1909.

Colopterus gerhardi sp. nov.

From Illinois comes the surprising discovery of a *Colopterus* remarkably distinct from our other five well-known species.

♂ *Holotype*. Broadly oval, depressed, elytra individually broadly convex. Nearly uniform testaceous brown, the head, scutellum, outer and apical elytral margins and an oval median thoracic spot vaguely darker, antennae testaceous at base, gradually darkening to the piceous club. Moderately shining, sparsely clothed with short, yellow pubescence.

Head moderately punctate, pronotal punctures coarse, shallow, separated by more than their diameters upon the disc, but more closely spaced laterally, scutellum impunctate on posterior fourth, elytral punctures ill-defined, arranged in 19 indistinct but definite rows, abdominal tergites regularly punctured, the punctures of the same size and density as on head and scutellum, punctuation below slightly finer, except for the impunctate sides of the prothorax. Labrum bilobed; antennal segments 2-6 longer than wide, 3 longest, 6-7 moniliform, 8 transverse, club 3-segmented, 1.6 times as long as wide.

Pronotum strongly transverse, 2.25 times as wide as long, widest slightly before the basal angles which are rectangular, sides regularly arcuately narrowed to the apex, basal margin sinuate on each side, disc with a well-defined sulcus extending medianly from the basal angles and continued by a vague depression which recurves to the basal margin. Elytra strongly descending on the sides to the narrowly reflexed lateral margins; posterior margin and suture, especially just behind the scutellum, depressed, each elytron broadly convex when viewed either from the side or from behind, apices each rounded truncate, exposing two abdominal segments and the posterior angles of the third.

Lateral margin of last abdominal sternite with six fine denticles, apical margin bisinuate, nearly truncate, due to the presence of the anal male segment, which is nearly concealed from above.

Dimensions: length 3.5 mm. with head somewhat deflexed, width 2.23 mm., pronotum .92 mm. long, 2.08 mm. maximum width, 2.04 mm. at basal angles, 1.13 at anterior angles, elytra 2.23 mm. wide, 1.93 mm. at humeral angles, 1.47 mm. maximum length and 1.26 mm. from base of scutellum to apex of suture.

Holotype. Olive Branch, ILLINOIS, X: 7:09, under bark of sycamore, Wm. J. Gerhard, collector, in the Field Museum collection. The type locality is near Thebes, Alexander County, southern Illinois, on the edge of the Mississippi River bottom.

This species is related to *Colopterus morio* Er. by its sulcate thorax, but differs strikingly from all our forms by the convex elytral outline. In this character it resembles *inflatipennis* Sharp of Mexico, but that species lacks the pronotal sulci. It cannot be identified as any of the numerous neotropical species, and none of the latter have been recorded north of Mexico.

CARPOPHILUS RUFUS Murray has been considered by Horn to be a variety of *melanopterus* Erichson. There is no apparent external structural character by which the two may be separated, and an examination of the male genitalia has not shown significant differences. However the color pattern is fundamentally different, and for this reason I believe it will prove to be a valid species. A large number of *melanopterus* have been observed and they are very constant in coloration. The body is red, with black antennal club and jet black elytra, and this black color develops before the body wall has hardened. *Rufus,* on the other hand, has always reddish brown elytra, and in fully colored specimens the body is conspicuously darker than the elytra, just the reverse of the case in *melanopterus.* The only host data for *rufus* I have seen is cactus blossoms, and these were probably prickly pear. *Melanopterus* occurs in the flowers of yucca, and apparently is spread by the cultivation of its host plant, for it has been taken at Amherst, Massachusetts. Other localities in the literature and from my records are Columbia, South Carolina, Florida, Georgia, Texas, Mexico; Downer's Grove, Dubois and Urbana, Illinois, and Putman and Marshall Counties, Indiana. *Rufus* has been recorded from Central America and "U. S."; other localities are Eastland County, Texas, Hamilton County, Kansas, Meadville, Nebraska, and Rapid City, South Dakota.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**A. D. I.**—Lower Permian Insects of Kansas. [31] 144: 641. **Fernald, H. T.**—The history of entomology at the Massachusetts Agriculture College, 1867-1930. [Fernald Club] Spec. Publ., no. 1; 55 pp. **Horn, Walther.**—Obituary by R. Korschefsky. [2] 35: 177-184, ill. **Imms, A. D.**—A 'safe' fluid for museum use. [31] 144: 599-600. **Porter, C. E.**—Notas de parasitologia. [44] 42: 122-124, ill. Algunos insectos de las provincias de Atacama y Coquimbo. [44] 42: 154-55, (S). Entomologia Chilena: Localidades nuevas de algunas especies. [44] 42: 166-169, ill. Notas breves de entomologia agricola. [44] 42:171-172. **Thompson, W. R.**—Biological control and the theories of the interactions of populations [116] 31: 299-388. **Tykac, J.**—L'influence des rayons ultra-violets sur les insectes. [Casopsis] 35: 68-70. (Russian, French summary). **Weiss, H. B.**—The entomology of Thos. Boreman's popular Natural Histories. [6] 47: 213-217. **Williams, C. B.**—An analysis of four years captures of insects in a light trap. Pt. I: General survey; sex proportion; phenology; and time of flight. [36] 89: 79-132, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Applegarth, A. G.**—The larva of Apterobittacus apterus (Mecoptera). [Microent.] 4: 109-120, ill. **Ferris, G. F. & Rees, B. E.**—The morphology of Panorpa nuptialis (Panorpid.). [Microent.] 4: 79-108, ill. **Haberman & Cumley.**—Serological investigation of Drosophila antigens using the precipitation reaction. [6] 47: 219-226. **Hilton, W. A.**—Nervous system and sense organs, LXXIX: Diptera. [13] 31: 54-62, ill. **Katzin & Kirby.**—The relative weights of termites and their protoza. [Journ. Parasitol.] 25: 444-445. **Maluf, N. S. R.**—Physiology of the Arthropodan circulatory mechanisms. [6] 47: 227-286, ill. **Minkiewicz, R.**—Les sexues du Leptothorax clypeatus et la probleme de la sexualisation somatique chez les fourmis. [Bull. Ent. Pologne] 16-17: 215-239, ill. **Nakagawa, Y.**—Types of tracheal distribution on silk glands lepidopterous larvae. [Trans. Kansai Ent. Soc.] 9: 41-43, ill. **Oosthuizen, M. J.**—The body temperature of Samia cecropia as influenced by muscular activity. [Jour. Ent. Soc. So. Africa] 2: 63-73, ill. **Smith, S. G.**—Cytology and parthenogenesis of the spruce sawfly, Diprion polytomum. [Trans. Ry. Soc. Canada] 33: 214. **Sparrow & Reed.**—Disproportionate effects of plus and minus bristle genes in Drosophila melanogaster. [Trans. Ry. Soc. Canada] 33: 215. **Strebel, O.**—Biologische Studien an einheimischen Collembolen, III. [56] 17: 272-291. **Wenig, K.**—Vitamin requirement of insects. [Casopis] 35: 16-20. (Russian, English summary).

THE SMALLER ORDERS OF INSECTS.—Applegarth, A. G.—The larva of Apterobittacus apterus (Panorpid.). [Microent.] 4: 109-120, ill. **Bailey, S. F.**—A n. sp. of thrips from the Mojave Desert. [55] 15: 168-172, ill. (k). **Campos, R. F.**—La brillante y fantastica Libellula Megaloprepus coerulatus (Odonata). [44] 42: 129-130. **Ferris, G. F. & Rees, B. E.**—(see under Anatomy). **Hood, J. D.**—A new Polyphemothrips (Thysanoptera) from Peru. [44] 42: 217-220, ill. Notes on Chirothrips, with descriptions of two n. spp. (Thysanoptera). [105] 10: 461-471. **Ioff & Tiflow.**—Materialien zum studium der Flöhe. III. Gattung Amphipsylla. [Rev. Microbiol., Epidemiol. & Parasit.] 16: 401-437, ill. [Russian with German summary]. **Jellison, W. L.**—Opisodasys, a gen. of Siphonaptera. [Journ. Parasitol.] 25: 413-420, ill. **Katzin & Kirby.**—The relative weights of termites and the protozoa. [Jour. Parasit.] 25: 444-445. **Maria, A.**—Catalogo de los Odonatos Columbianos. [44] 42: 206-211. **Mayo, V. K.**—New western Ephemeroptera. [55] 15: 145-154, ill. **Rehn, J. W. H.**—Studies in North American Mantispidae (Neuropt.). [1] 65: 237-263, ill. (k*). **Setty, L. R.**—The life history of Bittacus strigosus with a description of the larva (Mecoptera). [103] 12: 126-127, ill. **Willey, A.**—Unilateral variations in the wings of a stonefly, Allocapnia lygmaea. [Trans. Ry. Soc. Canada] 33: 207.

ORTHOPTERA.—Liebermann, J.—Contribucion al conocimiento de los Pauliniidae neotropicales (Acrid.). [44] 42: 61-65, ill. **Piza, jr., S. de Toledo.**—Dois novos Phasmidas do Brasil. [105] 10: 444-446, ill. **Rehn & Rehn.**—A review of the New World Eumastacinae (Acrid.). [Proc. Acad. Nat. Sci. Phila.] 91: 165-206, ill. (Sk*). **Severin, H. C.**—The Brown-banded Cockroach [Supella supellectilium] in South Dakota. [12] 32: 595.

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SPECIAL NOTICES. — **Manual of Myiology.** — Part VIII. By C. H. T. Townsend. 405 pp.

PRINCIPLES OF FOREST ENTOMOLOGY, Second Edition, by SAMUEL ALEXANDER GRAHAM, pages i-xvi, I-410, 165 text illustrations. McGraw-Hill Book Co., Inc., New York, N. Y. 1939, $4.00.—The passing of a decade has been marked by the appearance of this most welcome second edition of the only book limited to forest entomology in North America. This, like the first edition, is a discussion of cause and effect in relation to insect injuries and the possibilities of reducing or limiting damage by forest insects. It is recognized that direct control measures are ordinarily too costly and the author has most properly stressed the possibilities of control by forest management, one being that suggested on pages 244 and 245 in the tabular and diagrammatic presentation of Keen's Ponderosa Pine Classes and Risks. The relation between age, relative vigor and insect injury is one deserving careful attention. It has applications to other insects as well as bark beetles.

Considerable new matter appears in this edition, namely a summary account of contemporary work and workers in America, a chapter dealing with some indirect effects of forest insects, such as insects and wood rots and stains, insects and parasitic fungi and insects and virus diseases. A number of forest pests have appeared since the first edition was published and among these the author includes excellent accounts of the European pine shoot moth and European spruce sawfly. There is also new matter on *Melanophila* beetles and the *Pandora* moth. The chapter on insect abundance with its discussion of biotic balance and the relation between abundance and environmental factors has been largely rewritten to include the investigations of the past decade.

There have been important and valuable additions to the revised book though these are mostly in detail rather than relating to broader lines. The volume is the one publication dealing with forest entomological problems in America. The entomologist will find therein much of value and the forester will do well to follow the general principles elucidated by the author.

E. P. FELT, Bartlett Tree Research Laboratories.

A CLASSIFICATION OF THE LARVAE AND PUPARIA OF THE SYRPHIDAE OF ILLINOIS, exclusive of Aquatic Forms. By ELIZABETH M. HEISS. University of Illinois Bulletin, vol. 36, no. 1. Comprising vol. 16, no. 4 of the Illinois Biological Monographs. 142 pp., 17 pls. with 146 figs. Price, $1.50. Students of insect taxonomy are coming more and more to realize the importance of a better knowledge of the immature stages and their morphology. In this field of taxonomy, this work of Dr. Heiss' should be a welcome addition to the library of students of the dipterous family Syrphidae, as well as those who are particularly interested in the immature stages of insects in general. Dr. Heiss prefaces her work by chapters on the family characteristics, food habits and pupariation, evidence of generic relationships afforded by the larvae, parasites, and other larvae resembling Syrphidae. The taxonomic treatment contains keys to the known genera, and descriptions and keys to the species found in Illinois. An appendix gives a list of known parasites, and four pages of bibliography. The value of the present work is mainly the compilation under one cover of what has been done by various students, particularly as applied to the species occurring in Illinois. The author has secured by her own collecting and by loans from others, specimens upon which her descriptions were drawn, and she has given plain, well delineated figures of the essential characters, although some of these are credited to other authors. The placing of the specific names beneath the respective figures is a commendable feature.—E. T. CRESSON, JR.

BATS BY GLOVER MORRILL ALLEN. Cambridge, Massachusetts, Harvard University Press 1939. Pp. x, 368, 57 figs. $4.00. An interesting book on almost all phases of bats, except —and this is no censure—that their anatomy and physiology are not described in great detail. Into this book insects enter in two ways, as food and as enemies, chiefly parasites, of bats. That the insectivorous habit was once common to the whole group of bats "is indicated," Dr. Allen says, "by the fact that the greater number of the species now living are insect feeders, while in some of the families there are those of transitional habits, and others that have now become altogether vegetarians." He has brought together data from many sources, based largely on microscopic examination of bat droppings and of stomach contents. Dr. J. W. Hamilton, Jr's. analysis of 2200 pellets of dung from the big brown bat (*Eptesicus fuscus*) in West Virginia is quoted as showing that of the determined insect remains, 36.1% were Coleoptera, 26.3 Hymenoptera, 13.2 Diptera, 6.5 Plecoptera, 4.6 Ephemerida, 3.4 Hemiptera, 3.2 Trichoptera, 3.2 Neuroptera, 2.7 Mecoptera, 0.6 Orthoptera. Other bats, both in the Old and New Worlds, eat moths. "Probably it is safe to say that mosquitoes really form a negligible fraction of the diet of insectivorous bats." There are some slips in this part of the book, where *Agrotis* is referred to the Geometridae (p. 79) instead of Noctuidae, Hemerobiidae are called Mayflies (p.84) and Meloidae is spelled with two "ls" (p. 85). African driver ants are mentioned as occasionally attacking colonies of bats. The summary of arthropod parasites of bats is based on Stiles and Nolan's *Key Catalogue of parasites reported for Chiroptera* of 1931 (Bull. Nat. Inst. Health, U. S. Treasury Dept. No. 155) and papers by Ferris, including one in the NEWS for June, 1924. They comprise "over forty genera of mites and ticks," four genera of bedbugs (*Cimex, Cacodmus, Leptocimex* and *Loxaspis*), five genera of the Hemipterous Polyctenidae, one Dermapteron, *Arixenia esau* of Borneo, eight genera and ninety species of Nycteribiidae, and at least twelve genera of Streblidae, both families of Diptera. "No less than fifteen genera of fleas are listed from bats, and undoubtedly others will be discovered when more thorough search has been made for these pests."—P. P. CALVERT.

Iowa State College Press Established.

A new publication outlet for manuscripts dealing with science and technology has been provided at Iowa State College, Ames, Iowa, by the recent organization of the Iowa State College Press. The major purpose of the new Press, as outlined in its statement of editorial policy, is "to serve learning, and particularly learning in fields of science and technology, by providing a channel of publication." The new press will consider for publication manuscripts, not from Iowa State College alone, but from any source. It will be especially interested in developing publications in certain subject matter fields in science and technology for which satisfactory publication channels are not elsewhere available. The manufacture and sale of Iowa State College Press publications will be conducted by the Collegiate Press, Inc., also of Ames, a firm which entered the publishing field in 1934, and which has experienced a consistent growth since. Its books have been sold in more than 30 foreign countries as well as throughout the United States.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being ongest in) are discontinued.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

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Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

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Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

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VOLUME LI, 1940

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

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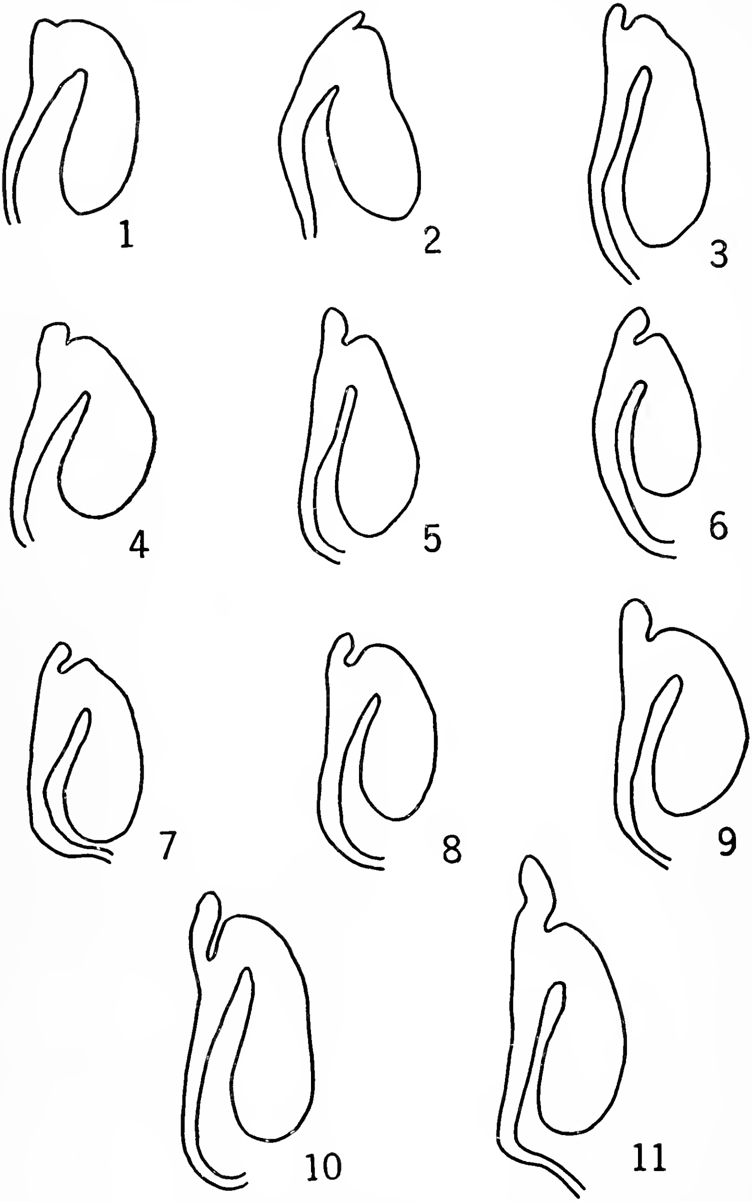

DISTAL TIPS OF SPERMATHECAE OF OEDIPODA COERULESCENS
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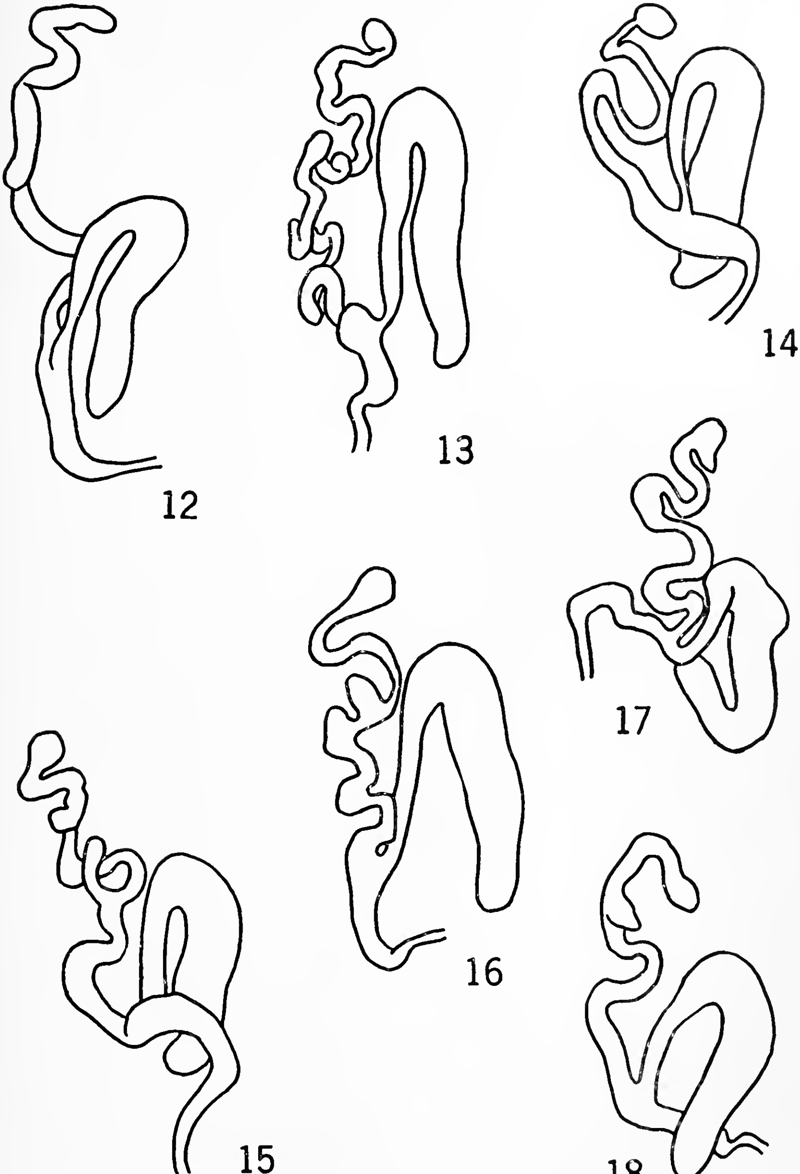

DISTAL TIPS OF SPERMATHECAE OF MELANOPLUS DIFFERENTIALIS.
Slifer.

ENTOMOLOGICAL NEWS

VOL. LI JANUARY, 1940 No. 1

Variations in the Spermatheca of Two Species of Grasshoppers (Orthoptera, Acrididae).

By ELEANOR H. SLIFER, Department of Zoology, State University of Iowa.

(Plates I and II.)

During a series of studies on the internal genitalia of female grasshoppers belonging to nine subfamilies and from many parts of the world the question concerning the amount of variation which occurs within a species naturally arose. Most of the species studied could not be obtained in sufficient numbers to permit a satisfactory investigation of this problem. Recently, however, a series of *Oedipoda coerulescens* (Linn.) collected at different localities in Europe and in Asia were sent to the writer by Dr. B. P. Uvarov of the British Museum (Natural History). These have proven to be extremely interesting because they indicate the amount of variation which may be expected within a single species taken at widely separated geographical points. To supplement these results an examination was also made of a large number of individuals of another species, *Melanoplus differentialis* (Thom.), which were collected in a more restricted area. These were caught, for the most part, in Iowa, or were raised from eggs hatched in this laboratory. Since *Oedipoda coerulescens* is a member of the Oedipodinae and an Old World form, while *Melanoplus differentialis* belongs to the Cyrtacanthacridinae and inhabits the New World, the data given here should serve as a better basis for generalizations than would results secured from more closely related species or from those taken in the same region.

As has been pointed out in a previous article (Slifer 1939), the spermatheca in the Acrididae is of considerable interest, for it varies in form in the different species, yet the members of a single subfamily possess spermathecae which, in nearly all cases, are of the same general pattern. The distal end of the spermatheca is of especial interest and is the part which has been selected here for purposes of comparison. The genitalia were prepared for study by boiling the posterior half of the abdomen in a solution of KOH and the parts shown, in consequence, represent only the chitinous linings. All muscles, epidermal tissues, etc., disintegrate in the alkali.

Outlines of the distal tips of the spermathecae from eleven specimens of *Oedipoda coerulescens* are shown on plate I. All, it will be noted, are provided with both a small apical diverticulum and a large, sac-like preapical diverticulum. The relative dimensions of the two diverticula are of some interest and measurements of the length of these parts show that the preapical diverticulum in figure 1 is approximately 10 times as long as the apical diverticulum, while the larger diverticulum of the specimen shown in figure 11 is only 2.7 times longer than the smaller one. The variations seem to show no correlation with the region in which the animal was captured.

For the second set of observations the spermathecae from 103 individuals of *Melanoplus differentialis* were examined and compared. In this species the spermatheca is also provided with two diverticula, but the entire structure is of a more complex type than that which occurs in *Oedipoda coerulescens*. The variations found in the diverticula of *Melanoplus differentialis* are of several kinds. The length of the apical diverticulum varies between such extremes as are shown in figures 13 and 18. It may contain few coils (fig. 14) or many (fig. 13). By far the greatest number of specimens are best described as intermediate between those shown in figures 12 and 13. In some the apical diverticulum is of nearly uniform diameter throughout its length, while in others certain regions are either enlarged (fig. 16) or narrowed (fig. 14). In seven out of 103 individuals which were studied small projections or "knobs", such as are shown in figures 15, 16 and 18, were found on the apical diverticulum. In a few cases the extreme tip of this diverticulum was unusual in shape (figs. 14 and 17). The preapical diverticula were somewhat less variable in form than were the apical diverticula. A specimen in which the free end of this diverticulum is bent back on itself is shown in figure 17.

From the results obtained with these two species it seems reasonably safe to predict that the form of the spermatheca will also be found to vary in the individuals of other species of Acrididae, but that the variations will be minor ones and that the general pattern will be retained.

REFERENCE.

SLIFER, E. H. 1939. The internal genitalia of female Acridinae, Oedipodinae and Pauliniinae (Orthoptera, Acrididae). Jour. Morph. 65 (3): 437-469, 7 pls. of 111 figures.

EXPLANATION OF PLATES.

Plate I. Distal tips of spermathecae from *Oedipoda coerulescens* (Linn.) after treatment with KOH. Locality where specimen was taken indicated for each. x 22.5. Fig. 1. Rome, Italy; 2. Schwalbach, Germany; 3. Sierra de Guadarrama, Spain; 4. Arquata, Italy; Tchimbulak, Alexander Mts., Turkestan; 6. Port-Bou, Gerona, Cataluna, Spain; 7. Mytilene, Greece; 8. Turin, Italy; 9. Crikvenica, Yugo-Slavia; 10. Zakaki, Cyprus; 11. South Russia.

Plate II. Distal tips of spermathecae from *Melanoplus differentialis* (Thom.) after treatment with KOH. To demonstrate range of variation found in 103 individuals. x 22.5.

fig. 12. Apical diverticulum with few coils.
fig. 13. Apical diverticulum with many coils.
fig. 14. Apical diverticulum ends in globose swelling.
fig. 15. Apical diverticulum with slender "knob".
fig. 16. Apical diverticulum with lateral swellings.
fig. 17. Apical diverticulum with oddly-shaped tip. Preapical diverticulum recurved.
fig. 18. Apical diverticulum with pointed, lateral projection.

Obituary Note: Dr. Royal N. Chapman.

DR. ROYAL NORTON CHAPMAN died December 2, 1939, according to *Science* for December 15. He was born at Morristown, Minnesota, September 17, 1889. He had returned to the University of Minnesota only recently, after nine years' service in Hawaii. His text-book on Ecology and the studies by himself and his students on populations of insects in stored food products are well known to entomologists.

The Life History of the Wood-Roach, Parcoblatta pennsylvanica DeGeer, (Orthoptera: Blattidae).

By Phil Rau, Kirkwood, Missouri.

The wood-roach, *Parcoblatta pennsylvanica*,[1] is well distributed throughout St. Louis County. It is usually found in hollow trees, under loose bark, and often in wood piles and in crevices in rural buildings. The wood-roach is a trim, pretty creature, with its chestnut brown color, and thorax and wing pads edged in white. It does not possess the repulsive odor that is so characteristic of roaches of other species that infest the dwellings of man. In the adult form the males are fully winged, while the females have only the conspicuous wing-pads which are functionless. The males fly swiftly, but have not the ability to sustain themselves in the air for long periods.

There are about a dozen species of *Parcoblatta* in North America, and *P. pensylvanica* is reported from Maine, Massachusetts, Connecticut, Vermont and Indiana (Morse, Orthoptera of New England, p. 305, 1920). Here in St. Louis and St. Louis County, this species was taken in about a dozen localities, which indicates its permanent establishment in Missouri. It was first seen about the premises in Kirkwood in 1925, where a large population lived in a pile of cord-wood, in the crevices of the barn and in a near-by hollow tree. In later years, with the removal of both wood-pile and tree, they established themselves in the barn, chicken-house and a discarded bee-hive.

These roaches are not active during the day, but neither are they wholly lethargic, as may readily be discovered when an attempt is made to capture them. Their greatest activity, however, is during the night, and it is then that both sexes enter the traps that are set for them, and the males fly into lighted dwellings.[2]

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[1] Specimens were identified by Mr. Morgan Hebard of the Academy of Natural Sciences of Philadelphia.

[2] Park and Keller (Ecology 13: 335-346, 1932) in experimental tests on the wood-roach find them to be active at night and inactive during the day.

The length of life of the roaches from the hatching of the eggs to the death of the adults is about one year. For several years I noticed that the nymphs in confinement, as well as those occupying the bee-hive outdoors, would become mature at the end of May. These adults would mate and oviposit, and the following May their offspring were matured and ready to do the same, thus completing the life cycle within a year.

Courtship.

Both sexes, as already stated, become adult at the end of May, and very soon after becoming mature the males go in search of females. On any pleasant evening in early June, the males may be observed in action. At about 7:30 p. m., which is about dusk in early June, they come out of hiding and may be seen flying swiftly in the air or running with lightning rapidity over wall or woodpile. Soon the search goes on in the crevices between the logs. He lands on the log-pile, and without a pause runs rapidly and excitedly in a very erratic manner, his antennae quivering nervously as he examines crevice after crevice. If his quest has been successful, he disappears among the logs to remain there; if unsuccessful, he soon emerges and continues the search in the same agitated manner.

About 20 to 25 males were observed performing in this fashion on several successive nights in my yard in 1925; the courtship manoeuvers began on May 30, and by June 7, the activities were generally lessened, with only a few males in flight at dusk. They always came out into the open at about 7:30 p. m., and continued their performance until a little after 8:15 p. m. At that time it was usually too dark for me to see them, but apparently it was not too dark for the males to continue the search for some minutes after dark, for with a flash-light I could see the performance still going on, but by 8:35 the show was all over and all the males were under cover. During all the observations no females were to be seen in the open, but by lifting some of the logs several of them were uncovered. Some of the males evidently spend the daylight hours in the crevices near the females, but it seems they need the stimulus of twilight to bring out their activities. One would think that this proximity would make the flight unnecessary, and that the males could easily find their mates without leaving the logs and going through the spectacular flight.

Copulation usually occurred under cover of the logs where it could not be witnessed, but I did see one pair mating on the barn wall. They were joined end to end with their heads in opposite directions and, contrary to the general belief that in roaches copulation is instantaneous, this pair remained mated for at least two hours.

Oviposition.

As in *Blatta orientalis* and *Periplaneta americana,* the wood-roach carries the egg-case protruding from her body for several days before she drops it. In this species the time varies from one to three days, the length of time probably being influenced by moisture or temperature conditions. The mother does not conceal the egg-case, as do the other roaches, who often carry them until they find a crack in which to conceal them or debris with which to cover them. The egg-capsule when it

Table I.

Egg-Cases Deposited by Parcoblatta pennsylvanica

♀ No.	Dates of Oviposition	No. Deposited	Date Died or Escaped	No. of Days Between Egg-Cases
A	June 23, 26—July 7, 12, 21, 26—Aug. 8, 16	8	Died 8/22	3, 11, 5, 9, 5, 8, 8
B	June 24, 26—July 7, 12, 21, 26—Aug. 3, 11	8	Died 8/22	2, 11, 5, 9, 5, 8, 8
C	June 26—July 9, 20, 31—Aug. 10	5	Esc.	13, 11, 11, 10
D	June 27, July 7, 12, 19	4	Esc. 7/27	9, 5, 7
E	June 27—July 4, 7, 11, 16, 19, 26	7	Esc. 8/6	7, 3, 4, 5, 3, 7
F	June 28—July 7, 9, 15	4	Esc. 7/22	9, 2, 6
G	July 1, 5, 23	3	Esc. 8/3	4, 17
H	July 11, 15, 28—Aug. 3	4	Died 8/6	4, 13, 6
I	July 7, 17, 28, 31—Aug. 6, 12, 17, 22	8	Died 8/25	10, 11, 3, 6, 6, 5, 5
J	July 11, 17, 25—Aug. 10, 15, 22, 28—Sept. 3, 7, 19, 24	11	Died 11/8	6, 8, 16, 5, 7, 6, 6, 5, 12, 5

first protrudes from her body is of a creamy white color, but it soon becomes dark brown. Each egg case shows by lines of demarkation on the outside the position of the egg and compartments on the inside; each compartment contains one egg, so the ova are easily counted.

Number of Egg Capsules Deposited.

Records were kept of the number of egg capsules deposited by ten females, (Table I) five of which lived the normal length of life in confinement. These five females (A, B, H, I and J in table) deposited from 4 to 11 egg cases. The other five (C, D, E, F and G), before they escaped, deposited from 3 to 7 cases.

In the last column of Table I, I have recorded the number of days that elapsed between the production of egg-cases in 52 instances.

Table II. Interval between deposition of egg-cases.

No. of Days	Frequency	No. of Days	Frequency
2	2	10	2
3	4	11	5
4	3	12	1
5	11	13	2
6	7	14	0
7	4	15	0
8	5	16	1
9	4	17	1
		Total	52

The period which elapsed between layings varied from two to seventeen days. These records were, of course, made under conditions of confinement. Table II shows, however, that about half the egg-cases were produced after an interval of rest of from 5 to 9 days.

Period of Incubation.

These wood-roaches deposited egg-cases from June 23 to September 24, 1937. Twenty-six of these cases were placed separately in vials as soon as deposited, for the purpose of observing the period of incubation. (Table III). These were kept at ordinary room temperature.

Table III.

Period of Incubation, Days	Frequency
30	3
32	3
34	4
36	8
37	2
38	2
40	2
41	2

Thus the 26 egg-cases required from 30 to 41 days to give forth their young, the majority hatching in 32 to 36 days.

NUMBER OF EGGS IN EACH CASE.

The size of the egg-case of the wood-roach varies considerably, and since the eggs are tightly packed in the case there is a definite relation between the size of the capsule and the number of eggs in it. Twenty-nine cases were placed in separate vials for the purpose of counting the emerging nymphs, with the following results. (Table IV):

Table IV.

Number of Young to Emerge	Frequency
18	2
19	1
20	4
22	2
24	5
25	3
26	5
28	1
30	6

Thus two-thirds of this lot of cases gave forth from 24 to 30 young, while the remainder yielded fewer, from 18 to 22.

When the eggs have hatched and the young emerge, the capsule springs open along the serrated edge, and immediately closes again after the nymphs have emerged. With the thumb and forefinger one can easily cause an empty egg-case to bulge open, but one cannot do so with a full one; this indicates that the edges of the opening are originally cemented together, and that it opens along this line with the expansion of the larvae within it.

THE NUMBER OF EGGS DEPOSITED, VERSUS THE NUMBER THAH HATCH.

When our wood-roaches had no opportunity to mate, egg-cases were deposited nevertheless. These in all instances proved to be infertile. In several instances female wood-roaches were confined with male oriental roaches, in the hope of getting hybrid young. It is not known whether mating occurred, but the eggs deposited by the wood-roaches under these conditions were always infertile.

In studying the empty egg-purses, we almost always find that all of the young have made a perfect escape. While the entire contents of an egg-capsule is usually disclosed at one time, one often finds a case giving forth one or two stragglers a day later. Only in rare instances do we find dead individuals in the capsule after the eggs have hatched, and in these instances not more than one or two dead ones are found. In normal egg-cases there is a small vestibule or air-chamber at each end. In some capsules, an extra egg has been crowded into this vestibule, and when this occurs, if there should be any mortality in the case at all, it is usually this one in the crowded position. But I have also observed on occasion the complete development of eggs in such places.

The roaches on hatching are white and almost transparent; only the eyes are pigmented, and there is a dark spot at the tip of the abdomen. After about six hours, they become light brown, and after another twelve hours they assume the normal color of very dark brown.

(To be continued.)

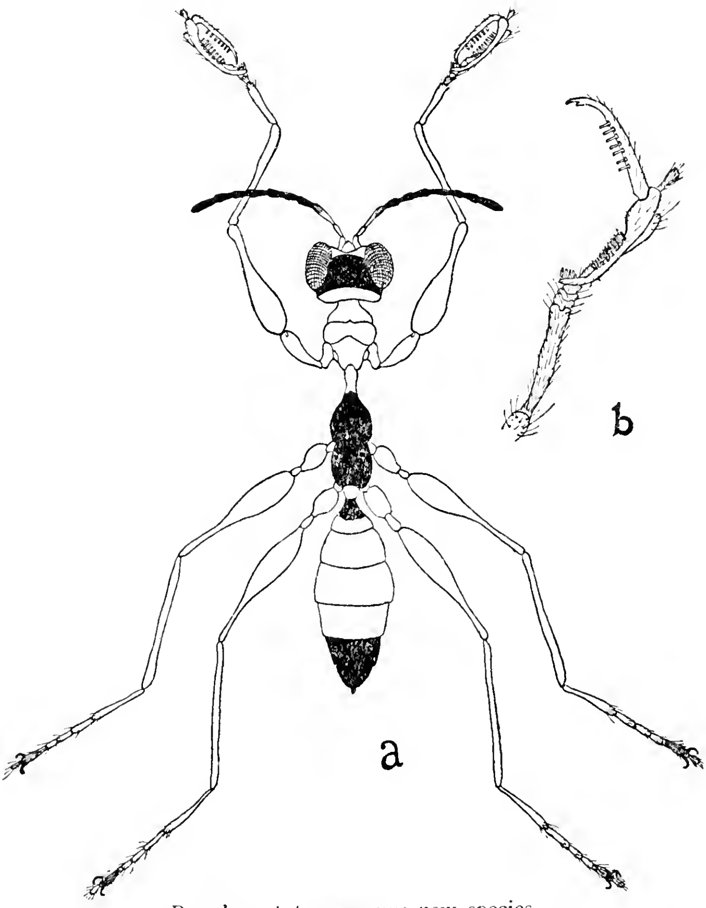
Tribute to the Late Dr. W. E. Britton.

Tribute to the late Dr. W. E. BRITTON, Connecticut state entomologist from 1901 until the time of his death, February, 1939, was part of the program of the sixteenth annual conference of Connecticut entomologists that met on October 27, 1939, at the Universiy of Connecticut at Storrs. The principal address was given by Dr. E. P. Felt.

A New Species of Pseudogonatopus (Hymenoptera, Dryinidae).

By Harry E. Brown, University of Missouri.

The single specimen described below as a new species of the genus *Pseudogonatopus* was collected July 30, 1932, in a swampy meadow in northern Indiana. The author wishes to extend sincere thanks to Dr. Frank A. Fenton of the Okla-



Pseudognatopus magnus new species.
a dorsal view of female, *b* details of chela.

homa Agricultural and Mechanical College for graciously furnishing information on the Dryinids and for making comparisons with specimens in his private collection.

Pseudogonatopus magnus n. sp.

♀. Honey yellow in color with black bands on head, thorax and abdomen.

Head transverse, truncate behind, strongly concave between eyes. Ocelli arranged in triangle, approximate and prominent. Eyes bare. Mandibles three-dentate, maxillary palpus four-segmented. Basal two segments and proximal half of segment three of antennae yellow, remainder dark fuscous. General color of head yellow with a broad fuscous band across concave dorsal portion between the eyes.

Prothorax yellow with fine shagreened punctation. Propodeum black, transversely rugulose anteriorly and posteriorly.

Fore legs completely yellow. Median chela arm with two rows of lamellae which converge toward distal end; tip spoon-shaped with cluster of lamellae. Lateral arm of chela with a pronounced notch or tooth at distal end and with a row of seven lamellae medianly. Middle and hind legs yellow except last segment of tarsus which is brown.

Abdomen smooth, polished; base of petiole and last two segments black, segments between yellow.

Length: 5 mm.

♂. Unknown.

Type Locality: Wawasee Lake, INDIANA.

Holotype, collected July 30, 1932. Specimen in the collection of Dr. Frank A. Fenton.

Remarks: The host is unknown, but because of the large size of the parasite it must be one of the larger fulgorids.

Obituary Note: Dr. Walther Horn.

Dr. WALTHER HORN, authority on the Cicindelidae, bibliographer and museologist in entomology, creator of the Deutsches Entomologisches Museum in Berlin-Dahlem, died in that city July 10, 1939. He was born October 19, 1879. An obituary notice by Dr. A. Avinoff, with portrait, is in the *Annals of the Entomological Society of America* for December, 1939; a much longer one by H. Sachtleben, with portrait and bibliography, is in *Arbeiten über morphologischen u. taxonomischen Entomologie* 6: 201-222. He was elected a corresponding member of The American Entomological Society in Philadelphia on June 12, 1911.

Observations on Mating Flights of the May-fly Stenonema vicarium (Ephemerida).

By Herman G. Cooke, University of Pennsylvania, Philadelphia.

A small company of *Stenonema vicarium* imagoes was first observed mating after sundown on July 15, 1938. They appeared over the foot of a bridge about eight paces from the bank of Darby Creek, one mile north of Clifton Heights, Pennsylvania.

The males of *Stenonema* exhibited a characteristic flight which differed widely from that of most known genera of mayflies, but in their approach during mating they showed striking similarity to other genera. Of greater importance was the fact that these imagoes neither rose nor fell in rhythmic undulations, as in the case of *Baetis* described by Murphy 1922, but for the most part maintained a constant level during flight. These performances were observed at the same locality from four to six times weekly. They usually began after sunset and about twenty minutes before nightfall and continued until I could no longer see them, owing to the increasing darkness. Searches made every hour in the day between 7 o'clock a. m. and midnight revealed no mating flights except at the hours mentioned above.

The first indication of flight was the appearance of a single male slowly descending with out-stretched wings from the gray distance, to about the level of the eye of an observer, at which point a hovering movement began. Within from two to three minutes about three additional males were suddenly seen executing the same performance. This small group of individuals formed the nucleus about which additional males revolved. After the flight had been in progress for about ten minutes, the number usually reached about fifteen. The complete company seldom exceeded more than twenty-five members. As they slowly manoeuvered to and fro along a course about ten paces long by six wide and executed quick turns, their forward projecting forelegs, shining wings and outspread tails gave color and grace to their performance.

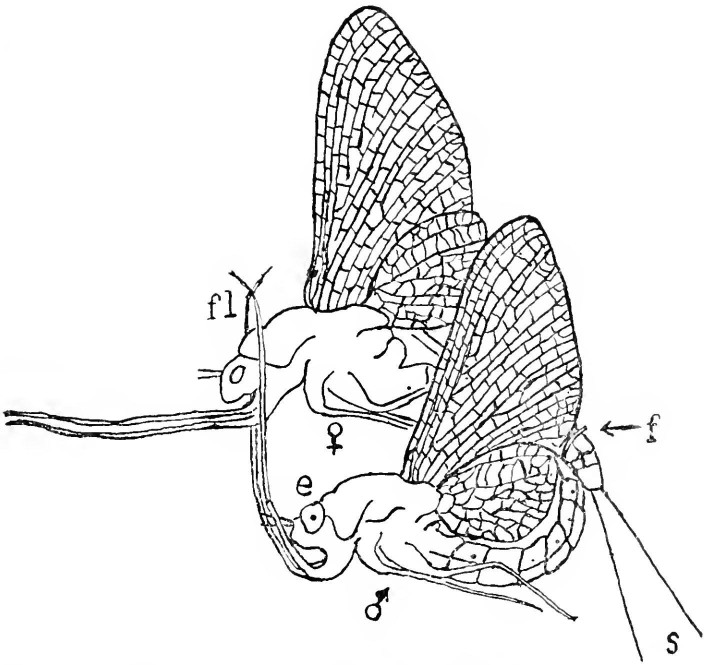


Fig. 1. A Mating Pair of *Stenonema vicarium*. *e* eye, *f* forceps, *fl* forelegs, *s* setae.

Females showed very little tendency to take part in the flights. The captures of two complete companies of imagoes and of the greater portion of a third yielded only one female, which was taken with the second group. It is probable that this female had just entered the swarm from beneath, because when a single female was seen passing below a company of males it was seldom disturbed; on the other hand, when it passed a few feet above or directly through the swarm, it was instantly attacked by them. The large eyes of the males are situated on the dorso-lateral regions of the head (fig. 1 e), a location which perhaps enables this sex to see females above them better than below. All attempts to mate were made by the male flying up beneath the female placing his forelegs over her prothorax and head. With upcurved abdomen he grasped the body of the female with his forceps near her seventh abdominal segment (fig. 1 f) and mating thus became effective. The couple executed a double flight, seldom rising over eight feet while at times they were borne nearly to the ground, but before reaching it they usually broke apart. For the most part, copulation lasts from about twenty to forty seconds. On several occasions, after having mated, or attempted to mate, the male was seen returning to the swarm while the female continued onward to the stream and flew up it maintaining nearly the same level until ready to oviposit.

Oviposition takes place as follows: The female selects a ripple on the surface of the water and slowly descends. After dipping the abdomen in the water, at least twice, a resting position is assumed upon the surface, with head turned upstream, she flutters for a few seconds and discharges the eggs which are already partly protruded from her oviducts. The current aids in releasing the eggs, which slowly separate in the water and adhere to objects by means of the viscid strands. Two females which were watched while releasing their eggs, then turned and flew down stream.

A couple of imagoes captured while mating remained united for several seconds. Shortly after the abdomen of the female had been released she discharged two spherical masses of flame-colored eggs from her oviducts, which adhered firmly to the bottom of the nest.

These flights were observed, as stated above, from four to six times weekly from July 15, 1938 to October 13, 1938. The last of these flights (October 13) took place amid a downpour of rain, after which the weather grew cooler and no such flights were seen at this location although daily observations continued until November 28, 1938.

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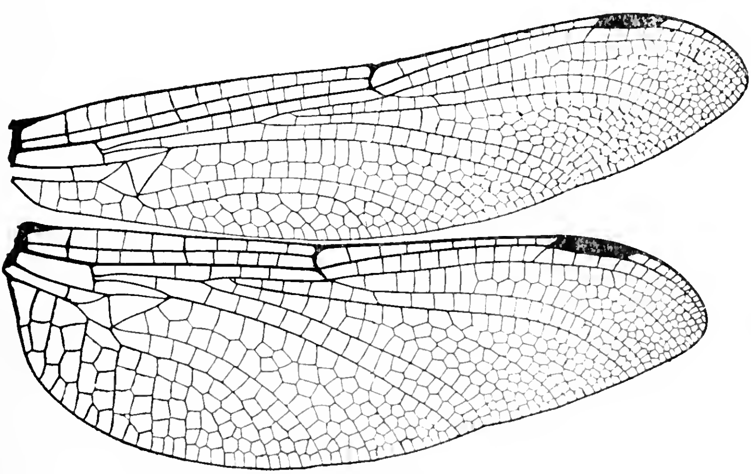
A Simple Method for Photographing Insect Wings.

By A. D. Hess, Instructor in Limnology, Laboratory of Limnology and Fisheries, Cornell University, Ithaca, New York.

The following-described method of photographing insect wings has been used by the writer for a number of years Because of its simplicity, it may be useful to other entomologists who wish to obtain pictures of insect wings with a minimum of cost and effort.

The wings are mounted dry between two lantern slide cover glasses. The mount is then placed in an enlarging machine in which the regular bulb has been replaced by a 10 or 15 watt bulb. The image is focused upon the easel in the same way as with a negative. The exposure is made upon Process film, using test strips to determine the proper exposure period the same as is done in ordinary enlarging. The film is developed in the Eastman D 11 formula. From the resulting "negative" as many positive prints as are desired may be made by regular printing methods.

The prints obtained are sharp and clear, are much more



Gomphus confraternus Selys.

accurate than drawings, and may be made in a fraction of the time which would be required to make a drawing.

The method is especially suitable for the many-veined hyaline-winged insects, such as the Odonata. The writer has used the method to make wing-prints of Odonata, Orthoptera, Diptera, and Plecoptera.

In order to get a picture of the entire venation in wings having patches of color on them (such as various species of *Celithemis*), Panchromatic Process film and a combination of color filters can be used to "filter out" the color patches.

Where it is desirable to obtain a picture of the venation of a valuable specimen from which the wings cannot be removed, it has been found possible to pin it on a block with the wings projecting over the edge and place the entire insect in the enlarger. A special frame has been made in which dragonflies can be placed with their wings held flat between plates of glass.

Negatives have also been made from lantern slide plates and enlarging paper, but the Process film proved the most satisfactory.

Some Cheap Editions of Books on Entomology.

I have noted recently that three volumes of unusual interest are in the "Everyman's Library" of E. P. Dutton & Co. These are: Bates, Henry W., "The Naturalist on the Amazons." Illus. Appreciation by Charles Darwin. (446), Belt, Thomas, "The Naturalist in Nicaragua," Map. Illus. Introd. by A. Belt. (561), and White, Gilbert, "A Natural History of Selborne." Introd. by Principal Windle (48). At the price of $.90 per volume these are all exceptional reprint buys, as the out-of-print originals would cost so much. Eric Nordenskiold's "The History of Biology" is now in a reprint series (Tudor Pub. Co., New York City) and sells for $1.48 plus postage. Presumably many of the readers of "Entomological News" who may not know about this would like a personal copy at this price.—Merle W. Wing.

Protective Shape and Coloration of the Spider, Cyclosa bifurca (Arachnida: Argiopidae).

By C. Brooke Worth, The Rockefeller Institute for Medical Research, Department of Animal and Plant Pathology, Princeton, New Jersey.

In early April, 1939, I observed many webs of *Cyclosa bifurca* against the walls of a house at Palm Beach, Florida.

Comstock (1) has already commented on the "self-protective habits" of a related spider, *Cyclosa caroli*, as follows:

"The orb of the adult is about six inches in diameter. The female fastens her egg-sacs in a series which extends across the orb from the hub to the upper margin like a stabilimentum, and looks like a dead twig caught in the web. This band of egg-sacs and the spider are of the same gray colour. When disturbed the spider rushes to the band and appears as if it were a part of it. And here it will cling motionless even when the band is removed from the web."

In less detail he gives a closely similar account for *Cyclosa bifurca*. But owing to the striking lesson in protective mimicry which these spiders afford, I wish to enlarge on Comstock's accurate and illuminating description.

The webs of *Cyclosa bifurca* are also about six inches in diameter. They are disposed in a vertical position, in this case closely parallel to the walls of the house. The egg-sacs are arranged in a row, occupying the position of the hands of a clock at exactly noon. The spider herself reposes at the center of the web, that is, immediately below and touching the lowermost egg-sac. She invariably faces the ground, so that her abdomen appears as an additional egg-sac in the row above her.

In my notes I state that the appearance of this mass of objects in the web is that of a catkin which has become entangled in the sticky meshes. This appearance is heightened by the spider's disposition of captured food. Such prey is wrapped in silk and anchored below the spider, forming an uneven row of objects as a direct short continuation of the line of egg-sacs.

The average length of the "catkins", i. e., egg-sacs, spider, and food-sacs from above downwards, is from two-and-a-half to three inches, which means that they occupy about half the diameter of the web. The usual number of egg-sacs ranges from five to nine, with eight as an average.

But the most remarkable feature of all is the resemblance of the egg-sacs to the abdomen of the female. The latter is light green with dark green central and lateral stripes, and in these details the egg-sacs agree precisely with their maternal source. The spider's abdomen moreover bears a series of tubercles and projections, which again are reproduced faithfully in the egg-sacs, even including the terminal bifurcation. The egg-sacs, finally, are deposited in the web in a shingled or over-lapping series, and the spider takes a position at the center of the web so that her abdomen overlaps the lowermost egg-sac in an exact continuation of the series above her.

The spider's abdomen, seen in profile, has a generally flattened S-shaped curve; so have the egg-sacs: and it is this shape which permits the easy overlapping of the entire series.

The spider's light green color and smooth integument give it a translucent appearance when seen close at hand. Even this quality of translucence is duplicated in the smooth-woven texture of the egg-sacs.

Thus the agreement in appearance of the spider's abdomen and her egg-sacs includes the following visual considerations: station and disposition in the web, total configuration, ground color, color pattern, and apparent texture. The spider, in short, would appear to be no more than an egg-sac herself, were it not for that significant appendage, the cephalothorax.

(1) Comstock, John Henry, 1920. The Spider Book, Doubleday, Page and Company, New York. Pp. 453 and 454.

The Evanidae (Hymenoptera).

From Part 24 of the *Catalogue of Indian Insects,* by M. S. Mani, issued under the authority of the Government of India, Delhi, 1939, recently received, we learn that 50 species, both recent and fossil, so far are described from India, over 300 species from the whole world. *Evania appendigaster* L. is cosmopolitan.

The Revista de Entomologia.

On April 25, 1931, there appeared the first fascicle of a new publication devoted primarily to the entomology of the vast Neotropical faunal area. The list of contributors to this initial volume, including the late John Merton Aldrich, Walther Horn and William Morton Wheeler, together with many others still living, indicated clearly the high standard that was proposed. This high calibre of authorship has been maintained consistently throughout the entire series of ten large volumes that have appeared to the present date. Its influence on the entomology of the Neotropics has been profound and cannot well be overestimated.

The founder and editor of the "Revista," P. Thomaz Borgmeier, recently has issued an appeal to certain of his subscribers in the United States calling to their attention the fact that, due to the disturbed conditions in Europe, many subscriptions to the magazine have been allowed to lapse and that if publication is to continue more subscribers must be obtained from countries not directly involved in the War. It is the purpose of this note to call the above fact to the attention of interested parties and friends of the "Revista" and thus do what is possible toward preventing the action suggested. It would be a catastrophe of highest order to have this splendid magazine cease publication or even be forced to curtail its activities to any degree. While being devoted primarily to entomology of South and Middle America, articles dealing with the North American fauna will be acceptable for publication.

The "Revista" considers all branches of entomology with thoroughness, including the Applied, Biological, Ecological, Morphological and Systematic aspects. Of particular interest and value to all scientists who are working on the Neotropical fauna is the section on "Bibliographia" wherein is presented a record of all papers that relate directly or indirectly to the entomology of the Neotropics. This section alone is well worth the price of the entire volume. It seems certain that the present disturbance in the Old World is merely a passing phase and that when peace is again restored South America and its virtually unlimited natural resources, including its wealth of insects and insect problems, will forge rapidly ahead in public attention and interest. It is because of this permanence of the future that the present doubt concerning the financial condition of the "Revista" should be speedily removed.

The "Revista" is published in three large fascicles per annum, recent volumes having included from approximately 450 to 600 pages, with numerous plates and text figures. The leading articles are published in English, French, German, Portuguese or Spanish, according to the nationality of the contributor. The magazine has received the highest possible commendation from many scientists, including several American entomologists. New subscriptions should be sent to the Editor, P. Thomaz Borgmeier, Convento S. Antonio, Largo da Carioca, Rio de Janeiro, Brazil. The subscription is four dollars, United States currency, per volume. The ten volumes that have appeared to this date may be obtained at the above stated annual subscription price by applying directly to P. Borgmeier.

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Amherst, Massachusetts.

The Entomological Society of India.

This Society, founded at Calcutta, January 7, 1938, during the Silver Jubilee Session of the Indian Science Congress, has issued, under one cover, Vol. I, Parts 1 and 2 of *The Indian Journal of Entomology*, June, 1939, New Delhi. The cover states: "The Society exists for the encouragement and promotion of entomological study and research in India. Membership of the Society is open to all persons, over 18, interested in Entomology. Owing to the difficulty of members from all over India meeting frequently at any one place the Society has established branches at important scientific centres in different parts of the country, where its meetings are held. *The Indian Journal of Entomology,* which is to be the official organ of the Society will for the present be published twice a year in June and December, and will be supplied free to members. For non-members, institutions, etc., the subscription is fixed at Rs. 16 abroad." The Journal is not open for exchange. In a list of 42 Foundation Members, with one European exception, the names are Indian. The Executive Council for 1939 included M. Afzal Husain, *President*, Hem Singh Pruthi and T. V. Ramakrishna Ayyar, *Vice Presidents*. Dr. Pruthi is Chief Editor of the *Journal* and the other members of the editorial board are Drs. Ayyar, Khan A. Rahman, N. C. Chatterjee, Dev Raj Mehta and K. Lal, Managing Editor. In the opening article, "Ourselves," is the passage: "The number of amateur entomologists in India is very insignificant and even that of professional entomologists is far from being adequate. The task of exploration of the insect communities of different ecological areas . . . cannot adequately be tackled unless there is a body of workers interested in insect life for its own sake and is pursuing studies unhampered by any considerations of their immediate utility."

We wish the Society and its Journal all success!

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista de Entomologia, Rio de Janeiro, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )follows; then** the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Allen, G. M.**—The parasites of bats [Bats] 1939: 293-317, ill. **Anon.**—Dehydration in Microscopy. [Museums Jour. London] 39: 376. Air bubbles in whole mounts. [Ward's Ent. & Nat. Sci. Bull.] 13:2. Shipping safely to foreign parts. [Ward's Ent. & Nat. Sci. Bull.] 13:2. An excellent new observation block. [Ward's Ent. & Nat. Sci. Bull.] 13:4. **Back, E. A.**—A new pest of books: Neogastrallus librinocens (Coleo.: Anobiidae). [12] 32: 642-645, ill. **Bradley, J. C.**—The philosophy of biological nomenclature. [Verh. VII Internat. Kongr. Ent.] 1: 531-534. **Chopard, L.** — Notice sur les travaux scientifiques. Mimeogr. 24pp. **Cockerell, T. D. A.**—The floating population of the air. [Science] 90: 353-354. **Detwiler, J. D.**—The history of the Entomological Society of Ontario as interpreted by a Londoner. [4] 71: 205-208. **Eichler, W.** ——Eine bibliographische symbolik. Zur wissenschaftlichen arbeitstechnik. [Zool. Anzeiger] 126: 268-270. **Fulmek, L.**—Ein Insekten-Parasiten-Wirte-Index der Welt in Werden. [Verh. VII Internat. Kongr. Ent.] 1: 540-547. **Girault, A. A.**—On the two divisions of scientific work. [Verh. VII Internat. Kongr. Ent.] 1: 144-146. **Griffin, F. J.**—The relationship existing between entomology and bibliography. [Verh. VII Internat. Kongr. Ent.] 1: 548-552. **Haskins, C. P.**—Of ants and men. Prentice-Hall Inc. New

York: 1939. 244pp., ill. **Heikertinger, F.**—Uber den heutigen Stand des Nomenklaturproblems: Die Alltagsformel als Losung. [Verh. VII Internat. Kongr. Ent.] 1: 553-563. **Hemming, F.**—Notice of possible suspension of the Rules of Nomenclature in certain cases. [71] 41: 304. **Horn, W.**—Lehrt die Bioliographie, dass der systematischen entomologie eine gefahr droht? [Verh. VII Internat. Kongr. Ent.] 1: 567-578. **Horn, Walther.**—Obituary by H. Sachtleben (Dr. W. Horn zum Gedächtniss) [with portrait and bibliography]. [109] 6: 201-222, ill. **Jordan, K.**—Uber zwei die Entomologie betreffende Nomenklaturfragen. [Verh. VII Internat. Kongr. Ent.] 1: 583-587. Die Terminologie der Formen und aberranten Individuen innerhalb der Spezies und Subspezies. [Verh. VII Internat. Kongr. Ent.] 1: 579-582. **Liu, Gaines.**—The earliest Bureau of Entomology. [6] 47: 307-310. **Malaise, R.**—Fabricius und die erste Feststellung von Gattungstypen. [Verh. VII Internat. Kongr. Ent.] 1: 588-590. **Martin, C. H.**—Description of an insect container for a traplight. [19] 34: 255-257, ill. **Netolitzky, F.**—Abfassung, Sammlung und Katalogisierung der Verbreitungskarten zur Insektengeographie. [Verh. VII Internat. Kongr. Ent.] 1: 329-331. **P. B. M. A.**—The New Entomology. [9] 72: 234-236. **Rosenbaum, W.**—Antrage fur die Nomenklatur-Sektion des VII. Internationalen Kongresses fur Entomologie in Berlin, 1938. [Verh. VII Internat. Kongr. Ent.] 1: 591-598. **Spacek, C.**—Le grattoir-ecorcoir de M. Felton [Ent. Nachricht.] 12: 159-160, ill. **Stegeman, L. C.**—Some parasites and pathological conditions of the skunk [Mephitis mephitis nigra) in Central New York. [Jour. Mammology] 20: 495. **Strong, L. A.**—Records on the occurrence and distribution of insects. [Ward's Ent. & Nat. Sci. Bull.] 13: 1pp. **Weiss, H. B.**—An early entomological book for children. [6] 47: 303-306. Mantis and mouse. [6] 47: 314. Thomas Boreman again. [6] 47: 351-352. **Zarapkin, S. R.**—Das Divergenzprinzip in der Bestimmung kleiner systematischer Kategorien. [Verh. VII Internat. Kongr. Ent.] 1: 494-518.

ANATOMY, PHYSIOLOGY, ETC.—Byrk, F.—Lepidopteren-Anomalien, Prof. A. Tullgren in Freundschaft gewidmet aur seinem 65 ten Geburtstag. [28] 60: 259-273. **Evans, A. C.**—The utilization of food by certain lepidopterous larvae. [36] 89: 13-22. **Ferris & Pennebaker.**—The morphology of Agulla adnixa (Raphid.) [Microent.] 4:

121-142, ill. **Gilbert, H. A.**—Explorations of the hypopharynx in Noctuid larvae. [4] 71: 231-237, ill. **Hase, A**—Ueber die wirtswahl bei insekten. [Die Naturwissensch.] 27: 662-664. **Janse, A. J. T.**—On the structure of lepidopterous larvae, with special reference to the mature larva of Leto venus. [Journ. Ent. Soc. So. Afr.] 2: 165-175, ill. **Nolte, D. J.**—A comparative study of 7 spp. of Transvaal Acrididae with special reference to the chromosome complex. [Journ. Ent. Soc. So. Afr.] 2: 196-260, ill. **Kellogg, Robinson, Moss, & Blackmer.**—Variations in the size of wings of some Massachusetts honeybees. [12] 32: 665-666. **Lund and Bushnell.**—The relation of nutritional levels to the growth of populations of Tribolium confusum. II.—Egg production in patent flour and in patent flour supplemented by yeast. [12] 32: 640-642. **Melampy & McGregor.**—Nutritional value of certain foods for the adult honeybee. [12] 32: 721-725. **Pennebaker**—(see Ferris & Pennebaker). **Ranzi, S.**—Die wirkung der bauchganglienkette auf die Ausfärbung der imaginalaugen von Ephestia kühniella. [Die Naturwiss.] 27: 660-661, ill. **Sellke, K.**—Versuche mit chemischen zur Bekampfung des Kartoffelkafers (Leptinotarsa decemlineata). [110] 6: 146-171, ill. **Spieth & Ide.**—Some gynandromorphs of Ephemeroptera. [4] 71: 165-168, ill. **Stanley, J.**—A peculiar phenomenon observed in larval populations of the flour beetle Tribolium confusum. [31] 144: 753-754. **Steinberg, D.**—The regulatory processes in insect metamorphosis. II. The embryonic territories of wing and legs in the hypoderm of the caterpillars of Galleria melonella. [Biol. Jour.] 7: 993-1012, ill. [Russian with English summary]. **Sweetman, H. L.**—Responses of the silverfish, Lepisma saccharina, to its physical environment. [12] 32: 698-700. **Trukhanov, I. F.**—Phenomenon of wing reduction in some Hemiptera. [Comptes Rend. Acad. Sci. URSS] 23: 982-984, ill. **Tulloch, G. S.**—Variation in the head hairs of Culex apicalis larvae. [19] 34: 235. **Verrier, M. L.**—Sur le polymorphisme des ommatidies des yeux composes. [25] 44: 187-190, ill. Remarque sur les yeux de Gyrinus urinator. [25] 44: 62-64, ill. **Voukassovitch, P.**—Contribution à l'étude de la fonction des ovaires chez un Coléoptere: Phytodecta fornicata. [Bull. Acad. Sci. Math. & Nat. Belgrade] B. Sci. Nat. No. 5: 113-125, ill. **Warnecke, G.**—See under Lepidoptera. **Wigglesworth, V. B.**—Source of the moulting hormone in Rhodnius. [31] 144: 753.

ARACHNIDA AND MYRIPODA.—Chamberlin & Ivie. —Studies on North American spiders of the fam. Micryphantidae. [Verh. VII Internat. Kongr. Ent.] 1: 56-73, ill. (*). **Hoffmann, C. C.**—Nuevas consideraciones acerca de los Alacranes de Mexico. [Verh. VII Internat. Kongr. Ent.] 1: 191-210, ill. **Medcof, J. C.** — On the occurrence of the terrestrial Isopod Androniscus dentiger, in Canada. [Can. Field-Nat.] 53: 115. **Oughton, J. G.**—The burrow of an Arctic spider, Lycosa asivak. [Can. Field-Nat.] 53: 123-124.

THE SMALLER ORDERS OF INSECTS.—Castle, G. B.—The Plecoptera of western Montana. [4] 71: 208-211, ill. **Clay, T.**—A note on some Mallophagan names. [71] 41: 175-177. **Ferris & Pennebaker.**—(see under Anatomy). **Fox, I.**—New species and records of Siphonaptera from Mexico. [Iowa State Coll. Jour. Sci.] 13: 335-339, ill. **Gurney, A. B.**—Nomenclatorial notes on Corrodentia, with descriptions of two new species of Archipsocus. [91] 29: 501-515, ill. (*). **Hemming, F.**—(see under General). **Hungerford, H. B.**—A note on Mantispidae. [19] 34: 265. **Jordan, K.**—On five new Siphonaptera from the Republic of Argentina. [71] 41: 292-303, ill. (*). **Keler, S.**—Uber brasilianische Mallophagen. [109] 6: 222-253, ill. (*). **Mosley, M. E.**—The Brazilian Hydroptilidae. [71] 41: 217-239, ill. (*). **St. Quentin, D.**—Die systematische Stellung der Unterfam. der Corduliinae (Odonata). [Verh. VII Internat. Kongr. Ent.] 1: 345-360, ill.

ORTHOPTERA.—Beier, M.—Die geographische Verbreitung der Mantodeen. [Verh. VII Internat. Kongr. Ent.] 1: 5-15. **Chopard, L.**—See under General. **Cousin, G.**—Sur la variabilite des caracteres taxonomiques interspecifiques due a l'allometrie de taille. Varabilite du pronotum chez deux especes de Gryllides: Gryllus campestris et G. bimaculatus et leurs hybrides reciproques. [25] 44: 138-144, ill. **Mello-Leitao, C. de.**—Notes sur les Proscopides [Verh. VII Internat. Kongr. Ent.] 1: 292-302, (Sk*). **Rehn, J. W. H.**—Notes on the Orthoptera of Nova Scotia and Newfoundland. [4] 71: 175-178. **Rehn & Rehn.**—A review of the New World Eumastacinae (Acrididae). Part 1. [Pro. Acad. Nat. Sci. Phila.] 91: 165-206, ill. (*). **Strohecker, H. F.**—Distributional and taxonomic notes on southeastern Dermaptera and Orthoptera, and a n. sp. of Cycloptilum. [4] 71: 169-175, ill.

HEMIPTERA.—Barber, H. G.—A new bat bug from the eastern United States (Cimicid.). [10] 41: 243-246, ill. **Caldwell, J. S.**—New Psyllids from Alberta. [4] 71: 211-212, ill. **Davis, W. T.**—New cicadas from North America and the West Indies. [6] 47: 287-302, ill. **Ruckes, H.**—Brochymena florida, a n. sp. of Pentatomid from Florida. [19] 34: 236-239, ill. **Smith & Knowlton.**—Three intermontain Aphids. [4] 71: 241-243, ill. (*). **Strickland, E. H.**—Further notes on Psyllidae taken in Alberta. [4] 71: 212-215. **Trukhanov, I. F.**—(see under Anatomy). **Vayssiere, P.**—Un nouveau genre de Cochenille a Panama. [25] 44: 124-127, ill. **Williams, C. B.**—A tent-building whitefly (Aleurodidae) from Trinidad. [9] 72: 225-227, ill.

LEPIDOPTERA.—d'Almeida, R. F.—Revisao das especies americanas da superfamilia Danaoidea (Pierid.). [111] 34: 113pp., ill. (k). **Breyer, A.**—Uber die Argentinischen Pieriden. [Verh. VII Internat. Kongr. Ent.] 1: 26-55, ill. **Bryk, F.**—See under Anatomy. **Freeman, T. N.**—Notes on the distribution of Plebeius aquilo with the description of a new race from Manitoba (Lycaen.). [4] 71: 178-180, ill. **Hemming, F.**—(see under General). **McDunnough, J.**—An apparently new Epipaschid from Nova Scotia. [4] 71: 221-222. A new race of Papilio belonging to the machaon complex. [4] 71: 216-217, ill. **O'Byrne, H. I.**—Notes on butterfly migration, II. [19] 34: 252-254. **Schade, F.**—Eine neue Colla. [17] 56: 65-67, ill. (S*). **Williams, C. B.**—The migration of the Cabbage White Butterfly (Pieris brassicae). [Verh. VII Internat. Kongr. Ent.] 1: 482-493, ill.

DIPTERA.—Ahlberg, O.—Diarthronomyia chrysanthemi n. n. (= hypogaea Felt nec Loew), (Cecidomyid.). [28] 60: 274-278. **Alexander, C. P.**—New or little-known species of West Indian Tipulidae IV. [Jour. Agric. Univ. Puerto Rico] 23: 91-130, ill. **Hall, D. G.**—Two n. spp. of Tachinidae parasitic upon hemlock sawfly larvae in North America. [10] 41: 239-243. **Hering, E. M.**—Neue Trypetiden der Erde. [Verh. VII Internat. Kongr. Ent.] 1: 165-190, ill. (S*). **Jobling, B.**—A redescription of Pseudostrebla ribeiroi and the description of a n. gen. and sp. of the Streblidae from Brazil. [109] 6: 268-275, ill. (k). **Pechuman, L. L.**—Notes on some Mexican spp. of Chrysops (Tabanidae), and the description of a n. sp. [19] 34: 240-244. **Tuomikoski, R.**—Empidideistä ja niiden elintavoista. [Luonnon Ystava] 43: 48-61, ill.

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SPECIAL NOTICES.—The Insect Legion by M. Burr, xvi + 321 pp., ill. Jas. Nisbet & Co., Ltd., London. **VII. Internationaler Kongress fur Entomologie, Berlin, 1938:** Verhandlungen, Bd. I: 1-617 (Systematik un Tiergeographie; Nomenklatur und Bibliographie). **Introductory Note** on publication of new journal, Thé Great Basin Naturalist. By V. M. Tanner. Volume 1, p. 1. **A laboratory guide in entomology: For introductory courses by R. Matheson**—135 pp., ill., (k). Comstock Publ. Co., Ithaca, N. Y.

A New Entomological Serial.—We are glad to welcome into the fold of entomological publications a new serial: Memoirs of The Entomological Society of Washington. Number one has just appeared containing a contribution entitled, "The North American Bees of the Genus Osmia (Hymenoptera: Apoidea)." By Grace H. Sandhouse. 167 pp., 278 figures on eleven text plates. Although imprinted as being issued August 15, 1939, it was received by the American Entomological Society October 13, 1939, so there should be some published announcement stating how that date of issue was established.

The North American Bees of the Genus Osmia. By Grace Sandhouse. Memoirs just cited. Received October 9, 1939.—This work of 167 pages is the first of a proposed series of Memoirs to be published by the Entomological Society of Washington. When Miss Sandhouse left Colorado, many years ago, she had advanced far in the preparation of a revision of North American *Osmia,* and in 1924 and 1925 she published important papers on the species of California and Canada. The complete revision was long postponed and I had given up all hope of seeing it in print; but here it is at last, and it may be said at once that it will be the foundation for all subsequent work on the subject. I have made no attempt to check the findings in detail, but all things considered, my impressions are very favorable and I rejoice that such a useful paper is now available for students. There are 19 new species, but many previously described ones are treated as synonyms. Thus of 23 species previously described by Miss Sandhouse herself, no less than 11 are reduced to the synonymy. Much of the synonymy results from the association of the sexes which had been described under different names; but much also from unwillingness to recognize local races or subspecies. It is proper to say that the recognition of such races, just as in *Megachile,* is not always easy, and often must depend on the examination of more and better material than is now available. This being understood, the proposed synonymy does no harm, but is indeed valuable as associating insects which are very closely allied. It would have been well to have cited the type localities, not only of the recognized names but also of those placed in the synonymy. The obligation to keep the work down to a moderate size is no doubt responsible for the many new distribution records which appear under the names of the states only, with no other information of any kind. Perhaps at some future time a paper may be prepared giving the exact particulars. — T. D. A. Cockerell.

Meadow and Pasture Insects, by Herbert Osborn, assisted by Mrs. Dorothy J. Knull. The Educators' Press Columbus, Ohio. 1939. Pp. viii, 288, 103 figs. $3.75.— Foreword by L. O. Howard, p. iii. In Chapter I, Meadow and Pasture Insects, pp. 1-11, the author's viewpoint is stated as follows: the meadows and pastures present a very distinct combination or a complex of organisms living in a close association, many of them with distinct mutual interdependence so that any attempt at a careful study of these conditions and the economic problems concerned must involve a careful survey of the whole combination and an attempt to analyze the dfferent factors concerned. The immense place of grass and other forage crops in our system of agriculture is possibly hardly realized because the more tangible results and available figures appear in other products. After a brief historical sketch of earlier treatments of insects injurious to meadows and pastures, pp. 8-10, the conviction is emphasized that any adequate control of meadow pests, especially for permanent meadows or pastures, must be based upon a careful examination of the combination or aggregation of organisms in this complex rather than by efforts to find remedies for single species of pests. It is only in an occasional year that any one species of insect appears in a noticeably destructive outbreak but in practically every season the aggregate loss from the combined attacks of the many species of grasshoppers, the various cut worms and army worms, white grubs, wireworms, leafhoppers, etc., is a very heavy one on the meadow or pasture crop. It becomes especially desirable therefore to know the habits and the possibilities of prevention or control of the composite or average annual assemblage, even if in the course of time we do accomplish the enormous task of working out the biology of the thousand or more species that enter into the insect part of the meadow complex. In Chapter II, Ecology of the Meadow, pp. 12-42, ecologic factors are classed as physical (elevation, topography, slope, humidity, temperature, shade, exposure to sun and wind, evaporation and drainage and the geological, chemical and physical characteristics of the soil) and biological (interaction of all organisms permanently or temporarily in the area). The following topics are then discussed: local habitats, p. 15, local migration, pp. 16-17, climatic zones, pp. 18-19, soil relations, pp. 19-20, plant life, pp. 20-21, and animal life, pp. 24-29, of the meadow, the meadow as a source of insects for other crops, pp. 29-30, subterranean association, pp. 30-33, turf-inhabiting fauna, p. 33, the terrestrial association, pp. 33-34, the fence row community, p. 34, stability, p. 35, and sedentary nature, p. 36, of the meadow forms, their succession and interrelationship, p. 37, the geographical sources of meadow insects, pp. 37-39, geological origin of the meadow fauna, p. 39, and the meadow complex, illustrated by a diagram, pp. 40-42. Chapter III, pp. 43-55, considers the animal groups, other than insects, in the meadow fauna from mammals to protozoa. Chapter IV, the Insect Population, pp. 56-59, is concerned only with the nature of losses from insects. Chapter V, pp. 60-69, states the general control measures for meadow and pasture insects in (*a*) fields which enter into a crop rotation and (*b*) in permanent pastures and meadows. The following chapters deal each with an order of meadow insects: VI Orthoptera (approximately 48 species), VII Thysanoptera (22), VIII Homoptera (119), IX Heteroptera (28), X Coleoptera (69), XI Lepidoptera (49), XII Diptera (17) and XIII Hymenoptera (45). These numbers do not include the species listed, with months of occurrence, at the conclusions of Chapters VI, IX, X, XII and XIII, based on collections made by A. E. Miller in the Ohio State University Meadow, which constitute a valuable contribution to knowledge of the insects of central Ohio. A list of the principal articles consulted in the preparation of the volume occupies pp. 273-283, the index pp. 285-288. It will be seen, therefore, that this book, in arrangement of contents and point of view, is a novelty in our American entomological literature and forms a worthy crown to Prof. Osborn's work in this field.—P. P. CALVERT.

A New Entomological Journal

Sweets & Zeitlinger, Ltd., Publishers and Booksellers, 471 Keizersgracht, Amsterdam, Holland, announce that they have recently published the Journal of the Entomological Society of South Africa, Volume I, March 31, 1939, 165 pages. With 18 figures, 6 plates and 2 portraits in the text, £ 1.2.6.

The first volume of this new journal publishes papers by members of the staff of the University of Pretoria, of Rhodes University College of the South African Institute for Medical Research at Johannesburg and others. Besides articles on South African insects, it contains those by Immelman, M.N.S., Pretoria — on the control of temperature and humidity of air in small cabinets; Omer-Cooper, Joseph, Rhodes University College—the classification of the recent hexapod insects, and obituaries of G. A. H. Bedford and Edward Meyrick.

South Africa offers a vast field for entomological research; the reports published in this journal will be of importance to entomologists the world over. The journal is obtainable from booksellers or from the publishers.

Entomological News for December, 1939, was mailed at the Philadelphia Post office on December 20th, 1939.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Mr. Robert "Colegio de la Salle, Vedado, Habana, Cuba," offers Coleoptera, Lepidoptera, Land and Sea Shells, Bird Skins, Botanical Specimens, Cuban Cactus and cleaned "Diatom" Material.

Wanted for cash or exchange any pamphlets dealing with the American Hesperiidae. K. J. Hayward, Entomologist, Concordia Experiment Station, E. R. Argentine.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

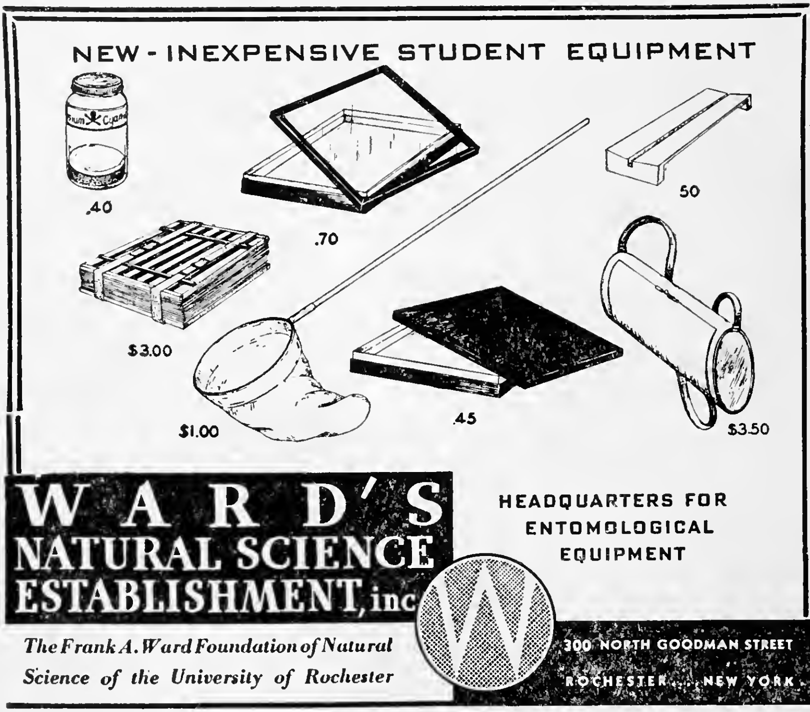
Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 65 cents; three or four pages, twenty-five copies, $1.05; five to eight pages, twenty-five copies, $1.75; nine to twelve pages, twenty-five copies, $2.35; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates up to 100 copies; over 100 copies prices on application direct to printer. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

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ENTOMOLOGICAL NEWS

VOL. LI FEBRUARY, 1940 No. 2

The Altitudinal Range of Dragonflies in the Pikes Peak Region (Odonata).

By A. D. HESS, Instructor in Limnology, Laboratory of Limnology and Fisheries, Cornell University, Ithaca, New York.

During the summer of 1932, while assisting Dr. R. J. Gilmore in a biological survey of the streams of Pikes Peak, Colorado, the writer made an intensive study of the altitudinal range of the Anisoptera of the region. Some additional records have since been furnished by Mr. Robert Sutton of Colorado Springs, Colorado. The accompanying table is a summary of the data obtained.

The table is based primarily upon the collection of adult insects, but in many cases the nymphs also were taken. A special effort was made to obtain the nymphal stage when collecting in the upper or lower limit of the range of a particular species. The narrow range of *Aeschna juncea*, high on the side of Pikes Peak, was verified by the collection of both the nymphal and adult stages.

Most of the 26 collecting stations from which the data were obtained were located within a 25-mile radius of Pikes Peak, but considerable collecting was done in the region of Pueblo, Colorado, because of the lower altitudes available along the Arkansas River Valley.

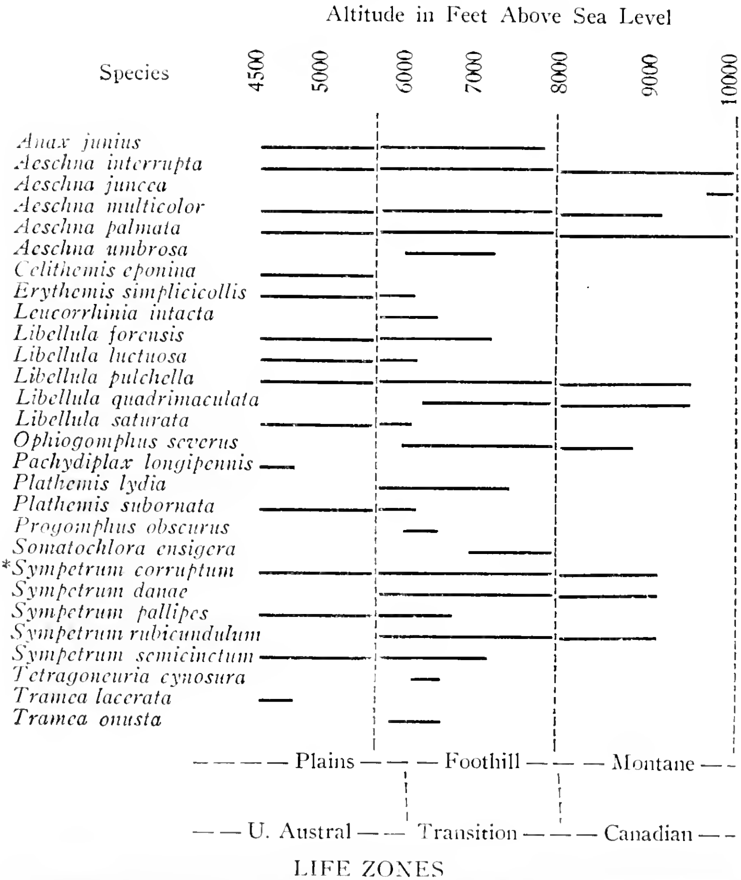
While few conclusions can be made from a single season's observations over such a limited area, the results indicate that there are both high and low altitude stenotherms as well as eurythermous species in the anisopterous fauna of the region. There is also an indication that the distribution of the stenothermous species bears a definite relation to the life zones of the region. The location of the life zones as shown in the table is taken from the following two papers.

References:

Ramaley, Francis. 1907. Plant zones in the Rocky Mountains of Colorado. Science, N. S., vol. 26, pp. 642-643.

Dodds, G. S. and F. L. Hisaw. 1925. Ecological studies of aquatic insects. IV. Altitudinal range and zonation of mayflies, stoneflies, and caddisflies in the Colorado Rockies. Ecology 6, pp. 380-390.

Altitudinal Range of Dragonflies in the Pikes Peak Region, Colorado.



**Tarnetrum* Needham

The Life History of the Wood-Roach, Parcoblatta pennsylvanica DeGeer, (Orthoptera: Blattidae).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 9.)

Duration of Life of the Adult.

In the latter part of April, 1937, I trapped several nymphs that had lived all winter in an abandoned bee-hive, and placed them in confinement. All of these became adult during the last week in May; the remaining population in the bee-hive likewise moulted into adulthood at about the same time. Notes were made on the duration of life on 21 females (Table V).

Table V.

Duration of Life of Female, Days	Frequency	Duration of Life of Female, Days	Frequency
35	1	73	2
42	1	75	3
44	2	82	2
58	1	84	1
59	1	85	2
60	2	132	1
67	1	160	1

These females lived from 35 to 85 days, with two exceptional individuals living far beyond a hundred days. The most ancient of these deposited an egg-case three days before death at 160 days.

The length of life of the adult males is considerably shorter than that of the females. In 1937 these extremely active insects escaped from confinement before data could be gathered.

Moulting.

In 1938 and 1939, roaches both in confinement and in the old beehive became adult about the middle of May, and in 1937, about ten days later. There was however a striking difference in another lot of nymphs that emerged from four egg-cases on August 12, 1937; here, reared under artificial conditions, the mortality at various stages was about 75% and the survivors, for some unknown reason, required about 21 months to mature.

Only a few records were kept on the number of moults in the wood-roach. When the nymphs leave the egg-case, they cast off a white thin membrane [3] which apparently is a portion of the covering of the egg. The first actual moult occurred for one lot 10 to 11 days after hatching; they emerged on August 12, and moulted on August 22 and 23. The second moult for this lot occurred on September 10 to 14, or 19 to 23 days later. A third moult occurred October 2 to 4, or 22 to 26 days later, and a fourth one about December 5. There was evidently a fifth and possibly a sixth which I overlooked, which occurred between December 5 and the final moult in May. Hence it seems, from the meager data, that this species moults from five to seven times during its life.

Food.

We have no way of knowing what the wood-roach eats when free in nature. In confinement, they thrived on fruits and vegetables, both raw and cooked; apple, lettuce, cabbage, string beans, apricots; they also ate cheese, bread and pastry. I have seen them chew paper and card-board, and once I saw a female with her head inserted in a cell of a deserted *polistes* nest, devouring a larva.

Enemies.

The enemies of the wood-roach, so far as I know, seem to be few in number. The agility of both sexes makes it difficult for enemies to capture them, although I record (Entom. News, 48: 91-94, 1937) finding them in cells of the roach-hunting wasp, *Podium carolina*. Ants should be included as enemies of this species. On one occasion carpenter-ants *Camponotus pennsylvanicus* entered one of my traps and killed and carried away piecemeal about a dozen adults of both sexes. There is, however, a hymenopterous parasite that attacks the egg-case of the wood-roach. In early July, 1939, I collected seven egg-cases from the floor of the old bee-hive, one of which

[3] Probably this membrane is the "thin cuticular sheath formed during embryonic development of all insects with incomplete metamorphosis and some holometabolous species," described by Snodgrass 1935 (Principles of Insect Morphology, p. 44), and the non-cellular, chitinous pronymphal sheath shed by the newly-hatched dragonfly larva (Tillyard 1917, Biology of Dragonflies, p. 69).

gave forth, three weeks later, an evaniid parasite identified by Mr. R. A. Cushman as *Hyptia reticulata* Say. These insects, commonly known as ensign-flies, are in all species parasitic on the egg-cases of cockroaches (Comstock, Introd. to Entom. p. 933, 1924.)

A New Pagasa from the United States (Hemiptera, Nabidae).

By H. M. Harris, Ames, Iowa.

I am indebted to Mr. H. G. Barber and Professor R. H. Beamer for the privilege of making known to fellow workers the beautifully marked species described below. The uniqueness of the form was first recognized by Mr. Barber, who sent me a specimen for study in January, 1933, and who since has made repeated trips to Cape Henry in an effort to take more examples. Dr. Beamer, likewise, was struck with the distinctness of the form and at my behest made a special trip to southern Kansas in search of a longer series.

Pagasa fasciventris n. sp.

Elongate, shiny throughout, with a few fine hairs and setae. Head, anterior lobe of pronotum (except narrow collar), genital segments, and sometimes the abdominal ring preceding the genital segments, deep piceous black; the remainder of body and the legs bright reddish orange. Antennae testaceous, the base of segment I, tip of III and all of IV and V darker.

Brachypterous female: Head short, measured to collum slightly longer than broad (47:42). Vertex (16) broader than an eye. Eyes dark, nearly twice as long as broad (25:13). Ocelli reddish, small. Antennae clothed with short, fine hairs; proportion of segments, I:II:III:IV:V=14:12:45:45:43. Rostrum darkened basally, the second segment reaching only to a point about opposite basal third of eye; proportions, 35:35:17.

Pronotum smooth and highly polished, longer than broad (70:63); the anterior lobe long (55), narrow; posterior lobe faintly impressed at the middle before base, its hind margin sinuate. Scutellum dull, the tip shiny, the disc bifoveate and the sides with a few fine long setae. Hemelytra shiny, short (50), the apex truncate and oblique, the claval veins and the inner vein of corium paralleled by rows of coarse punctures, the membrane very minute and deflexed (hemelytra sometimes longer, with membrane more greatly developed). Anterior femora stout, as seen from the side the length beyond apex of trochanter two-and-a-half times the greatest depth (55:21), the inner surface armed with rows of piceous, spine-like teeth along the distal three-fifths and with a few scattered granules toward the base. Anterior tibia with inner margin nearly straight, the length of apical fossa equal to diameter of femur. Posterior tibia clothed with short, fine almost recumbent hairs and with semi-erect setae.

Abdomen above coarsely punctate across the segments. Connexium semi-vertical.

Winged form: Pronotum shorter than width across the base (70:75), the posterior margin deeply sinuate at the middle. Hemelytra abbreviated, tapering posteriorly from the middle, the clavus and corium with scattered punctures, strongly shiny, the embolium less strongly so; cuneal fracture obsolete; membrane smoky, somewhat opaque, longer than pronotum, broadly rounded to apex, the veins distinct.

Length 5.7-6.0 mm. Width (pronotum) 1.26-1.50 mm; (abdomen) 1.50-2.0 mm.

Holotype: apterous female, Cape Henry, VIRGINIA, Sept. 12, 1932, H. G. Barber collector (in U. S. National Museum). *Morphotype*, winged female, Cape Henry, Virginia, June 25, 1932, H. G. Barber (U. S. National Museum). *Paratypes*: brachypterous female, Falls City, NEBRASKA, August, 1930, H. G. Barber; 2 brachypterous females, Cherokee County, KANSAS, August 31, 1939, R. H. Beamer, and 2 brachypterous females, Cherokee County, Kansas, September 6, 1939, R. H. Beamer (in collections of University of Kansas, H. G. Barber, and H. M. Harris).

This species belongs to the subgenus *Lampropagasa*. It differs from *P. fusca* in (1) color, (2) more elongate and narrow body, (3) fewer and finer hairs, with no long ones on legs, (4) smaller scutellum, (5) less incrassate front femora, which have fewer teeth, (6) the anterior tibiae are more nearly straight along their inner edge, and (7) the ostiolar canal has a more broadly rounded apex.

In addition to the type series there are at hand five late instar nymphs taken by Dr. Beamer on August 31. They have the same striking color as the adults. In one of the Kansas females the hemelytra are somewhat intermediate in development, being as long as the entire pronotum and having a distinct, but small membrane.

A List of Maryland Odonata.

By Elizabeth G. Fisher.
Academy of Natural Sciences, Philadelphia.

A collection of dragonflies made by the author contained some new distribution records for the state of Maryland; therefore a list of the collection seemed to be of interest. The collection was made mainly around Baltimore, but other places in the state where I have made collections are included for completeness.

I have given below a short description of some of the collecting stations:

In Baltimore City:

Roland Park—polluted streams.

Govans at Woodburne Ave.—a spring fed pond and small marsh.

Mt. Washington at Cross Country Blvd.—tiny swamp and pond in woods.

In Baltimore County:

Piney Creek near Bacon Hill—a meadow with brook and small marsh.

Pretty Boy—city reservoir and large woodland stream.

Shawan—a meadow brook.

Beaver Dam Stream—a clear woodland stream.

"The Caves", Eccleston—old ore bank.

"Soldier's Delight", Delight—a serpentine barren area with clear brooks.

Avolon—Potapsco River.

Dead Run near Colonial Park and Woodlawn—a sluggish stream.

Lock Raven—city reservoir and steams draining into it. Cromwell Bridge is on its large fluctuating outlet.

Lake Roland—artificial lake.

In Harford County:

Bush River—estuary of Chesapeake Bay.

In Frederick County:

Ridgeville—a marshy meadow.

Frederick—goldfish ponds.

In Anne Arundel County:

Swan Creek—salt marsh near Ft. Armstead.

Lakeshore—pitcher plant bog.

Waterford—old mill pond.

South River—at head of tidal water.

In Calvert County:

Governor's Run-beach with seepage from cliffs and small wooded ravines cutting through the cliffs.

In Kent County:

East Neck Island—a salt marsh.

Species recorded by other authors are listed for completeness. The author and date of publication alone are given within square brackets, the full reference being obtainable from the Zoological Record; the locality and the date from the original.

The number and sex of the specimens taken is shown below except for the commonest species which are represented by numerous specimens of both sexes, the word "common" referring to ten to twenty-five individuals captured, "very common" referring to any number above twenty-five. In the case of a few species, which are difficult to capture or rarely seen but easily recognized on the wing, I have included additional localities where I have seen the species but have not captured them; these are always listed as "seen" and further set apart by round brackets. Widely distributed and extremely common species are listed without specific localities (as *Agrion maculatum*, *Plathemis lydia*, *Ischnura verticalis* etc.).

FAMILY AESHNIDAE.

Petalurinae.

1. TACHOPTERYX THOREYI (Hagen). Beaver Dam Stream near Cockeysville, Baltimore Co., July 23, 1 ♂; Governor's Run, Calvert Co., July 7, 1 ♂; (seen Octoraro Creek, Cecil

Co., June 17 and Pretty Boy, Baltimore Co., June 20.) [See Hagen 1861, 1875, Banks 1892, Calvert 1893.]

The following notes were taken near Ithaca, New York, but indicate a characteristic habit of this species:

"We found this species in large numbers in Coy Glen, a deeply wooded narrow gorge. Males and females coursed up and down the gorge bottom, usually just above the level of our heads. They rested on the tree trunks where they were almost completely camouflaged. We soon learned where several favorite resting spots were and thus we were able to distinguish them from their surroundings. They would flatten their wings and abdomens against the tree and remain motionless while we quickly swung the net over them. Often the net would sweep right over them without disturbing them because they were so closely pressed to the tree and seemed to rely so implicitly on their camouflage."

Gomphinae.

2. Hagenius brevistylus Selys. Dead Run, Colonial Park, Baltimore Co., July 18, 1 ♂; (seen Shawan, Baltimore Co., June 8). [See Hagen 1875, Banks 1892, Calvert 1893.]

3. Ophiogomphus mainensis Packard, Shawan, Baltimore Co., June 6-8, 9 ♂.

This is the southernmost record for this species. The males rested on grasses and reeds that directly overhung the water of a clear meadow brook. They were absent at this locality when revisited on July 14.

4. Gomphus (Gomphurus) parvidens Currie. [See Currie 1917.]

5. G. (Gomphurus) vastus Walsh. [See Hagen 1875, Banks 1892.]

6. G. (Stylurus) plagiatus (Selys). [See Hagen 1875, Banks 1892, Calvert 1893.]

7. G. (Gomphus) grasilinellus Walsh. [See Muttkowski 1910.]

8. G. (Gomphus) exilis Selys. Dead Run, Colonial Park, Baltimore Co., June 4, 2 ♂ and 2 ♀. [See Hagen 1861, 1875, Banks 1892, Calvert 1893.]

In copulation June 4, resting on rocks in midstream or in the field.

9. G. (ARIGOMPHUS) VILLOSIPES Selys. Bush River, Harford Co., June 3, 1 ♂; (others seen resting on bare rocks, logs, etc.)

This is a new state record.

Aeshninae.

10. GOMPHAESCHNA FURCILLATA ANTILOPE (Hagen). [See Hagen 1874, 1875, Banks 1892, Calvert 1893.]

11. BASIAESCHNA JANATA (Say). South River, Anne Arundel Co., May 6, 10 ♂.

A female, unaccompanied by the male, was seen laying eggs on the submerged stems of the Arrow Arum. The males were coursing up and down the edge of the open water in a marsh at the head of tidal water, several individuals following the same beat. Absent at this locality on July 1.

12. BOYERIA VINOSA (Say). Beaver Dam Stream, Cockeysville, Baltimore Co., July 22, 2 ♂; "Soldier's Delight", Delight, Baltimore Co., Sept. 25, 3 ♂; (seen on wooded hill top at Long Green Run, Hartley, Baltimore Co., July 20.) [See Hagen 1861, 1875.]

These dragonflies were taken resting on rocks and trees.

13. ANAX JUNIUS (Drury). Common about practically all ponds and lakes or foraging over meadows, May 6—Oct. [See Hagen 1861, 1875.]

14. A. LONGIPES Hagen. [See Hagen 1890, Banks 1892, Calvert 1893.]

15. EPIAESCHNA HEROS (Fabricius). "Soldier's Delight", Baltimore Co., July 1, 1 nymph; Roland Park, Baltimore City, May 2, 1 ♀, and July 9, 1 nymph. [See Hagen 1861, 1875.]

16. AESHNA UMBROSA Walker. "Soldier's Delight", Delight, Baltimore Co., Sept. 25, 1 ♂, 1 ♀; Lake Roland, Baltimore Co., Sept. 24, 1 ♀. [See Walker 1912.]

17. AE. VERTICALIS Hagen. [See Walker 1912.]

Cordulegasterinae.

18. CORDULEGASTER DIASTATOPS (Selys). Piney Creek near Bacon Hill, Baltimore Co., June 6, 1 ♂; Shawan, Baltimore Co., July 1, 1 ♂; Govans at Woodburne Ave., Baltimore City, June 11, 2 ♂.

In marshy meadow land.

19. C. SAYI Selys. [See Hagen 1874, 1875, Banks 1892.]

20. C. MACULATUS Selys. [See Hagen 1861, 1874, 1875, Banks 1892, Calvert 1893.]

Family LIBELLULIDAE.

Macromiinae.

21. MACROMIA ILLINOIENSIS Walsh. Cromwell Bridge, Lock Raven, Baltimore Co., July 7, 1 ♀. Big Paint Creek, Montgomery Co., Sept. 2, 1 nymph.

22. M. TAENIOLATA Rambur. [See Hagen 1861, Banks 1892, Calvert 1893.]

Cordulinae.

23. EPICORDULIA PRINCEPS (Hagen). Otter Pt. near Abington, Harford Co., May 21, exuviae very common, 1 ♂, 1 ♀. [See Hagen 1861, 1874, 1875, Calvert 1893.]

Hundreds of exuviae were found among the water weeds washed up in the strand line. The nymphs were inhabitants of partially brackish water in this vicinity. No exuviae were found here on May 7.

24. TETRAGONEURIA CYNOSURA (Say). Rockland, Baltimore Co., June 15, 25 exuviae, 3 ♂, 2 ♀; Moore's Branch, Green Spring Ave., Baltimore Co., June 18, 2 ♂; (seen Notch Cliff, Baltimore Co., June 22; Lake Roland, Baltimore Co., May 25—July) [See Hagen 1875.]

Females were seen flying June 15 with large masses of eggs on the tips of their abdomens.

25. SOMATOCHLORA TENEBROSA (Say). [See Hagen 1875, Banks 1892.]

26. S. FILOSA (Hagen). [See Hagen 1874, 1875, Banks 1892, Calvert 1893.]

27. S. ELONGATA (Scudder). [See Walker 1925.]

28. DOROCORDULIA LEPIDA (Hagen). [See Hagen 1875, Banks 1892, Calvert 1893.]

Libellulinae.

29. NANNOTHEMIS BELLA (Uhler). Lakeshore, Anne Arundel Co., June 19, July 16, Aug. 4, very common. [See Uhler 1857, Hagen 1861, 1875, Banks 1892.]

This locality is a pitcher plant bog. Eggs were being laid June 19.

30. PERITHEMIS DOMITIA TENERA (Say). Moore's Branch, Green Spring Ave., Baltimore Co., July 11, 1 ♂; Dead Run, Colonial Park, Baltimore Co., July 9, 1 ♀; (seen Lake Roland,

Baltimore Co., June-July.) [See Hagen 1861, 1875, Ris 1903, 1910.]

31. Celithemis eponina (Drury). Swan Creek, Anne Arundel Co., June 19, 2 ♂, 1 ♀; Eliot's Island, Dorchester Co., Aug. 24, 1 ♀. [See Hagen 1861, 1875, Ris 1903, 1912.] In copulation June 19.

32. C. elisa (Hagen). "Soldier's Delight", Baltimore Co., Sept. 11, 1 ♂; Swan Creek, Anne Arundel Co., June 19, 4 ♂, 2 ♀; Lakeshore, Anne Arundel Co., June 19, Aug. 4, 3 ♂; "Crimea", Baltimore City, June 4, 1 ♀. [See Hagen 1875.]

33. C. martha Williamson. Lakeshore, Anne Arundel Co., Aug. 4, 2 ♂. [See Williamson 1922.]

34. Erythrodiplax minuscula (Rambur). Lakeshore, Anne Arundel Co., Sept. 22, 2 ♂.

This is the northernmost record for this species, hitherto known north as far as Kentucky and North Carolina. The locality is a pitcher plant bog.

35. E. berenice (Drury). East Neck Island, Kent Co., May 28-Sept. 18, very common; Governor's Run, Calvert Co., July 7, 2 ♂; Eliot's Island, Dorchester Co., Aug. 24, very common. [See Drury 1770, Hagen 1861, 1875, Banks 1892, Ris 1903, 1911, Shortess 1929.]

This species is very common about brackish water. Many specimens could be swept into a net with each stroke at Eliot's Island.

36. Libellula luctuosa Burmeister. Common about most ponds, June-August. [See Hagen 1861, 1875, Banks 1892, Ris 1910.]

37. L. auripennis Burmeister. Linthecium, Anne Arundel Co., July 5, 1 ♂; Lakeshore, Anne Arundel Co., August 4, 1 ♂, (many seen); East Neck Island, Kent Co., July-August, common. [See Hagen 1861, 1875, Ris 1903, 1911, Calvert 1903.]

This species is commonly seen on the coastal plain but is apparently absent above the Fall Line.

38. L. cyanea Fabricius, "The Caves", Baltimore Co., July 3, 2 ♂; Swan Creek, Anne Arundel Co., June 19, 2 ♂; East Neck Island, Kent Co., Aug. 25, 1 ♂; Gray's Swamp, Calvert Co., May 27, 1 ♂. (Seen Govans, Baltimore City, July 10.) [See Uhler 1857, Hagen 1861, 1875, Banks 1892, Calvert 1903, Ris 1910.]

(To be continued.)

Schistocerca americana (Drury) Unusually Abundant in Southern New Jersey during the autumn of 1939. (Orthoptera: Acrididae).

By Henry Fox, Cape May Court House, New Jersey.

The large southern bird grasshopper, *Schistocerca americana* (Drury), is normally very scarce in southern New Jersey, most of its reported occurrences in the section pertaining to single individuals met with sporadically at more or less widely scattered points. These were doubtless stray migrants which had wandered northward from the general breeding range of the species in the South. It is only on the coastal barrier-beach islands of the lower half of Cape May County that *S. americana* has been found with sufficient regularity to render probable its permanent residence within the geographic limits of the State, and even in that highly restricted section it has always been considered scarce.

In startling contrast with its usual scarcity, was the abundance and apparently wide distribution of *S. americana* in southern New Jersey during the autumn of the year 1939. At least, this was the condition observed in the section of Cape May County where the writer's home is located. Throughout October and during most of November adults of both sexes were seen almost daily at Ocean View. Here, as well as elsewhere, they were partial to old neglected fields and woodland clearings where *Andropogon* grasses and scattered bayberry bushes formed the predominant plant cover. It was no uncommon occurrence to flush from two to a dozen individuals in rambling casually across a field of moderate size. On one occasion a search of eight hours in a tract of about seven acres revealed thirty-three. The same tract had been frequently examined for Orthoptera in other years without disclosing a single example of *S. americana*, although in the late autumn of 1938 two individuals had been flushed in other tracts in the immediate vicinity.

Other localities in Cape May County where the species occurred in the same autumn about as abundantly as at Ocean

View, included Sea Isle City, South Seaville, Sea Isle Junction*, Clermont and Court House. No observations were made at other points in the County.

On October 19 two adults of *S. americana* were accidentally flushed from some roadside weeds near Merchantville, Camden County. Doubtless others could have been found had the writer been suitably clothed for field work at the time. This occurrence in a section far removed from Cape May County obviously points to the wide distribution of the species throughout southern New Jersey. That this was the case is also indicated by information received from Mr. J. A. G. Rehn (*in litt.*), who wrote that he had been lately asked by inquirers about a large grasshopper recently seen (presumably near Philadelphia) and which from their description was clearly the present species.

The phenomenal increase and apparently wide diffusion of *S. americana* in southern New Jersey during the autumn of 1939 can be explained as due to an expansion of the resident popualtion of the coastal islands of Cape May County, or as resulting from the invasion of the State by a swarm originating farther south in the general breeding range of the species. The former is rendered improbable by the fact that no clearly indicated increase in the local population had been previously observed in Cape May County. Field observations in the County had been conducted by the writer every summer since 1935 and during that period only a few individuals had been seen at rare intervals. The sudden increase in the autumn of 1939 is thus indicated as resulting from an invasion by one or more swarms from the South.

As mentioned by Blatchley†, *S. americana* is noted for its extended migrations. He describes a swarm which, coming from the southwest, invaded the city of Terre Haute. The present writer once observed a similar swarm which, in the autumn of 1917, invaded the town of Clarkesville, Tennessee,

* Now abandoned as a railroad junction.

† Orthoptera of northeastern America, 1920, p. 313.

and which was reported at other points between there and Hopkinsville, Kentucky. It is now widely accepted that certain species of grasshoppers which are normally stationary in their range, may at times pass into the swarming phase and migrate long distances beyond their normal habitat. Mr. Rehn informs me that some authorities consider *S. americana* to be the stationary phase of the extremely destructive *S. paranensis* (Burm.) and that, if this be true, no reason exists why the factors known to produce migratory types in other locusts may not operate in connection with *S. americana*. It therefore seems likely that local over-population in the latter may result in swarming conditions comparable with, though on a much smaller scale than, those witnessed in South America in the case of *S. paranensis*.

As an obvious test of the validity of the last suggestion, it would be interesting to know whether *S. americana*, coincident with its incursion into New Jersey, was unusually abundant in its normal breeding range. So far as the writer is aware, no information along this line has as yet appeared in print.

A List of the Dragonflies (Odonata) Taken in the Region of Muscongus Bay, Maine.

By Donald J. Borror, Department of Zoology and Entomology, Ohio State University.

During the summers of 1938 and 1939, while teaching insect study at the Audubon Nature Camp in Muscongus Bay, Maine, the writer had an opportunity to do some dragonfly collecting in this region (Lincoln and Knox counties). In the two summers 29 localities were visited; collections were made on 62 different days in the two summers.

Seventy species of Odonata have been taken, of which five are new for Maine: *Lestes eurinus* Say, *Enallagma laterale* Morse, *Libellula luctuosa* Burmeister, *Pantala flavescens* (Fabricius), and *Coenagrion resolutum* (Hagen), the last species being new for New England. These records bring the total number of Odonata recorded from Maine to 110 species (discounting doubtful records).

The writer wishes to acknowledge the assistance in collecting given him by students of the Audubon Nature Camp, a few of whom are mentioned below, and by Mr. Robert B. Wait, instructor in marine biology at the camp. He is indebted to Mr. Mike Wright of the Ohio State University for determining the nymphs and exuviae collected, and to Dr. E. M. Walker of the University of Toronto for determining *Coenagrion resolutum* (from camera lucida sketches).

Collecting Localities.

All of the localities in the following list are in Lincoln County, except 3, 8, and 19, which are in western Knox County. Locality names, unless otherwise indicated, are based on the topographic maps of the Monhegan, Waldoboro, and Wicasset quadrangles, published by the U. S. Geological Survey. The distances given are based on straight-line measurements on the map.

1. Back Meadow Brook, about 3½ miles northeast of Damariscotta and about a mile north of Little Pond.

2. Biscay Pond, southwest side, where it is drained by the Pemaquid River; this point is about 3½ miles southeast of Damariscotta.

3. Crystal Pond, near Martin, and about 1¾ miles southwest of Friendship.

4. Damariscotta Lake, east side at Morang Cove, about 5½ miles northwest of Waldoboro.

5. Damariscotta Pond, south end, about ½ mile west of Damariscotta Mills.

6. Dick's Pond. This pond (not named on the topographic map), is about a mile north of Hastings Pond (Locality No. 10) and about 2½ miles southwest of Round Pond.

7. Duckpuddle Pond, south end, about 3½ miles west-southwest of Waldoboro.

8. Dyer Long Pond, northeast end, about 4½ miles east-southeast of North Whitefield.

9. Forest Pond, about 1½ miles northwest of Friendship.

10. Hastings Pond, about 2½ miles north of New Harbor.

11. Hog Island, in the northern part of Muscongus Bay

just north of Muscongus Island. Collections were made in various parts of the island.

12. Keene Neck, a peninsula extending into Muscongus Bay north of Hog Island; about 8 miles south of Waldoboro.

13. Little Medomak Pond, about 7 miles north-northeast of Waldoboro.

14. McCurdy Pond, south end, about 4 miles east-southeast of Damariscotta.

15. Medomak Pond, southeast end, about 7 miles north of Waldoboro.

16. Monhegan Island, an island in the ocean several miles south of the mouth of Muscongus Bay.

17. Muscongus Island (swamp at north end), an island in Muscongus Bay, east of Round Pond.

18. Newcastle (a swamp about a mile northwest of town).

19. Newcastle (a pond on the south side of U. S. Route 1, about 3½ miles southwest of town).

20. North Pond, about 5 miles northeast of Waldoboro.

21. North Waldoboro (a small swamp about 1½ miles east-southeast of town), 6 miles north-northeast of Waldoboro.

22. Pemaquid Pond, north end just south of U. S. Route 1, about 4½ miles west of Waldoboro.

23. Pemaquid River, about a mile southeast of Bristol.

24. Pemaquid Sanctuary, along the road and marsh which separates Pemaquid Pond from McCurdy Pond, about 4 miles east-southeast of Damariscotta.

25. Pemaquid Sanctuary, east of the south end of Pemaquid Pond, about 4½ miles east of Damariscotta.

26. Pleasant Pond, about 10 miles north of Damariscotta Mills and 2¾ miles east-southeast of North Whitefield.

27. Seitensparker Pond, 3½ miles east of Waldoboro.

28. Webber Brook (not named on the topographic map), a stream running from the south end of Webber Pond to Muscongus Bay, about 2½ miles north of Round Pond.

29. Webber Pond, about 5½ miles southeast of Damariscotta.

(To be continued.)

Two New Lithobiid Chilopods from Burrows of the Florida Pocket Gopher.

By RALPH V. CHAMBERLIN, University of Utah, Salt Lake City.

The material upon which the present paper is based formed part of a collection of arthropods taken from burrows of the pocket-gopher, *Geomys floridanus*, in connection with an investigation on the life history and habits of that animal initiated by the late Mr. C. C. Goff. The centipeds were transmitted to me for study by Prof. Theodore H. Hubbell of the University of Florida. Types are, for the present, retained in the author's collection.

Eulithobius hypogeus sp. nov.

General color light yellow, the head and more caudal tergites more or less darker.

Antennae moderately long, distally rather fine, composed commonly of 35-37 articles.

Prosternal teeth 5+5.

Ocelli in a rather small, narrowly elliptic patch, in a maximum of five, more or less irregular and oblique series; e. g., 5, 5, 5, 5, 4, no single ocellus being set off from the others; ocelli small and black.

Posterior angles of 6, 7. 9, 11 and 13 dorsal plates produced.

Coxal pores strongly transverse, in single series; e. g., 6 (5), 7, 9, 7.

Anal legs long and very slender; ventral spines 0, 1, 3, 2, 1; dorsal, 1, 0, 2, 1, 0; claw single. Ventral spines of penult legs, 0, 1, 3, 3, 1; dorsal, 1, 0, 3, 1, 1; claw single. Last three pairs of coxae laterally armed. Ventral spines of first legs, 0, 0, 2, 3, 1.

Claw of female gonopods tripartite, the lateral lobes small and blunt. Basal spines normally 3+3; but in the holotype one spine on the right gonopod is on the second article, only two being on the first article which on the left gonopod bears all three.

Posterior legs of male not specifically modified.

Length, 21 mm.

Locality.—FLORIDA: Melrose, Putman County, 2 Aug., and Nov. 13, 1939, one female on each date, B. A. Barrington, coll.;

Leesburg, four males collected by C. C. Goff; Gainesville, Alachua County, near Devil's Millhopper, Aug. 6, 1938, H. R. Wallace, coll.; Alachua Co., near Newman's Lake, June 28, 1938, and July 2, 1928, collected by H. R. Wallace.

This is the only species known from the United States belonging to this genus as now restricted.

PHOLOBIUS gen. nov.

Differs from *Lithobius* in having the fourth article of the anal legs in the male conspicuously modified, this in the genotype being inflated, excavated above and produced upward at the end distad of the excavation. In this modification it resembles *Anobius,* from which, however, it differs in having the prosternal teeth numerous and the articles of the antennae more numerous, typically 30, instead of being fixed at 20. Posterior angles of ninth, eleventh and thirteenth dorsal plates produced. Dorsal spines of anal legs typically 1, 0, 2, 1, 1.

Genotype.—*Pholobius goffi* sp. nov.

Pholobius goffi sp. nov.

Dorsum light brown, the head and antennae and the posterior legs darker, the other legs yellow.

Antennae short, composed of thirty mostly short articles; the ultimate article about equalling the two preceding taken together, the first and second longest.

Prosternal teeth, 4 4. Special ectal setae situated ectoproximad of the outermost tooth, dark, short and slenderly spiniform, not hair-like.

Ocelli, 1 6, 4, 4, 3, 2, the single ocellus relatively greatly enlarged.

Coxal pores uniseriate, round, arranged thus: 5, 6, 6, 3.

Ventral spines of anal legs, 0, 1, 3, 3, 1; dorsal, 1, 0, 2, 1, 1; the claw single. Ventral spines of penult legs 0, 1, 3, 3, 1; dorsal, 1, 0, 3, 1, 1; claw double, the accessory claw small. Dorsal spines of thirteenth legs, 1, 0, 3, 2, 2; ventral, 0, 1, 3, 3, 2. Ventral spines of first legs, 0, 0, 2, 3, 2; dorsal, 0, 0, 2, 2, 1. Last three pairs of coxae armed laterally, the last five dorsally.

Anal legs in male of moderate length, the third and fourth joints inflated, the fifth being abruptly more slender; fourth joint excavated above, rising dorsad distad of the excavation, the process bearing the caudally directed spine.

Length, about 12 mm.

Locality.—FLORIDA: Leesburg, Lake County. One male taken by C. C. Goff (No. 418) Mar. 21, 1938.

Corrections and Additions to "The Genotypes of the Chrysididae", (Hymenoptera).

By WILLIAM G. BODENSTEIN, Cornell University.

Since the publication of my paper[1] on the genotypes of the Chrysididae several changes and omissions have been noted. The genera *Eurychrysis* Bischoff, 1910 and *Hexachrydium* Bischoff, 1913 were inadvertently omitted from the manuscript and Miss Grace Sandhouse of the Bureau of Entomology and Plant Quarantine has kindly called my attention to the omission of *Pseudodichrysis* Trautmann, 1921. These genera should be inserted as follows:

EURYCHRYSIS Bischoff, 1910. Mitt. K. Zool. Museums, Berlin, IV, p. 445.

TYPE: *Eurychrysis stilbiceps* Bischoff, 1910. (Monobasic.)

HEXACHRYDIUM Bischoff, 1913. Gen. Insect Fasc. 151, p. 16.

TYPE: *Hexachrydium sexdentatum* (Buysson) [= *Hedychrydium sexdentatum* Buysson, 1898 = *Hexachrydium sexdentatum* (Buysson)]. (Monobasic.)

PSEUDODICHRYSIS Trautmann, 1921. Stettiner Ent. Zeit., LXXXII, p. 132.

TYPE: *Pseudodichrysis bihamata* (Spinola) [=*Chrysis bihamata* Spinola, 1838=*Chrysis* (*Dichrysis*) *bihamata* (Spinola)]. (Monobasic.)

Isogenotypic with *Dichrysis* Lichenstein, 1876, q. v.

Mr. V. S. L. Pate of Cornell University has found that the type of *Pyria* Lepeletier & Serville, 1828 was first designated by Smith, 1874, Trans. Ent. Soc. London, p. 464, instead of by Ashmead in 1902 as cited in my paper. Smith designated *Pyria lincea* (Fabricius, 1775) as type but mentioned *Pyria armata* Lepeletier & Serville, 1828 as a synonym of that species.

[1] Trans. Amer. Ent. Soc., LXV, pp. 123-133 (1939).

OBITUARY

Dr. Henry Clinton Fall died at Tyngsboro, Massachusetts, on November 14, 1939. An obituary notice by Prof. T. D. A. Cockerell appeared in *Science* for December 29, 1939, and others are announced for *Psyche, The Pan Pacific Entomologist* and the *Dartmouth Alumni Magazine*. He was born December 25, 1862, at Farmington, New Hampshire, and took the B. S. at Dartmouth in 1884, the College giving him the Sc. D. in 1929. Prof. Cockerell states that he described over 1400 new species of American Coleoptera, and that his entire collection of these insects goes to the Museum of Comparative Zoology at Harvard.

The death of Dr. Henry McElderry Knower on January 10, 1940, is announced in *Science* for January 19. While chiefly known for his work in vertebrate anatomy, in which subject he was professor at the Universities of Cincinnati (1910-1925), Georgia (1924-26) and Alabama (1926-29) and associate professor at the Albany Medical College (1930-32) and research fellow (1932-33) and associate (1933-37) in biology at Yale, he was the author of a detailed account of the early embryonic development of a termite (*Eutermes rippertii?*), published in the *Journal of Morphology* for 1900. He was born at Baltimore, Maryland, August 5, 1868, and received the Ph. D. from Johns Hopkins University in 1896.

Juan Mina Entomological Station

The Juan Mina Entomological Station is a new station of the Gorgas Memorial Laboratory. It lies just inside the Canal Zone-Panama-boundary and is located in an old orange grove on the opposite side of the Chagres River from the town of Santa Rosa. It will make fine headquarters for any problems to be studied in that group of towns, whether by the permanent or the visiting staff. The building has two bedrooms, a dining room, a long porch, a kitchen, pantry, shower bath and closet. Half of the space will be made into laboratory rooms. Screening and the installation of a kerosene refrigerator and a kerosene stove will make it possible and safe to live as well as work in the cottage—*Annual Report of the Gorgas Memorial Laboratory 1938.* Washington, Government Printing Office, 1939.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.
Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.
This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.
For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.
Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.
The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :
Papers published in the Entomological News are not listed.

GENERAL.—**Dicker, G. H. L.**—Insects associated with cultivated forms of Rubus. [Trans. Soc. Brit. Ent.] 6:115-135. **Fernald, H. T.**—On type nomenclature. [7] 32: 689-702. **Horn, Walther.**—Obituary by A. Avinoff. [7] 32: 661-663, ill. Obituary by C. C. Hoffmann. [An. Inst. Biol. Mex.] 10: 373-375, ill. Obituary by A. D. Imms. [31] 144:857. **von Ihering, Rodolpho.**—Obituary by T. Borgmeier. [105] 10: 728-729, ill. **Karny, H.**—A la memoire du Prof. H. Karny, by F. Carpentier. [33] 79:399. **Macan, T. T.**—Notes on the migration of some aquatic insects. [Journ. Soc. Brit. Ent.] 2: 1-6. **Martorell, L. F.**—Methods of collecting and shipping Larra americana, a parasite of the Puerto Rican mole cricket. [7] 32: 703-712, ill. Insects observed in the state of Aragua, Venezuela, South America. [Journ. Agr. Univ. Puerto Rico] 23: 177-264. **Moon, H. P.**—Relationship between aquatic insect larvae and the food of fresh water fish. [Journ. Soc. Brit. Ent.] 2:13. **Post, R. L.**—Preserving insect specimens and preparing material for display. [69th Ann. Rep. Ent. Soc. Ont.] 1938: 115-119. **Schmidt, C. T.**—Musings of an armchair philosopher. [37] 10: 255-259. **Whitfield, F. G. S.**—Air transport, insects and disease. [22] 30: 365-442, ill.

ANATOMY, PHYSIOLOGY, ETC.—**De Bach, P.**—A hormone which induces pupation in the common house fly, Musca domestica. [7] 32: 743-746. **Behrendt, R.**—Untersuchung uber die wirkungen erblichen und nichterblichen fehlens bzw. nichtgebrauchs der flugel auf die flugmuskulatur von Drosophila melanogaster. [94] 152: 129-158, ill. **Carlson, J. G.**—Immediate effects of 250 R of X-Rays on the different stages of mitosis in neuroblasts of the grasshopper Chortophaga viridifasciata. [Jour. Morph.] 66: 11-23, ill. **Dumbleton, L. J.**—Contribution to the physical ecology of Tortrix postvittana (Lep.) [22] 30: 309-319. **Fraser, F. C.**—The evolution of the copulatory process in the order Odonata. [107] A, 14: 125-129, ill. **Green, W. R.**—The significance of the theory of heredity of the reduction in the number of body segments in Drosophila melanogaster through rigorous selection. [Journ. Morph.] 66: 67-97, ill. **Guareschi, C.**—La morfologia della cromatina delle ghiandole salivari di Chironomus plumosus in rapporto ad esperienze chimico-fisiche. [Boll. Zool. Italiana] 10: 109-114. **Harries, F. H.**—Some temperature coefficients for insect oviposition. [7] 32: 758-776, ill. **Hering, M.**—Die Peritrophischen Hullen der Honigbiene mit besonderer Berucksichtigung der Zeit wahrend der Entwicklung des imaginalen Darmes. [89] Abt. Anat., 66: 129-190, ill. [**Hilton, W. A.**]—[Nervous system and sense organs] LXXXI: Coleoptera. [13] 31: 50-71, ill. **James, H. C.**—Further studies on the reproductive methods of certain species of Coccidae (Hemiptera). [36] 89: 569-577, ill. **Jentsch, S.**—Vergleichend entwicklungsbiologische und okologische Untersuchungen an einheimischen Psocopteren unter besonderer Berucksichtigung der Art Hyperetes guestfalicus. [89] Abt. Syst., 73: 1-46, ill. **Johnson, C. G.**—Taxonomic characters, variability and relative growth in Cimex lectularius and C. columbarius (Hemip: Cimicidae). [36] 89: 543-568, ill. **Leeson, H. S.**—Longevity of Anopheles maculipennis race atroparvus, at controlled temperature and humidity after one blood meal. [22] 30: 295-301. **Malcolm, M. C.**—Recent cytological studies in saw-fly parthenogenesis. [Advance. Sci., Lond.] 1:46. **Marquardt, F.**—Beitrage zur Anatomie der Muskulatur und der peripheren Nerven von Carausius (Dixippus) morosus. [89] Abt. Anat., 66: 63-128, ill. **McClung, C. E.**—The apical cell of the insect testis—a possible function. [Contr. Zool. Laby. Univ. Penna.] 36: 437-444, ill. **Pflugfelder, O.**—Beeinflussung von regenerationsvorgangen bei Dixippus morosus durch exstirpation und transplantation der Corpora allata. [94] 152: 159-184, ill. **Robinson**

& **Wilson.**—Changes in the concentration of urease during pupal development of the blowfly Phormia regina. [Jour. Parasit.] 25: 455-459, ill. **Schulze, K.**—Die Hautdrusen der Odonaten. Hautdrusen als begattungshilfsorgane bei mannlichen Agrioniden. [89] Abt. Anat., 66: 55-62, ill. **Slifer, E. H.**—The internal genitalia of female Acridinae, Oedipodinae, and Pauliniinae (Orth., Acridid.). [Journ. Morph.] 65: 437-469, ill. The internal genitalia of female Thrinchinae, Batrachotetriginae, Pamphaginae and Pyrgomorphinae (Orth.: Acridid.). [Journ. Morph.] 66: 175-185, ill. **Stefanelli, A.**—Sul comportamento dei colloidi nucleari delle ghiandole salivari di Chironomus plumosus. Esperienze di micromanipolazione combinate con esperienze chimico-fisiche. [Boll. Zool. Italiana] 10: 149-161, ill. **Varley, G. C.**—On the structure and function of the hind spiracles of the larva of the beetle Donacia (Coleo: Chrysomel.). [107] A, 14: 115-122, ill. **Wigglesworth, V. B.**—'Visual adaptation' among Lepidoptera, observations and experiments by F. Suffert. [107] A: 14: 111-112. **Williams, J. L.**—The occurrence of spermatophores and their measurements in some British Lepidoptera. [Trans. Soc. Brit. Ent.] 6: 137-148, ill.

ARACHNIDA AND MYRIOPODA.—**Michelbacher, A. E.**—Further notes on Symphyla with descriptions of three n. sp. from California. [7] 32: 747-757, ill. (*). **Petrunkevitch, A.**—The status of the gen. Eurypelma (Araneae, Theraphrosidae). [75] 4: 561-568, (k*).

THE SMALLER ORDERS OF INSECTS.—**Aubrook, E. W.**—A contribution to the biology and distribution in Great Britain of Boreus hyemalis (Mecoptera). [Journ. Soc. Brit. Ent.] 2: 13-21, ill. **Clay & Meinertz-Hagen.**—Three n. genn. of Mallophaga from Charadriiformes. [75] 4: 450-454, ill., (k). **Fraser, F. C.**—[Odonata] See under Anatomy. **Hood, J. D.**—New North American Thysanoptera, principally from Texas. [105] 10: 550-619. **Jentsch, S.**—Die Gattung Ectopsocus (Psocoptera). [89] Abt. Syst., 73: 111-128, ill., (S*). **Marshall, A. C.**—A qualitative and quantitative study of the Trichoptera of western Lake Erie (as indicated by light trap material). [7] 32: 665-668, ill. (k). **Mosely, M.**—Leptonema pallidum Guerin (Trichoptera). [75] 4: 310-314, ill. **Sakimura, K.**—On the host plants of some Hawaiian Thrips. [37] 10: 251-254.

ORTHOPTERA.—Hatcher, E.—The consortes of certain North Carolina blattids. [Jour. E. Mitchell Sci. Soc.] 55: 329-334. **Karny, H. H.**—Genera Insectorum. Fasc. 206. Fam. Gryllacrididae. Subfam. Omnes. 317 pp., ill. **Liebermann, J.**—Catalogo sistematico y biogeografico de Acridoideos Argentinos. [104] 10: 125-230. **Slifer, E. H.**—See under Anatomy.

HEMIPTERA.—Barber, H. G.—A new bat bug from the eastern United States (Cimicid.). [10] 41: 243-246, ill. (*). **Bueno, J. R. de la Torre.**—See under Special. **China, W. E.**—On the generic nomenclature of certain Homoptera, with a note on the status of family names. [75] 4: 582-587. **Drake, C. J.**—Seven new South American Tingitidae. [105] 10: 525-530. **Drake & Frick.**—Synonymy and distribution of the Lantana Lace Bug (Tingit.) [37] 10: 199-202, ill. **Johnson, C. G.**—See under Anatomy. **Piza S. de Toleda, jr.**—Dois novos Ploiariideos do Brasil. [105] 10: 619-622, ill. **Squire, F. A.**—Observations on cotton stainers (Dysdercus) in the West Indies. [22] 30: 289-292, ill. **Sulc, K.**—Description of a new Psyllid from Greenland. [75] 4: 78-81, ill. **Usinger, R. L.**—A n. gen. of Pacific Island Enicocephalidae with n. spp. from the Hawaiian and Philippine Islands. [37] 10: 267-270, ill. Distribution and host relationships of Cyrtorhinus (Miridae). [37] 10: 271-273.

LEPIDOPTERA.—Bourquin, F.—Metamorfosis de Phthorimae euchthonia (Gelechiidae). [105] 10: 637-640, ill. **Bryk, F.**—Uber ein wichtiges verschollenes Werk von Fabricius. [Verh. VII Internat. Kongr. Ent.] 1: 535-539. **Dufrane, A.**—Lycaenidae. [33] 79: 289-292. **Eller, K.**—Fragen und Problem zur Zoogeographie und zur Rassen—und Artbildung in der Papilio machaon-Gruppe. [Verh. VII Internat. Kongr. Ent.] 1: 74-101, ill. **Hayward, K. J.**—N. spp. of Neotropical Hesperiidae. [105] 10: 517-525, ill. **Hoffmann & Vazquez.**—Una especie nueva de synopsia de las Montanas altas del centro de Mexico (Geometridae). [An. Inst. Biol. Mex.] 10: 335-341, ill. (*). **Klots, A. B.**—Brenthis aphirape in North America, with a new record of the sp. from Maine (Nymphal.) [19] 34: 259-264. **McDunnough, J.**—A new Coenonympha race from northeastern New Brunswick. [4] 71:266. N. spp. of Geometridae with notes, II. [4] 71: 249-258, ill. **Paskevsky, V.**—Nouvelles formes d'Agrias de la collection de Mme. G. Fournier de Horrack. [25] 44: 36-40, ill. (S). **Reich, P.**—Die

Barenspinner von Sudbrasilien. Faunistische Mitteilungen aus meiner Sammlung. [17] 56: 77-81. **Sperry, J. L.**—Two apparently new Geometrids from the southwest. [4] 71: 262-262. **Testout, H.**—Contribution a l'etude des Lepidopteres Saturnioides (VI). [Bull. Soc. Linn. Lyon]. 8: 232-233, (S*). **Warnecke, G.**—Uber die taxonomische Bedeutung der Genitalarmatur der Lepidopteren. [Verh. VII Internat. Kongr. Ent.] 1: 461-481, ill. **Watkins, W. T. G.** A new Satyrid butterfly [from Venezuela]. [75] 4:160. **Williams, C. B.**—Some records of butterfly migration in America. [107] A, 14: 139-144, (S). **Zikan, J. F.**—Die arten der Papilio protesilaus-Gruppe. [17] 56: 45-48; 116-118, ill. (Sk).

DIPTERA.—Alexander, C. P.—Records and descriptions of Tipulidae from tropical America, Pt. 2 [105] 10: 622-637, ill. (*). **Blanton, F. S.**—The abundance of Tabanidae as revealed by one season's survey at Babylon, N. Y. [6] 47: 311-314. Collecting notes on the fam. Asilidae. [19] 34: 229-235. **Boyce, H. R.**—A note on the parasitism of the leaf miner, Agromyza melampyga. [4] 71:267. **Hall, D. G.**—Two new species of Tachinidae parasitic upon hemlock sawfly larvae in North America (Tachinid.). [10] 41: 239-243. (*). **Krober, O.**—Beitrage zur Kenntnis der Conopiden. [75] 4: 362-395; 454-468; 525-544; 594-607; ill. (k*). **Lindner, E.**—Uber einige bemerkenswerte Konvergenzen im System der Stratiomyiiden. [Verh. VII Internat. Kongr. Ent.] 1: 236-239. **Lopes, H. de Souza.**—Contribuicao ao conhecimento do genero Helicobia (Sarcophag.). [105] 10: 497-517, ill. (S*). **Mesnil, L.**—Nouvelles suggestions sur la classification des Larvaevoridae. [Verh. VII Internat. Kongr. Ent.] 1: 319-328, ill. (k). **Parent, O.**—Dolichopodides des Iles Hawaii recuellis par M. F. X. Williams, principalement au cours de l'annee 1936. [37] 10: 225-249, ill. (k*). **Sabrosky, C.**—A summary of family nomenclature in the order Diptera. [Verh. VII Internat. Kongr. Ent.] 1: 599-612. **Scotland, M. B.**—The lemna fly and some of its parasites (Ephydrid.). [7] 32: 713-718. **Shewell, G. E.**—New North American spp. of Homoneura (Lauxaniid.). [4] 71: 264-266. **Townsend, C. H. T.**—The spp. of the supergenus Paratheresiae. [105] 10: 546-549, (Sk*). **Williams, F. X.**—Biological Studies in Hawaiian Water-Loving Insects. Pt. III: Diptera or Flies. B. Asteiidae, Syrphidae and Dolichopodidae. [37] 10: 281-315, ill.

COLEOPTERA.—Andrewes, H. E.—See under Special. **Arrow, G. J.**—Dimorphism in the males of Coleoptera. [107] A, 14: 113-114. **Balfour-Browne, J.**—Contribution to the study of the Palpicornia. [75] 4: 289-310, ill. (S*). **Benick, L.**—Die hohlenbewohnende Silphide Choleva holsatica, ein beispiel fur die Altersbestimmungsmoglichkeit rezenter Tierformen. [Verh. VII Internat. Kongr. Ent.] 1: 16-25, ill. **Blackwelder, R. E.**—The Leng Catalogue of Coleoptera of America, north of Mexico. 4th Supplement. 1939. Mount Vernon, N. Y. 146 pp. **Blake, D. H.**—Eight new Chrysomelidae from the Dominican Republic. [10] 41: 231-239, ill. (*). **Bruch, C.**—El gorgojo de los frutos del "Churqui", Nemarus ferrugineus (Curculio.). [Rev. Fac. Agr. La Plata] 23: 11-17, ill. (S). El Casido de las palmeras, Hemisphaerota crassicornis (Cassid.). [Rev. Fac. Agr. La Plata] 23: 19-25, ill. (S). Un nuevo Histerido mirmecofilo. [Not. Mus. La Plata, Buenos Aires] 4; Zool. no. 22: 259-262, ill. **Butovitsch. V.**—Zur Kenntnis der Paarung, Eiablage und Ernahrung der Cerambyciden. [28] 60: 206-258. **Franz, H.**—Vorarbeiten zu einer monographie der Tychiini (Curculionid.). [109] 6: 341-349. **Gebien, H.** — Korperbau und Lebenweise der Wustentenebrioniden. [Vehr. VII Internat. Kongr. Ent.] 1: 118-132, ill. **Gemignani, E. V.**—La Seccion Entomologica del Museo Argentino de Ciencias Naturales. [Verh. VII Internat. Kongr. Ent.] 1: 133-143. **Hinton, H. E.**—A note on the genus Austrolimnius, with a description of a n. sp. from French Guiana (Elmidae). [107] B, 8: 195-199, ill. Descriptions and figures of new South American Dryopidae. [75] 4: 430-439, (k*). **Jeannel, R.**—Les origines des faunes de Carabiques. [Verh. VII Internat. Kongr. Ent.] 1: 225-235, ill. **Leech, H. B.**—Three n. spp. of Nearctic rove beetles from the Pacific Coast (Staphylinid.). [4] 71: 258-261, ill. **Lepesme, P.**—Etude de la faune entomologique des denrees emmagasinees. [Rev. Franc. Ent.] 6: 58-73, ill. **Mequignon, A.**—Observations sur quelques noms de genres. III. —Le genre Buprestis. [25] 44: 48-50. **Obenberger, J.**—Ueber die von Herrn. H. Schmidt in Costa Rica gesammelten Buprestiden. [109] 6: 301-314, ill. **Ohaus, F.**—Verzeichnis der von expedition des Prof. Nello Beccari (1931-32) in British Guiana gesammelten Rutelinae (Scarab.). [Mem. Soc. Ent. Ital], 17:38. **d' Orchymont, A.**—Contribution a l'etude des Palpicornia, XIII. [33] 79: 357-378, ill. (S*). **Ray, E.**—A taxonomic study of the Neotropical beetles of the fam. Mordellidae, with descriptions of n. spp. [50] 87: 271-314, ill. **Reichensperger, A.**—Beitrage zur Kenntnis der Myrmecophilen fauna Costa Rica und Brasiliens. VII, nebst Beschreibung der Konigin von Eciton (Acamatus) pilosum. [89] Abt. Syst., 73: 261-350, ill., (*[Hister. & Staphyl.]). **Schedl, K. E.**—Die Einteilung und geographische Verbreitung der Platypodidae. [Verh. VII Internat. Kongr. Ent.] 1: 377-410, ill. (k*). Scolytidae und Platypodidae. [105] 10: 718-727, ill. (S*). Scolytidae und Platypodidae. [Mitt. Munchner Ent. Gesell.] 29: 564-585, ill. (s*). **Schenkling, S.**—Uber den Coleopterorum Catalogus. [Verh. VII Internat. Kongr. Ent.] 1: 613-617. **Swezey, O. H.**—Notes on Oedemeridae in Hawaii and Palmyra. [37] 10: 263-264. **Timberlake, P. H.**—A n. sp. of Hippodamia from Mt. Rainier (Coccinellid.). [37] 10: 265-266. **Tottenham, C. E.**—Some notes on the nomenclature of the Staphylinidae, Pts. I. 82 [107] B, 8: 224-226; 227-247. **Van Zwaluenberg, R. H.**—Larvae of Hawaiian Elaterid beetles. [37] 10: 275-279, ill., (k). **Voss, E.**—Ueber neue und wenig bekannte russler-arten aus der neotropischen region, vorwiegend aus Brasilien. [109] 6: 335-340, ill. (*). Bemerkenswerte interkontinentale Zusammenhange in der Unterfam. Rhynchitinae, Attelabinae und Apoderinae. [Verh. VII Internat. Kongr. Ent.] 1: 444-460, ill. **Zimmerman, E. C.**—The rediscovery of Mauia in Hawaii (Anthribid.). [37] 10:317. A review of the Hawaiian Mycetophagidae. [37] 10: 321-32r, ill. (k). A new Oodemas from Oahu (Curculion.). [37] 10: 329-330. Identification tables for the introduced Hawaiian Nitidulidae [37] 10: 331-333. Proterhinus of Hawaii (Aglycyderid). [37] 10: 339-341, (K). Cis of Maui and Lanai (Ciidae) [37] 10: 343-348, (k*).

HYMENOPTERA.—Benson, R. B.—On the genera of the Diprionidae. [22] 30: 339-342, ill. (k*). **Borgmeier, T.**—Sobre alguns Diapriideos myrmecophilos, principalmente do Brasil (Diapriidae). [105] 10: 530-545, ill. (*). **Boyce, H. R.**—See under Diptera. **Breland, O. P.**—Additional notes on sunflower insects (Chalcidoid.). [7] 32: 719-726, ill. (*). **Callan, E. McC.**—A note on the breeding of Probethylus callani (Bethylidae), and embiopteran parasite. [107] B, 8: 223-224. **Cockerell, T. D. A.**—Bees of the genus Centris from Barbados, B. W. I. [9] 72: 142, (*). Centris in Colorado. [19] 34:258. **Fullaway, D. T.**—N.

spp. of Proctotrupid Wasps from the Bishop Museum Collection of Samoan & Fijian Insects. [37] 10: 209-221. **Morley, B. D. W.**—The phylogeny of the Cerapachyinae, Dorylinae and Leptanillinae (Formicid). [25] 44: 114-118, ill. The phylogeny of the Ponerinae. [25] 44: 83-88, ill. **Perkins, J. F.**—The Ephialtes (Ichneumon.) parasitising the codling moth. [22] 30: 307-308, ill. (k). **Pratt, H. D.**—Studies on the Ichneumonidae of New England. Pt. II.—Male Genitalia of the Subfamily Ichneumoninae. [7] 32: 727-742, ill. (k). **Reichensperger, A.**—See under Coleoptera. **Richards, O. W.**—The Bethylidae, subfam. Sclerogibbinae. [107] B, 8: 211-223, ill. (k*). **Richards & Hamm.**—The biology of the British Pompilidae. [Trans. Soc. Brit. Ent.] 6: 51-114. **Swezey, O. H.**—Sclerogibbidae, a Hymenopterous Family new to Hawaii. [37] 10: 261-262, ill.

SPECIAL NOTICES.—The Generic Names of British Insects. Pt. 6: The generic names of the British Carabidae, with a check list of the British species [by H. E. Andrewes]. pp. 153-192. A Synopsis of the Hemiptera-Heteroptera of America north of Mexico. Pt. I: Families Scuteller dae, Cydnidae, Pentatomidae, Aradidae, Dysodiidae and Termitaphididae. By **J. R. de la Torre Bueno. [70] 19: 141-304, ill., (k).**

FOSSIL ORTHOPTERA ENSIFERA by FREDERICK EBERHARD ZEUNER. British Museum (Natural History) 1939. 2 volumes (one of text, one of plates).—This splendidly illustrated work in which Zeuner sums up the knowledge of the fossil Ensifera is in reality a monumental enterprise. The extensive information regarding localities at which Ensifera have been collected, which of necessity include most of the known insect-bearing formations of the Mesozoic and later periods, and his account of the various historical collections studied are of interest to all those interested in paleoentomology. After a brief statement of the relationships of the Orthopteroid orders, the Paleozoic Saltatoria are discussed and their evolution into the Acridioids, Gryllacridoids and Prophalangopsoids summarized. Then begins his treatment of the true Ensifera in which the phylogeny of the various subsidiary groups is discussed in some detail. The relationship between fossil and recent forms, and probable lines of development is thoroughly investigated. In this connection he has made a detailed study, particularly of the wing venation and other morphological structures of phylogenetic importance. One might add that, due to the present chaotic state of the classification of this group, it was necessary for him to make many extensive and detailed examinations of modern forms. Particularly in the Gryllacrididae and Prophalangopsidae has considerable revisionary investigation been undertaken. Since attempting the present study much labor has been spent by the author in organizing and increasing our knowledge of the groups within the Tettigoniidae, as is indicated by several of his latest papers. The systematic portion of the study includes the classification and descriptions of 157 species of fossil Ensifera. Most of the forms are fully illustrated by both photographs and line drawings, including some colored diagrams. This work contains 120 pages on phylogeny, followed by 174 pages of systematic descriptions and an extended bibliography of 16 pages. The volume of plates includes 49 plates of line drawings and diagrams and 31 plates of photographs.—J. W. H. Rehn.

Apateticus ludovicianus Stoner, A synonym of Andrallus spinidens (Fabricius) (Heteroptera: Pentatomidae).

On pages 462 to 463 of Entomological News for December, 1917 (Volume 28), I described "A New Apateticus from Louisiana." Some time thereafter, one of my correspondents wrote that the form described by me appeared to be *Andrallus spinidens* (Fabr.) and on further study I arrived at the same conclusion. Recently another worker called this matter to my attention.

Since I have heretofore made no public or formal statement regarding this situation, I now offer the present note by way of withdrawing the name *Apateticus ludovicianus* from the literature and relegating it to the status of a synonym for *Andrallus spinidens* (Fabr.). Dayton Stoner, New York State Museum, Albany, New York.

A Substitute Name for Bion Rehn, 1937 (Orthoptera).

It has been brought to my attention that the blattid generic name *Bion*, proposed by me in 1937 (Trans. Amer. Entom. Soc., LXIII, p. 252), for *Bion mastrucatus*, is preoccupied by *Bion* Cambridge, 1898, in Arachnida (Biol. Cent.-Amer., Arachnida, I, p. 244). To replace my preoccupied name I here propose **Bionoblatta**.—James A. G. Rehn.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

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ENTOMOLOGICAL NEWS

MARCH, 1940

Vol. LI No. 3

CONTENTS

PHILADELPHIA, PA.

THE ACADEMY OF NATURAL SCIENCES,

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MANUSCRIPTS AND ADVERTISEMENTS should be sent to the editor, Dr. P. P. Calvert, P. O. Box 14, Cheyney, Pennsylvania. The receipt of all papers will be acknowledged and, if accepted they will be published as soon as possible. If not accepted, authors will be so advised and postage requested for return of manuscripts. Articles longer than six printed pages will be published in two or more installments, unless the author is willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division. Proof will be sent to authors.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 65 cents; three or four pages, twenty-five copies, $1.05; five to eight pages, twenty-five copies, $1.75; nine to twelve pages, twenty-five copies, $2.35; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates up to 100 copies; over 100 copies prices on application direct to printer. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

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ENTOMOLOGICAL NEWS

Vol. LI MARCH, 1940 No. 3

Dragonfly Collecting in Eastern Massachusetts: 1939. (Odonata).

By Edward M. Davis, Baker Museum, Rollins College, Winter Park, Florida.

A state which has seen as much collecting as Massachusetts would seem a poor place in which to find dragonflies of any interest, but the results of the casual, haphazard collecting, which was the best I could do under the circumstances add emphasis to the fact that the collecting of any group will ordinarily furnish much worth-while material.

May 19th, Shirley. *Williamsonia lintneri.* Following some very cold weather the 18th of May was warmer and the 19th was very warm. In the middle of the afternoon I was walking through a field when a very young dragonfly fluttered by, fully a quarter of a mile from water and going directly towards a wooded slope. Although I had no net its flight was so feeble that I caught it in my hands when it came to rest on the trunk of a small tree. It was far too weak in flight to have captured any food previously, but lived four days in a paper bag without being fed, giving a good idea of a dragonfly's ability to survive if the weather should become unfavorable soon after emergence. This specimen was a male and at the time it was caught was completely black except for the pale brown labrum, brown eyes, and dark coppery lustre of the thorax and frons; in the field it appeared completely black.

May 29. Shirley. *Enallagma boreale.* First seen on this day at a small semi-stagnant pond about 150 feet long and 50 feet wide, surrounded by woods. By June 5th it was so numerous that the high bush blueberry bushes at the edge actually seemed to have a premature crop of ripe fruit. Never have I seen anywhere damselflies so numerous. As many as twelve were counted on a single spatter dock leaf and an experimental sweep of the net past the bushes captured sixteen.

June 5. Shirley. At the small pond mentioned above a male *Nasiaeschna pentacantha* was caught lazily cruising over the water. On June 12th another male was caught and still another was seen at the same place. It took patient and careful stalking in the water to capture these, for in spite of the slow, direct flight, their apparent knowledge of the length of my net handle was uncanny, and they constantly approached only to turn away at the last safe moment. Field identification of these is not difficult at this time of year, for the only other large dragonfly which I have ever seen around at this time is *Anax junius* which differs noticeably in color, shape, and habits. I was amused to see on one occasion an *Enallagma boreale* alight momentarily upon the abdomen of the cruising *Nasiaeschna*.

While wading in this pond on June 13th two *Leucorrhinias* passed me in tandem and I noticed that they were of different species. Fortunately I caught them and found one to be *L. intacta* and the other *L. proxima,* but what surprised me most was to find that both were males!

June 2 and 5. Shirley. *Tetragoneuria cynosura* and var. *simulans.* The former is normally common at this time of year in certain protected sunny places well away from water. I have always found them there and this year they were abundant, so that on one occasion I was able to catch them at the rate of almost one a minute for fifty minutes. Var. *simulans* mixed with the others but there were fewer of them; of those captured there was approximately one *simulans* to every five *cynosura,* though the true proportion was undoubtedly nearer one to eight or ten, since I was making a special effort to catch *simulans.* At this time there were many more females than males of both varieties in the flocks.

There were a few *Somatochlora kennedyi* mixed with the *Tetragoneurias,* and all but one that were caught were females. These are not at all common locally, but were easlly spotted in flight by the long, almost parallel-sided abdomen, greater overall length, and by their direct habit of flight. It was possible after seeing one to follow it about with a good chance of catching it, whereas following any single *Tetragoneuria* in a flock is ordinarily impossible because of their erratic flight.

Dorocordulia libera is a common dragonfly and a few usually were to be found in these flocks. The "Indian club" shape of the abdomen made field identification easy. When alive, the green-gold opalescence of the compound eyes of this species as well as those of *Cordulia shurtleffi* is of rare beauty. They reflect so much light that under certain conditions the entire thorax seems to be so colored.

June 11. Shirley. In the alder covered section of a shallow brook I found a female *Cordulegaster maculatus* ovipositing at the edge. The peculiar up and down plunging motion of the abdomen under these circumstances is hard to describe but very characteristic. She was laying actively as I approached, thrusting her abdomen into water about twice a second and she continued for 99 more times before stopping, and all this within an area of not more than four square inches.

One *Ophiogomphus aspersus* was caught at the same brook, but I have never found one of this genus where there are alders; only where the sides are grassy and open, when they will be found on the grass or more frequently upon stones jutting from the water. Several others, presumably this species, were seen; their habits and the noticeably green thorax distinguishing them from anything else, except some other species of the same genus.

Gomphus brevis was also collected on this day as well as subsequently in various other places. Its habits are similar to those of *O. aspersus* but its color is predominantly black. It also can be found along streams where the banks are wooded, where I have never yet found any *Ophiogomphines*.

June 15. Lancaster. *Enallagma minusculum* and *laterale* both found at a rather large pond. They look much alike in the field, but a person with good eyesight can easily separate them by the narrow but distinct black mark against the blue of the side of the 8th abdominal segment in *E. laterale*, there being no mark on *E. minusculum*. Also at this pond was *E. traviatum* and several of the commoner species of Zygoptera, while for some reason Anisoptera were almost entirely absent.

At a very small pond, not more than 100 yards from the one just mentioned, the only species of *Enallagma* occurring is *E. aspersum*, and it is not found at the large pond. There is a ridge about 30 feet high separating these ponds and evidently making an effective barrier. The small pond was swarming with Anisoptera, *Leucorrhinias* being so numerous that I was frequently catching them accidentally when swinging my net at other species.

July 1. Shirley. *Lanthus albistylus* has taken possession of the rocks in the brook where formerly *O. aspersus* and *G. brevis* held sway. They are active when flying and difficult to catch when on the wing; eight were caught mostly because of a fatal habit of returning to the rock from which they had first been frightened. Their green eyes, black and light green thorax, and very small size were distinctive, and it was usually possible to get near enough to see the white superior appendages. This species was caught in several localities over a period of a month but not a single female was found.

July 9 and 10. Ashby. Here my son and I found a lot of *Ophiogomphines* all within a distance of 150 yards along a small brook. As soon as the alders encroached these rare dragonflies disappeared. Of the twenty or more caught on two days, one was *O. asperus*, and the remainder are still a matter of discussion. They seem to be closest to *O. mainensis*. The brook was held by the males, and I believe from what little I was able to observe that the females were probably high in the neighboring trees. We caught two copulating pairs and one female just about to oviposit. She had a cluster of several hundred eggs ready to deposit; the largest cluster I have ever seen on a female dragonfly. Under my hand lens they were very light brown and spherical, and it was with pleasurable anticipation that I dipped her abdomen in the water and watched the stocking of the brook for my future collecting! These unidentified *Ophiogomphines* look exactly like *O. aspersus* in the field. A close comparison of the markings shows some small differences, while even without a hand lens the difference in the appendages can be seen.

An Unpublished Letter of Dr. Thaddeus William Harris.

[Dr. Dorothy Spring, of the Laboratory of Dermatological Research, School of Medicine, University of Pennsylvania, has shown me a letter, belonging to her mother, Mrs. Mary Dorr Spring, written by the famous entomologist, Dr. Thaddeus William Harris, to Miss Elizabeth Dorr, a grandaunt of Mrs. Spring.

Dr. Harris wrote in reply to questions from Miss Dorr, a teacher, who was born in Dorchester, Massachusetts, in 1804. She taught at academies in Windsor, Vermont, and New Bedford, Massachusetts, and was at the head of an academy in Dorchester. She painted, made collections of shells, insects and flowers, wrote essays and kept voluminous diaries. She did much of her collecting on the Island of Naushon. In 1836 she painted some "illustrations of the structure of the skin" for a Dr. Bartlett of New Bedford. He gave lectures on anatomy and she attended them. On January 7, 1837, she "passed the day with Catherine Harris in the nursery with her seven children, Thaddeus, aged 11y., Harriet Gardner, Emma Forbes, Charles and Catherine (twins), Amos Holbrook and Clarendon, about nine months old. It was a very pleasant day not soon to be forgotten." This list of Mrs. Harris's children naturally does not include Edward Doubleday Harris, also known as an entomologist, who was born September 20, 1839, and died March 2, 1919.

Since this letter gives a picture of the state of entomological literature in the United States more than a century ago, it seems to be worth printing, with Mrs. Spring's gracious permission to do so.—Editor.]

Miss Elizabeth Dorr, New Bedford, Mass.

Cambridge (Mass.) Jany. 23, 1833.

It gives me much pleasure to reply to the enquiries of my friend Miss Dorr, although my answer may not exactly meet her expectations. It is a fact that there is no work on Entomology fully applicable to the wants of the rising generation in this Country. We have no comprehensive Manual of the Science illustrated by reference to or descriptions of American

Insects. A London professor has, however, prepared a popular work, in 3 volumes 18 mo, forming a part of the 'Library of Entertaining Knowledge', & entitled 'Insect Architecture, Insect Tranformations, & Insect Miscellanies', which are highly entertaining & instructive, and of undoubted authority; for the editor & compiler is himself a practical naturalist, & has added much original matter, the result of his personal observations. This work has been republished in this country, & the volumes on Insects may be procured separately. Prof. Rennie has also prepared a very small 'Alphabet of Insects', treating briefly of the structure, senses, & growth of Insects, which is also to be purchased though not republished here. I cannot speak in terms of unqualified praise of this Alphabet, or of the cavilling spirit in which much of it is written; it is also defective in containing no explanation of the system of classification now almost universally adopted. In default of a better book it will enable the learner to understand the external and internal anatomy of insects.—By far the best general work on insects is one written jointly by the Rev. Wm. Kirby & Wm. Spence, Esq., & entitled 'An Introduction to Entomology', in 4 vols. 8vo, printed at London. Next to this valuable & rather expensive work is the 'Animal Kingdom' by Cuvier, the part on Insects by Latreille. It has been translated & printed in 4 vols., 8vo., in Philadelphia, & the translator, Dr. McMurtrie, has lately published an abridgment of it in 1 vol., 8vo., which forms a very useful manual on the Natural History & Systematic Arrangement of Animals. By the use of this Abridgment of the Animal Kingdom I believe you will be able to classify & refer to their proper genera most of our common insects. For their *specific* names you would have to consult a large number of books, many of which are not to be obtained without a good deal of difficulty & expense: but if you are particularly curious on that point, I can probably assist you, & shall be happy so to do, at any time when you may think proper to command the services of,

very sincerely

your friend & servt.

T. Wm. Harris."

A List of Maryland Odonata.

By Elizabeth G. Fisher,
Academy of Natural Sciences, Philadelphia.

(Continued from page 42.)

39. L. flavida Rambur. Maxwell Pt., Baltimore Co., July 8, 1 ♂, 1 ♀; tenerals; Swan Creek, Anne Arundel Co., June 19, 2 ♂, 2 ♀; Lakeshore, Anne Arundel Co., June 19, Aug. 4, 2 ♂, 3 ♀. [See Uhler 1857, Hagen 1861, 1875, Banks 1892, Ris 1910.]

This species is common on the costal plain but apparently rare above the Fall Line, being commonly associated with *L. auripennis*.

40. L. semifasciata Burmeister. Govans, Baltimore City, July 10, 1 ♂; "Crimea", Baltimore City, June 4, 1 ♀; Swan Creek, Anne Arundel Co., June 19, 1 ♂; Lakeshore, Anne Arundel Co., June 19, 1 ♀. [See Hagen 1861, 1875, Banks 1892, Ris 1910.]

Eggs were obtained from females on June 19. This species is also predominately a coastal plain species.

41. L. pulchella Drury. Very common about almost all ponds and streams as well as brackish water, June-August. [See Uhler 1857, Hagen 1861, 1874, 1875, Ris 1903, 1910, Calvert 1903.]

42. L. vibrans vibrans Fabricius. Mt. Washington, Baltimore City, July 11-12, 2 ♂; Roland Park, Baltimore City, June 18, 1 ♂; South River, Anne Arundel Co., July 1, 1 ♂ [See Calvert 1903.]

Not common, in localized areas.

43. Plathemis lydia (Drury). Very common about standing water or resting in sunny spots, May 27-September. [See Uhler 1857, Hagen 1861, 1875, Ris 1903, Calvert 1903, Ris 1910.]

I have seen this species in copulation as early as May 30. Their "white tails" were also prominent at this date.

44. Cannacria gravida (Calvert). [See Calvert 1907.].

45. Sympetrum obtrusum (Hagen). Cromwell Bridge, Lock Raven, Baltimore Co., Sept. 20, 1 ♂.

46. S. rubicundulum rubicundulum (Say). Rockland, Baltimore Co., July 6, 1 ♂, 1 ♀ tenerals; Owing Mills, Balti-

more Co., July 8, 1 ♂. [See Hagen 1861, 1875, 1890, Calvert 1893.]

47. S. RUBICUNDULUM ASSIMILATUM (Uhler). [See Hagen 1861, 1875, Banks 1892, Ris 1911.]

48. S. SEMICINCTUM (Say). Cromwell Bridge, Lock Raven, Baltimore Co., Sept. 20, 1 ♂; Lutherville, Baltimore Co., Aug. 11, 1 ♀; Linthecium, Anne Arundel Co., July 5, 1 ♂. [See Hagen 1861, Banks 1892, Calvert 1893.]

49. S. VICINUM (Hagen). "The Caves", Baltimore Co., Sept. 26, 1 ♀; Rockland, Baltimore Co., Oct. 11, 3 ♂, 2 ♀. Lakeshore, Anne Arundel Co., Aug. 4, 1 ♂, 1 ♀. [See Hagen 1861, Banks 1892, Ris 1903, 1911.]

Mating on October 11 at Rockland.

50. PACHYDIPLAX LONGIPENNIS (Burmeister). Very common about most ponds and over brackish water, May 30-Aug. 24. [See Hagen 1861, Ris 1903, 1911.]

51. ERYTHEMIS SIMPLICICOLLIS (Say). Very common about most ponds and brackish water, May-Aug. 24. [See Say 1839, Hagan 1861, 1875, Banks 1892, Ris 1903.]

52. PANTALA HYMENAEA (Say). "Soldier's Delight", Baltimore Co., July 8, 1 ♂.

53. P. FLAVESCENS (Fabricius). "Soldier's Delight", Baltimore Co., July 18, 1 ♂. [See Hagen 1861, 1874, 1875, Calvert 1893, Ris 1903, 1913.]

54. TRAPISTIGMA LACERATA Hagen. Often seen about ponds but rarely taken as they fly rapidly and far from shore. [See Hagen 1861, 1875, Calvert 1893, Banks 1892.]

This species was mating on May 30 at Frederick.

Family AGRIONIDAE.

Agrioninae.

55. AGRION MACULATUM Beauvais. Very common about practically all streams, June-October. [See Hagen 1861, 1875, Root 1923.]

56. HETAERINA AMERICANA Fabricius. "Soldier's Delight", Baltimore Co., Sept. 11-25, 5 ♂, 3 ♀; Long Green Run, Hartley, Baltimore Co., July 17, 1 ♂; Dead Run, Colonial Park, Baltimore Co., June 4-July 9, 7 ♂, 1 ♀. [See Hagen 1861, 1875, Banks 1892, Calvert 1893, Root 1923.]

A localized species.

Family Coenagrionidae.

Lestinae.

57. Lestes inequalis Walsh. Rockland, Baltimore Co., July 15, 2 ♂, 1 ♀.

58. L. forcipatus Rambur. Mt. Washington, Baltimore City, July 8, 1 ♂; Swan Creek, Anne Arundel Co., 1 ♀; Lakeshore, Anne Arundel Co., Sept. 22, 2 ♂, 1 ♀. [See Root 1923.]

59. L. disjunctus Selys. [See Ris 1903.]

60. L. rectangularis Say. Rockland, Baltimore Co., July 6-15, common; Lake Roland, Baltimore Co., July 13, 1 ♂; Frederick, Frederick Co., May 30, 4 ♂; Swan Creek, Anne Arundel Co., June 19, 2 ♂, 4 ♀. [See Hagen 1861, Banks 1892, Ris 1903, Root 1923.]

Tenerals were found on July 15.

61. L. vigilax Hagen. Lakeshore, Anne Arundel Co., Aug. 4, 1 ♂. [See Root 1923.]

62. L. uncatus Kirby. Govans, Baltimore City, April 24, 4 ♂, 3 ♀.

This species was in copulation at this early date. It was the first species on the wing at this pond.

Coenagrioninae.

63. Argia apicalis (Say). Very common about Lake Roland, Lock Raven, and Potapsco River at Avolon, May-August. Conewingo, Baltimore Co., Aug. 7, 6 ♀; Union Dam at Oella, Baltimore Co., July 23, 1 ♂, 1 ♀; "Soldier's Delight", Delight, Baltimore Co., July 4, 1 ♀; Octoraro Creek, Cecil Co., June 17, 1 ♂. [See Root 1923.]

This species was abundant flying in a heavy rain at Union Dam. Tenerals were still numerous on June 17.

64. A. bipunctulata (Hagen). Lakeshore, Anne Arundel Co., June 19-Aug. 4, very common. [See Root 1923.]

65. A. moesta putrida (Hagen). "Soldier's Delight", Delight, Baltimore Co., June 18, 5 ♂, 2 ♀, July 4, 3 ♂, 2 ♀; Dead Run, Colonial Park, Baltimore Co., June 4, 1 ♂; July 18, 3 ♂; Mt. Washington, Baltimore Co., June 8, 4 ♂. [See Hagen 1861, Banks 1892.]

66. A. sedula (Hagen). [See Root 1923.]

67. A. tibialis (Rambur). Pretty Boy, Baltimore Co., June 23, 1 ♀.

68. A. TRANSLATA Hagen. Lock Raven, Baltimore Co., July 2, very common; Ashland, Baltimore Co., June 30. 1 ♂ teneral; Lake Roland, Baltimore Co., June 25, 1 ♀. [See Root 1923.]

In copulation and ovipositing on July 2.

69. A. VIOLACEA (Hagen). This species is common about ponds, streams, and brackish water. May 30-Aug. 11. [See Hagen 1861, Banks 1892, Ris 1903, Calvert 1903.]

This species is our commonest *Argia*. In copulation June 8.

70. AMPHIAGRION SAUCIUM (Burmeister). Piney Creek, Baltimore Co., June 6, 2 ♂, 5 ♀; Pretty Boy, Baltimore Co., June 24, 1 ♂; Lutherville, Baltimore Co., June 29, 1 ♂; Back River, Baltimore Co., July 15, 1 ♂; Ridgeville, Frederick Co., May 30, common; Frederick, Frederick Co., May 30, 1 ♂; Govans, Baltimore City, June 11, common; Glenburnie, Anne Arundel Co., June 19, 1 ♂, 2 ♀; Waterford Mill, Old Annapolis Road, Anne Arundel Co., June 10, 1 ♂. [See Hagen 1861, Selys 1876, Banks 1892, Root 1923.]

At Ridgeville on May 30, I found large numbers in a marshy field where they were mating and in tandem among the sedges.

71. NEHALENNIA GRACILIS Morse. Swan Creek, Anne Arundel Co., June 19, 4 ♂, 2 ♀; Lakeshore, Anne Arundel Co., June 19-Aug. 4, common. [See Root 1923.]

72. N. IRENE (Hagen). Rockland, Baltimore Co., June 15, 1 ♂, 2 ♀.

73. CHROMAGRION CONDITUM (Hagen). "Soldier's Delight", Delight, Baltimore Co., July 8, 1 ♂; Mt. Washington, Baltimore City, June 11, 3 ♂; Gray's Swamp, Calvert Co., May 27, 1 ♂. [See Selys 1876, Calvert 1893.]

The last locality cited is a cypress swamp in the southern part of the state.

74. TELEALLAGMA DAECKII (Calvert). [See Root 1923.]

75. ENALLAGMA HAGENI (Walsh). [See Selys 1876, Banks 1892, Root 1923.]

76. E. DURUM (Hagen). Bush River, Harford Co., June 3, 5 ♂, 2 ♀; Swan Creek, Anne Arundel Co., June 19, 1 ♂; Governor's Run, Calvert Co., July 7, 2 ♀; East Neck Island, Kent Co., June-August, very common. [See Hagen 1861, Selys 1876, Calvert 1893, 1903, Ris 1903, Banks 1892, Root 1923.]

This is our commonest species about brackish water. Mating pairs were seen on June 3.

77. E. GEMINATUM Kellicott. [See Root 1923.]

78. E. SIGNATUM (Hagen). Bush River, Harford Co., June 3, 2 ♂, 6 ♀, (many seen); Lake Roland, Baltimore Co., June 17, 1 ♂, 1 ♀; Dead Run, Colonial Park, Baltimore Co., June 4, 2 ♀; South River, Anne Arundel Co., July 1, 2 ♂, (many seen). [See Selys 1876, Banks 1892, Calvert 1893, Root 1923.]

Many were seen mating at the Bush River locality on June 3rd; they appeared to be concentrated in the reeds close to the water in company with *Enallagma durum*.

79. E. VESPERUM Calvert. [See Root 1923.]

80. E. EBRIUM (Hagen). Lake Roland, Baltimore Co., May 25, 1 ♂. [Muttkowski 1910.]

81. E. EXSULANS (Hagen). Lock Raven, Baltimore Co., June-July, common; Lake Roland, Baltimore Co., June-July, common; "Soldier's Delight", Delight, Baltimore Co., July 4, 1 ♀; Cockeys Mill Rd., Baltimore and Howard Cos. July 10, 1 ♂; Dead Run, Colonial Park, Baltimore Co., June 4-July 18, common; Potapsco River at Avolon, Baltimore and Howard Cos. July 9, common. [See Selys 1876, Banks 1892, Root 1923.]

This species was seen mating on both June 4th and 24th.

82. E. PALLIDUM Root. [See Root 1923.]

83. E. CIVILE (Hagen). Frederick Co., May 30, 1 ♂; Swan Creek, Anne Arundel Co., June 19, 4 ♂, 3 ♀; East Neck Island, Kent Co., Sept. 18, 1 ♂, 1 ♀; Miles River, Talbot Co., Aug. 25, 1 ♂. [See Hagen 1861, Banks 1892, Root 1923.]

84. E. ASPERSUM (Hagen). Woodbrook, Baltimore Co., June 24-July 5, 2 ♂; Notch Cliff, Baltimore Co., June 22, 1 ♂. [See Root 1923.]

85. E. TRAVIATUM Selys. Waterford Mill, Old Annapolis Rd., Anne Arundel Co., June 10, 1 ♂. [See Root 1923.]

86. ISCHNURA RAMBURII Selys. Swan Creek, Anne Arundel Co., June 19, 4 ♂, 1 ♀; Marley's Creek, Anne Arundel Co., June 19, 4 ♂; Galesville, Anne Arundel Co., May 27, 1 ♂· Governor's Run, Calvert Co., May 27, common; East Neck Island, Kent Co., May 28-Aug. 15, very common; Vienna, Dorchester Co., Aug. 25, 4 ♂, 1 ♀; Miles River, Talbot Co., Aug. 25, 2 ♂. [See Hagen 1861, Selys 1876, Banks, 1892, Root 1923.]

Both heterochromatic and homochromatic females were mating on May 27th.

87. I. POSITA (Hagen). Very common about sluggish streams, or ponds and lakes, April 24-August 25. [See Calvert 1903, Ris 1903, Root 1923.]

One of our commonest species.

88. I. VERTICALIS (Say). This species occurs practically everywhere about water, May 4-August. [See Selys 1876, Calvert 1903, Root 1923.]

89. ANOMALAGRION HASTATUM (Say). Bush River, Harford Co., May 21, 5 ♂; Winter's Run, Harford Co., June 3, 1 ♂; Rockland, Baltimore Co., July 6, 5 ♂; Govans, Baltimore City, April 24, 1 ♀; (seen Frederick, Frederick Co., May 30, 1 ♂); Lakeshore, Anne Arundel Co., Sept 22, 1 ♂, (many seen); East Neck Island, Kent Co., July, 1 ♂, 1 ♀; Vienna, Dorchester Co., Aug. 25, 3 ♀. [See Selys 1876, Banks 1892, Ris 1903.]

Megasoma elephas Fab. in Pennsylvania (Coleop.: Scarabaeidae).

By MARK ROBINSON & JOHN W. CADBURY, 3rd
Philadelphia, Pa.

On January 12, 1940, Mr. John Dalrymple, of Philadelphia, brought to the Academy of Natural Sciences, a fine male of this giant beetle for identification. Many strange and unusual tropical insects are brought in for this purpose from time to time, but they are, so to speak legitimate, having been collected in their native haunts and sent in to collectors. But here was another story. The beetle was taken alive, according to Mr. Dalrymple, clinging to a piece of rope in a truck loaded with bananas and other tropical fruit at Huntingdon and American Streets, Philadelphia. The truck was being unloaded on to a freight car when the specimen was discovered.

We were, to put it mildly, a trifle skeptical at first, but it appears that the specimen had lived two days in captivity, and had only just died. Upon examining the specimen it was found to be still in a partially relaxed condition and also to weigh considerably more than dried examples in the studied collection. It weighs, in fact, 1¼ ounces and measures 110 mm. in length, of which the frontal bifurcated horn alone is 30 mm. The width at its greatest point is 46 mm.

For the benefit of those unfamiliar with this huge insect, it is a member of the subfamily Dynastinae, is black, with the dorsal surface sericeous, anteriorly ferruginous, shading to fulvous on the elytra. At the base of the long frontal horn on the head, is a smaller, down-curved process, and on each side of the pronotum is a short, nearly straight, acute horn. The striae on the elytra are extremely fine. The anterior tibia is incurved, armed with three teeth, and between the strong, large, curved tarsal claws is a prominent pencillate pulvillus, tipped with a few short hairs.

Normally *M. elephas* occurs in Guatemala, Costa Rica, Panama and Nicaragua where it frequents mangoes, especially when these trees are in fruit. It is notably a strong flyer and it has been said that when hit while driving it can break the windshield of a car. The exceedingly heavy chitinous exoskeleton, together with the large bulk of the beetle, would seem to make such reports plausible.

So far as the writers know this is the only instance on record of the occurence of the species in continental United States. How it got to Philadelphia will always be a matter for conjecture, but it was undoubtedly imported with a cargo of fruit from a Central American port. Mr. Dalrymple generously deposited the specimen in the collection of the Academy.

OBITUARY

A letter from his daughter brings the sad news that KENNETH J. MORTON died at his home in Edinburgh, Scotland, on January 29, 1940, in his eighty-second year. Since 1882 down to the January which saw his death, he had published on Trichoptera, Plecoptera, Neuroptera and Odonata.—P. P. C.

A List of the Dragonflies (Odonata) Taken in the Region of Muscongus Bay, Maine.

By Donald J. Borror, Department of Zoology and Entomology, Ohio State University.

(Continued from page 47.)

List of Species.[1]

1. Agrion aequabile (Say). (23), 5 ♂ July 3, 1939. A couple of males will "dance" around each other in the middle of the stream, a foot or two above the water, for several minutes at a time.

2. A. maculatum Beauvais. Common at (28), June 21 to Aug. 24; (9), 1 ♂ June 18, 1839; (23), 5 ♂ July 3, 1939.

3. Lestes congener Hagen. (29), 3 ♂ and 3 ♀ Aug. 14, 1939. These were ovipositing, in tandem, on *Juncus* sp. about a foot above the water.

4. L. disjunctus Selys. Common along marshy lake shores. Taken at (2, 3, 7, 19, 22, 24, and 29), July 6 to Aug. 28.

5. L. eurinus Say. (29), 5 ♂ July 5, and 4 ♂ July 6, 1939. This is a new record for Maine.

6. L. forcipatus Rambur. (2), 1 ♂ July 2, 1939.

7. L. inaequalis Walsh. (8), 1 ♂ July 8, 1939; (29), 1 ♂ July 5, 3 ♂ July 6 and 1 ♂ July 20, 1939.

8. L. rectangularis Say. (6), 2 ♂ Aug. 24, 1939; (19) 2 ♂ and 3 ♀ Aug. 5, 1938; (25), 3 ♂ Aug. 23, 1938; (29), 1 ♂ and 1 ♀ July 6, 1939.

9. L. uncatus Kirby. Fairly common at (17), June 21 to July 22; (29), 1 ♀ June 30, 1938.

10. L. unguiculatus Hagen. Common in swamps and along marshy shores. Taken at (11, 16, 17 and 29), June 21 to Aug. 29. Very abundant at (17), where several could be taken with a single sweep of the net during most of the summer.

11. L. vigilax Hagen. Fairly common along marshy lake shores. Taken at (3, 5, 9, 10, 13, and 29), June 17 to Aug. 16.

12. Argia moesta (Hagen). (24), 1 ♂ July 5, 1939, on road.

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[1] Numbers in parentheses refer to localities, as numbered in the list above.

13. A. VIOLACEA (Hagen). Common along pond shores and occasional in swamps and along streams. Taken at (2, 6, 7, 10, 14, 24, 25, 28, and 29), June 12 to Aug. 26.

14. NEHALENNIA IRENE (Hagen) Abundant in swamps and along marshy lake shores. Taken at (2, 5, 11, 13, 14, 17, 18, 20, 21, 22, 24, 25, 27, 28, and 29), June 19 to Aug. 22.

15. CHROMAGRION CONDITUM (Hagen). (8), 1 ♂ and 1 ♀ July 8, 1939; (18), 3 ♂ July 9, 1938; (29), 1 ♂ June 22, 1939.

16. ENALLAGMA ASPERSUM (Hagen). (6), 1 ♂ Aug. 24, 1939, along road near pond; (17), 1 ♂ Aug. 9, 1938, and 1 ♂ July 22, 1939.

17. E. BOREALE Selys. Fairly common in swamps and along marshy lake shores. Taken at (13, 14, 17, 21, 24, and 29), June 9 to July 22.

18. E. CIVILE (Hagen). Common along pond shores. Taken at (2, 17, 19, 20, 22, 24, 25, 27, and 29), June 28 to Aug. 26.

19. E. EXSULANS (Hagen). (20), 6 ♂ and 3 ♀ July 19, 1939.

20. E. HAGENI (Walsh). Very common and abundant at ponds and swamps; occasional along streams. Taken at (2, 5, 8, 9, 10, 13, 14, 15, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, and 29), June 9 to Aug. 16.

21. E. LATERALE Morse. (20), 1 ♂ July 19, 1939, taken while sweeping bulrushes along shore of pond. This is a new record for Maine.

22. E. MINUSCULUM Morse. Common in 1938, abundant in 1939, at ponds. Taken at (7, 14, 20, 24, 25, 27, and 29), June 12 to Aug. 16. In the two seasons 142 ♂ and 26 ♀ were collected.

23. E. VESPERUM Calvert. (24), 2 ♂ June 21, 1939; (27), 1 ♂ and 1 ♀ July 19, 1939; (29), seen June 30, 1938.

24. COENAGRION RESOLUTUM (Hagen). (21), 2 ♂ June 28, 1939. This is a new record for New England.

25. ISCHNURA POSITA (Hagen). (9), 1 ♂ July 16, 1939.

26. I. VERTICALIS (Say). The most common damselfly of the region. Taken at (1, 2, 5, 7, 8, 9, 10, 11, 13, 14, 15, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 29), June 9 to Aug. 28.

27. ANOMALAGRION HASTATUM (Say). (17), 2 ♂ Aug. 9 and 1 ♂ Aug. 22, 1938.

28. Hagenius brevistylus Selys. (11), 1 ♀ Aug. 11, 1939 (by Clare Zufeldt); (24), 1 exuvium June 14, 1938.

29. Gomphus exilis Selys. Common along lake shores. Taken or observed at (13, 14, 20, 23, 24, 25, and 29), June 9 to Aug. 26.

30. Dromogomphus spinosus Selys. (20), 1 ♂, July 19, 1939 (by Robert B. Wait).

31. Gomphaeschna furcillata (Say). (25, bog), 3 ♂ June 12, 1938, and 1 ♂ June 15, 1939.

32. Basiaeschna janata (Say). (2), 2 ♂ July 2, 1939; (24), 1 ♀ June 12, 1938, 1 ♀ June 15, 1939; (29), 1 ♀ July 3, 1939.

33. Boyeria vinosa (Say). (28), 2 ♂ Aug 23, 1938 (by May Stewart), and 7 ♂ Aug. 14, 1939 (by Clare Zufeldt). Seen at (28) Aug. 24, 1939. This species flies in a zig-zag flight a few inches above the surface of the stream. Nymphs were found throughout the summer at (28), under stones in the brook.

34. Anax junius (Drury). Fairly common and wide-ranging. Taken or observed at (2, 3, 7, 9, 10, 14, 16, 17, 19, 20, and 29), June 18 to Aug. 22.

35. Aeshna canadensis Walker. (7), 1 ♂ Aug. 16, 1939; (17), 1 ♂ Aug. 15, 1939; (24), 1 ♂ Aug. 26, 1939; (29), 1 ♀. Aug. 14 and 2 ♂ Aug. 23, 1939 (by Frank Jackson).

36. Ae. clepsydra Say. (2), 3 ♂ Aug. 16, 1938; (29), 1 ♀ Aug. 16, 1938, 1 ♂ Aug. 23, 1939, and seen Aug. 28, 1939; 1 ♀ on radiator of writer's car, Aug. 10, 1939, taken between Damariscotta and Muscongus Bay, in Lincoln Co.

37. Ae. constricta Say. (11), 1 ♂ Aug. 8, 1939; (17) 2 ♂ Aug. 9 and 2 ♂ and 2 ♀ Aug 22, 1938; (24), 1 ♂ Aug. 23, 1938.

38. Ae. tuberculifera Walker. (29), 1 ♀ Aug. 24, 1939 (by Robert Altman).

39. Ae. umbrosa Walker. (19), 1 ♀ Aug. 5, 1938. This individual was flying slowly over a bushy ditch, about a foot above the water, hovering or moving slowly as though looking for a place to oviposit.

40. Ae. verticalis Hagen. (2), 1 ♂ July 2, 1939; (11), 1 ♂ Aug. 15, 1939; (17), 1 ♂ July 6, 1938, 2 ♂ Aug. 15, 1939, and seen Aug. 29, 1939; (29), 1 ♀ Aug. 7, 1939 (by Clare Zufeldt).

41. CORDULEGASTER DIASTATOPS Selys. 1 ♀ on radiator of auto at (12), June 22, 1938. It is likely that the specimen was obtained somewhere in Lincoln Co. during the preceding week.

42. C. MACULATUS Selys. (28), 2 ♂ and 1 ♀ June 22, 1939; seen at this locality on June 21 and July 5, 1939.

43. DIDYMOPS TRANSVERSA (Say). (23), seen July 3, 1939; (25), 1 ♂ June 15, 1939, along road; (29), 1 ♂ July 15, 1938, along road.

44. TETRAGONEURIA CYNOSURA SIMULANS Muttkowski Fairly common along lake shores, and often flying some distance from water over roads and fields. Taken or observed at (2, 11, 14, 15, 24, 25, and 29), June 15 to July 5.

45. T. SPINIGERA (Selys). (25), 1 ♂ and 1 ♀ June 15, 1939, in clearing in bog, and 1 ♀ June 21, 1939, along road.

46. HELOCORDULIA UHLERI (Selys). (14), 1 ♂ June 22, 1939; (28), 1 ♂ June 21 and 4 ♂ June 22, 1939. The nymphs apparently do considerable migrating before transforming, as an exuvium was found at (4) July 22, 1938, under the eaves of a cottage about 15 yards from the shore of the lake.

47. SOMATOCHLORA FORCIPATA (Scudder). (11), 2 ♂ and 1 ♀ Aug. 11, 1939, in an alder swamp (1 ♂ by Clare Zufeldt and 1 ♀ by Martha Pelikan).

48. S. KENNEDYI Walker. (25), 7 ♂ June 12 and 1 ♀ June 14, 1938, 6 ♂ June 15, 1939, 1 ♂ June 21, 1939, seen July 5, 1939; (29), 1 ♀ July 3, 1939, along road. At (25) most of the specimens were taken in an alder-sphagnum bog; 1 ♂ was taken along a road bordering the bog. The ♀ oviposits in water among grasses much like a gomphine or libelluline.

49. DOROCORDULIA LEPIDA (Hagen). (10), 2 ♂ July 3, 1939; (25), 1 ♂ July 7, 1939; (26), 3 ♂ July 8, 1939; (29), 1 ♀ Aug. 14, 1939 (by Clare Zufeldt).

50. D. LIBERA (Selys). (5), 1 ♂ July 8, 1939; (8), 1 ♂ July 8, 1939; (17), 1 ♂ June 21, 1938; (29), 1 ♂ July 3, 1939. In both this species and the preceding the eyes are a brilliant green in life.

51. NANNOTHEMIS BELLA (Uhler). (29), 1 ♀ June 17, 1938, along road.

52. CELITHEMIS ELISA Hagen. Fairly common at ponds. Taken or observed at (2, 12, 13, 14, 24, and 29), June 17 to Aug. 26.

53. C. MARTHA Williamson. At ponds, but less common than *elisa*. (14), 2♂ Aug. 10, 1939, seen Aug. 26, 1939; (24), 1♂ and 3♀ Aug. 26, 1939; (29), 1♂ July 5, 1939 (by Helen B. Knapp), seen July 18 and Aug. 7, 1939.

54. LADONA EXUSTA (Say). Fairly common at ponds or over roads near ponds. Taken or observed at (1, 24, 25, and 29), June 12 to July 17.

55. L. JULIA (Uhler). (13), seen June 28, 1939; (21), seen June 28 and 29, 1939; (29), 3♂ June 22, and 2♂ July 6, 1939. This species and the preceding are fast fliers and often difficult to catch.

56. LIBELLULA INCESTA Hagen. (2), 1♂ Aug. 16, 1938.

57. L. LUCTUOSA Burmeister. (19), 1♀ Aug. 5, 1938. This is a new record for Maine.

58. L. PULCHELLA Drury. A common species. Taken or observed at (3, 5, 7, 8, 9, 10, 11, 16, 17, 19, 20, 22, 25, 26, and 29), June 21 to Aug. 24.

59. L. QUADRIMACULATA Linnaeus. Common at ponds and swamps. Taken or observed at (5, 9, 10, 11, 13, 17, 21, 25, and 29), June 12 to July 22.

60. PLATHEMIS LYDIA (Drury). At ponds, but not common. Taken or observed at (24) and (29), June 22 to Aug. 4.

61. SYMPETRUM COSTIFERUM (Hagen). Rare in 1938, fairly common in 1939. Taken at (3, 7, 22, and 29), Aug. 7 to 28.

62. S. DECISUM (Hagen). Common and abundant, the commonest species of the genus in this region. Taken at (2, 6, 7, 11, 12, 16, 17, 19, 22, 25, and 29), June 29 to Aug. 29. Although *decisum* Hagen has never been recorded from Maine, it is likely that most of the records of *rubicundulum* Say from Maine are this species.

63. S. OBTRUSUM (Hagen). (16), 3♂ Aug. 20, 1938; (17), 2♂ Aug. 9, 1938, and 1♂ Aug. 29, 1939; (29), seen (collected by a student) Aug. 28, 1939.

64. S. VICINUM (Hagen). (16), 1♀ Aug. 19, 1938 (by Robert Livingston); (17), 2♂ Aug. 15, 1939; (19), 3♂ Aug. 5, 1938.

65. LEUCORRHINIA FRIGIDA Hagen. (17), 22♂ and 2♀ June 28 and 9♂ and 1♀ July 22, 1939; (27), 6♂ July 19, 1939; (29), 1♂, July 3 and 1♂ July 18, 1939. This species flies low, in a very erratic fashion, through marsh grasses and rushes.

66. L. GLACIALIS Hagen. (17), 1 ♂ July 22, 1939. In the field, this species may be distinguished from other species in the genus by the large size, the large amount of red on the thorax and base of the abdomen, and the reddish stigma.

67. L. HUDSONICA (Selys). (11), 1 ♂ June 17, 1939, in clearing in woods; (17), 8 ♂ and 1 ♀ June 21, 1938, and 1 ♂ June 28, 1939; (24), 2 ♂ July 6, 1939 (by Donald Cooper); (25), 3 ♂ July 12 and 2 ♂ July 17, 1939, along road near swamp.

68. L. INTACTA (Hagen). Fairly common along marshy shores and in swamps. Taken or observed at (5, 8, 9, 10, 11, 13, 17, 21, 24, 26, 27, and 29), June 18 to July 19.

69. L. PROXIMA Calvert. Rare in 1938, fairly common in 1939. Taken at (10, 17, 21, 24, 25, and 29), June 28 to Aug. 14.

70. PANTALA FLAVESCENS (Fabricius). (11), 1 ♂ July 17, 1939 (by Frank Jackson); (16), seen Aug. 27, 1939; (20), seen July 19, 1939.

New or Little-Known Neotropical Polistes (Hymenoptera, Vespidae).

By J. BEQUAERT, Museum of Comparative Zoology, Cambridge, Massachusetts.

1. POLISTES MAJOR var. (or subsp.) **weyrauchi**, new.
♀ and *Worker*.—Head reddish chestnut-brown. Thorax reddish chestnut-brown over most of pronotum, mesonotum, scutellum and a spot in upper part of mesopleura; remainder black, the postscutellum blotched with russet. Abdomen mostly reddish chestnut-brown; basal two-thirds of first tergite, base of second tergite, and most of first to third sternites, black. Legs chestnut-brown; coxae and most of femora black; mid and hind tarsi orange. Antennae reddish-brown; basal two-thirds of flagellum blackish. Wings strongly purplish-black; stigma russet.

♂.—Very similar to the female.

Holotype and *paratype*, females from one nest, Valle Chanchamayo, PERU, 800 m. (W. Weyrauch). *Allotype*, male, Mt. San Lorenzo, Santa Marta, 5,500 ft., COLOMBIA (G. Salt). Paratypes: Cerro Quemado, San Lorenzo Mt., COLOMBIA, one male (H. L. Viereck); Bonda, River Manzanares, 7 miles east of Santa Marta, Colombia, nine females and one male (Herbert H. Smith).—Holotype, allotype and paratypes at Museum of Comparative Zoölogy, Cambridge, Mass.; paratypes also at Carnegie Mus., Pittsburgh, at Academy of Natural Sciences, Philadelphia, and at U. S. Nat. Museum.

Structurally and in size like typical *P. major* Palisot de Beauvois, as characterized in Ent. News, XLVII, 1936, p. 8. There is a mere trace of prepectal suture in the two females from Peru and in one of the males from Colombia. In the other specimens from Colombia, however, the suture is well-marked.

This new form is nearest to *P. major* var. *castaneicolor* J. Bequaert, to which I had originally referred two of the males from Colombia (Ent. News, XLVII, 1936, p. 13). The discovery by Dr. Weyrauch of additional specimens and of the nest, makes it advisable to distinguish the South American form by name. It is homeochromic with certain specimens of the typical form of *P. canadensis,* with which I confused the Peruvian females until Dr. Weyrauch pointed out to me (*in litt.*) that nest and larvae were different.

The var. *castaneicolor* is restricted to Mexico, southern Arizona and southern New Mexico.

2. Polistes major var. (or subsp.) **colombianus,** new.

♀ (or *Worker*)—Body almost entirely chrome-yellow, with only the following parts cinnamon-brown: antennae (strongly infuscate above over most of flagellum); mandibles; a transverse stripe on vertex, in the ocellar region; a median line on mesonotum, widened anteriorly and posteriorly; tegulae; sternum; most of sutures of thorax (that between mesonotum and scutellum broadly blackish); legs, except for large yellow spots on coxae and on tips of femora; and broad bases of first and second abdominal segments. Wings as in typical form.

Holotype female, Valparaiso, Dept. Magdalena, 2,500 ft., Colombia. Mus. Comp Zoöl., Cambridge, Mass.

In structure and size like typical *P. major,* scarcely with a trace of the prepectal suture. It is the most xanthic variant of the species, homeochromic with *Polistes carnifex* var. *boli-*

viensis J. Bequaert, which occurs in the same general region.[1]

3. Polistes versicolor var. (or subsp.) **xanthogaster**, new.

♀ and *Worker*.—Head yellow; vertex, occiput, frons to near base of antennae (entering ocular sinuses), spots between antennae and clypeus, black; most of outer orbits ferruginous; antennae ferruginous; middle portion of flagellum black. Thorax black; most of pronotum and scutellum ferruginous; anterior and posterior margins of pronotum, tegulae, most of postscutellum, two short stripes on propodeum, articular valvulae, and a spot on upper part of mesopleura, yellow (sometimes slightly orange). Coxae black; femora black basally, ferruginous medially and yellow at tips; tibiae and tarsi ferruginous, hind tarsi somewhat yellowish. Abdomen mostly yellow; only the bases of the segments black, turning ferruginous toward the yellow areas, which are slightly notched by ferruginous on the second and third tergites, more broadly so on the first tergite. Wings as in typical form.

♂.—Similar to the female; but one specimen has two ferruginous lines on the mesonotum and ferruginous (instead of yellow) stripes on propodeum, while the other lacks all trace of yellow stripes on the propodeum.

Holotype female, *allotype* male and two *paratypes* (male and female), Cochabamba, Bolivia (R. G. Harris). Mus. Comp. Zoöl., Cambridge, Mass.

In my key to the varieties of *P. versicolor* (1934, Rev. de Entomologia, IV, pp. 148-149), this will run out to var. *peruvianus;* but it is readily separated from that and other forms by the broad apical yellow bands of most of the tergites and sternites.

4. Polistes versicolor var. (or subsp.) **willei**, new.

♂.—Head mostly yellow; upper half of frons, vertex, occiput and hind half of outer orbits black; antennae ferruginous, slightly orange basally, the scape with a blackish spot above. Thorax black, with most of the dorsal area of the pronotum, tegulae, most of scutellum, two small dots on postscutellum, and small spots on the mesosternum, yellow. Legs

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[1] I have seen many specimens of *P. carnifex* var. *boliviensis* from Colombia: Muzo, Dept. Boyacá; Porcecito, Rio Porce, Dept. Antioquia; Cacaguelito near Sa. Marta, Dept. Magdalena. These have generally a median longitudinal cinnamon-brown stripe over the yellow mesonotum.

black; small spots on under side of fore and mid coxae, narrow tips of femora, a line on underside of fore and mid femora and most of fore tibiae, yellow; tarsi ferruginous. Abdomen: first tergite black, with a broad apical yellow margin, divided medially by a brownish line; second tergite yellow, with a narrow black base protruding behind triangularly in the middle and more broadly on the sides; remaining tergites yellow; first sternite black; second and third sternites black, with broad yellow apical margins (bearing a blackish spot on each side); remaining sternites yellow. Wings as in typical form.

Holotype male, Cuczo, PERU (G. N. Wolcott). Mus. Comp. Zoöl., Cambridge, Mass.[2]

This wasp is strikingly different from all other Neotropical *Polistes* in the contrast between the almost entirely yellow abdomen and the mostly black thorax. I am unable to find structural characters to differentiate it from the males of the other color forms of *P. versicolor.*

5. POLISTES CANADENSIS var. (or subsp.) **satanulus,** new

♀ (or *Worker*).—Entirely shiny coal-black, except for the flagellum which is mostly ferruginous, darker above. Wings subhyaline, slightly suffused with ferruginous, somewhat darker anteriorly; veins of basal two-thirds and stigma brownish-black, those of apical third pale ferruginous.

Holotype female, Joinville, State of Sa Catharina, BRAZIL (F. Schade). Mus. Comp. Zoöl., Cambridge, Mass.

Perfectly homeochromic with *Polistes melanosoma* de Saussure, *Polistes deceptor* Schulz, and *Gymnopolybia angulata* (Fabricius). It was probably confused thus far with *P. melanosoma,* which no doubt occurs in the same territory. Specimens of *G. angulata* were taken by Mr. Schade at Joinville the same day as the type of *satanulus.*

The var. *satanulus* is the only color form of *P. canadensis* in which the legs are entirely black (including the hind tarsi).

6. POLISTES PARAGUAYENSIS Bertoni.

Polistes consobrinus (?) A. de Winkelried Bertoni, 1918, Anal. Cientif. Paraguayos, (2), No. 3, p. 227 (♀ ♂; Puerto

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[2] This interesting wasp was received from Dr. J. E. Wille, of the Estacion Experimental Agricola de la Molina, near Lima, Peru. I wish to thank Dr. Wille for permission to deposit the type at the Museum of Comparative Zoölogy.

Bertoni, Paraguay and Ihgatimi, Matto Grosso, Brazil). Not of H. de Saussure, 1858.

Polistes paraguayensis A. de Winkelried Bertoni, 1921, Rev. Soc. Cientif. Paraguay, I, pt. 1, p. 12 (based on his supposed *Polistes consobrinus* of 1918).

P. consobrinus de Saussure is now recognized as a melanic variant of *P. versicolor* (Olivier). A. de Winkelried Bertoni pointed out that his supposed *consobrinus*, which he fully described in 1918, was structurally different from *P. versicolor*. I have one female and one male from Bolivia which agree well with Bertoni's account. They are of about the size and color of *P. versicolor* var. *consobrinus;* but in the male the clypeus is very broadly separated from the inner orbits, while it touches over a short distance in the female. There is a curious superficial resemblance between these specimens and some *fuscatus* var. *nestor,* of North America. The structure of the clypeus, however, separates *paraguayensis* from *fuscatus;* while, in the male, there is no median tubercle on the depressed area of the last sternite. Owing to the absence of prepectal suture and the presence of a complete median mesepisternal groove, *P. paraguayensis* belongs in the group of *P. canadensis.*

Undescribed Species of Crane-Flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part VI

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts.

The crane-flies discussed at this time were derived from various sources that are acknowledged in connection with each species. The preceding part under this general title was published in Entomological News, vol. 40: 44-49; 1929.

Tipula (Oreomyza) broweri n. sp.

Belongs to the *marmorata* group; allied to *nebulipennis;* femora obscure yellow, the tips blackened, preceded by a subequal clearer yellow ring; wings subhyaline, conspicuously clouded with brown or grayish brown; cell *C* clear, cell *Sc* only a trifle darkened; abdomen chiefly yellow, the outer segments, including the hypopygium, more variegated with brown; male hypopygium with a rectangular blackened lobe at base of outer dististyle; gonapophyses conspicuous, jutting from the genital chamber, the outer pair narrowed at apex; eighth sternite with a deep median incision, forming two conspicuous yellow lobes that are fringed along their mesal margins with long coarse setae.

♂. Length about 10-12 mm.; wing 11.5-13 mm.

♀. Length about 12-13 mm.; wing 11-12 mm.

Frontal prolongation of head gray; palpi brownish black. Antennae with scape obscure yellow, pedicel orange, flagellum uniformly black; flagellar segments only moderately incised. Head dark gray.

Mesonotal praescutum dark gray with four dark brown stripes, the cephalic ends of the intermediate pair paler, posterior sclerites of notum gray, the scutal lobes weakly darkened. Pleura light gray, variegated with darker gray, especially on anepisternum, ventral sternopleurite and ventral meron. Halteres yellow, the knobs dark brown basally, their apices paling to reddish brown.

Legs with the coxae gray; trochanters yellow; femora obscure yellow, the tips conspicuously blackened, preceded by a subequal clear yellow ring; tibiae and basitarsi brownish yellow, the tips darkened; remainder of tarsi black, claws (♂) with a single basal spine.

Wings subhyaline, clouded with paler brown or grayish brown, the pattern arranged much as in *fragilis* and unusually contrasting for a member of this group of flies; cell *C* clear, cell *Sc* only a trifle darkened; stigma darker brown; veins brown. **Venation**: *Rs* approximately one-half longer than *m-cu*.

Abdomen chiefly yellow, the first tergite and remainder of pleural region darkened; beyond midlength of abdomen both tergites and sternites more darkened laterally; hypopygium chiefly dark brown, the conspicuous lobes of the eighth sternite and the dististyles extensively yellow. Male hypopygium with the lateral lobes of tergite terminating in short decurved points, the margin of the median notch with microscopic blackened points. Basistyle on mesal edge below insertion of dististyles with a blackened plate or flange. Outer dististyle with a rectangular blackened lobe or flange at base. Inner dististyle relatively narrow, the apex of beak microscopically bidentate.

Gonapophyses conspicuously projecting from genital chamber, the inner pair narrow, tapering to a slender apex, the surface with delicate pale setulae; outer apophyses broad but tapering gradually to a narrow obtuse lobe. Eighth sternite with a deep median incision, forming two conspicuous yellow lobes, their mesal margins with abundant long coarse setae.

Habitat.—Maine. *Holotype*: ♂, Mount Katahdin, summit, altitude 5,200 feet, September 2, 1939 (A. E. Brower). *Allotopotype*, ♀, with the type. *Paratopotypes*, 11 ♂♂, 1 ♀, altitude 4800-5,200 feet, September 2-3, 1939 (A. E. Brower).

Tipula (*Oreomyza*) *browcri* is named in honor of the collector, my good friend, Dr. A. E. Brower, who has added vastly to our knowledge of the insects of Maine. The species is most similar to *T.* (*O.*) *nebulipennis* Alexander, of Labrador, Gaspé, and the alpine summits of Mount Washington, New Hampshire, yet is entirely distinct from this, as well as all other members of the group. As common in the Tipulidae, the details of structure of the male hypopygium furnish the most evident specific characters, especially the structure of the dististyles, gonapophyses and the eighth sternite. Dr. Brower found this species in various places between Baxter Spring and the summit, associated with another member of the same group, *Tipula* (*Oreomyza*) *insignifica* Alexander, which is an autumnal species known elsewhere only from the alpine summits of the Presidential Range, New Hampshire (Lakes of the Clouds; Alpine Garden; Madison Springs; Star Lake).

The type of *broweri* is preserved in my personal collection of these flies.

(To be continued.)

The Charles Robertson Collection of Insects.

Science for March 1, 1940, announces that the Illinois Natural History Survey has purchased this collection from Charles V. Robertson, the son. It consists of more than 30,000 pinned specimens, about two-thirds of which are bees and wasps, and about 200 type specimens, gathered in connection with Prof. Robertson's study of insect pollination. He died June 17, 1935; a brief obituary notice appeared in the News for October, 1936, page 228.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Anon.—Crystal-clear Plastics. [The Institute News] 4: 4, ill. **Bondar, G.**—Insetos daninhos e parasitas do cacau na Bahia. [Inst. Cacau Bahia] Bol. Tec. No. 5: 112 pp., ill. **Crossland, C.**—Rules of Zoological Nomenclature. [31] 144: 942. **Fortunato, F.**—An aid in spreading paraffin sections. [Pro. Penna. Acad. Sci.] 13: 21. **Imms, A. D.**—Air transport, insects and disease. [31] 145: 76. **Martorell, L. F.**—Insects observed in the state of Aragua, Venezuela, South America. [Jour. Agric. Univ. of Puerto Rico] 23: 177-232. **Martorell & Salas.**—Additional insect records from Venezuela. [Jour. Agric. Univ. Puerto Rico] 23: 233-255. **Needham, P. R.**—Trout stream animals. Comstock Publishing Co. Ithaca. 1938. 73-112, ill. **Schackleford, M. W.**—New methods of reporting ecological collections of prairie arthropods. [Amer. Mid. Nat.] 22: 676-683, ill.

ANATOMY. PHYSIOLOGY, ETC.—**Beadle, Tatum & Clancy.**—Development of eye colors in Drosophila: Production of v^+ hormone by fat bodies. [92] 77: 407-414. **Becker, E.**—Uber die Natur des Augenpigments von Ephestia kuhniella und seinen Vergleich mitden Augenpigmenten anderer Insekten. [97] 59: 597-627, ill. **Bounhiol, J. J.**—Récentes recherches expérimentales sur les insectes les fonctions des corps Allates (Corpora allata). [Notes et Revue, Paris] 81: 54-64, ill. **Ch'eng-Pin, P.**—

Morphology and anatomy of the chinese scorpion Buthus martensi. [Peking Nat. Hist. Bull.] 14: 103-117, ill. **Child, G.**—The effect of increasing time of development at constant temperature on the wing size of vestigial of Drosophila melanogaster. [92] 77: 432-442, ill. **Clancy,** (see **Beadle, Tatum & Clancy). Cousin, G.**—Sur les principes de L'analyse biométrique d'une hybridation. [Arch. Zool. Exp. et Gen.] 81: 285-316, ill. **Ekblom, T.**—Étude des chromosomes du Gerris asper. [Notes et Revue, Paris] 81: 65-77, ill. **Ghidini, G. M.**—Studi sulle termiti: Sulla presenza di Acetilcolina in Reticulitermes lucifugus e Calotermes flavicollis. [Riv. Biol. Coloniale] 2: 207-213, ill. **Krause, G.**—Die eitypen der insekten. [97] 59: 495-536, ill. **Lison, L.**—Excretion intestinale et athrocytose discriminante chez Machilis maritima (Thysan.). [77] 132: 309-310. **Marcu, O.** — Nachtrag zu den vergleichenden untersuchungen an den stridulationsorganen der Cerambyciden. [Bull. de la Sec. Sci. Acad. Roumaine] 15, (1932): 240-245, ill. **Miller, J. A.**—(See under Diptera). **Rees & Ferris.**—(see under Diptera). **Tatum,** (see **Beadle, Tatum & Clancy). Weber, H.**—Beiträge zur kenntnis der ueberordnung Psocoidea. [97] 59: 397-409, ill. **Weber, H.**—Vergleichend-funktionsanatomische untersuchungen an atypischen beissmandibeln von insekten. [97] 59: 541-566, ill.

ARACHNIDA AND MYRIOPODA.—Biraben, M.—Sobre nidos de Arañas del género Thomisoides. [Notas del Museo, Buenos Aires] 4: 361-365, ill. (s). **Chamberlin, R. V.**—On a Diplopod Collection from Barro Colorado Island, Panama. [Bull. Univ. Utah] 30: 16 pp. (*). **Ch'eng-Pin, P.**—See under Anatomy. **Chickering, A. M.**—Anyphaenidae and Clubionidae of Michigan. [Pap. Mich. Acad. Sci. A & L.] 24: 49-84, ill. (k). **Herman, C. M.**—(See underNeuroptera). **Jellison, W. L.**—The burrowing owl as a host to the Argasid tick, Ornithodoros parkeri. [Suppl. Jour. Parasit.] 25: 17. **Keiffer, H. H.**—Eriophyid studies VII. [Bull. Dept. Agric. State Calif.] 28: 484-505, ill (*). **Krull, W. H.**—Observations on the distribution and ecology of the oribatid mites. [91] 29: 519-528. **Loomis, H. F.**—The millipeds collected in Appalachian caves by Mr. Kenneth Dearolf. [Bull. Mus. Comp. Zool.] 86: 165-193, ill. (*). **Philip, C. B.**—Ticks (Ornithodoros spp.) in Arizona Bat "Caves". [Suppl. Jour. Parasit.] 25: 15-16. **Severin, H. C.**—Some unexpected species of Arthropoda found in South Dakota. [Pro. So. Dak. Acad. Sci.] 19: 86-88. **Verhoeff,**

K. W.—Von Dr. G. H. Schwave in Chile gesammelte Isopoda terrestria, Diplopoda und Chilopoda. [52] 8: 301-324, ill. (k).

THE SMALLER ORDERS OF INSECTS.—**Adamson, A. M.**—A second report on the termites of Trinidad, British West Indies. [Trop. Agric.] 17: 12-15. **Davis, C.**—Taxonomic notes on the order Embioptera. [Pro. Linn. Soc. N. S. W.] 64: 181-190, ill. (*s). **Herman, C. M.**—Parasites obtained from animals in the Collection of the New York Zoological Park during 1938. [Zoologica, New York] 24: 481-485. **Hood, J. D.**—Un nuevo Polyphemothrips (Thysan). del Perú. [Bol. Mus. Hist. Nat. "Javier Prado"]. III: 58-62, ill. **Kohls, G. M.**—Siphonaptera: A study of the species infesting wild hares and rabbits of North America north of Mexico. [Suppl. Jour. Parasit.] 25: 17. **Ricker, W. E.**—Notes on specimens of American Plecoptera in European Collections. [Trans. Ry. Can. Inst.] 22: 129-156, ill. **Tillyard & Fraser.**—A reclassification of the order Odonata. Based on some new interpretations of the venation of the dragonfly wing. [The Australian Zool.] 9: 195-221, ill. (*) **Tsuda, M.**—Ueber das vorkommen von Odonatennymphen, Pantala flavescens in Stark Salzhaltigem Wasser. [Annotat. Zool. Japonenses] 18: 133-136.

ORTHOPTERA.—**Bragg, J. H.**—The geographic distribution of Acrididae in northern Oklahoma. [Amer. Mid. Nat.] 22: 660-675, ill. **Cantrall, I. J.**—Notes on collecting and studying Orthoptera. [Ward's Ent. & Nat. Sci. Bull.] 13: 1-6, ill. **Cousin, G.**—(See under Anatomy). **Edwards, J. L.**—A bird-catching insect. [Abst. Proc. Linn. Soc. N. Y.] 1934: 44. **du Plessis, C.**—The influence of weather conditions on the incipient swarming of the brown locust, Locustana pardalina. [Dept. Agric. & For. Union So. Africa] Sci. Bull. 186: 51 pp., ill. **Rehn, J. A. G.**—The status and relationship of the neotropical genus Scyllinops (Acrididae). [104] 10: 115-123. **Severin, H. C.**—(See under Arachnida).

HEMIPTERA.—**Caldwell, J. S.**—Three new species of Psyllidae with notes on others. [43] 40: 49-50. (*). **de Carlo, J. A.**—Los Belostómidos Americanos. [An. Mus. Arg. Cien. Nat.] 39: 189-252, ill. (*). **Hoffmann, C. C.**—Nota acerca de la alimentacion de las larvas pequenas de Triatoma (Triatomidae). [An. Inst. Biol. Mex.] 10: 343-346. **Knowlton & Allen.**—Five Mucrotrichaphis aphids.

[43] 40: 31-35, ill. (*k). **Oman, P. W.**—Revision of the genus Ceratagallia (Cicadellid.). [91] 29: 529-543, ill. (*). **de la Torre-Bueno, J. R.**—A synopsis of the Hemiptera-Heteroptera of America north of Mexico. [70] 19: 141-310, ill. **Usinger, R. L.**—Fossil Lygaeidae from Florissant. [Jour. Paleon.] 14, (1): 79-80, ill. (*).

LEPIDOPTERA.—Gäbler, H.—Ueber das auftreten verschiedener-farbvarietäten der nonne (Lymantria monacha). [Forsch. und Fortsch.] 15: 386-387, ill. **Hayward, K. J.**—Hesperioidea Argentina X. [An. Soc. Cien. Argentina] 128: 289-296, ill. **Kellogg, D. K.**—Studies of Papilio cresphontes Cramer in southern Texas. [Univ. Colo. Studies] 26: 85-86. **dos Passos, C. F.**—The Satyridae. [Bull. Cheyenne Mountain Mus.] 1: 13 pp.

DIPTERA.—Cresson, E. T., Jr.—Descriptions of new genera and species of the dipterous family Ephydridae. Paper XII. [Notulae Naturae] No. 38: 10 pp. **Ferris, see Rees & Ferris). Frohne, W. C.**—Biology of certain subaquatic flies reared from emergent water plants. [Pap. Mich. Acad. Sci. A & L.] 24: 139-147. **Fulton, B. B.**—Lochetic luminous dipterous larvae. [Jour. E. Mitchell Sci. Soc.] 55: 289-293, ill. **Hardy, G. H.**—Miscellaneous notes on Australian Diptera V. On eye-coloration, and other notes. [Pro. Linn. Soc. N. S. W.] 64: 34-50. **Hinman & Hurlbut.**—A study of winter activities and hibernation of Anopheles quadrimaculatus in the Tennessee Valley. [Suppl. Jour. Parasit.] 25: 16. **Hoffmann, C. C.**—La formacion de razas de Anopheles Mexicanos. III. Anopheles chiriquiensis komp en el interior del estado de Chiapas. [An. Inst. Biol. Mex.] 10: 347-352, ill. **Miller, J. A.**—Studies in mosquito behavior. [Sci. Monthly] 1940: 172-175, ill. **Milne, L. J.**—Autecology of the golden-rod gall fly. [84] 21: 101-105, ill. **Rees & Ferris.**—The morphology of Tipula reesi (Tipulidae). [Microent.] 4: 143-176, ill. (*). **Simmons, S. W.**—The culture of fly larvae for use in maggot therapy. [Iowa State Coll. Jour. Sci.] 14: 81-83.

COLEOPTERA.—Benick, L.—Die Steninen Mittelamerikas (Staph.). [Mitt. Munchner Ent. Gesell.] 29: 617-642, ill. (*). **Blut, H.**—Beitrag zur verbreitung und systematik der gattung Dendropaemon. [52] 8: 263-300, ill. (s*). **Bruch, C.**—Coleópteros: Mirmecófilos y Termitófilo (Hist. Staph.). [An. Mus. Arg. Cien. Nat.] 39: 125-133, ill. (s*). **Chagnon, G.**—Contribution a l etude des Coleopteres de la Province de Quebec. [98] 66: 229-238, ill. **Knull, J. N.**—A new Acmaeodera from the Southwest. (Buprestid.). [43] 40: 36. (*). **McQuerrey, J. E.**—The biology of Tenebrio molitor. [Univ. Colo. Studies] 26: 90. **Marcu, O.**—(See under Anatomy). **d'Orchymont, A.**—Les espècies du groups Chaetarthria pallida (Palpicornia). [Bull. Mus. Ry. Hist. Nat. Belgique] 15: 7 pp., ill. (*k). **Pic, M.**—Diagnoses de Coleopteres exotiques. [L'Echange Rev. Linnee., Moulins] 1939: 31-32. (*s).

HYMENOPTERA.—Cockerell, T. D. A.—The bees of the Southern California Islands. [61] 23: 427-436. (*). **Gemignani, E. V.**—Nueva nota sobre la familia Eucharidae (Chalcid.). [An. Mus. Arg. Cien. Nat.] 39: 159-166, ill. (s). **Hill & Pinckney.**—Keys to the parasites of the Hessian fly based on remains left in the host puparium. [U. S. Dept. Agric.] Tech. Bull. 715: 13 pp., ill. **Milliron, H. E.**—The taxonomy and distribution of Michigan Bombidae, with keys. [Pap. Mich. Acad. Sci. A. & L.] 24: 167-182. **Weber, H.**—(See under Anatomy).

SPECIAL NOTICES.—The generic names of British insects. Part 6. The generic names of the British Carabidae, with a check list of the British species. 1939. London. pp. 153-192. **The Indian Journal** of Entomology. Volume 1. Parts 1 & 2. June 1939. Published by The Entomological Society of India. 137 pp.

Notice of a Forth-Coming Checklist of North American Orthoptera.

A synonymic checklist of the Dermaptera and Orthoptera of America north of Mexico has been prepared by Morgan Hebard and myself. This list (the first since the catalogue published by Scudder in 1900) is now being revised as a preliminary to publication late this year or early in 1941. All persons having in manuscript records which constitute significant extensions of ranges, new synonymy, or descriptions of new species or races of North American Orthoptera or Dermaptera are urged to publish as soon as possible, in order that their information may be included in the checklist. It will facilitate the work of revising the list if the authors will send me reprints of their articles.—Theodore H. Hubbell, Department of Biology, University of Florida, Gainesville, Florida.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—*Megathymus streckeri* from S. W. Colo. or New Mex. Also from Texas. Also *M. yuccae* from Colo. Offer in exch. *Meg. leussleri* Holl. (Nebr. race *streckeri*). R. A. Leussler, 115 S. 52nd St., Omaha, Nebr.

Wanted—Cantharidae of the United States, esp. those of the genus Cantharis. Will exchange named beetles of Oregon. K. M. Fender, 930 S. Davis St., McMinnville, Oregon.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect in ects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Onpo, Korea, Japan.

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MANUSCRIPTS AND ADVERTISEMENTS should be sent to the editor, Dr. P. P. Calvert, P. O. Box 14, Cheyney, Pennsylvania. The receipt of all papers will be acknowledged and, if accepted they will be published as soon as possible. If not accepted, authors will be so advised and postage requested for return of manuscripts. Articles longer than six printed pages will be published in two or more installments, unless the author is willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division. Proof will be sent to authors.

Twenty-five extras (separates) of an author's contribution will be given free when they are requested; they will be "run of form," that is without removal of extraneous matter (parts of other articles at beginning and at end), folded, but unbound, uncut and without covers. Authors wishing more than 25 separates can obtain them, at the rates given at the bottom of this page, by ordering at the time of returning proof. When more than the twenty-five free separates are ordered, ALL the extras will be free of extraneous matter.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 65 cents; three or four pages, twenty-five copies, \$1.05; five to eight pages, twenty-five copies, \$1.75; nine to twelve pages, twenty-five copies, \$2.35; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates up to 100 copies; over 100 copies prices on application direct to printer. Printed covers for 50 copies, \$4.00 or more, according to number of pages bound.

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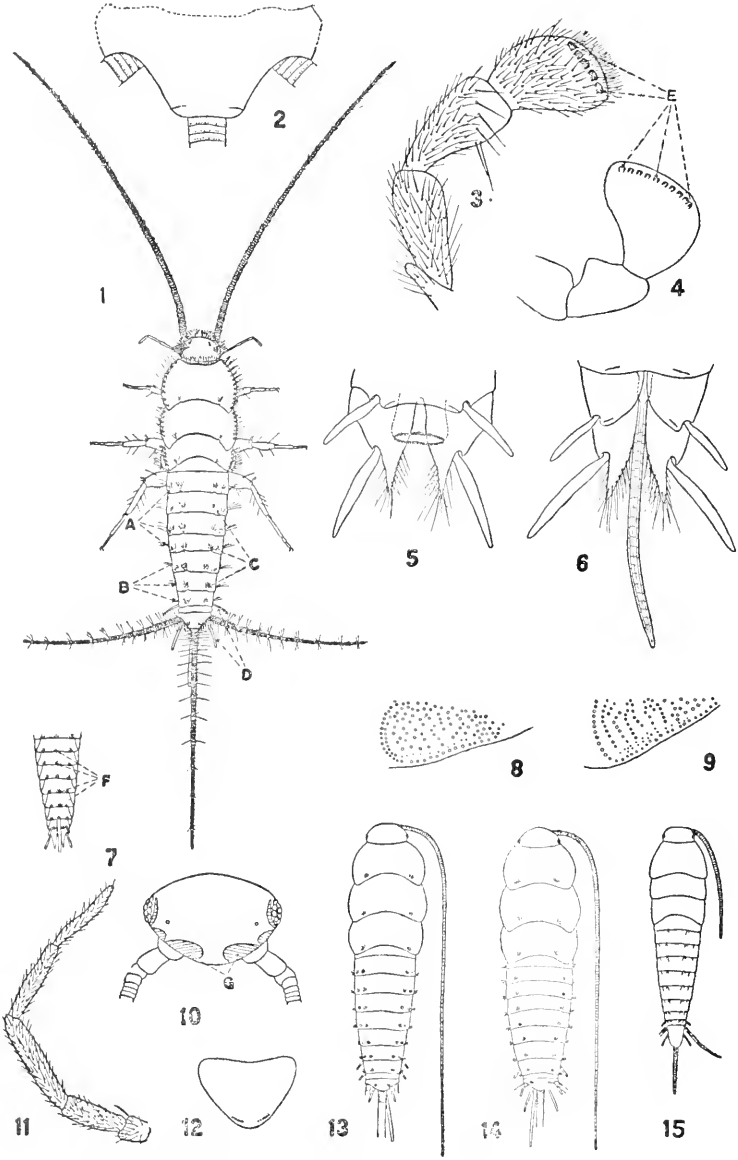

LEPISMATIDAE OF THE UNITED STATES—SLABAUGH.

ENTOMOLOGICAL NEWS

VOL. LI APRIL, 1940 No. 4

The History of the Riker Mount.

By STANLEY F. BAILEY, University of California, Davis, California.

During the past two years, a number of interesting facts have come to hand concerning the Riker Mount. In order that this material may be set down before the information is lost, this brief report has been prepared.

In conversation, Prof. T. I. Storer brought up the question of the origin of the widely-used biological specimen case called the Riker Mount. He stated that he knew that Judge Walter Fry, Park Commissioner, Sequoia National Park, California, had invented a case of this nature many years ago. Upon my inquiry, Judge Fry wrote (August 22, 1938), "Back in 1901 I began making collections of various sorts and mounting them on cardboard. I kept this up until 1905, when it became apparent that these cardboards would soon wear out through use. In 1906, I wrote the Welch Manufacturing Company at Chicago regarding specimen cases, outlining the sort of thing I wanted and the size. The specimen cases I had devised were laborious to make and not adapted to the larger specimens. I wanted something that had a telescope lid and other specimens could be added, not sealed like mine were. The Welch people advised that they could make these for me and quoted prices, and also asked if they might patent the idea.

"From then on until 1917, I purchased my cases from the Welch people. On August 9, 1917, all this collection together with papers and the correspondence with the Welch people, burned."

The writer searched the published records of the Patent Office, but could find no such patent granted to the Welch Company. However, the patent of C. B. Riker, No. 696,750, of April 1, 1902, was located* describing the biological specimen mount or case as it is so commonly used today.

Through the kindness of Mr. C. M. Holmes of the Braun-Knecht-Heiman Company of San Francisco, Mr. Riker's address was located. Mr. Holmes' letter of August 1, 1939, however, presents some interesting additional facts . . . "Today we are in receipt of a letter from Mr. Jordan of the Jordan Paper Box Company of Chicago, in which he says that he finds that Mr. O. Fulda of the Butterfly Store, New York City, who has had long experience with Mr. C. B. Riker, informs him that in about 1900 Mr. Riker was engaged in the business of exporting drugs and made frequent trips to South America. He says that Mr. Riker became interested in butterflies and brought back several collections in wooden boxes. Because of the damage to the Butterflies through this method of packing, he was prompted to design the Riker Mount for the better handling and display of Butterflies and insects."

Upon writing to Mr. Riker of Newark, N. J., I received his reply (August 18, 1939): "Strangely, indeed just by accident, I discovered a pamphlet which I issued in 1903, which gives the whole history of the Riker Specimen Mount, together with its uses. This business was discontinued very shortly after that date and the patent sold to a concern in Providence, Rhode Island. The name of the people to whom I sold the patent has slipped from my mind.

From the above-mentioned pamphlet published by the Sydney Ross Company, 48 Vesey Street, New York, the introduction, historically, is well worth quoting:

For the past thirty years I have been a collector of insects and various other Natural History Specimens. The number of collections of greater or less size which I have seen go to ruin would have completely discouraged a person with less enthusiasm. After seeing a magnificent collection, the result

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* Official Gazette, U. S. Patent Office, V. 99, part 1, page 144, April-May, 1902. Device for mounting entomological specimens. Clarence B. Riker, Maplewood, N. J. Filed Feb. 15, 1900, serial No. 5, 251 (no model).

of five months of busy application on the Amazon River, go to pieces in spite of the most approved cabinets for a pinned collection, I was almost in despair. Only a few months of absence abroad and the consequent lack of attention worked the ruin. After trying various plans and expending a considerable sum of money on patent mounts I became convinced of the entire unsuitableness of the methods in use, and set about to devise a simpler and more practical mount. The Riker Specimen Mount is the result.

In this mount, the insect can be advantageously shown in connection with its life history asd food-plant. Preparations may be made in mounts of uniform size and collections may be kept in library cases, accurately catalogued and readily accessible at all times. This mount has been in use in my own collection for five years, during which time I have not lost a single specimen nor can I observe any signs that any of the preparations are deteriorating to the slightest degree.

A collection on pins will deteriorate in spite of the most careful handling. The raising of the cover of the case or the slightest jar is often sufficient to loosen the brittle and dried wing or antennae and cause them to drop from the body. A fragmentary specimen is worse than none. Dust is certain to collect and dull the brilliancy of coloring, insect pins corrode and cover the body of the insect with verdigris, in fact so numerous are the deteriorating influences that it is well nigh impossible to preserve specimens in presentable condition. Pests (anthrenus and dermestes) add to the difficulty of the collector. Just how they infect specimens placed inside apparently hermetically sealed cases is a problem. The fact however remains that they do and that they cannot be effectually guarded against if the old style "pin mount" is used.

The plaster method offered a new means for mounting lepidoptera, but the detail of preparing the mount to suit the specimen, together with the inconvenience of having a collection in mounts of different size proved a rather serious obstacle to their use. The fragility of the mount and the brittleness of the dried insects made the glass mount of little practical value.

Friends who saw my collection became enthusiastic and advised securing a patent on the mounting device and placing it on the market. Application for the patent was made Feb. 5th, 1900, and the patent was granted on April 1st, 1902.

I can strongly indorse this mount as the most simple and satisfactory of all the means now on the market, for mounting and preserving Natural History Specimens and I can unhesitatingly recommend it for the use of both amateur and professional collectors. During the past year it has given me much pleasure to see these mounts in use in many of our leading Colleges and Experiment Stations as well as in the hands of a gratifying large number of private collectors.

The adaptability of this method for botanical purposes are suggested by its use with the food plants of insects.

The Botanical Mount does not have the deep box back of the insect case but it is similar in every other respect. It excludes the air and prevents dampness from affecting the specimen which causes the faded appearance and musty smell of ordinary herbariums.

As before intimated, my sole purpose in devising these mounts was for my own pleasure. If a small part of the pleasure which I have experienced in their use shall be the lot of those who may use them in the future, I shall feel repaid for my efforts in placing them within their reach.

Maplewood, N. J., April 2nd, 1903 C. B. Riker

Further information obtained from Mr. F. H. Ward, of Ward's Natural Science Establishment, furnishes the name of the concern which Mr. Riker had forgotten. Mr. Ward (September 28, 1939) wrote, "We did not have the department of entomology here until 1910, when we bought out the American Entomological Company's stock. At that time the only source for Riker Mounts, due to the fact that the patent had not run out, was the Angell and Cash Company of Providence, Rhode Island, and we secured our stock from them for a number of years."

Other information concerning the history of the Riker Mount may later come to light. However, at present these are the known facts. The writer has seen the original Fry Mounts and they are fundamentally the same as the present-day Riker Mount. Therefore, it seems that this type of specimen mount was invented independently by Mr. Riker and Judge Fry.

A New Thysanuran, and a Key to the Domestic Species of Lepismatidae (Thysanura) found in the United States.

By Ruth E. Slabaugh, Dept. of Entomology, University of Illinois, Urbana, Illinois.

(Plate III.)

While trapping for *Thermobia domestica* (Pack.), the firebrat, in one of the buildings of the University of Illinois, in January, 1939, an unknown species of the genus *Ctenolepisma* Escherich was caught. More specimens were captured at intervals throughout the year.

Ctenolepisma urbana n. sp.

♀. (Fig. 1).—Length: body, 15 mm.; antennae, 17 mm.; cercus, 10 mm.; median filament, 12 mm.; ovipositor as seen from below averaging 3.5 mm. Width, 3.5 mm. Body elongate, slender; thorax slightly wider than abdomen, which tapers weakly posteriorly. Body color white; dorsal surface with slate grey scales, when freshly molted much darker; ventral surface with white scales; setal tufts of head yellowish-golden; legs white, with golden hairs; cephalic aspect of distal end of femur with grey and white scales; cerci and median filament reddish with light segments at intervals.

Setal tufts of head prominent, with many radiating setae. Distal segment of labial palpus slightly shorter than the penultimate one, and weakly hatchet-shaped, with five large sensory papillae (Fig. 3); number of setae on inner edge of lacinia varying from 8-10; maxillary palpus 5-segmented (Fig. 11). Thorax strongly arched, more than half length of abdomen. Posterior edge of metasternal plate narrow, rounded (Fig. 12). Tergite X (Fig. 2) trapezoidal, with tip narrowed, very slightly emarginated, length less than combined lengths of tergites VIII and IX. Outer dorsal setal combs (Fig. 1, *A*) on abdominal tergites II to VI; thus, abdominal tergites II to VI with 3+3 setal combs (i.e., three on each side); tergites VII and VIII with 2+2; IX with none; and X with 1+1. Two pairs of styli, second pair longer than first; ovipositor long and slender, extending beyond processes of sternite IX (Fig. 6).

♂.—Like the female, except for differences in genitalia (Fig. 5).

This species differs from *Ctenolepisma quadriseriata* (Pack.) (Fig. 13), the only other species of this genus recorded from the United States, by the number of styli, shape of tergite X, by having six outer dorsal setal combs instead of five, and by scale coloring; it agrees with it in the comparative length of ovipositor and antennae. It is very similar to *Ctenolepisma longicaudata* Esch., a species of economic importance in Africa and Australia, but differs in the following respects. The species, *longicaudata*, has from 9-12 sensory papillae on the labial palpus (Fig. 4, *E*) while the five papillae in *urbana* (Fig. 3, *E*) were found constant in every stage of development examined, including first instar nymphs. The setae in the medial setal tufts of the head in *urbana* are much more numerous and more haphazard in position (Fig. 8; 10, *G*); in *longicaudata*, they are arranged in rather definite and widely spaced rows (Fig. 9). The slight indentation in the tip of tergite X is more consistent than in *longicaudata*, specimens of which were examined that had no emargination.

Holotype female. Urbana, ILLINOIS, June, 1939, in a basement room. *Allotype* and *paratypes* from same locality. *Holotype, allotype, paratypes* (2 ♂, 2 ♀), deposited in collection of the Illinois State Natural History Survey, Urbana, Illinois. Also, *paratypes*, 2 ♂, 2 ♀, in the United States National Museum, no. 53977; *paratypes*, 1 ♂, 1 ♀, in Museum of Comparative Zoology, Harvard University.

Remarks. 40-50 specimens were trapped in glass jars with flour bait, in two connecting rooms in a University building. One of these rooms, an infrequently used storeroom containing old museum exhibits from all over the world, suggests a possible introduction of this species from some other country.

Appreciation is expressed to Miss Eder Lindsay, University of California, Berkeley, California, for supplying specimens of *C. longicaudata* for comparison.

BIOLOGICAL NOTES.

The adults of this species, compared to the quick moving *T. domestica*, are much more quiet and move about slowly and ponderously, while the nymphs are more active. It has been found that they thrive in a high percent of relative humidity and a temperature of from 80-90° F. Whole wheat flour is readily accepted as food.

Eggs were laid by captured individuals in May and October and very young nymphs were trapped during these months. The eggs, creamy white in color, oval in shape, averaging 1.0 mm. in length and 0.77 in width, hatch in from 20-25 days. The young nymphs split the shell by means of a spine egg-burster situated on the head between the bases of the antennae. First instar nymphs are opaque white in color, without scales, with the antennae and caudal appendages short and stout, and the tarsus with a single segment. In the second instar, the body has a shiny, transparent appearance, the appendages have increased in length, and the tarsus has two segments. The head and posterior margins of the thoracic and abdominal segments have a rough, wide network of reddish-brown color. This coloring persists until scales appear in the fifth instar, but grows fainter in the third and fourth instars. The styli on the ninth sternite first appear in the fifth instar, and in one individual observed, the second pair appeared in the ninth instar. The total number of molts has not been observed.

Key to Domestic Species of Lepismatidae in the United States.

The following key is included to aid in the identification of those species of Lepismatidae that are found in houses in the United States. *Thermobia domestica* and *Lepisma saccharina* are the two very common species of economic importance.

1. Abdominal sternites with medial setal combs (Fig. 7, *F*); abdominal tergites without outer dorsal setal combs (i. e., 2 rows of setal combs on each side, or setae not in brushes or combs) (Figs. 14, 15) 2
1. Abdominal sternites without medial setal combs; abdominal tergites with outer dorsal setal combs (i. e., 3 rows of setal combs on each side) Figs. 1, *A*; 13) 3
2. Maxillary palpus six-segmented; cephalic and abdominal setae in tufts or combs, not single; tergite X trapezoidal, posterior margin not indented; ovipositor extending considerably beyond tergite X; three pairs of styli in female (Fig. 14), two in male; color of scales brown and tan. *Thermobia domestica* (Pack.)
2. Maxillary palpus five-segmented; cephalic and dorsal abdominal setae occurring singly or in small groups, never

in tufts or combs; tergite X long, rounded on posterior margin; ovipositor not visible beyond tergite X; two pairs of styli in both sexes; color of scales silver grey (Fig. 15).
Lepisma saccharina Linne.

3. Two pairs of styli (Fig. 1, *D*); outer dorsal setal combs on abdominal tergites II-VI (Fig. 1, *A*); tergite X trapezoidal (Fig. 2), with the posterior margin weakly emarginated; color of scales slate grey.
Ctenolepisma urbana n. sp.

3. Three pairs of styli; outer dorsal setal combs on abdominal tergites II-VII (Fig. 13); tergite X short, with the posterior margin not indented; color of scales violet brown, with four longitudinal stripes on abdomen.
Ctenolepisma quadriseriata (Pack.)

Note.—It is often advisable to clear and stain specimens so that the structures can be more easily seen.

Explanation of Plate III.

Figs. 1-3. *Ctenolepisma urbana* n. sp.; 1, Entire insect, dorsal view, *A*, outer dorsal setal combs, *B*, lateral setal combs, *C*, inner dorsal setal combs, *D*, styli; 2, Tergite X; 3, Labial palpus, *E*, sensory papillae, which distinguish this species from *C. longicaudata*.

Fig. 4. *Ctenolepisma longicaudata*, labial palpus, *E*, sensory papillae.

Figs. 5, 6. *C. urbana*; 5, Sternites 8 and 9 and terminalia, male; 6, the same, female.

Fig. 7. *Lepisma saccharina*, ventral view of abdomen, *F*, medial setal combs.

Fig. 8. *C. urbana*, medial cephalic setal area showing arrangement of setae.

Fig. 9. *C. longicaudata*, medial cephalic setal area showing arrangement of setae.

Figs. 10-12. *C. urbana*; 10, dorsal view of head, *G*, medial setal areas; 11, maxillary palpus; 12, metasternal plate.

Fig. 13. *Ctenolepisma quadriseriata*, dorsal view.

Fig. 14. *Thermobia domestica*, dorsal view.

Fig. 15. *Lepisma saccharina*, dorsal view.

Undescribed Species of Crane-Flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part VI

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts.

(Continued from page 85.)

Pedicia (Tricyphona) gigantea n. sp.

Size very large (wing 23 mm.); mesonotum light gray, the praescutum with four very distinct brown stripes; halteres yellow; femora obscure yellow basally, passing into brown at near midlength, the tips blackened; wings with a brownish yellow tinge, with a scarcely indicated dark seam on *r-m*; Sc_2 opposite origin of *Rs*; R_{2+3+4} present, in oblique alignment with *r-m*.

Sex? Wing 23 mm.

Rostrum gray; palpi with basal two segments yellow, outer segments dark brown. Antennae with scape gray pruinose; pedicel brownish black, flagellum broken. Head light gray.

Mesonotum light gray, the praescutum with four very distinct brown stripes, the intermediate pair narrowly separated by an obscure line of the ground color; lateral stripes more grayish brown than the intermediate pair; scutellum paler gray. Pleura clear gray. Halteres yellow, the knobs undarkened.

Legs with the coxae light gray pruinose; trochanters obscure yellow; femora obscure yellow on basal half, passing into brown outwardly, the tips blackened; tibiae obscure brownish yellow, the tips narrowly brownish black; tarsi black.

Wings with a brownish yellow tinge, the prearcular and costal portions more saturated yellow; stigma deeper yellow; a very narrow to scarcely indicated dark seam on *r-m*; veins dark brown, a little brighter in the flavous portions. Venation: Sc_2 opposite origin of *Rs*, the latter long, angulated at origin, in longitudinal alignment with R_5; R_{2+3+4} present, in oblique alignment with *r-m* and about one-half as long; cell 1*st* M_2 elongate; cell M_1 with petiole subequal to *m*; *m-cu* a short distance beyond fork of *M*.

Abdomen broken beyond the second segment; basal tergite light yellow on sides and on cephalic portion, the remainder dark brown; second tergite with lateral border pale yellow; basal ring bright yellow, the extreme cephalic portion and a narrow sublateral stripe dark brown; posterior ring chiefly occupied by two nearly confluent brownish black stripes; basal two sternites chiefly pale. From the nature of the tergal pattern, it is probable that the succeeding tergites are uniformly darkened or with a very restricted median brightening only.

Habitat. — NORTH CAROLINA. *Holotype*: Sex? Black Mountains, May 23, 1912 (Wm. Beutenmuller); in the Academy of Natural Sciences, Philadelphia, from the Dietz Collection.

I am greatly indebted to Mr. Rehn and Mr. Cresson for the privilege of describing the very interesting species here considered. In December, 1912, I spent a most pleasant week with Dr. and Mrs. Dietz at Hazleton and together we examined the extensive Beutenmuller collection made the preceding spring in the Black Mountains of western North Carolina. Outstanding in this rich material was the single specimen upon which the above species is based; it is my recollection that the specimen then possessed an abdomen and that it represents the male sex. The specimen still bears the label "*Pedicia* sp." in my writing affixed at that date. Among all other regional species of *Tricyphona* the fly stands out by its great size, which rivals or exceeds that of species in the typical subgenus *Pedicia*, all of which have the characteristic dark pattern of the wings. Among the known species of *Tricyphona* within our limits, the fly comes closest to *P.* (*T.*) *auripennis* (Osten Sacken) but is amply distinct in its coloration, venation and unusual size.

Chionea stoneana n. sp.

Size small (length, about 4 mm.); general coloration dark brown, the antennae, legs and palpi brownish black; antennae 5-segmented, with only two flagellar segments beyond the fusion; male hypopygium with the gonapophyses protruding from the genital chamber as parallel darkened rods; ovipositor with cerci compressed, the lower edge conspicuously arcuate.

♂. Length about 4 mm.

♀. Length about 4-4.2 mm.

General coloration (in alcohol) dark brown, the abdominal membranes paler; antennae, palpi and legs brownish black. Antennae 5-segmented, with only two flagellar segments beyond the fusion-segment, the total length of these free segments subequal to the length of the fusion. Maxillary palpi with terminal segment short-oval, obtusely rounded at apex. Legs with femora moderately incrassated, the setae abundant but not as erect and conspicuous as in *alexandriana*. Male hypopygium with gonapophyses protruding from the genital chamber as parallel, darkened rods that are straight or nearly so throughout their length. Ovipositor with cerci subacute at tips, more compressed-flattened and with ventral edge more arcuate than in *alexandriana*; hypovalvae obtuse at tips.

Habitat.—ILLINOIS. *Holotype*: ♀, on microscope slide, Urbana, December 11, 1938, in mouse nest (P. C. Stone); Collector's No. 220. *Allotopotype*, ♂, on microscope slide, in nest of field mouse, *Microtus ochrogaster* Wagner, December 16, 1939. *Paratopotypes*, 1 ♀, in alcohol, January 12, 1939, in mouse nest. 1 ♂, 1 ♀, February 2, 1940. I am indebted to the collector for the privilege of retaining the type male and female. The paratypes are preserved in the State Natural History Collection, Urbana, and in the Museum of Comparative Zoology.

I take unusual pleasure in dedicating this interesting crane-fly to the collector, Mr. Philip C. Stone, who discovered the materials upon which the species is based while making a study of the arthropoda in the nests of the Prairie Field Mouse. *Chionea stoneana* is most generally similar to *C. alexandriana* Garrett (Proc. Ent. Soc. Washington, 24: 62-64; 1922) of western North America. Both species have the number of antennal segments much reduced, in the present form there being only five, with two simple segments beyond the fusion-segment. Although *C. alexandriana* was described as having five antennal segments, material at hand shows six segments in the male, there being three segments beyond the fusion; in the female, the most basal of these three segments is apparently only partially separated from the fusion.

The present case shows the greatest reduction in number of antennal segments as yet discovered in the genus or in the entire family Tipulidae. Kratochvil (Bull. Soc. Ent. France, 1936: 250) has arranged the western Palaearctic species of *Chionea* into two groups, one of which, the *Chioneæ brachycornæ* (more correctly *brachyceræ*) includes those species with six or seven antennal segments. The definition should be modified to include the 5-segmented condition of the present fly.

Erioptera (Ilisia) sweetmani n. sp.

General coloration of mesonotal praescutum orange-yellow, with indications of four more reddish brown stripes on posterior half; pleura light gray, striped longitudinally with dark brown, the latter color also including the lateral margin of the praescutum and scutum; femora chiefly blackened, the bases of fore femora and a post-medial ring on all legs yellow; tibiae uniformly yellow; wings light yellow, restrictedly patterned with dark brown, including a narrow but entire band at cord; *m* lying far distad; male hypopygium with the tergite bearing a median oval spatulate lobe that is provided laterally with long spinous setae; shoulders of tergite with groups of smaller spines.

♂. Length about 4.5 mm.; wing 5.5 mm.

Rostrum gray; palpi black. Antennae with scape blackened; succeeding segments yellow, the outer flagellar segments passing into brown; basal flagellar segments subcylindrical, the outer segments more elongate; longest verticils unilaterally distributed. Head brownish gray.

Pronotum yellowish gray medially, blackened on sides. Mesonotal praescutum clear orange-yellow, with indications of four more reddish brown stripes, especially evident on the posterior half of sclerite, the lateral margin of praescutum and scutum conspicuously brownish black; pseudosutural foveae and humeral pits pale; scutum and scutellum brownish gray, the scutal lobes a little darker; postnotum grayish brown. Pleura light gray, striped longitudinally with brown, including a dorsal line from the fore coxae across the ventral anepisternum onto the dorsal pteropleurite; meral region extensively darkened; dorso pleural membrane yellow. Halteres uniformly yellow.

Legs with the coxae gray; trochanters grayish yellow; femora chiefly blackened, the proximal fourth of fore pair obscure yellow; all femora with a narrow yellow ring beyond midlength, this narrowest on the fore and middle legs, broader on the posterior pair where it equals in extent the outermost black ring; extreme tips of femora brightened; tibiae and tarsi uniformly light yellow, only the outer tarsal segments darkened.

Wings light yellow, restrictedly patterned with dark brown spots, including a narrow but entire band at cord, ending at vein *Cu;* other spots at origin of *Rs*, Sc_2, midlength of vein *Cu*, fork of M_{3+4}, *m* and a marginal series at ends of all longitudinal veins, smallest on R_4, larger on the anal veins; veins yellow, darkened in the clouded areas. Venation: *m* lying far distad, the outer section of vein M_3 less than twice *m* alone.

Abdomen dark brown, sparsely pruinose; hypopygium dark. Male hypopygium with the tergite distinctive; a medial oval spatulate lobe that is provided along its lateral margins with long spinous setae, the longest about one-third the length of the lobe; apex of lobe obtusely rounded; lateral shoulders of tergite on either side of median lobe with additional strong spinous setae. Outer dististyle relatively stout but regular in outline, without an outer lobe as in *armillaris*. Inner dististyle with apical blade narrow, much more so than in *lævis*. Gonapophyses appearing as slender black horns, the tips converging toward the midline, without a serrulate dilation before apical spine, as in *armillaris*.

Habitat.—Georgia. *Holotype*: ♂, Toccoa Falls, Stephens County, on cañon rocks and cliffs, April 19, 1939 (H. L. Sweetman).

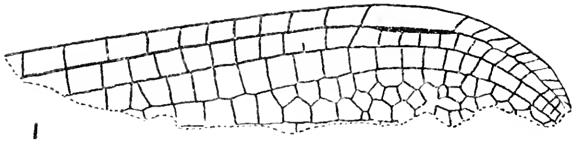
I am very pleased to name this interesting and unusually beautiful crane-fly in honor of my colleague at the Massachusetts State College, Dr. Harvey L. Sweetman. In its genitalic characters, it is quite distinct from *Erioptera* (*Ilisia*) *armillaris* Osten Sacken and *E.* (*I.*) *lævis* Alexander, both of northeastern North America.

A Dragon-fly from the Eocene of Colorado (Odonata: Agrionidae).

By T. D. A. Cockerell, University of Colorado, Boulder, Colo.

In the vicinity of Roan Creek, north of DeBeque, Mr. John Player, of the University of Colorado Museum, found a very beautiful fossil dragon-fly in the Green River shales. The precise locality is along Scott's Trail, 100 feet or more above the rim.

The insect appears to be most nearly related to *Hypolestes* Gundlach (*Ortholestes* Calvert) from the West Indies, and the continental American genus *Archilestes*. It is so near to *Hy-*



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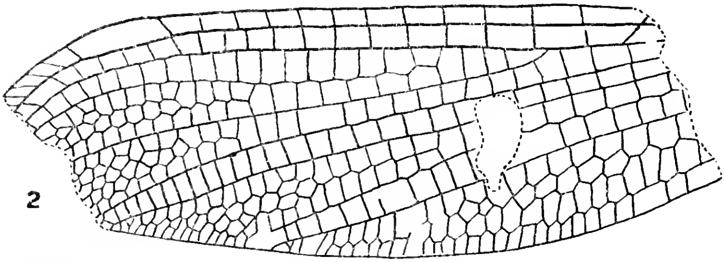

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polestes that I at first thought it might be referred to that genus, but on closer analysis it is evidently distinct. In giving the generic characters I follow the method of Calvert for *Ortholestes* (Proc. Acad. Nat. Sci. Phila., 1893, p. 377).

EOLESTES new genus.

(1) Medium sized species with robust thorax and unclouded wings, the anterior wing 31 mm. long.

(2) Nodus 11.6 mm. from base of wing and 14.5 from stigma; petiole slightly over 5 mm. long.

(3) Quadrangle with upper side longer than base, but not so long as the very oblique apical side, which meets the lower margin at a very acute angle. Thus the quadrangle is more like that of *Archilestes* than that of *Ortholestes*. The base of the quadrangle is however narrow (style of *Megalestes*), not broad as in *Archilestes*.

(4) Stigma large and long, as in *Archilestes*, but not appreciably swollen below. Its lower side is bounded by 4½ cells in one wing, 3½ in another (the upper wing of the opposite side).

(5) There are 12 to 14 cells on costa between nodus and stigma; this nearly agrees with *Archilestes; Ortholestes* has more.

(6) Nodus to second antecubital crossvein is 5.3 mm., apparently a shorter distance than in *Archilestes*.

(7) The nodal sector (M_2) arises 2½ cells beyond subnodus, essentially as in *Ortholestes*, not as in *Archilestes*.

(8) The ultra-nodal sector (M_1a) arises four cells beyond origin of nodal sector, and is bounded above by a series of cells precisely as in *Ortholestes;* below it are first seven simple cells, then four double ones, and after that there are three rows of small cells, all this essentially as in *Archilestes*. The vein M_1a is not evidently curved or arched below stigma.

(9) The subnodal sector (radial sector) has above it, from origin of M_2 onward, 11 or 12 simple cells, followed by three double, after which there is a reticulated pattern of small cells, reaching as many as five in a transverse row. This resembles *Archilestes* rather than *Ortholestes*, though the latter varies, as shown by the figures of Calvert and Munz.

(10) Below the subnodal sector is a regular series of simple cells, the outer ones much higher than long, this agreeing essentially with *Megalestes*. Thus the median sector (M_4) remains parallel with and closely following the subnodal sector, quite unlike *Ortholestes*, but suggesting *Megalestes*.

(11) Below the median sector, from the level of the subnodus out, are first about seven simple cells, then six or seven double ones, after which there are three or four small cells in a transverse row. This is suggestive of *Archilestes*.

(12) Cu_1 and Cu_2 are separated by a row of simple cells as in *Ortholestes*.

(13) Below Cu_2 the wing is widened, with a dense reticulation of cells, four in a transverse row at the widest part. This is quite unlike *Ortholestes* or *Archilestes*, and suggests such genera as *Devadatta* and *Diphlebia*.

(14) The femora have short widely spaced bristles, the distance between them greater than the length of one; the tibiae have longer bristles, on the inner side longer than the width of the tibia.

Eolestes synthetica new species

Characters as cited above.

The figures represent the anterior wings of the two sides. They were made by Professor Hugo Rodeck, who drew the veins over a photograph which was then bleached out. As originally collected, the body and bases of the wings could not be seen. With great difficulty, Professor Rodeck uncovered these sufficiently to show the characters described. The specimen is in the University of Colorado Museum.

Entomology at Dartmouth College.

President Ernest Martin Hopkins recently announced the establishment at Dartmouth College of the Henry Clinton Fall Fund for the promotion of the study of entomology. The fund is a memorial to the late Henry Clinton Fall of Tyngsboro, Massachusetts, Dartmouth graduate and internationally famous entomologist, from whose estate a capital fund of $5,000 has been received by the college. So that income for entomological research may be available at once, the bequest provides an additional amount for immediate expenditure.

The first use of the Fall Fund by the college will be to purchase entomological equipment for the Dartmouth College Museum, which plans a survey of the insect fauna of the Hanover area as part of its program to promote knowledge of the economic entomology of the region. The survey will also result in important additions to the 40,000 specimens already possessed in the various entomological collections at Dartmouth.

Dr. Fall, who died last November in his 77th year, was an authority on American beetles. He discovered more than 1400 new species during the research which he carried on in addition to his duties as high school teacher, and collected some 200,000 mounted specimens. A graduate of Dartmouth in 1884, he was honored with the degree of Doctor of Science in 1929. He was made a member of the permanent committee of the International Congresses of Entomology at Brussels, Belgium, in 1910, and also held membership in the Entomological Society of America, the American Association for the Advancement of Science, and the American Academy of Arts and Sciences.

The entomological collections in the Dartmouth College Museum have grown in the last ten years from virtually nothing to more than forty thousand specimens. Three quarters of these were acquired in 1929 through two gifts—the John Dexter Locke collection of moths, butterflies, and beetles, numbering over 25,000 specimens, which was presented by Mrs. Moses Dyer Carbee of Haverhill, New Hampshire; and the Charles Pliny Whitney collection of North American butterflies and moths, containing nearly 5000 specimens, which was presented to the College by Dr. Herbert Stillman Hutchinson, Dartmouth '75, and recently transferred from the Department of Biology to the Museum.

The remaining 10,000 specimens are the result, in large measure, of the collecting activities of the Museum's staff and students, directed chiefly to the filling in of other groups of insects not represented in these two collections. Numerous small collections have also been presented in recent years, and the foundation for a good general collection now exists.

Until now, however, the growth and development of the collections have been severely handicapped by insufficient storage containers and other equipment, and field work has necessarily been curtailed. The income from the Henry Clinton Fall Fund will be used primarily for this purpose so that storage and study facilities may keep pace with the growth of the collection.

While the aim of the Museum is to build up a general teaching collection of insects, field work will naturally be chiefly in Vermont, New Hampshire and Maine, where a thorough survey is being planned. In so far as New Hampshire is concerned, the Museum will work in close cooperation with the recently organized Biological Institute of the University of New Hampshire.—*Dartmouth College News Service.*

On a Collection of Centipeds from Texas, New Mexico and Arizona (Chilopoda).

By Ralph V. Chamberlin and Stanley Mulaik,
University of Utah, Salt Lake City.

The collection of chilopods upon which this article is a report was made by the junior author and Mrs. Dorothea Mulaik at various times from 1933 to 1939, but mostly during the last of these years. Most of the collecting was done in Texas in Hidalgo County, in the extreme southeastern corner of the state and in and near Kerr County, in the south central section. The collecting in New Mexico was done at Camp Mary White, about fifteen miles southeast of Cloudcroft, in Bear Canyon, at an elevation near 8,000 feet. Only two species recorded here are from Arizona. Types are at present deposited in the collection at the University of Utah.

Cryptopidae.

Cryptops eques new species.

Head overlapping the first dorsal plate.

First dorsal plate with a transverse semicircular sulcus behind the margin of the head. Claws of prehensors of normal length; anterior margin of prosternum smooth and essentially straight. Last dorsal plate with caudal margin strongly convex but somewhat straight over middle portion.

Anal coxae truncate behind, not at all produced, the caudal margin with a few short setae. Femur of anal legs with numerous spines below and laterally, leaving no naked area below, replaced above by finer spines or short setae. The tibia clothed like the femur. Metatarsus with three teeth below, the first joint of the tarsus with two.

Length, about 6.5 mm.

TEXAS: Kerr County, Raven Ranch. One specimen taken in August and many in December, 1939; Brooks County, December, 1939.

The species seems to be distinct from *C. hyalinus* in the differences in the sculpturing of the first dorsal plate, i. e., the semicircular impression in place of the angulation and depression at the middle in *hyalinus*, and in the fewer number of teeth on metatarsus and tarsus I.

SCOLOPENDRIDAE.

SCOLOPENDRA HEROS Girard. In Marcy's Rep. Expl. Red River, 1854, p. 272, pl. 18.

TEXAS: Brewster County, Rock Springs, July, 1933; Edinburg, May 1936 and October, 1937; Kerr County, at the Raven Ranch, July and August, 1939. Many specimens.

S. VIRIDIS Say, Proc. Acad. Nat. Sci. Phila., 1821, p. 110.

TEXAS: Kerr County, Raven Ranch, July-August, and December, 1939, many specimens; Bandera County, 7 miles north of Medina.

S. POLYMORPHA Wood, Proc. Acad. Nat. Sci. Phila., 1862, p. 11.

ARIZONA: 32 miles south of Prescott, Sept. 8, 1939; east of Geronimo, 7 Sept., 1939; Navajo Indian Reservation, Sept. 9, 1939; and Junction on Route 66, Sept. 7, 1939.

S. MORSITANS Linne.

TEXAS: Big Springs. A young specimen taken in December, 1939, is referred with some doubt to this species.

HIMANTARIIDAE.

GOSIPHILUS LATICEPS (Wood).

STRIGAMIA LATICEPS Wood, Journ. Acad. Sci. Phila., 1862, ser. 2, vol. 5, p. 49.

TEXAS: Kerr County, Raven Ranch, Aug., 1939, two specimens; Bandera County, one young specimen with 87 pairs of legs taken in December, 1939.

G. AUXIMUS Chamberlin, Entomological News, 1938, vol. xlix, p. 254.

TEXAS: Edinburg. Male holotype taken Oct. 16, 1936.

SCHENDYLIDAE.

SIMOPORUS new genus.

Labrum with median arc wide, toothed. Mouthparts in general structure as in *Nyctunguis*. Some of the sternites with pores in a definite, undivided field. Coxae of anal legs with a single large pore. Tarsus of last legs two-jointed, terminating in a well-developed claw.

Genotype.—Simoporus texanus, new species.

This genus is close to *Nyctungius* from which it differs in having only one large gland on each anal coxa instead of two.

Simoporus texanus new species.

Head longer than wide (cir. 7:6); posterior margin truncate, the anterior convex; sides convex; widest near middle. No frontal suture present. Basal plate with greatest width about 2.8 times the length. Articles of antennae of moderate length, the ultimate about equal in length to the two preceding taken together. Labrum with median arc bearing about 17 teeth of which the 3 or 4 at each end have fine curved tips and suggest the form of the pectinations each side of the arc; the ten teeth of middle portion of arc darker, more conical and closer together. Mandible bearing typically five long teeth not united into distinct blocks.

Joints of prehensors unarmed within; no chitinous lines present; claws when closed equalling anterior margin of head or nearly so. Spiracles all circular. Ventral pores numerous; in a median circular area on the sternite. Last ventral plate wide. Coxae of last legs large, the axis extending caudolaterad. A single large pore on each side at edge of sternite. Anal pores not evident.

Genital appendages rather slender, biarticulate in both sexes. Anal legs in female slender throughout, terminating in a well developed claw. In the male the anal legs are crassate, especially the third, fourth and fifth articles, while the tarsal articles are abruptly thinner, with the ultimate thinner than the penult which is somewhat intermediate.

Pairs of legs 55-61, but mostly 57 or 59.

Length, about 25 mm.

TEXAS: 2 miles north of Medina, Bandera County. Six specimens, males and females, taken Dec. 16, 1939.

GEOPHILIDAE.

ARENOPHILIUS UNASTER (Chamberlin).

GEOPHILUS ATTENUATUS UNASTER Chamberlin, Ann. Ent. Soc. America, 1909, vol. 2, p. 179.

ARENOPHILIUS UNASTER Chamberlin, Bull. Mus. Harvard, 1912, vol. 54, p. 417.

TEXAS: Edinburg, 1934; Kerr County, Raven Ranch, July, August and December, 1939, common; Brooks County, north of Alice, December; Bandera County, north of Medina, December; Kendall County, December; Big Springs, 15 December, 1939.

GEOPHILUS MISSOURIENSIS Chamberlin, Entomological News, 1928, vol. XXXIX, p. 153.

TEXAS: Edinburg. One specimen taken 13 Feb., 1939.

PACHYMERIUM FERRUGINEUM (C. L. Koch).

Geophilus ferrugineus C. L. Koch, Syst. der Myr., 1847, p. 187.

TEXAS: 5 miles northwest of Hidalgo. One specimen taken Nov. 28, 1936.

Linotaenia kerrana new species.

On the last intercalary segment a pleurite on each side adjacent to the tergite is distinctly developed and separated from the tergite. Body very sparsely hirsute. Anal glands distinct.

Cephalic plate with posterior margin angular, the border well overlapped by the basal plate. Sides of cephalic plate convex, the plate narrowing cephalad, rounded anteriorly. Antennae with ultimate article somewhat longer than the two preceding taken together.

Claws of prehensors normal; each bearing at base a rather small acute tooth. Spiracles small, circular, the anterior not enlarged.

Anal legs in female equal in size to the penult legs. Anal coxae large, bearing few, typically four, moderately large pores on each, these arranged along margin of sternite, the last ventral sternite triangular.

Pairs of legs, 45.

Length, 20 mm.

TEXAS: Kerr County, Raven Ranch. One female taken in December, 1939.

Related to *L. chionophilya* (Wood) but apparently quite distinct in the form of the last sternite and in the number and arrangement of the coxal pores.

(To be continued.)

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within ( )follows; then** the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Anon.—Entomology at Dartmouth College. [68] 91: 184. **Ayyar, T. V. A.**—Entomology in India—a retrospect. [Indian J. Ent.] 1: 9-16. **Earle, O.**—Insect factories. [Nat. Hist.] 45: 44-45, ill. **Evans, W. H.**—Scientific names: a plea. [9] 73: 5-7. **Fall, H. C.**—Obituary by E. G. Linsley. [55] 16: 1-3, portrait. **Hafez, M.**—Some ecological observations on the insect-fauna of dung. [Bull. Soc. Fouad d'Ent.] 1939: 241-287, ill. **Janssens, E.**—See under Coleoptera. **Mani, M. S.**—Autophotographs of some Indian butterflies. [Indian J. Ent.] 1: 111. **Pennington, C. E.**—List of Bulletins of the Agricultural Experiment Stations for the calendar years 1937 and 1938. [U. S. Dept. Agric.] Misc. Publ. No. 362: 91 pp. **Pruthi, H. S.**—Record of some insects from a hot spring in the Kulu Valley, Punjab. [Indian J. Ent.] 1: 65-67. Host selection by insect parasites. [Indian J. Ent.] 1: 115-116. **Pruthi & Samuel.**—A micro-cage. [Indian J. Ent.] 1: 110. **Sachtleben, H.**—Dr. Walther Horn zum Gedächtnis. [110] 6: 217-222. **Vanni, V.**—Osservazioni e ricerche sperimentali in una endemia di Leishmaniosi cutanea. [Mem. R. Acc. d'Italia] 10: 87-104, ill. **Vogel, H. H.**—The Koo-Mik. [New England Nat.] No. 5: 10-11, ill.

ANATOMY, PHYSIOLOGY, ETC.—Agar, W. E.—A gynandromorph grasshopper. [93] A, 109: 139-140, ill. **Ahmad, T.**—Ecological studies on the spotted bollworms of cotton and their parasites: I.—The pre-imaginal development and viability of Earias fabia and Microbracon lefroyi under different conditions of temperature and humidity. [Indian J. Ent.] 1:17-47. **A. [yyar], T. [V. R.],**—Influence of the quality of food on the development of insects. [Indian J. Ent.] 1: 116-117. **Balch, R. E.**—Further notes on the fall cankerworm and its control by "Solid-stream" spraying. [Sci. Agric.] 19: 411-423, ill. **Batra, R. N.**—Phototropism in Schistocerca gregaria (Orth. Acrid.). [Indian J. Ent.] 1: 113. **Bhatia, D.**—The influence of duststorms on the migrations of the desert locust. [Indian J. Ent.] 1: 49-51. **Bounhiol, J.-J.**—Recentes recherches experimentales sur les insectes. Les fonctions des corps allates (corpora allata). [Arch. Zool. Exp. & Gen.] 81, N. & R.: 54-64, ill. **Chatterjee, P. N.**—On the biology and morphology of Apanteles machaeralis (Braconidae, Hymen.). [Indian For. Rec.] 5: 381-395, ill. **Chauvin, R.**—Sur quelques différences pigmentaires entre les Criquets pèlerins grégaires et solitaires. [77] 132: 397-398. **Churney, L.**—A contribution to the anatomy and physiology of the salivary gland system in the larva of Chironomus (Dipt.). [J. Morph.] 66: 391-407, ill. **Codreanu, R.**—Recherches biologiques sur un Chironomide Symbiocladius rhithrogenae ectoparasite "cancerigene" des Ephemeres torrenticoles. [Arch. Zool. Exp. & Gen.] 81: 1-283, ill. **Corey, H. I.**—Chromomere vesicles in Orthopteran cells. [J. Morph.] 66: 299-321, ill. **Ehrenhardt, H.**—Experimentelle untersuchungen und freilandbeobachtungen uber den einfluss von Kälte und eis auf die blutlaus. [110] 6: 257-285, ill. **Eigenbrodt, H. J.**—The relationship of body size and egg size in Drosophila. [Trans. Ill. State Acad. Sci.] 32: 204-205. **Erschova**—(see Kosminsky, Erschova & Gusseva.) **Ferris & Pennebaker.**—The morphology of Agulla adnixa (Neuroptera: Raphidiidae). [Microent.] 4: 121-142, ill. **Ferris & Rees.**—The morphology of Panorpa nuptialis (Mecoptera: Panorpidae). [Microent.] 4: 79-108, ill. **Florkin & Frappez.**—Sur l'ammoniaque sanguine des Arthropodes. [77] 132: 486-487. **Frolova, S. L.**—Development of the giant nuclei of salivary gland type in different organs of Drosophila and their comparison with metabolic nuclei of larvae and imago. [Biol. Zhur.] 7: 703-736, ill. [Russian with English summary.] **Gertsch, W. J.**—(see under Arachnida). **Gohrbandt, I.**—See under Lepidoptera. **Gusseva.**—(Kosminsky, Erschova & Gusseva). **Hatcher, E.**—The consortes of certain North Carolina Blattids. [J. Elisha Mitchell Sci. Soc.]

55: 329-334. [**Hilton, W. A.**—Nervous system & sense organs] LXXXI: Coleoptera. [13] 31: 50-71, ill. **Jahn & Crescitelli.**—Diurnal changes in the electrical responses of the compound eyes. [92] 78: 42-52, ill. **Kauffmann, O.**—Der Luzerneblattnager (Phytonomus variabilis) [Coleo: Curculion.] [65] 26: 312-358: 387-448, ill. **Kohler, W.**—Der Einfluss verschiedenen Ernahrungsgrades auf ausseres Korpermerkmale, auf die Entwicklungsgeschwindigke.t Lebensdauer und Fortpflanzungsfahigkeit von Ephestia kuhniella. [97] 60: 34-69, ill. **Kosminsky, Erschova & Gusseva.**—Contributions to the genetics of the silk worm (Bombyx mori). XIX. New data on the "Recessive multilunar" character. [Biol. Zhur.] 7: 813-826, ill. [Russian with English summary.] **Krause, G.**—Die regulationsfahigkeit der Keimanlage von Tachycines (Orth.) im extraovatversuch. [87] 139: 639-723, ill. **Kuhn & Piepho.**—Uber die Ausbildung der Schuppen in Hauttransplantaten von Schmetterlingen. [97] .60: 1-22, ill. **Laabs, A.**—Brutfursorge und Brutpfluege einiger Hydrophiliden mit Berucksichtigung des Spinnapparates, seines ausseren Baues und seiner Tatigkeit. [46] 36: 123-178, ill. **Lal, K. B.**—The effect of host size upon the sex ratio of hymenopterous parasites and its bearing upon biological control work. [Indian J. Ent.] 1: 118-119. **Lauter & Vrla.**—Factors influencing the formation of the venom of the honeybee. [12] 32: 806-807. **Marken, W.**—Zur Kenntnis con Campodea. [46] 36: 41-88, ill. **Marshall, J.**—The hydrogen ion concentration of the digestive fluids and blood of the codling moth larva. [12] 32: 838-843, ill. **Oboussier, H.**—Beitrage zur Biologie und Anatomie der Wohnungsmilben. [65] 26: 253-296, ill. **Panshin, I. B.**—The cytogenetic nature of the position effect of the genes white (mottled) and cubitus interruptus. [Biol. Zhur.] 7: 837-868. [Russian with English summary]. **Patterson & Stone.**—Gynandromorphs in Drosophila melanogaster. [Univ. Texas Publ.] No. 3825: 67 pp., ill. **Peters, H. M.**—Problem des Kreuzspinnennetzes. [46] 36: 179-266, ill. **Rahman & Sohi.**—Observations on the reactions of the Dermestid beetle Trogoderma khapra to light. [Indian J. Ent.] 1: 57-63, ill. **Rees & Ferris.**—The morphology of Tipula reesi (Dipt.: Tipulid.). [Microent.] 4: 143-178, ill. **Rehm, E.**—Die Innervation der inneren organe von Apis mellifica. Zugleiche ein Beitrage zur frage des sog. sympathischen nervensystems der Insekten. [46] 36: 89-122, ill. **Riggert, E.**—Untersuchungen uber die Rubenblattwespe Athalia colibri

(Hymen.: Tenthred.). [65] 26: 462-516, ill. **Rosenkranz, W.**—Die Symbiose der Pentatomiden (Hemipt.). [46] 36: 279-309, ill. **Schmidt, E.**—Uber die Bedeutung des Pterostigmas bei Insekten. [Mitt. Deut. Ent. Ges.] 9: 53-56, ill. (k). **Schwerdtfeger, F.**—Untersuchungen uber die Wanderungen des Maikaefer-Engerlings (Melolontha melolontha & M. hippocastani). [65] 26: 215-252, ill. **Stone.**—(see Patterson & Stone). **Takai, M.**—On the reaction of Anomala cuprea to the lights of different wave lengths. [Oyo-Kontyu] 2: 20-24, ill. [in Japanese]. **Tate, P.**—The early stages of Limnophora exurda (Dipt.: Anthomyiid.). [116] 31: 479-485, ill. **Toth, L.**—Ueber die Biologie der Blattlaus Pemphigus spirothecae (Aphid.). [65] 26: 297-311, ill. **Tykac.**—L'influence des rayons ultra-violets sur les insects. [Casopis] 35: 68-70, [Czech with French summ.] **Weber, H.**—Beobachtungen uber die Wirkung von Empusa weberi auf die Larve von Raphidia ophiopsis. [65] 26: 522-535, ill. **Williams, J. L.**—The occurrence of spermatophores and their measurements in some British Lepidoptera. [Trans. Soc. Brit. Ent.] 6: 137-148, ill. **Wolf, E.**—Postural reactions of insect antennae. [92] 78: 1-8, ill. **Yalvac, S.**—Der Weibliche Gesleschtsapparat von Ixodes. [46] 36: 310-314, ill.

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Smith, C. N.—The male, nymph, and larva of Ixodes dentatus (Acarina: Ixodidae). [10] 42: 16-20, ill. **Yang, W.**—(See under Hemiptera).

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FLEAS OF EASTERN UNITED STATES. By IRVING FOX, Department of Zoology and Entomology, Iowa State College, Ames, Iowa. The Iowa State College Press, February, 1940. Pp. vii, 191, 31 plates of 166 figs. $3.00. The preface states: "Since many of the types of western species are in collections unavailable to the author, this work was necessarily confined to a consideration of the species reported as occurring in the East. Therefore, the keys and diagnoses of larger groups apply to the fleas which inhabit the eastern half of the United States, i. e., the region east of the one hundredth meridian with the exclusion of Texas. Fifty-five species, falling into five families comprising thirty-three genera, are now known to occur in this area. They parasitize about seventy-five mammalian and avian hosts including man and domestic animals, according to our present knowledge. With but few exceptions, the writer has seen specimens of all the eastern fleas, but of the types, for the most part, only those in the United States National Museum have been available to him. All illustrations and descriptions are original except a few which, because of the inability to obtain material, have been adapted from previous publications." The introduction occupies five pages and is concerned with collection and preservation of specimens, morphology and terminology, life history and control; the section on morphology and the figures on plate I, by which it is illustrated, are not as full and complete as those in the late Carroll Fox's *Insects and Disease of Man* (1925), to quote only one of recent American text books. The taxonomic or main portion of the text extends from page 7 to 110. Keys are given to the two suborders, the Eastern families and genera, and to the Eastern species of most of the multispecific genera. The treatment of each of the better known species embraces references to previous descriptions and figures, separate descriptions of male and of female, records of material examined (the localities grouped under the state names, the latter arranged alphabetically), lists of the eastern hosts and eastern localities (state names only) and a statement on the type material and its location. The location of the material examined is not indicated, except in the most general way in the preface (page v). All of the species treated are illustrated by figures of structural details. One new genus, *Eptescopsylla,* is erected for *Nycteridopsylla chapini* Jordan. page 107; it would have been well to call attention to it in the preface also. There is a synonymic index, alphabetically arranged under genera, pp. 111-113, a systematic host index, pp. 114-119, a selected bibliography under authors' names arranged alphabetically, pp. 121-124, and an alphabetical index, pp. 125-127. The remaining pages are occupied by the plates and their explanations. It is interesting to note from the host index that the mammalian hosts are of the orders Marsupialia, Insectivora, Chiroptera, Carnivora, Rodentia, Lagomorpha, Artiodactyla and Primates. Under the Artiodactyla are listed the *horse,* the white-tailed deer and the hog; our citation of them is not primarily to remark that the horse is not usually grouped with the Artiodactyla, but that the three species of flea which have been found on these three ungulates, *Echidnophaga gallinacea, Oropsylla arctomys* and *Pulex irritans,* respectively, are more commonly found on other and widely different hosts. One wonders why it is that Ungulates have apparently escaped more extensive and intensive parasitization by fleas, seeing that certain species of mites, ticks, sucking and biting lice are peculiar to them. The last four named groups of arthropods are parasitic both as larvae and as adults, while no flea larvae are known to have this habit. In this connection a remark by Ewing (*Manual of External Parasites,* 1929, p. 153) has significance: Fleas "are especially abundant on rodents or on mammals that construct nests in which to rear their young or to hibernate." This volume by Irving Fox should prove to be of great convenience in bringing together in one volume data on our Eastern United States fleas.

P. P. CALVERT.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Desired—Ichneumonidae. Especially Tryphoninae of the world for revisionary work. Will exchange or purchase acceptable material. Andrew R. Park, Jr., c/o State Dept. of Public Health, 1800 Fillmore Street, Chicago, Illinois.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted.—Blatchley's Coleoptera of Indiana at reasonable price. W. W. Chapman, 308 Custom House, New Orleans, Louisiana.

Lepidoptera—Polyphemus cocoons for Cecropia, Luna, etc., also Georgia Butterflies for others. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

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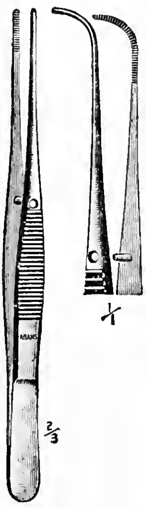

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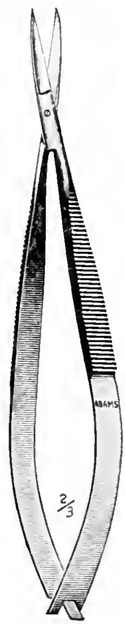

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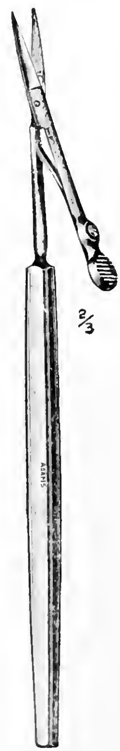

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ENTOMOLOGICAL NEWS

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The Life History of the American Cockroach, Periplaneta americana Linn. (Orthop.: Blattidae).

By PHIL RAU, Kirkwood, Missouri.

The American cockroach *Periplaneta americana* L., even though regarded as abhorrent and loathsome, has for many years been a favorite laboratory insect for biology students and investigators. Its anatomy and physiology have been studied with some degree of thoroughness, but it is indeed surprising to find that its life-history and the details of its every-day behavior remain practically unknown. When the cockroach, steeped in alcohol, reaches the student it is quite a changed creature from what it once was—not even its odor is the same—to make no further comparison with the live, agile insect, inquisitively waving its long antennae in the air for impressions of food, mates and shelter.

Having already done some work on the life-history of the Oriental roach, *B. orientalis,* (Acad. Sci. St. Louis, 25: 57-79, 1924) and on the woodroach, *Parcoblatta pennsylvanica,* (Ent. News 51: 4-9, 33-35, 1940) I decided, when I found I had American cockroaches on hand for other purposes, to also work out whatever behavior details I conveniently could on these insects. The work was done at Kirkwood in 1937 and 1938 on material received from a dealer in New Orleans.

GENERAL LIFE HISTORY NOTES.

Both sexes of the American cockroach have the wings fully developed, and they can, and actually do, use them for flight even though it is for only short distances. In this they differ from the two other species with which I am intimately acquainted, *Blatta orientalis* and *Parcoblatta pennsylvanica.* In the latter two species, only the males have fully developed wings which they can use for flying; the females have only functionless wing pads. In *P. americana,* as in many species of cockroaches, both sexes have a pair of well developed cerci at the tip of the abdomen; the males, in addition, possess a pair of stylets very near to them. I find the stylets useful in distinguishing the male, but this is hardly necessary for the last segments in the abdomen of the female are modified into a sort of ovipositor, which is responsible for the manufacture of the oötheca and for holding it in place several days, while it is being filled with eggs as it is slowly pushed from the body. The cerci and stylets are sense organs whose use is not known; they probably function in some way in the mating process.

This species, like most cockroaches, is nocturnal in habit, spending the daylight hours gregariously in dark crevices, but becoming very active, if all is quiet, as soon as the last rays of twilight have faded. If one had any faith in Loeb's tropism theory, one would say at once, that these cockroaches are positively thigmotatic, for they love to spend the day-light hours piled one upon another—regardless of size, age or sex—with their bellies and backs in contact with animate or inanimate objects. But, of course, they go into this huddle of their own volition through the use of their organs of sense, and are not drawn into it in the mechanical fashion that Loeb's theory would imply.* It is surprising indeed how great a number of roaches can pack themselves between small pieces of crumpled paper, or under a slightly raised block of wood, or within small card boxes thrown into the cage. The scene changes after nightfall, and if the cage in which they are confined is a large one, they soon troop out of their hiding places and spread themselves over floor, ceiling and walls, where they engage in several activities and assume many unusual postures. They employ themselves in feeding, courting, mating, leaping from place to place and seldom missing their objective, and in activities which seem to be merely play.

* Loeb prefers to use the term Stereotropism, (Forced Movements, Tropisms and Animal Conduct p. 135, 1918).

They are fleet of foot, and can scamper with great activity across floor, wall or ceiling whether it be wood or glass, This species is quicker in its movements than either the Oriental-roach or the Wood-roach, but not so quick as the little German cockroach, *Blattella germanica.*

The antenna is a sensory organ, attached to the head by a ball and socket arrangement; they wave them in the air a great deal and pass them slowly over surfaces of cage or food. They spend much time in cleaning them, and this is done by slowly passing them, one at a time, through the jaws, thereby removing any debris that may adhere to the sensory hairs.

The American cockroach is more and more establishing itself in the St. Louis area, and I have seen them on several occasions in Chicago, Illinois. They are not yet established in the homes in St. Louis and this is evidently due to the irregular heating conditions in such places, but they are fully established in certain public buildings that are evenly heated all winter. In my laboratory during the winter with temperature varying from 42 degrees to 55 degrees F., they all remained huddled together, several hundred of them in a small cardboard box, in a sort of hibernation stupor; none ever coming out during this period. *Periplaneta americana,* so often said to be an inhabitant of tropical and subtropical America, is, more likely, a native of Africa, in the opinion of Mr. James A. G. Rehn. It has not only increased its northern range in America, but has established itself permanently in many European and Asiatic countries.

The adults, when I first obtained them, were very wild and attempted at every opportunity to escape. After a few weeks, when they had become established in their new home (which was a glass tank, size 33 inches long, 12 inches high and 16 inches wide) and knew where to find each friendly crevice, they became quite tame and seldom attempted to escape.

THE FOOD OF THE AMERICANA COCKROACH.

Like the two species already mentioned found in households, *B. germanica* and *B. orientalis,* the American roach is omnivorous. There is probably not an item of food used by man that is not also used by all three species of cockroaches; in addition there are many items consumed by cockroaches that are not eaten by human beings. The sense of taste in the American roach is well developed. One often notices their discrimination when they have a choice of foods; for instance, when layer cake is given to them, the icing between the layers is first eaten, or when a bit of cheese is given at long intervals, one may see two cockroaches struggle for it; the winner, if the piece is small, running to cover holding it in its jaws. A sense of taste is further suggested by observing them nervously moving the palpi as well as the antennae over a morsal of food as it is being eaten.

I have seen them eat dead and maimed individuals and egg-cases of their own species, as well as moist cardboard and note paper, and often they ate it when it was not moist. They do like to eat jam and soda crackers and once I saw a roach carry off a bit of cracker to a distance of 6 inches and place it under a piece of cardboard. Fruits, vegetables and pastry, as well as bread and cheese were readily eaten. Bananas, raw sweet and Irish potatoes, sweet corn and carrots were relished; such fruits as apple and peach served as both food and drink. Lettuce, cabbage and cantaloup were relished and likewise supplied both food and liquid to them. Cooked vegetables became mouldy more quickly than dry ones, and there was often more or less mould in the cages but unless it became too abundant, it did not seem to do the cockroaches any harm.

The American cockroach is sometimes regarded as a pest in greenhouses, and I learn from Mr. G. H. Pring that this insect is very troublesome in the orchid-house at the Missouri Botanical Garden, where they devour the open flower-petals of Cattleya orchids as well as the aerial roots and the growing succulent flower-spikes of the Vanda orchid.

Moisture and water are necessary to their well being; they like to secrete themselves between moist layers of paper or cardboard, and it is a perfect joy to see a thirsty roach lap up a drop of water.

(To be continued.)

On a Collection of Centipeds from Texas, New Mexico and Arizona (Chilopoda).

By Ralph V. Chamberlin and Stanley Mulaik,
University of Utah, Salt Lake City.

(Continued from page 110.)

Sonipuilidae.

Soniphilus secundus Chamberlin, Pomona College, Journal of Entomology, 1912, vol. IV, p. 665, figs. 218A-218B.

Texas: Kerr County, Raven Ranch. Several specimens conform in essentials with this species, which was described originally from Sausalito and Pacific Grove, California.

Sogonidae.

Timpina texana Chamberlin, Bull. Mus. Comp. Zool. at Harvard College, 1912, vol. LIV, no. 13, p. 433, pl. 3, figs. 6-8.

Texas: McCulloch County, one specimen taken December 15, 1939. The holotype and only other recorded specimen of this species was taken at Austin.

Gosipina bexara Chamberlin. Texas: Bexar County, one male, received from the U. S. Bureau of Entomology and Plant Quarantine, and taken Nov. 9, 1936; Kerr County, at Raven Ranch, many specimens taken by Dorothea and S. Mulaik in December, 1939; Brooks County, 17 mi. north of Alice, 3 specimens, taken in Dec., 1939, also by the Mulaiks.

The additional material now at hand makes it possible to add the following to the generic diagnosis. The labrum, as in other genera of the family, is of one piece and this is free only on the sides; the median portion which is widely convex behind, is continuous in front with the clypeus. The mouthparts are nearly as in *Garrina,* the palpi of the first maxillae being two-jointed and wholly without lappets.

The number of pairs of legs in the specimens now on hand varies from 51 to 67, but 59 is much the commonest number.

Garrina ochra Chamberlin, Bull. Mus. Comp. Zool. Harvard College, 1915, vol LIX, no. 8, p. 507, pl. 3 figs. 1-3.

Texas: Kendall County; McCulloch County, 37 miles west of Brady. Several specimens were taken in December, 1939.

This species was previously known from Mexico at Hidalgo (Guerrero Mill), Pachucha and Distrito Federal (Esclava), but had not been taken within the United States.

Henicopidae.

Lamyctes diffusus new species.

The dorsum of this form is a distinctly reddish or violaceous brown excepting the head, the first and the last two segments together with the antennae and prehensors which are yellow. Legs pale, almost colorless.

The head characterized by a large indefinitely limited diffused black area about and mesad of each ocellus, the latter in consequence not sharply defined. Antennae composed of 25 articles as in *fulvicornis*.

Prosternal teeth very small, 2+2; median sinus narrow acute. The posterior corners of the ninth and eleventh dorsal plates rectangular, not at all obliquely excised as in *fulvicornis,* the posterior margin straight as in *pinampus*.

Coxal pores, 3, 3, 3, 2. Claw of female gonopods slenderly acute. Basal spines 2+2, acuminate from base.

Length, 5.8 mm.

Texas: Edinburg. One female, which lacks the posterior legs, taken in Dec., 1939.

Lamyctes caducens Chamberlin, Ann. and Mag. of Nat. Hist., 1938, ser. 11, vol. 2, p. 625.

New Mexico: Camp Mary White, Bear Canyon. One female, Aug., 1934.

Gosibiidae.

Gosibius texicolens Chamberlin, Ann. and Mag. Nat. Hist., 1938, ser. 11, vol. 2, p. 635.

Texas: Edinburg, one male in 1934 and one Nov. 29, 1936; McCulloch County, 5 miles south of Brady, December, 1939; Kerr County, Raven Ranch; Big Springs; Concho County, 10 miles west of Eden; Brooks County, 17 miles north of Alice; Bandera County, 7 miles north of Medina, December, 1939.

G. mulaiki Chamberlin, Ann. and Mag. Nat. Hist., 1938, ser. 11, vol. 2, p. 634.

New Mexico: Camp Mary White, Bear Canyon, 15 miles southeast of Cloudcroft. Seven specimens taken Aug. 20, 1934.

LITHOBIIDAE.

SOZIBIUS TEXANUS Chamberlin, Ann. & Mag. Nat. Hist., 1938, ser. 11, vol. 2, p. 633.

TEXAS: Bexar County, One male taken Mar. 22, 1937.

OABIUS PARVIOR Chamberlin, Ann. & Mag. Nat. Hist., 1938, ser. 11, vol. 2, p. 631.

NEW MEXICO: Bear Canyon, Camp Mary White. One male taken in August, 1934.

POKABIUS PRAEFECTUS Chamberlin, Ann. and Mag. Nat. Hist., 1938, ser. 11, vol. 2, p. 632.

NEW MEXICO: Bear Canyon, Camp Mary White, elevation 8,000 ft., a male and female taken Aug. 20, 1934; TEXAS: Palo Dura Canyon, two specimens taken December 13, 1939.

LOPHOBIUS APACHUS Chamberlin, Pan-Pacific Entomologist, 1940.

ARIZONA: Duncan. Three males taken Sept. 5, 1939.

LIOBIUS new genus.

Differing from *Oabius*, to which it is closely related, in having the tibia of the anal legs of the male specially modified, this article being moderately inflated and excavated above and the surface of the depression subdensely setose. It also differs in having the third article of anal and penult legs bear but 2 spines instead of the 3 normal in *Oabius*.

Genotype.—*Liobius mimus* new species.

Liobius mimus new species.

Having the general appearance of an *Oabius*, the body above pale yellow with legs lighter, yellowish white; head light orange.

Lateral margin of head continuous. Antennae of moderate length, composed of 20 articles. Ocelli in holotype 5 in number in two series, 1+3, 1, the most anterior ocellus much reduced and the single ocellus contiguous with large first eye of upper row proper.

Prosternal teeth 2+2, small, the line of apices a little recurved and the median sinus V-shaped.

Ventral spines of anal legs 0, 1, 3, 2, 0; dorsal, 1, 0, 2, 1, 0; claw single. Ventral spines of penult legs 0, 1, 3, 3, 1; dorsal, 1, 0, 2, 1, 1; claw single. Only the last pair of coxae laterally armed. Ventral spines of first legs 0, 0, 0, 2, 1; no dorsal spines of first legs 0, 0, 0, 2, 1; no dorsal spines on this or two following pairs of legs.

In the male the anal legs are much longer and thicker than the penult; depression of dorsal surface of tibia shallow, deepest toward distal end; the setae rather short, erect.

Length, about 6.8 mm.

TEXAS: 37 mi. west of Brady. One male taken in December, 1939.

LLANOBIUS new genus.

A genus related to *Sigibius* but differing in the smaller number of articles to the antennae, 20-22 as against 25 or above, and in the spining of the legs. In both of the known species the legs of the last three pairs wholly lack dorsal spines, while the dorsal spines of the twelfth legs are 0, 0, 3, 2, 2. The ventral spines of penult and anal legs are 0, 0, 1, 1, 1 and 0, 0, 1, 1, 0, respectively. First legs without spines.

Genotype.—*Llanobius paucispinus* new species.

Only the two species described below are at present known to fall into this genus.

Llanobius paucispinus new species.

Rather robust. Dorsal plates roughened. Body and legs pale, very dilute yellow, the head darker.

Head with lateral margins evenly continuous. Antennae short, in the holotype composed of 22 of which the ultimate is long, decidedly longer than the two preceding articles taken together. Ocelli about 7 in three series: 1+3, 2, 1.

Prosternal teeth 2+2, small and pale with a line of apices straight. Coxal pores very small; 2, 2, 2, 2 (1).

Neither the anal nor the penult legs dorsally armed. Ventral spines of penult legs 0, 0, 1, 1, 1; with two claws. Ventral spines of anal legs 0, 0, 1, 1, 0; claws two. Thirteenth legs also unarmed dorsally, but the twelfth with dorsal spines 0, 0, 3, 2, 2. First legs without spines.

Anal legs in male but slightly thickened, the penult intermediate in size between the anal and the thirteenth.

Length, about 7 mm.

TEXAS: Kerr County, Raven Ranch. One male taken in Dec., 1939. Several other specimens seem to be the immature of the same species. The type of *paucispinus* may lack a moult of maturity.

(To be continued)

New and Little-known Utah Dolichopodidae[1] (Diptera).

By F. C. Harmston and G. F. Knowlton[2].

The following report includes descriptions of two apparently undescribed long-legged flies, the previously undescribed female of *Parasyntormon hendersoni* H.-K., and the male of *Polymedon castus* Wheeler.

Dolichopus vernaae n. sp.

♂. Length 5.6 mm.; of wing, 4.8 mm. Face rather wide and short, leaving lower corners of eyes exposed, covered with golden-brown pollen; front shining blue, with purplish reflections, lightly dusted with yellow pollen which is thicker along orbits; palpi and proboscis black; antennae (fig. A5) black, third joint scarcely longer than wide; lateral and inferior orbital cilia entirely black.

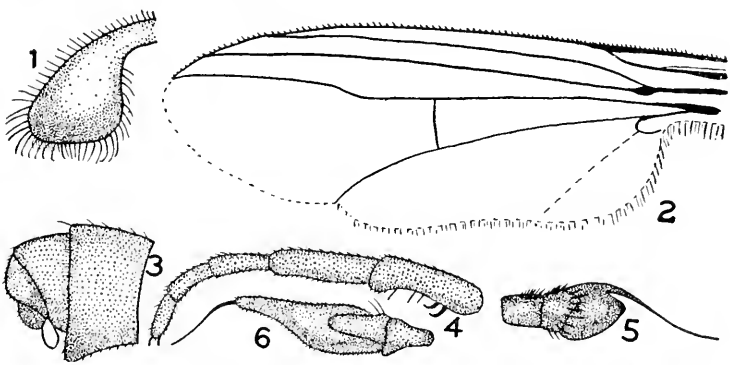

Fig. A. *Dolichopus vernaae* n. sp., Male, 1-2, 5; *Syntormon uintaensis* n. sp., 3-4, 6.

Thorax shining green; pleurae green with bronze reflections, dulled somewhat with whitish pollen; abdomen dark green, shining, fifth segment with pronounced bronze reflection, all segments noticeably free from pollen; hypopygium black, its lamellae (fig. A1) brownish, scarcely jagged at tip, the wide, blackish, somewhat truncate apical margin fringed with long black hairs.

Coxae black, fore pair with black hairs on anterior surface, the bristles at tip black, strong; fore femora black with narrow

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

[2] Research assistant and research associate professor, respectively.

yellow tip; middle femora black at base and along lower edge for one-half their length; hind femora black at base, tip, and along lower and upper edges, leaving an oblong, dark yellow spot near the middle from which arise the preapical bristles; middle femora with four preapical bristles; hind femora with six preapical bristles, ciliated on lower inner edge with black hairs about one-third as long as the width of femora; fore and middle tibiae yellow, middle pair with three bristles below, one at apex, one near apical third, the other near middle; posterior tibiae somewhat thickened, black on apical third; fore tarsi approximately equal to their tibiae; middle tarsi about one and one-third times length of corresponding tibiae; both fore and middle tarsi black from the tip of first joint; hind tarsi approximately one and one-half times length of hind tibiae, wholly black; calypters yellow with thick black cilia; halteres yellow.

Wings (fig. A2) grayish, costa somewhat enlarged at tip of first vein.

♀. Face wider than in male, its pollen silvery; third antennal joint shorter, more rounded at tip; middle femora with three preapical bristles; hind femora with four to five preapical bristles; otherwise approximately as male in general coloration of body and legs.

Described from male *holotype* and female *allotype* taken at Woodruff, Utah, June 6, 1939, by G. F. Knowlton and F. C. Harmston; also eleven male and eleven female *paratypes* taken in the same locality, June 11, 1939 by F. C. Harmston and V. H. Harmston.

Holotypes and allotypes of the two species here described as new are deposited in the U. S. National museum; paratypes in the insect collections of the Utah Agricultural Experiment Station, Academy of Natural Sciences, Philadelphia, and the California Academy of Sciences.

Syntormon uintaensis n. sp.

♂. Length 3.6 mm., of wing, 4.3 mm. Face moderately wide, narrowed in the middle, covered with silvery pollen which hides the ground color; palpi brownish with silvery pollen and minute white hairs; front brown, dull; antennae (fig. A6) black, second joint overlapping the third on inner side to near its middle, third joint about three times as long as wide, densely pubescent; arista apical, approximately one-half length of third joint; upper orbital cilia black, lower cilia white, back of which are other similarly colored cilia.

Dorsum of thorax and the pleurae brown with coppery reflections, dulled with whitish pollen, the dorsum with indistinct brownish vittae; scutellum with one pair of large bristles and a few tiny pale hairs on the margin (the latter rather difficult to discern). Abdomen nearly black with dark coppery reflections and white pollen, the last segment having distinct greenish reflections; hypopygium (fig. A3) nearly concealed, lamellae tiny, pale, fringed with delicate yellowish hairs.

All coxae and femora blackish dulled with white pollen, the tips of the fore and hind femora narrowly yellowish; middle femora with apical one-fourth yellowish; fore coxae clothed on anterior surface with fine white hairs, those near tip longer; middle femora with a row of approximately eight bristles of increasing length on lower, inner surface; all tibiae dark yellow and without unusual bristles; fore and middle tarsi black from tip of first joint, hind tarsi (fig. A4) entirely black, the first joint noticeably hollowed on lower surface, with two hook-like bristles near the base and a few smaller, straight bristles beyond; joints of fore tarsi as 32-11-9-8-9, of middle pair as 40-16-10-8-8 and of hind tarsi as 20-22-14-10-10; halteres and calypters yellow, the latter with narrow brown tip and brownish cilia which appear yellowish in certain lights.

Wings without spots but tinged with brown, especially along the costal margin.

Described from ten males and seven females; male *holotype* and female *allotype* taken at Altonah, UTAH, May 9, 1939, five male and four female *paratypes* taken same date and locality, one male and one female *paratype* taken at Portage, Utah, May 1, 1939 and three male and one female *paratypes* from Grouse Creek, Utah, August 30, 1939, all specimens taken by G. F. Knowlton and F. C. Harmston.

Taxonomy. This interesting species belongs in the group which includes *Syntormon strataegus* Wheeler and *S. tricoloripes* Curran; all possess a pair of hook-like bristles on the lower surface of the posterior basitarsi. *S. uintaensis* n. sp. is easily separated from *tricoloripes* and *strataegus* by the greatly elongated third antennal joint, which in the latter two species is but slightly longer than wide. The hind femora of *uintaensis* are wholly black except for the narrow yellowish tip, whereas in *strataegus* they are yellow, blackened only at base and on upper apical portion. Female very closely resembles female of *strataegus*.

The three species discussed above can be separated by the following key:

1. Antennal arista equal to or exceeding length of third antennal joint 2
   Antennal arista approximately one-half length of third antennal ....*uintaensis* n. sp.
2. Posterior femora yellowish, blackened only at base and on upper apical margin; middle femora yellow with five bristles near middle of lower edge...*strataegus* Wheeler.
   Posterior femora black; middle femora black except apical third, its lower surface with seven or eight bristles near middle ....*tricoloripes* Curran.

POLYMEDON CASTUS Wheeler, Proc. Calif. Acad. Sci. 2:6. 1899.

The writers have failed to find a description of the male of *P. castus* in the literature; for this reason the following description and notes concerning this species are given.

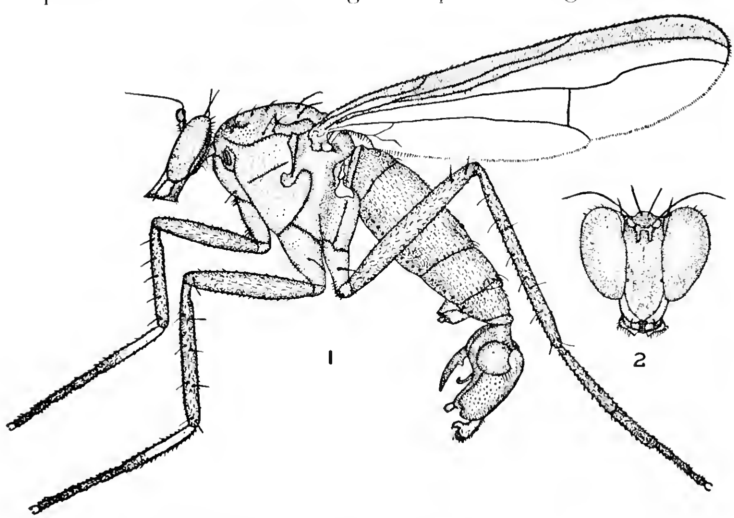

Fig. B. *Polymedon castus* Wheeler. Male, 1-side view; 2-front of head.

♂. Length 8.8 mm.; of wing (fig. B1) 8.5 mm. Face (fig. B2) wide, a little bulged near its middle, sides nearly parallel, thickly covered with golden-yellow pollen, pointed below, extending below the lower corner of the eyes a distance equal to its width; front dark metallic green with bronze reflections, lightly dusted with whitish pollen; palpi yellow, with minute white hairs on the surface and a long, strong black bristle near their tips; proboscis brown, fringed with a row of tiny, white cilia; upper orbital cilia black, the inferior cilia and whiskers white; antennae with first joint entirely yellow, the second brownish, the third black, rounded at tip; arista black, about twice the length of antennae.

Thorax shining green with bronze reflections, the anterior and lateral margins dulled with white pollen; pleurae densely covered with white pollen, entirely hiding the ground color; abdomen shining bronze-green, incisures black, not shining, the lateral margins and venter dulled with whitish pollen; hypopygial lamellae yellow with black border, the fringe and hairs of the surface minute, yellow.

Fore coxae yellow with white pollen, their anterior surfaces covered with fine black hairs and stronger bristles near base and at tip; middle and hind coxae black with white pollen, the former with a strong black bristle on their anterior surface, the latter with a similar bristle on the outer surface; femora yellow, the middle pair with one preapical bristle, the posterior pair somewhat arcuated and with two preapical bristles; tibiae yellow, of plain structure; fore and middle tarsi yellow, blackened from the tip of first joint, posterior tarsi wholly black, the basitarsi slightly thickened; calypters and halteres brownish-yellow, the former with black cilia.

Description made from seven *plesiotype* males, five of which were taken in Zions National Park, and two at Leeds, UTAH, on September 13, 1939, by G. F. Knowlton and F. C. Harmston. Both sexes of this species, together with those of *P. nimius* Aldrich and *Liancalus hydrophilus* Aldrich were found in moderate abundance resting upon cool, moist rocks around small shaded waterfalls in the two localities listed above. *P. nimius* has also been collected by the writers in Utah at Moab and Clear Creek Canyon (Sevier County), *L. hydrophilus* being common throughout the state.

PARASYNTORMON HENDERSONI Harmston and Knowlton, Ent. News. 50: 265, 1939.

♀. Length, 2.5 mm. Face wide, its ground color hidden by greyish pollen, sides nearly parallel; front concolorous with face; palpi nearly twice the size of those of male, blackish, their surface covered with black hairs; antennae shorter and darker than in male, the third joint as broad as long, densely pubescent; arista dorsal, nearly twice the length of antenna.

Thorax, abdomen, and legs colored as in male; fore coxae with minute white hairs upon their anterior surfaces, a few blackish bristles at tips.

Wings broader than in male, the anal angle more prominent.

Described from three females taken at Monticello, UTAH, August 18, 1939, by G. F. Knowlton and F. C. Harmston.

Taxonomy. The female of *Parasyntormon hendersoni* H.-K., closely resembles that of *P. montivagum* Wheeler. The writers have not examined a female of the latter species but it would appear from the description that the species differ in the color of the hairs of fore coxae, which are yellow in *hendersoni* and black in *montivagum.*

The Species of Polyphylla in America, North of Mexico (Coleoptera: Scarabaeidae).

By MONT A. CAZIER, University of California, Berkeley, Calif.

The appearance of the new supplement to the Leng Catalogue by Blackwelder (1939) has revealed several papers that have been heretofore overlooked. Among these is one by Kuntzen[1] in which the American species of *Polyphylla* are arranged, according to the Rassenkreis concept, into two Rassenkreis species. It is the purpose of this brief paper to point out that this concept is unadaptable to the genus *Polyphylla,* as it is now understood, and that only lack of knowledge or disregard of biological, ecological, morphological and distributional data, concerning American species, would prompt an author to arrange our forms into Rassenkreis species as done by Kuntzen.

Kuntzen utilizes only Casey's Memoir (1914) and Leng's Catalogue (1920) as a basis for his arrangement. It is apparent that the most fundamental and critical paper on American *Polyphylla* by Fall (1928), published five years prior to Kuntzen's contribution, was overlooked. If Kuntzen had been acquainted with this paper he probably would not

[1] Kuntzen, H., 1933, Aus den Verbreitungstatsachen mitgefolgerte neue Auffassungen über das System einiger Scarabaeidengenera vornehmlich der paläarktischen Region. Mittl. Zool. Mus. Berlin, 19:458-472.

have applied the Rassenkreis concept to our American *Polyphylla*. Also, had Kuntzen been aware that Casey was describing, for the most part, individual differences rather than distinct biotic entities, in *Polyphylla*, his conclusions would, no doubt, have been quite different. By working with Casey's Memoir one is impressed with the extreme similarity of his descriptions and might, therefore, assume, since the localities were often different, that Casy was dealing with a limited number of Rassenkreis species, each composed of numerous races or subspecies. The application of the Rassenkreis concept to this genus, as done by Kuntzen, is unjustified because Leng was merely compiling and arranging the described species of Coleoptera in his catalogue and Casey was describing individual variations rather than subspecies, varieties or races.[2]

It is also apparent that Kuntzen has disregarded morphological evidence. Species that are now known, without doubt, to be synonymous are listed as subspecies, while other species known to be absolutely distinct morphologically from any others are considered as subspecies. It is probable that little if any American material was examined during the preparation of his paper. It must be assumed that such species as *Polyphylla cavifrons* Lec., *hammondi* Lec., *crinita* Lec., *arguta* Csy., *variolosa* Hentz, *gracilis* Horn and *10-lineata* Say were not critically compared or they would not have been listed as subspecies. The fact that in many localities two or more distinct morphological forms occur together, under the same conditions, yet maintain their distinctiveness and never intergrade, is further evidence that we have a number of distinct species that can in no way be confused as races, subspecies or varieties. *Polyphylla 10-lineata* overlaps the distribution of and occurs with *arguta, cavifrons, crinita, hammondi, modulata* Csy. and *barbata* Cazier, showing not the slightest tendency to intergrade with any of these species which are themselves geographically isolated.

[2] For further information concerning Casey, the unfamiliar reader is referred to: "Thomas Lincoln Casey as a Coleopterist". Hatch M. H., 1926, Ent. News, 37:175.

To contrast *Polyphylla* with a genus such as *Cicindela* is further evidence of the superficial nature of Kuntzen's work. In the latter genus some of the species lend themselves very well to the application of the Rassenkreis concept since there is a great deal of geographical instability among the species. Intermediate forms occur in the intervening territory to link these subspecific units. Such North American species as C. *tranquebarica* Hbst., *purpurea* Oliv., *longilabris* Say, *scutellaris* Say, *obsoleta* Say, *carthagena* Dej., *pusilla* Say and *dorsalis* Say and various members of the genus *Omus* are outstanding examples of typical Rassenkreis species. The only way to contrast any one of these Rassenkreis species in *Cicindela* with any unit in the genus *Polyphylla* is to take the more widely distributed forms in the latter genus. *Polyphylla 10-lineata* is, perhaps, the most widely distributed and most variable single unit in North America and is therefore most suitable for this comparison. If this were a Rassenkreis species, each of Casey's described geographical units would represent a geographical subspecies. The differences given by Casey for these forms are individual variations, are not of geographical significance and do not remain as distinct units when large series are examined from the same or different localities. As many as eight of Casey's "species" have been found intergrading in each of several series taken in Arizona, California, Oregon and British Columbia. An examination of Kuntzen's paper indicates that some one of Casey's species was selected to represent each locality; all others from the same locality were not given subspecific status but are listed with a question mark. The fact that Casey seldom limited himself to one form in each locality should have aroused suspicion in the minds of those attempting to interpret any of these as subspecies. To arbitrarily select one of these individual descriptions to represent that particular locality is a questionable procedure. Valid species within the same genus frequently occur together in the same locality. It seems to me that to select two or more subspecies of a Rassenkreis species from a single locality would not be in accord with the Rassenkreis concept.

If the most variable and widespread American species of *Polyphylla,* as it is now known does not lend itself to geographical subspeciation, it is apparent that the Rassenkreis concept has been incorrectly applied in this genus. Perhaps one or two of our variable forms, such as *10-lineata* and *hammondi,* have valid subspecies and should therefore be Rassenkreis species but we most certainly have more than two valid species in North America.

The above discussion is not meant to imply that the species problem in this genus is satisfactorily understood. It will take additional field knowledge and large series of specimens to determine accurately the status of disputed forms. Certainly the arrangement given by Fall (1928), with the addition of several newly described species and minor changes, is much more accurate than that of Kuntzen. Such an arrangement is given below to replace that of Kuntzen.

1. *P. cavifrons* Lec.
2. *P. squamiventris* Cazier
3. *P. hammondi* Lec.
    - *squamicauda* Csy.
    - *molesta* Csy.
    - *verecunda* Csy.
    - *oblita* Csy.
    - *impigra* Csy.
    - *subvittata* Lec.
    - *bisinuata* Csy.
    - *sejuncta* Csy.
    - *proba* Csy.
    - *diffusa* Csy.
    - *pimalis* Csy.
    - *oklahomensis* Hatch
4. *P. hirsuta Van* Dyke
5. *P. diffracta* Csy.
    - *fuscula* Fall
    - *adusta* Csy.
6. *P. utcana* Tanner[3]
7. *P. rufescenta* Tanner[3]
8. *P. opposita* Csy.
9. *P. barbata* Cazier
10. *P. rugosipennis* Csy.
    - *laevicauda* Csy.
11. *P. sobrina* Csy.
12. *P. alleni* Cazier
13. *P. crinita* Lec.
    - *nigra* Csy.
    - *mystica* Csy.
    - *incolumis* Csy.
    - *relicta* Csy.
    - *robustula* Csy.
    - *ona* Bloeker[4]
    - *santarosae* Bloeker[4]
    - *santacruzae* Bloeker[4]
    - *martini* Bloeker[4]
14. *P. arguta* Csy.
15. *P. speciosa* Csy.
    - *acomana* Csy.
    - *latifrons* Csy.
16. *P. 10-lineata* Say
    - *parilis* Csy.
    - *laticauda* Csy.

[3] The status is doubtful as no specimens are available for examination.

[4] The reasons for this synonomy are being given by vonBloeker, Bull. So. Calif. Acad. Sci. 38.

reducta Csy.	17. *P. modulata* Csy.
pacifica Csy.	*comstockiana* Bloeker[4]
squamotecta Csy.	18. *P. matrona* Csy.
ruficollis Csy.	19. *P. occidentalis* L.
castanea Csy.	20. *P. variolosa* Hentz
oregona Csy.	21. *P. comes* Csy.
perversa Csy.	22. *P. gracilis* Horn
	23. *P. pubescens* Cartwright

POLYPHYLLA CAVIFRONS Lec., 1854, Proc. Acad N. S., Phila., 7: 222.

This species was described from Mexico and has been, in the past, questionably recorded from Arizona. The new Supplement to Leng's Catalogue states that it is not a North American species, the latter phrase being rather inappropriately used to include only America north of Mexico. The species has been collected in the United States at Holtville, Imperial Co., California, June 28, 1936 (E. S. Ross and M. A. Cazier); Blythe, Riverside Co., California, July 1, 1937; Yuma, Yuma Co., Arizona, May 15, 1939 (T. G. Aitken) and Ehrenberg, Yuma Co., Arizona, July 18, 1939 (K. Stage) and should definitely appear on our lists.

P. BARBATA Cazier, 1938, Pan. Pac. Ent., (4) 14: 161.

This species, which was described from thirteen male specimens from Mt. Hermon, California, has recently been collected in large numbers at the type locality by Mr. J. J. du Bois. Taken with it was a series of *P. 10-lineata*. The 139 specimens of *barbata*, 134 of which are designed as metatypes by the writer, show remarkable uniformity. The markings are irregular and never form even bands as in *10-lineata*, the scales are distributed as in the type and the hair is present and long on all specimens. Among this series there is one female which is here designated as allotype of the species. The female has the usual small antennal club and is slightly more robust posteriorly, otherwise it is like the male.

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Replacement of Two Preoccupied Generic Names of Blattidae (Orthoptera).

Dr. B. P. Uvarov, of the British Museum (Natural History) has kindly called my attention to the fact that several generic names of cockroaches, proposed by me in past years, are preoccupied. In consequence I am here suggesting substitute names which will have the same genotypes as those which they replace.

The name PLATYLESTES Hebard, 1919 (Trans. Amer, Entom. Soc., XLV, p 97), but not of Selys, 1862 (Bull. Acad. Roy. Sci., Bruxelles, (2) XIII, p. 337), I would replace with **Eurylestes.**

For PLUMIGER Hebard, 1929 (Proc. Acad. Nat. Sci., Phila., LXXXI, p. 22), but not of Horvath, 1926 (Ann. Hist.-Nat. Mus. Nat. Hungar., XXIII, p. 196), I would substitute **Aristiger.**

MORGAN HEBARD.

The Distribution of Reduviidae (Hemiptera) in Oklahoma.

By K. C. EMERSON, Stillwater, Oklahoma*

The *Reduviidae* are mostly predacious on other insects, but several species are known to be hematophagous; among these are some which are intermediate hosts of certain pathogenic parasites and have attracted a great deal of attention. Many excellent papers have been published in connection with the

* Contribution from the Entomology Department of Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma.

experimental transmission of trypanosomiasis or Chagas's disease, but most of the literature deals with the taxonomy of the group. A few papers deal with the faculative blood-sucking of this group, citing many authentic cases.

The purpose of this paper is to make known the distribution of the family in Oklahoma. It is true that many of these species are of no pathogenic significance, but seven of the included species are listed by Herms as "likely to be of medical importance." Included in the list of references, are papers which contain descriptions and keys to the species mentioned.

The specimens from which these records have been obtained, are in the entomological museum of Oklahoma A. and M. College, and the identifications were made by Dr. H. M. Harris of Iowa State College.

Oncerotrachelus acuminatus (Say)—Stillwater 3.16.30.

Pygolampis pectoralis (Say)—Noble County 6.28.26.

Stenopoda cinerea LaP—Ada 7.16.37, Page 6.23.37, Pawnee 6.17.37, Elmer 7.6.37, Stillwater 7.8.34, Strang 6.18.39, Broken Bow 6.19.34, Fairfax 7.31.32, Ardmore 6.8.39, Westville 6.15.39.

Narvesus carolinensis Stal.— Stillwater 7.8.30, 6.4.34, 6.21.34, Flint—6.19.37, Grove 6.17.37, Page 6.23.37, Muse 6.25.37, Sayre 6.8.37, Lebanon 7.2.37, Grant 7.1.37, Broken Bow 6.13.39, Summerfield 6.14.39, Ardmore, 6.8.39, Claremore 6.20.39, Wyandotte 6.19.39.

Reduvius personatus (Linn.)—Cleo Springs 6.5.37, Taloga 6.6.37, Stillwater 7.3.39.

Triatoma sanguisuga (LeConte)—Stillwater 5.20.32, 4.6.-34, Pearson 7.23.37, Osage County 8.4.35, Locust Grove 5.5.34, Henryetta 7.25.39.

Melanolestes picipes (H. S.)—Lebanon 7.2.37, Oswalt 7.3.37, Cheyenne 6.7.37, Sallisaw 2.28.30, Jay 7.2.31, Medford 8.29.31, Alva 8.4.33, Perkins 3.31.32, Watts 6.16.39, Wyandotte 6.19.39, Summerfield 6.14.39, many from Stillwater.

M. abdominalis (H. S.)—Sallisaw 2.28.30, Idabel 7.12.30, Kiowa Co. 9.15.38, Hugo 7.6.38, many from Stillwater.

Rasahus hamatus (Fabr.)—Wilburton 6.12.34, Claremore 6.20.39, Westville 6.15.39, Watts 6.16.39.

Sirthenea carinata (Fabr.)—Perkins 5.8.32, Sallisaw 7. .31, Hinton 6.13.37, Summerfield 6.14.39, Stillwater 5.25.38.

Rhigina cruciata (Say)—Stillwater, nothing further given.

Apiomerus crassipes (Fabr.)—Lincoln County 7.9.31, Creek County 7.28.32, Okmulgee County 6.19.31, Stillwater 6.17.31, Herd 7.21.31, Pawnee 7.13.32, Centralia 6.27.31, Fairfax 7.30.32, Holdenville 7.17.37, Dewey 7.17.31, Bluejacket 6.19.31, Jay 7.8.31, Bryant 6.13.34, Quinton 6.10.34, Hugo 6.20.34, Cushing 7.3.32.

Apiomerus spissipes (Say) — Kenton 6.23.33, Stillwater 7.1.32, 9.18.31, 7.29.32, McCurtain County 7.8.32, Creek County 7.27.32, Jackson County 6.17.34, Cherokee 6.4.37, Hinton 6.13.37, Lugert 6.11.37, Clinton 6.4.39.

Zelus cericalis Stal.—Nashoba 6.14.34, Quinton 6.10.34, Hugo 6.20.34.

Z. exsanguis Stal.—Fairfax 8.4.32, Davis 4.30.32, Cherokee 8.5.32, Roger Mills County 8.16.33, Watts 6.16.39, Stillwater 5.25.32, Sulphur 7.14.37, Bluejacket 6.19.31, Craterville 7.6.34, Wichita Nat'l Forest 7.8.34.

Z. socius Nbl.—Stillwater 7.7.34, Bryant 7.24.34, Cherokee 8.25.32, Eufaula 10.31.34, Craterville 7.6.34, Idabel 8.13.37.

Pselliopus cinctus (Fabr.)—Smithville 8.19.31, Stillwater 9.22.33, Wilburton 6.13.34, Sallisaw 6.8.34, Flint 6.6.34, Grove 6.5.34, Stillwater 9.12.33.

Ps. barberi Davis—Stillwater 4.1.32, 4.11.32, 3.13.33, Wyandotte 6.9.31, Grove 6.5.34, Davis 4.30.26, Sallisaw 2.28.29, Watts 6.16.39.

Fitchia aptera Stal.—Wilson 12.1.27, Stillwater 3.1.34, 12.14.24, 3.18.31, 2.23.32, 3.11.33, 2.26.32.

Arilus cristatus (Linn.)—Has been collected in every county.

Sinea diadema (Fabr.)—Kenton 6.30.33, Fairfax 7.29.32, Optima 7.18.33, Alva 8.7.33, Pawnee 7.20.32, Cherokee 8.13.32, Grand 8.4.33, Stillwater 9.23.23, 9.24.30, 9.20.26, 9.16.31, 6.16.35, Oklahoma County 10.11.30, Laverne 8.4.33, Perkins 10.27.34, Fork 8.8.32, Henryetta 6.8.34, Eufaula 10.29.34, Wyandotte 6.4.34, Cushing 6.9.32, Osage County 8.3.32, Idabel 8.13.37, Noble 8.4.32, Bluejacket 6.20.31.

S. spinipes (H. S.)—Cleveland County 10.3.30; Fairfax 7.30.32, 8.1.32, Oklahoma County 10.4.30, Sallisaw 7.9.31, Pawnee 7.13.32, McIntosh County 6.18.33, Eagletown 6.28.37, Hictchita 7.17.34, Noble County 7.31.32, Locust Grove 5.5.34, Bluejacket 6.19.31, Broken Bow 6.17.34, Ford 8.4.32, Stillwater, 8.4.26, 9.14.32.

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Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper

appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Abeloos, M.—Les problèmes de l'hibernation des insectes. [Bull. Soc. Sci. Bretagne] 15: 125-131. **Ainslie. Charles N.**—Obituary by Walton & Caffrey. [10] 42: 27-30, ill. **Anon.**—Daily Mail. [Collecting lamp and bottle]. [Ward's Comb. Ent. & Nat. Sci. Bull.] 13:4, ill. **Barnes & Kaloostian.**—Flight habits and seasonal abundance of dried-fruit insects. [12] 33: 115-119. **Beall, G.**—The technique of randomization in field work. [4] 72: 45-48. **Beaulne, J. I.**—Notes on some recent additions to the insect collections of the Quebec Plant Protection Service. [4] 72: 61-62. **Caesar, L.**—Fifty years of entomological progress, Pt. II, 1899-1909. [12] 33: 15-21. **Canzanelli, A.**—La fauna dei funghi freschi. 1 Contributo: Elenco delle specie e notizie generali morio-biologiche. [Bol. Zool. Agrar. e Bach. della R. Univ. Milano] 9: 85-107. **Carter, W.**—Royal Norton Chapman. [68] 91. 255-256. **Essig, E. O.**—Fifty years of entomological progress, Pt. IV, 1919-1929. [12] 33: 30-58. **Fall, Henry Clinton.**—Obituary by J. D. Sherman. [6] 48: 33-36, portrait. **Ginsburg, I.**—Divergence and probability in taxonomy. [Zoologica] 25: 15-31. **Hansberry & Chiu.**—Presentation of Time-dosage-mortality data by three dimensional graphs. [12] 33: 139-141, ill. **Lemardeley & Fremy.**—Le Microscope et son emploi. [Mem. Soc. Nat. Sci. et Math. Cherbourg] 43: 87-88. **Lent, H.**—(see under Hemiptera). **Marlatt, C. L.**—Fifty years of entomological progress, Pt. I, 1889-1899. [12] 33: 8-15. **Metcalf, C. L.**—Fifty years of entomological progress, Pt. III, 1909-1919. [12] 33: 21-30. **Milum, V. G.**—Larval pests common to nests of bumblebees and combs of the honeybee. [12] 33: 81-83. **Morrill, A. W.**—Living parasitic and predaceous insects for classroom use. [12] 33: 123-128. **Murphy, R. C.**—The "chair" for insects? [Sci. Monthly] 1940: 357-364. **Nomura, K.**—Methods of the comparison of faunae. [Kontyu] 13: 236-239, ill. [Japanese, with English summary]. **Parsons, C. T.**—Observations in Cuba on insect mimicry and warning coloration. [5] 47: 1-7, ill. **Pickles, W.**—The effects of ants on the acidity of soils. [8] 76: 49-52. **Rohwer, S. A.**—Fifty years of entomological progress, Pt. V, 1929-1939. [12] 33: 58-65. **Roudabush, R. L.**—The use of cross section paper in the preparation of microscope slides. [Ward's Com. Ent. & Nat. Sci. Bull.] 13: 1-2, ill. **Roudabush, R. L.**—Section Measurer. [Ward's Comb. Ent. & Nat. Sci. Bull.] 13: 7-8, ill. **Sasscer, E. R.**—Undesirable insect aliens. [12] 33: 1-8. **Silvestri, F.**—Compendio di Entomologia Applicata. Volume I. 972 pp., ill.

ANATOMY, PHYSIOLOGY, ETC.—Anon.—New data concerning the physiology of the growth of the silkworms and their utilization in Sericiculture.—Something more about the Ecology of Lacerta agilis. [Priroda] No. 9: 83-85. [Russian, English title]. **Balli, A.** —Influenza delle basse temperature sulla conservazione della fecondabilita nel Bombyx mori. [Atti Soc. Nat. E Matemat. Modena] 70: 43-47. **Brooks, G.**—Observations sur la phosphorescence des trois derniers anneaux du ver luisant. [Comptes Rendus, Acad. Sci. U. S. S. R.] 210: 228-230, ill, **Brues, C. T.**—Food preferences of the Colorado potato beetle, Leptinotarsa decemlineata. [5] 47: 38-43. **Cheng & Campbell.**—Toxicity of phosphorus to cockroaches. [12] 33: 193-199, ill. **Cooper, K. W.**—(see under Neuroptera). **Denis, J. R.**—A propos du travail de Mlle. M. A. Vassal sur l'hypopharynx des larves d'Éphémères quelques mots sur la question de l'hypopharynx. [Bull. Sci. Bourgogne] 8: 141-145. **Deonier, C. C.**—Carcass temperatures and their relation to winter blowfly populations and activity in the southwest. [12] 33: 166-170. **Dorsey, C. K.**—See under Coleoptera. **Gross & Howland.**—The early embryology of Prodenia eridania (Lep.: Noctuid.). [10] 33: 56-65, ill. **Imms, A. D.**—On growth processes in the antennae of insects. [Quart. Jour. Micro. Sci.] 81: 585-593, ill. **Jones, C, R.**—The alimentary canal of Diplotaxis liberta (Coleo: Scarab.). [43] 40: 94-103, ill. **Kohler, W.**—Der Einfluss verschiedenen Ernährungsgrades auf äussere Körpermerkmale, auf die Entwicklungsgeschwindigkeit, Lebensdauer und Fortpflanzungsfähigkeit von Ephestia kühniella. [97] 60: 34-69, ill. **Kuhn & Piepho.**—Ueber die Ausbildung der Schuppen in Hauttransplantaten von Schmetterlingen. [97] 60: 1-22, ill. **Lawson, C. A.**—The developmental history of germaria in parthenogenetic female aphids. [43] 40: 74-81, ill. **Lüers & Schubert.**—Untersuchungen zur Frage der selektiven Befruchtung an Drosophila melanogaster und Drosophila funebris. [97] 60: 69-78, ill. **McCutcheon, F. H.**—The respiratory mechanism of the grasshopper. [10] 33: 35-55, ill. **Paillot, A.**—Contribution à l'étude cytologique et histophysiologique du Bombyx du Mûrier pendant la mue. [Ann. Épiphy. et Phytogéné., Paris] 5: 339-386, ill. **Peacock & Sanderson.**—The cytology of the thelytokously parthenogenetic saw-fly Thrinax macula. [Trans. R. S. Edinburgh] 59: 647-660, ill. **Phillips & Swingle.**—Rearing of mosquito larvae and effect of diet on their resistance to rotenone and nicotine. [12] 33: 172-176. **Piepho.**—(see Kuhn & Piepho). **Porter & de Rorthays.**—Quantité de nourriture absorbée par les Lépidoptères a l'état d'imagines. [Comp. Rend. Sea. L'Acad. Sci.] 210: 324-325. **Pumphrey, R. J.**—Hearing in insects. [Biol. Reviews] 15: 107-132, ill. **Roonwal, M. L.**—Some recent advances in insect embryology, with a complete bibliography of the subject. [Jour. Ry. Asiatic Soc. Bengal Sci.] 4: 17-105, ill. **de Rorthays.**—(see Porter & de Rorthays). **Schubert.**—(see Lüers & Schubert). **St. George, R. A.**—A note concerning the larva of a beetle, Boros schneideri, a European sp. [10] 42: 68-73, ill. **Steinberg, D.**—The regulatory processes in insect metamorphosis. III. The effect of the regeneration process on the pupation of caterpillars. [Bull. Acad. Sci. U. R. S. S.] 1939: 502-509, ill. **Tauber, O. E.**—Mitotic response of roach hemocytes to certain pathogenes in the hemolymph. [10] 33: 113-119, ill. **Vassal, M. A.**—Recherches sur l'hypopharynx des Éphémeres. [Bull. Sci. Bourgogne] 8: 133-140, ill. **Weiss, H. B.**—The death-feints of Sitophilus granarius and S. oryzae (Coleo.). [6] 48: 37-46.

ARACHNIDA AND MYRIOPODA.—Bonnet, P.—La proportion sexuelle chez les Araignees. [Bull. Soc. Hist. Nat. Toulouse] 72: 241-256. **Chamberlin R. V.**—On some Chilopods and Diplopods from North Carolina. [4] 72: 56-59, (*). New genera and species of North American Paraiulidae. [Bull. Univ. Utah] 30: 3-39, ill. (*). **Hixson, H.**—Field biology and environmental relationships of the Gulf Coast tick in southern Georgia. [12] 33: 179-189, ill. **de Mello-Leitao, C.**—Aranhas do Xingu colhidas Pelo Dr. Henry Leonardos. [Ann. Acad. Brasileira Sci.] 12: 21-32, ill. (*). **Peyton.**—(see under Shoup & Peyton). **Shoup & Peyton.**—Collections from the drainage of the big south fork of the Cumberland River in Tennessee. [Jour. Tenn. Acad. Sci.] 15: 105-116.

THE SMALLER ORDERS OF INSECTS.—Bailey, S. F.—The distribution of injurious thrips in the United States. [12] 33: 133-136, ill. **Banks, N.**—On some new and previously-known Neuroptera in the collection of the Academy of Natural Sciences of Philadelphia. [Notulae Naturae] 32: 1-5, ill. (*). **Cooper, K. W.**—The genital anatomy and mating behavior of Boreus brumalis. [Amer. Midl. Nat] 23: 354-367, ill. **Crawford, J. C.**—A new Stomatothrips from the United States (Thysanoptera). [10] 42: 45. **Davis, C.**—Taxonomic notes on the order Embioptera. A new neotropical genus of Embioptera. The genus Clothoda. The identity of Embia ruficollis de Saussure and of Oligotoma venosa. [Proc. Linn. Soc. N. S. W.] 64: 217-222; 373-380; 572-575, ill. (s*). **Denis, J. R.**—(see under Anatomy). **Fox, I.**—Notes on North American Dolichopsyllid Siphonaptera. [10] 42: 64-68, ill. (*). Fleas of eastern United States. Iowa St. Coll. Press, 200 pp., ill., (k). **Setty, L. R.**—Biology and morphology of some North American Bittacidae. [Amer. Midl. Nat.] 23: 257-353, ill. **Shoup & Peyton,**—(see under Arachnida). **Stewart & Holland.**—A n. gen. of the fam. Dolichopsyllidae from Canada (Siphonaptera.). [4] 72: 41-42, ill. **Vassal, M. A.**—(see under Anatomy). **Walker, E. M.**—A preliminary list of the Odonata of Saskatchewan. [4] 72: 26-35. **Womersley, H.**—Primitive Insects of South Australia. Australia. 1939. 322 pp., ill. (k),

ORTHOPTERA.—Cantrall, I. J.—Orthoptera. Part VI. Care of material before shipping. [Ward's Com. Ent. & Nat. Sci. Bull.] 13: 4-5. Orthoptera. Pt. 5. Preservation of specimens in the field. [Ward's Comb. Ent. & Nat. Sci. Bull.] 13: 5-7, cont. **Gunther, K.**—Revision der Acrydiinae, III. Sectio Amorphopi. [Abhandlungen. Reihe A.] 20: 335 pp., ill. (k*s). **Hubbell, T. H.**—A blind cricket-locust (Typhloceuthophilus floridanus n. gen. & sp.) inhabiting Geomys burrows in peninsular Florida. [10] 33: 10-32, ill. **Knowlton, G. F.**—The European earwig in Utah. [12] 33: 204. **Memoria de la Comision.**—Central de investigaciones sobre la Langosta. 1936. Buenos Aires, Rep. Argentina. 298 pp., ill. **Wolcott, G. N.**—A tachinid parasite of the Puerto Rican changa. [12] 33: 202.

HEMIPTERA.—da Costa Lima, A.—Sobre uma especie Brasileira de Aradomorpha (Reduviid.). [Ann. Acad. Brasileira Sci.] 12: 59-61, ill. (s*). **Knowlton & Harmston.**—Utah Insects. Hemiptera. [Utah Agric. Exp. Sta.] Mimeogr. Ser. 200, Pt. 6: 10 pp. **Lent, H.**—Sobre o hematofagismo da Clerada apicicornis e outros artropodos; sua importancia na transmissão da doença de Chagas. [Mem. Inst. Oswaldo Cruz] 34: 583-606, ill. **Lent & Pifano.**—Dados experimentais sobre a infestação do Eutriatoma nigromaculata pelo Schizotrypanum cruzi e sua redescrição. [Mem. Inst. Oswaldo Cruz.] 34: 627-635. ill. **Mazzotti, L.**—Infeccion natural por Trypanosoma cruzi en otras dos especies de Triatomas [Rev. Inst. Salubridad y Enfermed. Trop., Mexico] 1: 73-78, ill. (s). **Neiva, Pinto & Lent.**—Notas sobre triatomideos do Rio Grande do Sul e descrição de uma nova especie. [Mem. Inst. Oswaldo Cruz] 34: 607-610, ill. (*).

LEPIDOPTERA.—Clarke, J. F. G.—A n. sp. of Utethesia from Newfoundland (Arctiid.). [10] 42: 42-44, ill. **Comstock, W. P.**—Butterflies of New Jersey; A list of the Rhopalocera occurring in N. J., giving time of flight, food plants, records of capture with locality and date. [6] 48: 47-84. **Dethier, V. G.**—Life histories of Cuban Lepidoptera. [5] 47: 14-26, ill. **Field, W. D.**—Distribution notes on Amblyscirtes nysa (Hesperiid). [103] 13:7. New records of butterflies for Kansas. [103] 13: 28-29. Some unusual butterfly records for Kansas. [103] 13: 30-31. **Freeman, T. N.**—Additional notes on Strymon acadica (Lycaen.). [4] 72: 43. **Heinrich, C.**—Some new American Pyralidoid moths. [10] 42: 31-41, ill. **Köhler, P.**—Tres nuevos microlepidopteros Argentinos. [An. Soc. Cien. Argentina] 128: 369-374, ill. (*). **Kuhn & Piepho.**—(see Anatomy). **McDunnough, J.**—The Argynnids of the Cariboo region of British Columbia. [4] 72: 23-25. Eupithecia notes. [4] 72: 35-40, ill. (*). Notes on the gen. Peronea with description of a n. sp. [4] 72: 59-61, ill. **Miller, H. D. O.**—Observations on Stenoma mistrella. [103] 13: 1-3. ill. **Milum, V. G.**—See under Hymenoptera. **Piepho.**—(see Kuhn & Piepho). **Schaus, W.**—New species of British Guiana Heterocera. [Zoologica] 25: 83-88.

DIPTERA.—Alexander, C. P.—Studies on the craneflies of Mexico (Tipuloidea), Pt. VII. [10] 33: 140-161. **Carpenter & Hull.**—The fossil Pipunculidae. [Bernsteinforschungen] 1939: 8-17, ill. (*). **Fairchild, G. B.**—A note on the early stages of Lepiselaga crassipes (Tabanid.). [5] 47: 8-13, ill. **Frey, R.**—Die Arthropodenfauna von Madeira nach den Ergebnissen der Reise von Prof. Dr. O

Lundblad Juli-August 1935. XIX. Diptera Brachycera. [83] 31 (A): 18 pp., ill. **Hardy, D. E.**—Studies in New World Plecia, Pt. I. [103] 13: 15-27, ill. (*). **Lindquist, A. W.**—See under Hymenoptera. **Millot, J.**—Le developpement et la biologie larvaire des Oncodidés (Cyrtidés), Dipteres parasites d'Araignées. [Bull. Soc. Zool. France] 63: 162-183, ill. **Parent, O.**—Étude sur les Dolichopodides exotiques de la collection von Roder. [Ann. Soc. Sci. Bruxelles] 49: 169-246, ill. (*). **Parsons, C. T.**—The Conopidae of the West Indies and Bermuda. [5] 47: 27-37, ill., (*). **Shaw, F. R.**—Some new Mycetophilidae. [4] 72: 48-51. ill. **Spencer, W. P.**—Subspecies, hybrids and speciation in Drosophila hydei and Drosophila virilis. [90] 74: 157-179, ill. **Stains & Knowlton.**—Three new western Simuliidae. [10] 33: 77-80, ill. **Stone, A.**—Two new Nearctic Tabanidae and some new records and corrections. [10] 42: 59-63, ill. **Townsend, C. H. T.**—Manual of Myiology. Part IX. Oestroid generic diagnoses and data. 267 pp. **Vargas, L.**—Notas sobre la Quetotaxia de la larva del Anopheles pseudopunctipennis de Temixco, Morelos. [Rev. Inst. Salubridad y Enfermed. Trop., Mexico] 1: 79-99, ill. **Wolcott, G. N.**—See under Orthoptera.

COLEOPTERA.—Boyer, L. B.—A revision of the species of Hoplia occurring in America north of Mexico. (Scarabaeidae). [Microent.] 5: 31 pp., ill. (*k). **Bruch, C.**—El gorgojo de los frutos del "churqui." "Nemarus ferrugineus." [Rev. Fac. Agron. Argentina] 23: 11-17, ill. (s), El cásido de las palmeras "Hemisphaerota crassicornis." [Rev. Fac. Agron. Argentina] 23: 19-25, ill. **Brues, C. T.**—See under Anatomy. **Chaboussou, F.**—Contribution a l'étude biologique de Lebia grandis, prédateur américain du doryphore. [Ann. Epiphy. et Phytogéné., Paris] 5: 387-433, ill. **Dorsey, C. K.**—A comparative study of the larvae of six spp. of Silpha. [10] 33: 120-139, ill., (k). **Flanders, S. E.**—A Coccinellid introduced into California. [12] 33: 202-203. **Hinton, H. E.**—A synopsis of the Brazilian spp. of Microcylloepus (Elmidae). [8] 76: 61-68, ill. (k*). **Moorefield, H. H.**—The mammal nest beetles. (Leptinidae). [Bull. Nat. Hist. Soc. Md.] 10: 13-14, ill. **Musgrave, P.**—A new name: Elmidae. [10] 42: 48. **Pic, M.**—Diagnoses de Coléoptères exotiques. [L'Ech. Rev. Linne.] No. 479: 2-4. (*s). **Reinhard, H. J.**—Notes on Texas Phyllophaga with description of one n. sp. (Scarab.). [103] 13:

4-5. **Ross, E. S.**—New Histeridae from the burrows of the Florida pocket gopher. [10] 33: 1-9, ill. **Sanderson. M. W.**—A new Phyllophaga (Scarab) from Jamaica. [103] 13: 14. **Saylor, L. W.**—Two new generic names for South American Coleoptera. [10] 42: 46. **Uhmann, E.**—Die Arescini und die gattungen Solenispa und Stenispa. [2] 35: 298-300. (s*). **Wehrle, L. P.**—The discovery of an alfafa weevil (Hypera brunneipennis Boh.) in Arizona. [12] 33: 119-121. **White, R. T.**—See under Hymenoptera.

HYMENOPTERA.—Bequaert, J.—Variation in the North American Odynerus (Rygchium) dorsalis (Vespid.). [4] 72: 52-55, (k*). Monobia, Montezumia and Pachymenes, Neotropical elements in the Nearctic fauna. [10] 33: 95-102, ill., (*). An introductory study of Polistes in the United States and Canada with descriptions of some new North and South American forms (Vesp.). [6] 48: 1-31, (k). **Bohart, G. E.**—A revision of the North American species of Pterocheilus and notes on related genera (Vespid.). [10] 33: 162-208, ill., (k*). **Cockerell, T. D. A.**—Notes on Andrena campanulae. [4] 72: 42. **da Costa Lima, A.**—Alguns parasitos de moscas de frutas. [Ann. Acad. Brasileira Sci.] 12: 17-20, ill. (*s). **Cushman, R. A.**—The Nearctic spp. of Iseropus (Ichneumon.). [10] 42: 51-58, ill. (k*). N. genn. & spp. of Ichneumonflies with taxonomic notes. [50] 88: 355-372, ill., (k). **Fernald, H. T.**—A probable prenuptial gathering of Polistes (Vespid.). [10] 33: 33-34. **Hopper. H. P.**—A synoptical revision of the tribe Trogini Ashmead of the United States and Canada (Ichneumon.). [1] 65: 307-346, ill., (k*). **Krombein, K. V.**—A revision of the Myrmosinae of the New World with a discussion of the Old World spp. (Tiphiidae). [1] 65: 415-465, ill., (k*). **Lindquist, A. W.**—The introduction of an indigenous blowfly parasite, Alysia ridibunda, into Uvalde Co., Texas. [10] 33: 103-112. **Michener. C. D.**—A revision of the genus Neolarra (Nomadid.). [1] 65: 347-362, ill., (k*). **Milum, V. G.**—Larval pests (Lepidoptera) common to nests of Bumblebees and combs of honeybees. [12] 33: 81-83. **Perkins, J. F.**—Notes on the synonymy of some genera of European Pimplinae (Ichneumon.). [9] 73: 54-56. **Pickles, W.**—See under General. **Rau, P.**—The nesting habits of several species of Mexican social wasps (Vespid.). [10] 33: 81-93, ill. **Wadley, F. M.**—Telenomus ovivorus (Proctotryp.). an egg-parasite of the false chinch bug. [103] 13: 6-7. **White, R. T.**—The relation of ants to the Japanese beetle and its established parasites. [6] 48: 85-99.

SPECIAL NOTICES.—Fifty years of Entomological Progress. Parts I to V. By Marlatt, Caesar, Metcalf, Essig & Rohwer. [12] 33: 8-65. **Primitive Insects** of Australia: Silverfish, Springtails, and their Allies. **Womersley, H.** 322 pp., illus. (k). So. Austr. Br. Brit. Sci, Guild, 1939.

A Laboratory Guide in Entomology, For Introductory Courses. By Robert Matheson, Professor of Entomology, Cornell University. Comstock Publishing Company, Inc., Ithaca, N. Y., 1939. Pp. vii + 135. 48 plates. Price, $2.00. This work is a most welcome addition to the literature of entomology from the standpoint of elementary teaching. It fills a definite gap, being one of the very few published laboratory guides to introductory entomology. In this respect elementary entomology has fallen behind general zoology and even some of the subdivisions of zoology, *i. e.*, physiology, anatomy, etc. This guide is divided into 28 exercises which include: the crustacean type, external and internal structure of insects, mouthparts, metamorphosis and growth, keys to the principal orders, keys to the families of the more important orders, wing venation studies, adaptations of insects, sound-producing organs, social life, insects as pollinators, insects in relation to disease, and the problem of insect control. In addition to these there is an excellent appendix on the collection, preparation, mounting, preservation, and rearing of insects. The value of the guide is greatly enhanced by the glossary which gives concise and clear definitions of over 120 words frequently encountered in general entomology. Lists of selected references follow certain exercises. The 48 plates with their many figures are with the exception of one photograph all carefully chosen and well executed line drawings. The format is of a convenient notebook size, *viz*, 8" x 11". In fact the pages are perforated and punched so that they may be easily removed from the book and incorporated into loose-leaf covers. The paper, printing, and binding are of good quality. Teachers undoubtedly will find this guide useful in their general courses.—Merle W. Wing.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Lucanidæ of the world. Will determine, exchange or purchase. Desire especially neotropical material for revisional work. Bernard Benesh, Box 159, North Chicago, Ill.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis** or **Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted.—Blatchley's Coleoptera of Indiana at reasonable price. W. W. Chapman, 308 Custom House, New Orleans, Louisiana.

Lepidoptera—Polyphemus cocoons for Cecropia, Luna, etc., also Georgia Butterflies for others. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange against Col. or all other insects from Bolivia. Walter Wittmer, Casilla 219, Oruro, Bolivia, S. America.

ENTOMOLOGICAL NEWS

JUNE, 1940

Vol. LI No. 6

CONTENTS

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ENTOMOLOGICAL NEWS

Vol. LI JUNE, 1940 No. 6

The Life History of the American Cockroach, Periplaneta americana Linn. (Orthop.: Blattidae).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 124.)

One often reads of the injury done to the eyebrows of sleeping children by this cockroach in Central and South America. The story, incredulous as it may seem, is that the roaches at night find the sleeping children and feed upon their eyebrows. From my own experience this seems quite probable, for on three occasions during the few years that I had had the roaches under observation they had absolutely no respect for my person when I fell asleep on the couch in the laboratory. On these occasions, I was awakened by a tickling sensation on my face, only to find upon opening my eyes, a pair of long cockroach antennae playing delicately for sense impressions while the cockroach's extended mouth parts were imbibing moist nutriment from my nostrils.

Day and Night Rhythms.

Cockroaches of the household species, as everyone knows, are quiet by day and active at night. Temperature, light, and moisture, as well as sounds, are factors that influence their movements. Sometimes when one enters, during the daytime, a house that has been closed for a long time, one finds the roaches hurrying to cover; this indicates that the reversal of nocturnal behavior is due to quietude, rather than darkness. I have noted this behavior several times over a period of years with *B. orientalis*, and occasionally in reduced numbers with *P. americana*. On several occasions it was noted that temperature is the apparent factor to induce activity. As an example I may cite the following; on October 25, at 10 P. M., when the room temperature was 70 degrees F., about 300 orientalis nymphs had left their hiding places and were active on floor, ceiling, and walls of their large container, but during the same time two days earlier when the temperature was 50 degrees F. only three had left their hiding places.

In contrast to cockroaches being active during day-light hours when the house is quiet, I have observed, time and time again, that when they are active at night in a darkened room, it takes not a great deal of light brought upon them suddenly to get them all to scamper to their hiding places. As an example, on November 7, the room temperature was 70 degrees F., at 7 P. M., I quietly entered the dark room, switched on the light, and the many roaches of *B. orientalis* and *P. americana* on wall, floor and ceiling of the cages at once scampered into their hiding places. When the light of a 40 watt shaded bulb was again turned off, they all crawled out of their dark holes within 5 or 10 minutes; when it was again turned on, they all went into hiding. This experiment was tried a dozen times before midnight and always with the same result. It shows that they are highly sensitive to differences in light intensities rather than to actual light, because if the latter were the case they would not come out during day-light as they often do when all is quiet, or remain uninfluenced when a dimmed flash light of low intensity is thrown upon them, as is described for the mating behavior in later pages.

The fact that both the Oriental and the American cockroach always come out of hiding at about dusk—and dusk may be anywhere from 5 to 8 P. M., according to season—shows quite plainly that their daily rhythms are influenced by conditions or intensities of light, rather than by an hereditary fixation which would induce activity each day when the hands of the clock, as it were, reached a certain point. One experiment which I neglected to perform, was to let the light burn for a week at a time, to see at what point hunger would cause them to reverse their nocturnal activity.

As the days and weeks go on, they become more and more accustomed to the use of artificial light by the observer and when it is of low intensity they do not then run to cover so quickly, if they do so at all, as they did at first.

Mating Behavior.

When twilight falls *P. americana* come out of the crevices and scatter all over the big glass box in which the colony lives. If undisturbed by noise or light, they spend the entire night away from the home-crevices, but retire to them again before dawn. The night is the time when the entire cage is alive with big golden-yellow cockroaches doing any one of a number of things, feeding, toilet-making, preening the antennae, running about, climbing walls or ceilings, leaping from point to point,* indulging in courting antics, and in mating.

In the excitement of mating they tolerate the dim light of my flash lamp, and it is then possible to note some of the courtship and mating behavior. When the mating season is at its height, and a subdued light is flashed upon the colony, one's eye meets with an unusual spectacle. Dozens of excited males run hither and yon in a haphazard manner, with their long wings raised high in the air, their claspers spread wide open and their long abdomens, now stretched to nearly twice their length, dragging on the floor as they move. The whole population seems to be in motion—walking, running, hitting one another with their abdomens and with attempts at haphazard matings. I was able to observe a few details of the courtship and mating behavior, for example, at 9 P. M., on August 17, 1938, I found a male on the floor of the big container, fluttering his wings rapidly in front of a female two inches distant; she walks slowly away from him—he pursues her, and when she stops again he takes a position diagonally to one side of her and attempts to attach his claspers to the tip of her body. He does not succeed, however, because she has an egg-case protruding at the end of her abdomen which his claspers cannot grasp, and which apparently his sense organs, whichever ones they might be, failed previously to

* The cage is supplied with wooden uprights in the center and small boxes pyraminded at one end.

perceive. He runs away, but soon another male approaches, repeats the behavior and also for the same reason, fails to attach himself to her. Meanwhile another pair in copula on the wall nearby fall to the floor and separate; the female runs away but is pursued by two males; she finally escapes and hides under a piece of cardboard on the floor. About 18 males are wildly and excitedly running about the floor in many uncertain directions; their wings raised high in the air and the claspers widely extended. They pounce upon female after female, and occasionally a male with upright wings will push his own body under one of them, commencing at a point under her head and gradually working it backwards until the tips of both abdomens touch and then an exciting attempt is made to connect her body with his own. This is by no means easy to do and I have, in an hour, seen twenty failures to one successful mating. The females are mostly to blame for this because they are almost constantly on the move, and apparently they move about quickly because they do not wish the mating to occur. Sometimes however, the female is quiet, and the male with wings highly raised and genitalia spread open places the rear end of his own body under her head, pushes it quickly backwards until the tips of both abdomens touch and mating occurs at once.

Sometimes a male would make a dozen attempts at mating and miss his mark, and this was because he awkwardly attempted to reach his objective diagonally from one side or the other of the female, instead of from the front; and sometimes, even though he starts in the right way, he fails because he does not push his body back far enough. This is evidently due to the fact that he cannot possibly see what the tip of his abdomen is doing, although he actually does probe with it here and there among her segments.

I have made one observation in which the female took the initiative in the coutrship maneuvers. The male concerned, was one who unsuccessfully tried to mate with a female but she ran off leaving him face to face with another lady only a few inches away. He approached her, and as he did so, she shook her body very violently from side to side for several seconds, as a man would do who was suffering with a chill. She repeated this antic seven or eight times, and when I thought it was about time for him to pay some attention to her, another male rapidly ran to her from the other side of the cage and quick as a flash, even before I had time to realize what was happening, he united the tip of his abdomen with hers and the pair was at once mated. When I realized what had happened I found the pair united with heads in opposite directions, the female slowly walking away and awkwardly dragging her male-burden after her, and finally disappearing with him under a bit of cardboard. I waited fifteen minutes, lifted the cardboard and found them still united; they separated upon being disturbed, but soon reunited when I replaced the cardboard.

Mating end-to-end with heads in opposite directions seems to be the normal procedure, but how they finally get into that position with the male making his approach from the front of the female is more than I can say. Walking slowly about while united in this fashion was observed for many pairs. I have also seen so many unsuccessful attempts at mating that I often blamed the awkwardness of the male; but I finally concluded that in many of the unsuccessful attempts the females were unwilling, or not at all ready to mate. In the few successful cases that I have observed early in the courtship, the females showed by their behavior a decided willingness to mate. The male cannot see to properly direct the genitalia in the mating procedure but I think that the cerci or stylets, in a sensory capacity, act as a probing organ, but no observations have been made to substantiate this statement.

The general impression is abroad that mating is quickly over with, but I have seen several pairs of Americana remain in copula for at least an hour and I think the time spent in this act is longer.

(To be continued.)

On a Collection of Centipeds from Texas, New Mexico and Arizona (Chilopoda).

By Ralph V. Chamberlin and Stanley Mulaik,
University of Utah, Salt Lake City.

(Continued from page 128.)

Llanobius santus new species.

A larger and darker species than the genotype. The body of the holotype is a dark, somewhat olivaceous brown, with the head, antennae, first segment and posterior end of dorsum orange; legs yellow. The dorsum is roughened with rugae much as in *paucispinus*.

Antennae short, attenuated, composed of 20 articles. Ocelli fewer than in *paucispinus*, numbering but 4 in the type, and these arranged thus: 2+2, the two upper ones larger than the two of the lower series.

Prosternal teeth very small, pale, 2+2, line of apices slightly recurved; median sinus nearly semicircular. Coxal pores very small, few, 2, 1, 1, 1.

The spining of the legs is as in *paucispinus*. From that species it differs, however, notably in having the claws of the anal and penult legs single instead of double.

Length, about 8 mm.

Texas: Tom Green County, 11 miles east of San Angelo. Male holotype taken 15 Dec., 1939.

TEXOBIUS new genus.

Resembling *Sigibius* but distinct in having the antennal articles fewer and definitely fixed at 19 in the genotype. Ocelli few. Prosternal teeth 2+2. None of the dorsal plates with posterior angles produced. Spines of legs reduced in number much as in *Sigibius*.

Unique in the form of the penult legs of the male in which the ultimate article is abruptly much thinner than the penult and also decidedly shorter than the ultimate article of the adjacent legs (13th and 15th); penult article with a lobe on caudal side of its distal end.

Claw of the gonopods of the female strictly entire; basal spines 2+2.

Genotype.—*Texobius unicus* new species.

Texobius unicus new species.

Body and legs pale yellow or lemon-colored, the head, or head and first segment or two, with antennae and prehensors darker, more or less orange-colored.

Head with lateral margins interrupted. Antennae short, articles 19 of which the last is somewhat longer than the two preceding taken together. Ocelli usually 5, in two series, 3, 2, those of lower series smallest, and the posterior eye of upper row not separated as "single" ocellus.

Prosternal teeth small and pale, 2+2, the line of their apices slightly recurved and the median sinus narrowly rounded at bottom. Coxal pores few, small, circular and uniseriate.

Ventral spines of first legs 0, 0, 0, 0, 0; of the second, 0, 0, 0, 0, 1. Ventral spines of the penult legs, 0, 1, 2, 1, 0; dorsal, 0, 0, 2, 0, 0; claw single. Ventral spines of anal legs, 0, 1, 1, 1, 0; dorsal, 0, 0, 2, 0, 0; claw single. None of the posterior coxae armed.

In the male the anal and penult legs are inflated, and much longer and thicker than the preceding ones; anal without special lobes; penult with last article much shorter than that of thirteenth or fifteenth legs, and abruptly much narrower than the penult article; distal border to penult article extended into a lobe or process on caudal side of base of last article, this bearing a patch of setae on caudal face.

Claw of gonopod of female strictly entire, acute; basal spines 2+2.

Length, about 6 mm.

TEXAS: Kerr County, Raven Ranch. About twelve specimens, most of which are males. Also one male taken 17 miles north of Alice, Brooks County, and three from a station south of Three Rivers, Live Oak County. All were taken in Dec., 1939.

Pholobius mundior new species.

When in full color the dorsum and the two posterior pairs of legs chestnut, with the dorsal plates often darker across caudal borders, the antennae chestnut or dark brown; legs other than the posterior pairs are yellow. Specimens not in full color vary from light brown to yellow.

Antennae rather short, composed mostly of from 30 to 35 articles of which those beyond middle are very short. Ocelli in a subelliptic patch, black, with a single ocellus a little apart and moderately enlarged, the other ocelli small; arrangement, e. g., 1+4, 5, 5, 5, 3, 1.

Prosternal teeth commonly 5+5; the special marginal seta ectad and slightly caudad of outermost tooth on each side, the seta more robust than ordinary setae, slenderly subspiniform. Coxal pores round, uniseriate, a typical number and arrangement being 5, 5, 5, 5.

Ventral spines of anal legs, 0, 1, 3, 3, 1, or 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 0; claw single. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw single. Last five pairs of coxae typically dorsally armed, the last two pairs laterally armed. Dorsal spines of first legs, 0, 0, 3, 2, 1; ventral, 0, 0, 2, 3, 2.

Posterior angles of ninth, eleventh, and thirteenth dorsal plates acutely produced, those of the seventh pair more broadly and moderately produced.

The gonopods of the female tripartite, with the acute median lobe much exceeding the laterals; basal spines 2+2, slender acuminate from base.

In the male the fourth joint of the anal legs is moderately crassate, flattened and slightly incurved from end to end above, with a shallow longitudinal dorsal furrow and a low rounded elevation at distal end. The last article of both anal and penult legs longitudinally furrowed on mesal (caudal) surface.

Length, 18 mm.

Texas: Kerr County, Raven Ranch. Many specimens taken in August and one in December, 1939.

Differs from *P. goffi* in lighter color, larger number of antennal articles, in having the ventral spines of penult legs 0, 1, 3, 3, 2 instead of 0, 1, 3, 3, 1, and the claw single instead of double, etc.

Neolithobius suprenans Chamberlin, Bull. Mus. Comp. Zool. Harvard College, 1925, vol. LVII, no. 8, p. 500.

Texas: Kerr County, Raven Ranch, many specimens; Bandera County, 7 miles north Medina; 11 miles southwest of Boerne. All the specimens were taken in December, 1939.

Scutigeridae.

Scutigera coleoptrata Linné. Texas: Kerr County, Raven Ranch. Several young and partly grown specimens taken in July, August and December, 1939.

Entomological Usage of Subspecific Names.[1]

By Curtis W. Sabrosky, Michigan State College, East Lansing, Mich.

An outline of the conflicting interpretations and problems of nomenclature regarding names of categories lower than species was presented by the writer in a recent issue of Entomological News (Ent. News, L, pp. 197-203, July, 1939). It seems worthwhile at this time to place on record the data accumulated in a survey of the actual practices of entomological authors in North America during the past fifty years.

The present summary is based on all infra-specific names in entomology proposed as new during the fifty-year period, 1890 to 1939, inclusive, in the following North American journals[2]:

Academy of Natural Sciences of Philadelphia, Proceedings
American Entomological Society, Transactions
Biological Society of Washington, Proceedings
Brooklyn Entomological Society, Bulletin
California Academy of Sciences, Proceedings
Canadian Entomologist
Entomologica Americana (o. s.)
Entomological News
Entomological Society of America, Annals
Entomological Society of Washington, Proceedings
Insect Life
Insecutor Inscitiae Menstruus
Kansas Entomological Society, Journal
Microentomology
New York Entomological Society, Journal
Ohio Journal of Science and the Ohio Naturalist
Pan-Pacific Entomologist
Psyche
Smithsonian Miscellaneous Collections
United States National Museum, Bulletin
United States National Museum, Proceedings

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[1] Journal Article No. 354 (n. s.) from the Michigan Agricultural Experiment Station.

[2] Complete to the end of 1939 except for the last three volumes of the Bulletin of the Brooklyn Entomological Society, and a few early issues of the Proceedings of the California Academy of Sciences. Approximately 750 volumes were examined during the survey.

It will be apparent to taxononists that the above journals include a significantly large proportion of new infra-specific names in entomology, and that the general picture is therefore a fair representation of the practices of North American authors during the past half-century.

Table I. Total Number of New Infra-specific Names, 1890-1939, inclusive.

	Number	% of Total
Variety	1522	55.4%
Subspecies	746	27.1%
Race	90	3.3%
Aberration	151	5.5%
Form	110	4.0%
Transition Form	122	4.4%
Miscellaneous	6	.2%
Grand Total	2747	

Of the grand total (Table I) of 2,747 new infra-specific names which appeared during the period, over half (55.4%) were proposed as new variety, in spite of the fact that the word variety is not mentioned by the International Rules. "Variety" was therefore twice as frequently used as the term "subspecies", which accounted for one-quarter (27.1% of the new names. All other names together (race, form, etc.) accounted for the remainder. Variety and subspecies together totaled 82.5% or over four fifths of the names, indicating that the other terms are of much less frequent use and of relatively minor importance compared to the two principal categories.

Although the grand totals show a preponderance of usage in favor of variety, a shift or trend in the other direction is evident when the data are arranged by ten-year and five-year periods (Table II). The use of variety has decreased during the last few periods, whereas the use of subspecies has increased. The number of new subspecies exceeded the number of new varieties for the first time during the five-year period, 1935-1939, when 174 new subspecies were proposed, compared with 123 new varieties. The change is striking when one compares the latter period with the first ten-year period, 1890-

Table II. Total Number of New Varieties and Subspecies

(a) per Ten-year Periods

	1890-'99	1900-'09	1910-'19	1920-'29	1930-'39
Variety	104	266	443	428	281
Subspecies	6	69	210	193	268

(b) per Five-year Periods

	1925-1929	1930-1934	1935-1939
Variety	213	158	123
Subspecies	90	94	174

1899, in which new varieties outnumbered new subspecies 104 to 6. A part of the change is probably due to greater knowledge and discrimination, but undoubtedly there has been a considerable shift in ordinary practice among entomological workers in general.

As a further means of breaking down the data into more comparable classes, the various names were tabulated by order (Table III). The arrangement demonstrates that for the fifty-year period under consideration, the use of variety exceeded that of subspecies in all cases but one, the Orthoptera (cf. Table VI). In some orders (e. g., Homoptera, 269 to 19) the difference is very great, probably due in the example cited to the extensive use of the term variety in the family Cicadellidae. In the order Hymenoptera, on the other hand, partly because of the frequent use of the term subspecies by specialists in the

Table III. The Use of New Infra-Specific Names, by Orders, 1890-1939, inclusive

	Variety	Subspecies	Race	Aberration	Form	Transition Form
Coleoptera	290	123	2	52	8	...
Lepidoptera	314	112	68	97	100	121
Hymenoptera	354	262	14	...	2	...
Diptera	122	77	2	...	2	...
Homoptera	269	19	2	...	...	...
Hemiptera	98	20	...	...	...	...
Orthoptera	28	74	3	...	2	...
Other Orders	45	38	...	...	...	...

ants and bees, the totals for variety and subspecies are much closer. Over one-third of all new subspecies for the past fifty years were in Hymenoptera. Table III also shows the extremes in usage of infra-specific names, from the many terms employed in the Lepidoptera to the two kinds used in the Hemiptera and the smaller orders.

As a final step in the analysis, the data were arranged by ten-year periods for each order, to determine if there have been any noteworthy trends in usage in different orders. The orders Lepidoptera, Coleoptera, and Orthoptera are presented here as examples. The order Lepidoptera best illustrates the point that the data must be treated in several ways for full effect (Table IV). Although variety outnumbers subspecies 3 to 1 in the entire fifty-year period (cf. Table III), we find from Table IV that one-half of the varietal names in Lepidoptera were proposed *before 1910* (and two-thirds before 1915) but only 11 of all other names. After 1915, the use of variety dropped steadily, while the use of subspecies and of other terms increased remarkably. The use of names other than variety and subspecies reached its peak in the five-year period, 1925-1929, when such names were six times as numerous in the literature of Lepidoptera as the two major terms (199 to 36). Over half of all "new races" in entomology were proposed within this single five-year period in the order Lepidoptera alone.

Table IV. New Infra-Specific Names in Lepidoptera, per Ten-year Periods

	1890-'99	1900-'09	1910-'19	1920-'29	1930-'39
Variety	57	104	81	42	30
Subspecies	...	2	33	41	36
Race	1	1	3	48	15
Form	...	...	14	54	32
Aberration	4	3	15	66	9
Transition Form	...	...	...	77	44

The order Coleoptera further illustrates the corresponding increase of subspecies and decrease of variety in frequency of use over the last twenty to thirty years (Table V). In the five-year period, 1935-1939, the number of new subspecies for the first time exceeded new varieties (33 to 12), the difference being great enough to show a predominance in favor of subspecies for the last ten-year period.

Table V. New Infra-Specific Names in Coleoptera, per Ten-year Periods

	1890-'99	1900-'09	1910-'19	1920-'29	1930-'39
Variety	3	60	96	85	46
Subspecies	1	21	10	28	63
Race	...	...	...	2	...
Form	...	...	...	7	1
Aberration	...	...	...	51	1

As the only order to show a greater number of subspecies than varieties in the grand totals, the order Orthoptera was also tabulated by ten-year periods (Table VI). The same trend is again evident, with variety decreasing and subspecies increasing in frequency. In the other orders, however, it has only been within the last ten years, and usually within the last five years, that subspecies have equaled in number or have slightly exceeded varieties (cf. Tables IV and V). In the Orthoptera, "subspecies" has definitely predominated since 1910, due in large measure to the lead of Rehn and Hebard. The change from variety to subspecies is much more marked than in any other order, for five-sevenths of the new varietal names were proposd *before* 1920, and three-fourths of the new subspecies were proposed *after* 1920.

Table VI. New Infra-Specific Names in Orthoptera, per Ten-year Periods

	1890-'99	1900-'09	1910-'19	1920-'29	1930-'39
Variety	4	14	2	5	3
Subspecies	...	5	13	20	36
Race	...	...	2	1	...
Form	1	1	...	...	...

The frequencies of variety and subspecies in the order Hymenoptera have not differed greatly since 1900, with variety usually having a slight advantage in numbers. The other orders do not show striking differences.

CONCLUSION

The results of a survey of actual entomological practices in North America for the last fifty years (1890-1939, inclusive) on the use of variety, subspecies, race, etc., in proposing new infra-specific names, are briefly presented in tabular form.

Regardless of which viewpoint one upholds in discussions of principle, the fact is inescapable that over one-half of all new infra-specific names proposed in entomology in the last fifty years (at least in North America) were proposed as new varieties, and that nearly three-fourths were proposed under some categorical name other than subspecies.

Undoubtedly, some or many of the names proposed as new varieties were really names for subspecific entities and were so considered in the minds of the authors. The proposers of new varieties frequently discussed them as "geographic races", pointed out their distinctive range as opposed to related "varieties", etc., thus indicating beyond a doubt that they were dealing with "subspecies" in the geographic sense of the term. Such new "varieties" were at least proposed in the spirit of the Code, if not in the letter of the Code as interpreted by those who believe that only names proposed definitely as new "subspecies" are valid.

It is patently impracticable for the International Rules of Nomenclature to deal with auctorial concepts. Generally speaking, the Code must deal with the *names* as proposed, regardless of what the categories meant to the various authors. It would seem that an interpretation of the term subspecies in the Code should be guided in part at least by the practical applications and consequences resulting from the acceptance or rejection of terms for the several infra-specific categories. The present summary shows the extensive use of the term variety, far exceeding the use of subspecies, and the lesser use of other terms. The confusion which would result from the absolute rejection of all such names as invalid is worthy of careful consideration.

Spring Collecting in the far South and the Big Freeze of 1940. (Lepidoptera).

By Margaret M. Cary, Philadelphia, Pennsylvania.

From the 22nd of March to the 12th of April, 1940, John W. Cadbury, III, and I have been engaged in making an entomological Survey in the far South for the Academy of Natural Sciences. The first two weeks were spent in collecting in the Okefenokee Swamp of Southern Georgia and part of the third week was spent in extreme southern Florida in Everglades and Florida City. We selected these weeks because normally in our experience they are among the best of the year for collecting.

In the Swamp we used a gasoline pressure lamp hung in front of a white sheet and every evening sugared about one hundred trees. We not only got very few species but very few specimens of any species. It was warm, day temperatures reaching as high as 98 degrees, the rain conditions normal, there was little wind. On several nights the collecting conditions seemed ideal. We began to wonder whether the extreme cold of February had something to do with this shortage, finding that for two nights the temperatures had dropped as low as 18 degrees with cold days preceding and following the actual freeze. In the daytime a few butterflies of common species were seen, but this type of piney woods has few flowers, and there are never many butterflies.

We then went to Everglades where a few years before at this time of year both the Noctuid and Sphingid collecting had been outstandingly good. We had for instance in four nights of collecting over petunias secured 45 fresh and perfect specimens of the scarce Sphingid, *Madoryx pseudothyreus*. The Academy owns the type of this species and we had hoped to collect a series of fresh specimens here. We found an almost ideal garden of petunias and many other sweet-smelling flowers, received permission to collect there, and went to work with high hopes. Not a single Noctuid or Sphingid came to those flowers that evening. There was not even a single *Proto-*

parce celeus or *carolina* which before had been in droves. The lights, although well placed, also produced nothing.

In Florida City we collected over petunias in the early evening, catching one *Dolba hylaeus,* and about eleven o'clock, armed with headlights, we collected over the sweet-smelling night-blooming jasmine bushes, whose heavy odor fills the air for hundreds of yards. In other years these bushes swarm with Noctuids, Notodonts, Sphingids, so that one has to select his species. This year, although the night was warm and still, we secured two Notodonts, three Noctuids and one common Sphingid, *Xylophanes tersa.* The lights of the town and the sugar yielded nothing. In Florida City the temperature had reached 24 on two successive nights and many tropical plants and palms were brown and dead. The freezing damage was even more apparent at Everglades where the temperature was equally low. All the mangrove islands of the Ten Thousand Islands, as far as eye could see, were completely brown and dead to the water line where new shiny green sprouts were coming out. While all collectors have experienced many disappointments for various reasons it seems fairly clear to us that the great freeze of 1940 has laid an unusually heavy toll on Insect life. Resident collectors are waiting to see what happens the rest of the season, but are inclined to agree with us as to the cause of this year's poor collecting.

Fernald Club Yearbook for 1939.

This Yearbook is the ninth annual report of the Fernald Entomological Club, Massachusetts State College, Amherst. It is devoted to the personnel, present and past, and the interests of the Department of Entomology. This issue is dedicated to the late Dr. W. E. Britton, state entomologist of Connecticut, to whom Prof. A. I. Bourne pays a tribute, while Dr. E. P. Felt contributes a biographical notice. A portrait of Dr. Britton accompanies it. There is a biography of Dr. Harvey L. Sweetman, author of the recent volume on Biological Control of Insects, Assistant Professor at the College. Interesting data are given on the discovery of arsenate of lead, as an insecticide, by the late Prof. Charles H. Fernald and associates. Many notes on the recent activities of the Department fill the rest of the 36 mimeographed pages.

A new Species of Encopognathus from California (Hymenoptera, Sphecoidea).

By P. H. Timberlake, University of California, Citrus Experiment Station, Riverside, California.

Rhectognathus was described by Pate (Entom. News, 47, p. 147, 1936) as a subgenus of *Encopognathus*, but it is perhaps a good genus. The angulation of the intercubitus in *Encopognathus* and *Rhectognathus* was stressed by Pate, but possibly the significance of this structure escaped his attention. When the fore wing of *Rhectognathus* is viewed by transmitted light, the obsolete portion of the venation is visible as fine creases. These creases indicate the ancestral form of venation, viz., a petiolate second cubital cell, which has become obsolete by the atrophy of the outer fork of the intercubitus and corresponding part of the cubitus. The second recurrent is also indicated by a crease and is interstitial with the outer fork of the intercubitus. In various other Crabronines there is no such indication of a petiolate second cubital cell, although the venation is otherwise similar. *Rhectognathus*, therefore, may show some remote affinity with *Bothynostethus* (usually classified with the Larrinae), which has a similarly shaped head and prepectus (Crabronine characteristics), but on the other hand, has three cubital cells, the second petiolate, a short, pointed marginal cell, and simple mandibles. The head in *Rhectognathus* is shaped much as in *Entomognathus*, but is somewhat less quadrate, with the temples and vertex less lengthened behind the eyes and the eyes are slightly less convergent below.

Encopognathus (Rhectognathus) rufiventris n. sp.

Similar to *E.* (*R*) *pectinatus* Pate, but is distinguished by the red color of the abdomen, a different denticulation at apex of clypeus, more dusky wings, with fuscous veins, and somewhat duller, more aciculate sculpture.

♀.—Head and thorax black. Scape, tubercles, spot at anterior end of tegulae, transverse line on each side of thorax between scutellum and wing base, metanotum medially and thin line on posterior margin each side to base of hind wings, apex of all femora, tibiae except on inner side, front tarsi and base of middle and hind tarsi, yellowish-white. Under side of flagellum narrowly pale brownish beneath, this color gradually changing to yellowish-white on the basal segments and on under side of pedicel. Mandibles rufo-piceous at base, red in middle and black at apex. Tegulae testaceous, except the white spot. Spurs pallid. Abdomen red, with the basal half of tergite 1 and a rather large but nubilous mark on middle of basal part of tergites 2 to 4, black. (In *pectinatus* the abdomen is black, with the apex yellowish-white). Venter, except last segment, blackish, the apical border of ventrites 2 to 5 broadly testaceous, with a golden luster. Wings lightly infuscated, the veins nearly black.

Apical margin of clypeus with six teeth (seven in *pectinatus*), the inner pair and outermost ones rather broad and blunt, the other two subacute. Head and thorax duller than in *pectinatus*. Frons, vertex and mesonotum minutely aciculate, with fine punctures. The punctures slightly coarser than in *pectinatus* and considerably sparser, especially on the head and mesoscutum. Cheeks duller, finely, closely and longitudinally carinate anteriorly, with minute punctures between the lines. Anterior half, or a little more, of mesopleura sculptured like mesoscutum, the posterior margin and metapleura polished. Sculpture of propodeum nearly as in *pectinatus*, but duller. Abdomen about the same in shape and sculpture as in *pectinatus*. Pubescence and ammochaetae practically the same in the two species, with the clypeus, except median beveled area, and lower half of anterior orbits densely silvery.

Length, 5 mm.; anterior wing, 4 mm.; width of head, about 1.7 mm.

One female (*holotype*) collected at flowers of *Phacelia distans*, 10 miles southwest of Victorville, CALIFORNIA, May 6, 1939 (Timberlake). Type in collection of Citrus Experiment Station, Riverside, California.

E. pectinatus is represented in the collection by one female, taken at flowers of *Baeria chrysostoma*, near Strathmore, Tulare County, California, March 29, 1937.

Invasion from Africa (Diptera: Culicidae).

Under this title, the Review for 1939 of the Rockefeller Foundation by its President, Raymond B. Fosdick, devotes six pages to an account of the campaign, in north-eastern Brazil, against the African malaria-carrying, *Anopheles gambiae*. First found at Natal, Brazil, in 1930, this mosquito, following the prevailing winds, now occupies 12,000 square miles.

Two New Species of Batrisodes from South Carolina (Coleoptera: Pselaphidae).

By Milton W. Sanderson, University of Arkansas, Fayetteville, Arkansas.

The two new species described in this paper were among a box of miscellaneous Pselaphidae recently sent me for determination by O. L. Cartwright, Clemson College, South Carolina. Although each species is represented by a single male, they are believed to be sufficiently distinct from all described species in this difficult genus to warrant their descriptions. Both species were collected by Mr. Cartwright, one is named in his honor, and through his courtesy I have been allowed to retain the types in my collection.

Batrisodes cartwrighti n. sp.

Length 2.25 mm.; width .78 mm.

Color dark brown, elytra lighter and more reddish, appendages paler. Upper surface, except head, impunctate, clothed with short, yellow, subdecumbent hairs.

Head slightly wider across eyes than from base to anterior margin of clypeus; quadrate. Vertex elevated, convex, and without carinae; less closely and coarsely punctured than remainder of head. Front continuous with clypeus, not excavated between antennae, declivous in front of antennal bases at an angle of about 45 degrees. Sides emarginate next the antennae; front strongly and closely punctured. Clypeus less strongly punctured and more shining. Circumambient sulcus obsolete anteriorly, each sulcus terminating in a slight depression. Frontal foveae small, nude, and on a line through the hind margin of the eyes. Sides of head in front of the semicircular and finely faceted eyes straight, but strongly convergent and rounded posteriorly to the neck. Side of head behind eye nearly twice diameter of eye.

Antenna shorter by the distal segment than the combined length of pronotum and elytra in the median line. First segment longer and broader than either of the next eight, distinctly punctured anteriorly on lower surface; third slightly longer than wide, the following six with length and width subequal; tenth abruptly larger than ninth, nearly circular, and with a large internal fovea occupying nearly an entire side of segment; eleventh slightly narrower than tenth, narrowed in anterior two-thirds, as long as preceding two combined. All segments with long, yellow hairs.

Pronotum as wide as long, wider slightly before the middle. Median sulcus distinct in front of basal fovea to within a distance equal to length of first antennal segment behind apex. A small carina from fovea to base. Extreme base of pronotum with two foveae on each side near hind angles; lateral discal foveae distinct. Discal carina, before the spiniform process, distinct and ending opposite end of median sulcus.

Lower side of front femur angulate at basal one-third. Inner margin of middle tibia at apex with a short oblique spine. Hind tibia with a terminal spur equal to width of tibia at apex.

Elytra wider than long, sides evenly rounded; humeri very distinct and acutely spinose. Three distinct basal foveae on each elytron.

Abdomen equal in length to elytra, the abdominal carinae extremely basal and occupying about one-fifth of width of segment. Pygidium very strongly tumid in middle, transverse. Last ventral segment deeply and broadly, longitudinally excavated, the excavation opening posteriorly, and with the produced though transversely narrowed fifth segment visible above the excavation.

Holotype male, Clemson College, SOUTH CAROLINA, April 13, 1931, O. L. Cartwright.

The absence of the inner antennal excavation places this species in Bowman's Group II (The Pselaphidae of North America, 1934, p. 59). The only eastern species in this group is *schaumi* Aube, from which *cartwrighti* differs by its impunctate elytra and absence of a tooth on seventh and eleventh antennal segments of male. It differs too from all other species in this group by its sexually modified antennae. The tenth segment is as broad as the eleventh, and has a large fovea on the inside.

Batrisodes curvatus n. sp.

Length 2.1 mm.; width .68 mm.

Color reddish brown, the elytra and appendages lighter. Upper surface impunctate, rather thickly clothed with yellow, subdecumbent hairs nearly equal to width of first antennal segment.

Head from base to apex of labrum approximately equal to width across eyes. Vertex elevated, convex, and with one carina in median line at base. Front declivous, narrowed between the antennae and continuous to the margin in the form of a slight carina. Circumambient sulcus distinct though somewhat evanescent anteriorly at the smooth and excavated front between antennae. Frontal foveae small, mutually separated by a distance subequal to the distance from fovea to eye, the foveae on a line behind the hind margins of the eyes. Tempora behind eyes rounded, convergent, and twice the length of the eye; hind angles of head not distinct. Eyes small, convex.

Antenna about equal to combined length of pronotum and elytra. First segment broader though shorter than the next two combined; two to seven subequal in length, a little longer than wide; eight as wide as seven, nearly circular; ninth and tenth increasing in width and strongly rounded; eleventh still broader and longer than ninth and tenth combined. All segments clothed with long yellow hairs.

Pronotal length and width subequal, the greatest width slightly in advance of middle. Median sulcus only faintly evident in apical third; basal fovea distinct. A small carina from fovea to base. Extreme base of pronotum with two foveae on each side near hind angles; lateral pubescent foveae on a line slightly in advance of median basal fovea. Discal carina indicated only by a short, obtuse projection, slightly carinate anteriorly, between lateral and median foveae.

Hind femur nearly parallel-sided in basal two-fifths, then rather strongly clavate and spindle shaped to apex. Trochanter of hind leg with a short basally recurved spine at its apex. Hind tibia with spurs.

Elytra slightly wider than the sutural length, sides rather evenly rounded, the humeri just visibly distinct, not at all toothed. Base of elytron apparently with three foveae, the sutural one very small and close to the second. Discal stria obsolete.

Abdomen very slightly narrower than elytra. Basal abdominal carinae very short and occupying one-fifth of abdominal segment at base; extreme base of segment transversely grooved and pubescent. Last ventral segment slightly depressed in basal two thirds, the apex somewhat lobed to fit the rounded pygidial emargination.

Holotype male, Clemson College, SOUTH CAROLINA, April 25, 1938, O. L. Cartwright.

This species appears to occupy an intermediate position between *cavicrus* Csy. and *carolinae* Csy. While agreeing with both species in the dentiform trochanter, it differs from *cavicrus* by the single carina on the head, pronotum without a distinct median groove, except a slight one anteriorly, and the two series of recurved pronotal spines are absent. It agrees with *carolinae* by the unicarinate occiput, but differs notably by its impunctate hind femora, and lack of recurved pronotal spines.

An Undescribed Corythucha (Tingitidae-Hemip.) from Colorado.

By C. J. Drake, Iowa State College, Ames, Iowa.

The new species of lace bug described below was collected, by sweeping vegetation, in Colorado. The types are in the collection of the author.

Corythucha tuthilli sp. nov.

Small, whitish, without color marking. Antennae rather short, brownish, beset with a few long, bristley hairs, the fourth segment dark at apex. Body beneath, including bucculae, head and rostral laminae black. Rostrum long, extending almost to end of sulcus. Legs slender, brownish, the tibiae testaceous.

Pronotum almost flat, whitish, slightly grayish in front, distinctly pitted; triangular process long, sharply narrowed posteriorly, reticulate; lateral carinae strongly foliaceous, areolate, arched above, concave within, extending forward to the base of hood; median carina not strongly arched above, about one-third as high as hood, the areolae large, rectangular, some of them divided so as to be two deep in highest part. Hood moderately large, longer than median carina, narrowed anteriorly, extending in front of head, moderately constricted near the basal third. Paranota long, broad, mostly four areolae deep. Elytra distinctly narrowed posteriorly, widest near base, the tumid elevation moderately large; costal area moderately broad, biseriate. Margins of elytra, paranota and carinae armed with moderately long, black-tipped spines; also nervelets of hood, paranota and elytra with erect spines.

Length, 3.45 mm.; width, 1.45 mm.

Holotype (male), *allotype* (female) and 8 *paratypes* Creede, Colorado, July 14, 1938, collected by L. D. Tuthill.

This species is distinctly smaller than other western species of similar color. The long lateral carinae, shorter spines and biseriate costal area separate it from *C. hispida* Uhler. *C. immaculata* O. and D. is a much larger species with triseriate costal area.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal. R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte. hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Comparceé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.

56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista de Entomologia, Rio de Janeiro, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.
Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within** ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Balduf, W. V.—The bionomics of entophagous insects. Part II. 384 pp., ill. John S. Swift Co., Inc. **Brues, C. T.**—Is ours the "Age of Insects?" [Scien. Monthly] 1940: 413-418. **Cutright, P. R.**—The Great Naturalists explore South America. 1940: 284-323. Published by The MacMillan Company. New York. **Frenguelli, J.**—Nidos fósiles de insectos en el terciario del Neuquén y Río Negro. [Notas del Museo, Buenos Aires] 4: 379-402, ill. **Ide, F. P.**—(See under Smaller Orders of Insects.) **Kautz, H.**—Meine Stellungnahme zur Frage der Anpassung an die Umgebung auf Grund eigener Beobachtungen. [64] 25: 49-55, ill. **Rensch, B.**—Tiergeographie. [Fortsch. der Zool.] 4: 307-328. **Thiel, M. E.**—Systemlehre und Stammesgeschichte. [Fortsch. der Zool.] 4: 222-286, ill. **Tonnoir, A. L.**—Obituary by A. J. Nicholson. [31] 145: 453-454.

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SPECIAL NOTICES.—Generic Names of British Insects. Part 7. Pub. by Roy. Ent. Soc. London. 1940. 196-209. **Hautflugler oder Hymenoptera.** 1: Ameisen oder Formicidae. By H. Stitz. [Tierwelt Deutschlands] 37: 428 pp., ill.

Destructive and Useful Insects; their Habits and Control. By C. L. Metcalf and W. P. Flint. Edition 2. McGraw-Hill Book Company. $7.50. In 1928 these authors put out a book under this title which I considered one of the most important on the subject published in America and which both the teacher and layman should find to be one of the most valuable books on insects and their relation to man. It presents most concisely our knowledge of insects in their various phases: their importance to man as regards injurious and beneficial rôles; their general classification; and their control. That first edition contained 918 pages and over 561 figures. In 1939 this second edition appeared, containing 981 pages and 584 figures and was found necessary because of the astonishing progress made in the knowledge of the life histories, bionomics, morphology and physiology of our most important insect species. Of the 918 pages in the first edition, only a few remain unchanged in the present one. Much effort has been made to present the context in such manner that it may be readily understood by even the most uninitiated; and for those seriously interested in the species concerned, determination keys to their orders, are presented, augmented by illustrations of the types of insects of these various orders. A most interesting and useful compendium of economic entomology.

E. T. Cresson, Jr.

THE SPIDER BOOK. By JOHN HENRY COMSTOCK. Revised and edited by DR. W. J. GERTSCH. Doubleday, Doran & Company, Inc. 729 pages, over 770 illustrations. 1940. $6.00.—The exhaustion of the first edition of this work by America's beloved teacher of entomology, which appeared in 1912, indicated the increased interest his book created in this universally shunned and feared group of animals. No American work, since Dr. Henry C. McCook's volumes on American spiders, has in any way presented the spider as interestingly as Comstock's book. The publishers of Comstock's book have persuaded Dr. W. J. Gertsch, of the American Museum of Natural History, an authority in this field, to go over the original work for this new edition. However, he has found it unnecessary to make many changes, and those made were merely to bring it into line with the more modern systems of classification and are chiefly in the taxonomic sections, with the introduction of new keys and revisions by others. This book should be in the library of all students of nature and will be indispensable to those serious students of spiders.

E. T. CRESSON, JR.

COMPENDIUM OF ENTOMOLOGICAL METHODS. PART I COLLECTING MAYFLIES (EPHEMEROPTERA). By JAY R. TRAVER, Ph.D., Massachusetts State College, 1940. Ward's Natural Science Establishment, Inc., Rochester, New York. 8 unnumbered pages, 17 unnumbered figures.—We are informed that this publication will contain specific information concerning the various orders and groups of insects written by specialists. It is designed to give detailed directions concerning methods of collecting and preparing specimens for study. The various sections will be mailed free of charge to all professional and amateur entomologists requesting them from the publisher. Part I gives instructions for collecting and preserving both immature and winged stages of mayflies and for rearing life history material, by one of the joint authors of *The Biology of Mayflies* of 1935. Parts on Orthoptera, by Dr. Irving J. Cantrall, and on Mallophaga, by Dr. F. H. Wilson, are promised. It is hoped, when the series is complete, that the resulting Compendium may be published in book form. The plan of this series is commendable. Wards announce also the early publication of a new booklet entitled *How to Collect,, Mount and Store Insects,* profusely illustrated.—P. P. CALVERT.

STUDIES IN THE MECOPTERA. Reprinted from The American Midland Naturalist, Vol. 23, No. 2, pp. 257-367, March, 1940. For sale by the Naturalist at University of Notre Dame, Notre Dame, Indiana, price $1.00, paper bound, postpaid.—This reprint consists of two articles: Biology and morphology of some North American Bittacidae by L. R. Setty, of Park College, Parkville, Missouri. (pp. 257-353, 179 figs), and The genital anatomy and mating behavior of *Borcus brumalis* by Kenneth W. Cooper, of the Dep't. of Biology, Princeton University (pp. 354-367, 9 figs.). Both are accompanied by extended bibliographies.

Mr. Setty's article is preceded by an extensive table of contents which makes it easy to find any topic in which the reader may be interested. While much of this study was made at Cornell University, his field observations extended through a number of the United States. The biology and morphology of egg, adult and larva of various species of *Bittacus* are described, both external and internal structure being included. There is a section on the importance of these hanging flies (which "deserve to be placed on the list of insects beneficial to man" because of the adults feeding on mosquitoes and of the scavengering habits of the larvae) and another on improved methods and apparatus for biological work. This is an important paper for the subjects of which it treats and for comparative insect morphology and life history.

The title of Dr. Cooper's article describes its contents. He has found differences in both male and female internal reproductive organs of *B. brumalis* Fitch from those of *B. hyemalis* L. In spite of these "marked internal differences, the mating, behavior of *brumalis,* is identical with that of *hyemalis.* Correspondingly, the external genitalia, are remarkably similar." Cooper's observations on mating agree with those of Brauer (1855), Poujade (1884), Cockle (1908), Withycombe (1926) and Steiner (1937) but contradict those of Carpenter (1936).

—P. P. CALVERT.

THE CHEMISTRY AND TOXICOLOGY OF INSECTICIDES. By HAROLD H. SHEPARD, Ph.D., Assistant Professor of Entomology and Economic Zoology, University of Minnesota, Burgess Publishing Co., 426 South 6th St., Minneapolis, Minnesota. 1939. 10¾ x 8½ inches, (7) + 383 pages, mimeoprinted on both sides of each leaf, 97 tables, 40 figs. $4.00.—The author says in his foreword: "This volume is intended not only for college students of entomology who will use it as a class-room text, but for the many persons in public and private entomological pursuits who need a reference book on this subject. It is the purpose of the author to present within the limits of a book of convenient size the important facts and theories relative to insecticides, including not only the chemical, physical and toxicological aspects, but also information regarding the history and commerce pertaining to this field. Although this text is not merely an annotated bibliography, it is primarily a guide to the insecticide literature. Methods of insect control are not given except as the action of specific insecticides is illustrated. Spray schedules often are of only local significance." The first four chapters, 46 pages, comprise an Introduction, History of Insecticides, Principles of Insecticide Toxicology and Quantitative Toxicology of Insecticides. The introduction (pp. 3-4) presents "a convenient classification of insecticides" which is followed in the later chapters. It is:

Stomach Poisons: Arsenicals (chap. 5), Fluorine and other inorganic poisons (chap. 6).

Contact Poisons (*Inorganic*) Sulfur, copper and selenium compounds (chap. 7).

Contact Poisons (*Organic*) Mineral, vegetable and animal oils and soaps (chap. 8).

Plant Products: Nicotine, pyrethrins, rotenone, hellebore and others (chap. 9).

Fumigants: Hydrocyanic acid, sulfur dioxide, carbon disulfide, chlorinated hydrocarbons, methyl bromide and crystalline compounds (chap. 10).

Miscellaneous Chemical Control (chap. 11).

Each chapter ends with a list of references. An appendix contains conversion tables. An alphabetical index occupies a little more than six pages. As a sample of the treatment of the subject matter, chapter 5 on arsenical totals 63 pages, of which 3 are devoted to the estimation of the toxicity of stomach poisons to insects, 14 to the chemistry of the arsenicals, 1 to the determination of arsenic, 5 to the solubility of arsenicals, 3+ to spray mixtures and correctives, 3 to effect of arsenic on plants, 3 to spray deposit and its ingestion by insects, 7 to the toxicology of arsenic in insects, 1 to relative toxicity to insects, 3 to toxicity of arsenic to other animals, 8 to arsenical residues and 9+ to references. This volume will surely fulfill the author's aim to furnish a reference book on this subject.

—P. P. CALVERT.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted.—Blatchley's Coleoptera of Indiana at reasonable price. W. W. Chapman, 308 Custom House, New Orleans, Louisiana.

Lepidoptera—Polyphemus cocoons for Cecropia, Luna, etc., also Georgia Butterflies for others. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange against Col. or all other insects from Bolivia. Walter Wittmer, Casilla 219, Oruro, Bolivia, S. America.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

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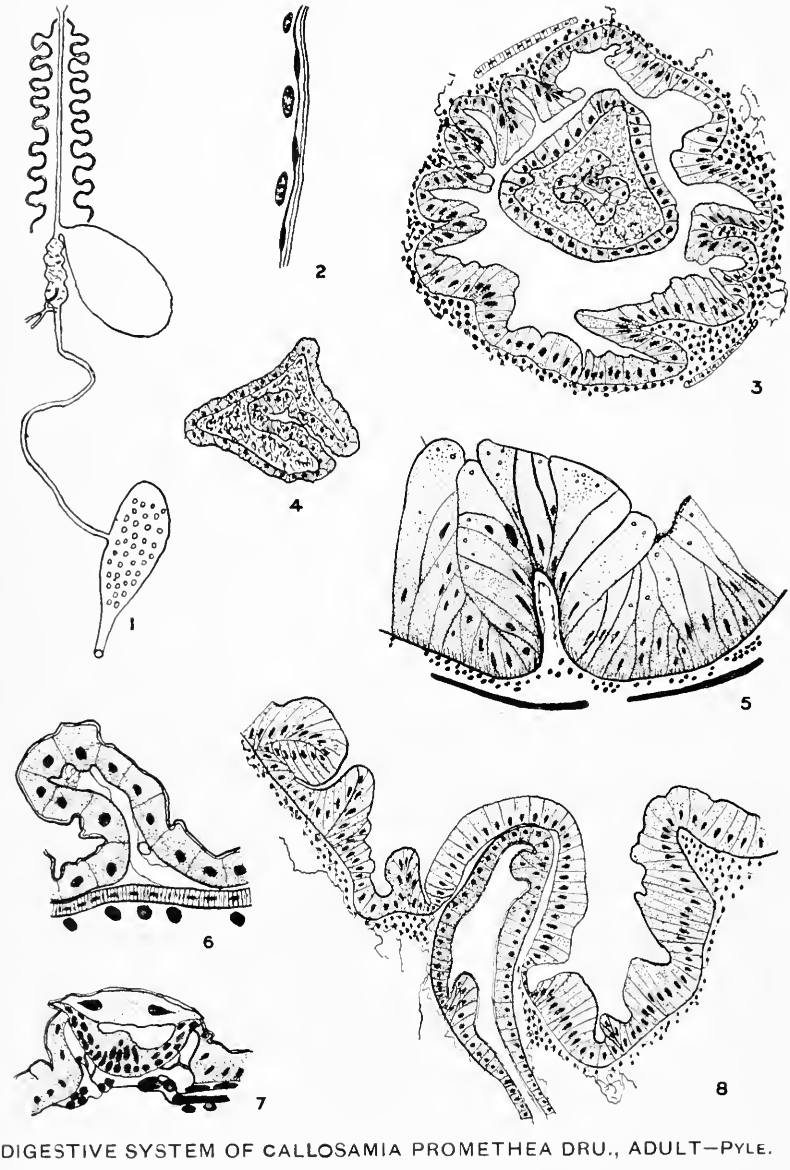

DIGESTIVE SYSTEM OF CALLOSAMIA PROMETHEA DRU., ADULT—PYLE.

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The Anatomy and Histology of the Digestive System of a Supposedly Non-Feeding Adult Moth, Callosamia promethea Dru. (Lepidoptera: Saturniidae).[1]

By Robert W. Pyle.

(Plate IV).

Callosamia promethea is one of the Saturniid Moths. It is said never to feed in the adult stage. This statement aroused my interest to examine the digestive tract to determine whether or not it is in any way different from the digestive systems of feeding Lepidoptera, and whether any part is atrophied. I wish to thank Dr. P. P. Calvert for his kindly criticisms and for specimens used as collateral material.

Methods and Materials

Cocoons of *Callosamia promethea* were collected during the fall of 1938 and were kept indoors in order to force the emergence of the moths. Some were killed as soon as they left the cocoons, while others were permitted to live several days. No attempt was made to feed them at any time.

The specimens were fixed in two ways: (1) B-3 for twenty-four hours and (2) warm water (85 degrees Centigrade) for two or three minutes. The material fixed in warm water was cut open along the abdomen, upon removal from the water, and placed in 50% alcohol for six hours after which it was transferred to 70% alcohol and kept until used for microscopic sections or dissection.

Serial sections were made of a number of specimens. Dioxane dehydration was most satisfactory as dehydration in alcohol and subsequent clearing in oil tended to produce a very great shrinkage and brittleness. The tissues were dehydrated from twenty-four to thirty-six hours in dioxane, and

[1] Presented to the Faculty of the Graduate School of the University of Pennsylvania as a thesis in Zoology in partial fulfillment of the requirements for the degree of Master of Arts, 1939.

infiltrated for six hours in either paraffin or tissuemat. In some cases tissuemat was preferable to paraffin. Sections were cut from ten to twenty micra thick. It was also helpful to soak the paraffin block (after partial cutting) in water for six to eight days in order to soften the chitin thus avoiding tearing the sections in cutting.

Haemalum and equeous eosin were the best stains for sections from material not stained *in toto*. *In toto* staining saves time; alum cochineal and alum carmine were used; these were counterstained with fast green (0.01% solution in 95% alcohol). Other stains used were Delafield's haemotoxylin, alcoholic eosin, alcoholic cochineal, picric acid and picrofuchsin.

Notes on the Literature on the Digestive System of Lepidoptera.

The study of the Lepidopterous digestive system has interested anatomists since the times of Reaumur and Latreille, but there is no need to review the early literature here. Burgess (1880) in his account of *Danais archippus* was the first to give an accurate description of the digestive system. Minot and he (1884) pointed out that the salivary glands of *Alctia xylina* empty into the lower part of the buccal cavity This is not the case in *C. promethea*.[2]

Bordas (1920) has given an account of the digestive systems of species of Papilionidae, Nymphalidae, Satyridae, Notodontidae, Saturnidae, and Noctuidae. He describes the gross anatomy and histology of these pointing out that they possess numerous "rectal glands". He figures many species as possessing cilia on the ends of the mid-gut epithelial cells and the Malpighian tubule cells.

Snodgrass (1930) has suggested that the so-called sucking stomach is inflated with air, in the case of *Malacosoma americana,* to assist in the breaking of the pupal case when the imago is about to emerge. This seems to be the case with *C.*

[[2] Ito (1915, 1920a and b, 1921) has described the anatomy and histology of the silk glands, alimentary canal and Malpighian tubes, in connection with the metamorphosis of these organs of the silkworm into those of the non-feeding adult, although without comparisons with other species. We are indebted to Dr. A. Glenn Richards, Jr., for calling our attention to Ito's contributions. P. P. Calvert.]

promethea. Swingle (1931) states that the tissue of the fore and mid-gut of *C. promethea* adult is capable of digesting maltose and fats. Wigglesworth (1932) gives the function of the "rectal glands" as absorptive. He quotes Borri (1925) as having shown that *Bombyx mori* has as many of these "glands" as do the Pieridae. They are very numerous in the case of *C. promethea.* Schmitt (1938), in his account of the feeding mechanism of Lepidoptera, figures (11-B p. 23) *Samia cecropia* as having the salivary ducts emptying into the buccal cavity. This is not the case in *C. promethea.* Generalized accounts of the digestive system of Lepidoptera are contained in the texts by Imms (1933) and Snodgrass (1935).

ANATOMY OF THE SYSTEM. (Plate IV, fig. 1)

Mouth Parts—External. The clypeus covers the anterior portion of the head between the compound eyes. Its lateral boundaries are well marked by sutures. On the ventral margin of the clypeus there is a very small labrum. On either side of the labrum are the rudiments of the mandibles which are immovable and functionless. Behind the mandibles are the maxillae which are so atrophied that only the galeae protrude as two shapeless lobes. The mouth cavity opens just posterior to the labrum and anterior to the galeae. Between the galeae protrude the remnants of the spinneret which forms the external opening of the salivary ducts. The labium is small; the labial palps are short bristled, three-jointed structures.

Buccal Cavity or Sucking Pump. The buccal cavity opens to the exterior at a point just anterior to the galeae of the maxillae. It is a large cavity with respect to the size of the head being in specimens examined about 325 micra wide, 500 micra high (dorso-ventrally) and 630 micra at the widest place antero-posteriorly. It is roughly rectangular in shape, narrowing toward the dorsal area. Structurally it is similar to that of *Samia cecropia* as described by Schmitt (1938).

The Salivary Glands are much folded and extend through the thorax to the abdomen. At the anterior end they empty into narrow ducts which join in a common duct extending to the exterior through the remnants of the larval spinneret. The ducts from the salivary glands are much thinner than the glands proper. The possible function of the glands may be to secrete a fluid which tends to dissolve the silk strands of the cocoon so that the imago may emerge. This has been suggested by Snodgrass for *Malacosoma americana.* This fluid may also act as a lubricant for the emerging moth.

The Oesophagus is small and very delicate. It follows the dorsal vessel, to which it is attached by a common membrane of connective tissue, posteriorly to the aortic arch. At the aortic arch the oesophagus leaves the dorsal vessel, after both have reached a point that is dorsal to the lowest layer of longitudinal thoracic muscles, and continues posteriorly above these muscles.

The Sucking Stomach occupies the upper portion of the first two and part of the third abdominal segments in the male. In the female it is pressed against the anterior and dorsal walls of the abdominal cavity by the ovaries. It is attached to the posterior portion of the oesophagus just anterior to the mid-gut. It is apparently inflated with air by the insect to facilitate breaking the pupal case as has been suggested by Snodgrass for *Malacosoma americana.* Such a condition is found in the female if she is killed only immediately upon emergence from the cocoon.

Oesophageal Valve. The oseophagus is telescoped into the mid-gut in such a manner as to form a structure called by some the oesophageal valve, or homologue of the proventriculus. The oesophagus is not directly continued into the anterior portion of the mid-gut, but rather extends obliquely into the dorsal surface of the latter. This forms a double layer of cells that is common in other insects. At first the oesophagus causes an invagination in the anterior dorsal wall of the mid-gut, passing somewhat ventrally as well as posteriorly. Soon the dorsal wall of the mid-gut covers the oesophagus so that the latter is enclosed within a layer of mid-gut epithelium and loose connective tissue in the mid-gut (fig. 3). The oesophagus terminates in a ventral position and has but a small posterior opening (fig. 4).

Mid-gut. The mid-gut is a much wrinkled structure which is two to four times as long as wide. This varies with the individual and is proportionally longer in the female on account of the pressure of the ovaries. It extends from the posterior half of the first segment to the hind end of the second abdominal segment. It is much wider than either the oesophagus or the intestine. In the male it is supported by loose connective tissue and fat, but in the female it is much compressed by the pressure of the ovaries. It is filled with a brown fluid which is probably waste material left from the pupal stage. There are no gastric caeca.

Malpighian Tubules. There are six Malpighian tubules present. They are much folded upon themselves and when extended are longer than the abdominal cavity. They are divided into two groups, each consisting of three on each side, which are united in a common duct which joins the alimentary tract at the junction of the mid-gut and intestine. They also have more or less of the brown waste material within them.

The *Intestine* is nearly as long as the abdominal cavity, and lies folded upon itself in the ventral part of that cavity except where it extends dorsad to join the rectrum. In the female it is much compressed by the ovaries, but in the male it is supported by loose connective tissue and fat. It also contains the brown material found in the mid-gut.

The *Rectum* is pear-shaped, the anterior end being the broader. The intestine enters it on the ventral surface near its middle and extends into it for some distance. There are many round gland-like structures in its walls.

(To be continued.)

Yellow Fever Service in Brazil.

The Rockefeller Foundation has been in charge of the administration of the government Yellow Fever Service in Brazil for 16 years. Arrangements were made to surrender this responsibility at the end of 1939. Those sections devoted to the control of aegypti breeding, viscerotomy and vaccination have been incorporated by presidential decree in a special National Yellow Fever Service, subordinated directly to the Ministry of Education and Health.—*Rockefeller Foundation, President's Review for 1939.*

The Life History of the American Cockroach, Periplaneta americana Linn. (Orthop.: Blattidae).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 155.)

The Egg-Case.

The egg-case is constructed within the walls of the female reproductive tract where it is slowly pushed out into the open air and requires about 24 hours for completion. It may be removed with the forceps at any stage of its development, a complete egg-capsule containing eggs with, strangely enough, both ends closed. It is not dropped as soon as completed, but protrudes from the body for, from several hours to a day or two, and sometimes for even three days, but rarely four days. Here is an example of what happened in one case and shows how slow the process may be: April 19, 10 P. M., egg-case is just beginning to protrude from the ovipositor; 36 hours later it is three-fourths complete and after another 36 hours it protrudes about seven-eighths of its length, and finally after another half day it is dropped as a completed egg-case—the whole process consuming about three and one-half days. We do not know just what causes the mother to retain the egg-case in this way for so long a time, or why she retains it at all. It was thought at one time that conditions of moisture or temperature were factors that influenced the retention of the egg-case, but many observations made by me on cockroaches in confinement, show decidedly that these are not the factors involved. The American cockroaches are very particular about concealing the egg-cases and it seems more likely that they carry them about until they find the proper hiding places.

There is a very important reason why the mother wishes to conceal her egg-case, for those that are not concealed would soon become food for other roaches in the cage. So serious is the habit, that if I did not provide debris and crevices for their concealment I would get no egg-cases for study. The hiding places in the cages were crumpled bits of paper, pieces of corrugated cardboard, portions of rotten wood, pyramids built up of sticks and hollow thread-spools. However, the cockroaches are not satisfied with merely hiding them, but would always cover them with the surrounding material. If they dropped the oötheca in a piece of crumpled paper, they always chewed out bits of the same paper, masticated it into pulp and glued it bit by bit all over the egg-case, thereby completely hiding it. I have several egg-cases that look very pretty, completely covered with rough bits of yellow, or blue or white paper-pulp which was gotten from the surrounding medium. I obtained cockroach egg-cases deposited on pieces of rotten wood that were completely covered by chewed-up bits of the same wood. When the soft or rotten wood is used, I find that the egg-cases are not merely placed on it but are actually buried in it; a groove having first been chewed out. The egg-case is then dropped in it and later completely covered with masticated bits of the same material, solidly glued, mouthful by mouthful, in place. The force of habit in covering the egg-case is so great that when no crevices or debris are at hand, the mothers place the egg-cases on the floor in the angle of the wall, and then cover them with the only material available—the fine dust on the floor, mixed with their own saliva. The dust they evidently brush together with much labor. In a rusted tin lid, in one cage I found a row of egg-cases glued against its inside edge, and every one of them so covered with red rust that they had completely escaped my notice and I filled the lid with water several times before I discovered them. In another tin lid which I had filled with white sand, I found more than a dozen egg-cases so completely covered with white sand (not loosely covered with it, but the grains of sand actually glued on them) that I surely would have been deceived had I not known what to expect. That the cockroaches often carry this covering material for some distance was seen in several egg-cases that were covered with rotten wood. The only source of this material in that cage was a piece of rotten wood at least four inches away from the egg-cases. Another observation was on three egg-cases covered with fine black dust in the top of a clean hollow hardwood spool. The dust could only have been gathered from the floor, which meant transporting it to the top of the spool for a distance of at least five or six inches. The hardwood of the spool was evidently too much for their jaws to dismember so they went to a distant point and obtained dust.

The concern shown for the egg-cases by the mothers, and the extreme effort which they expend to make them protectively colored indicates that this behavior is more intelligent than instinctive. One needs only to read the account by Haber* who spent most of one night watching a female trying to hide her egg-case, to feel that if any insect behavior at all may be called intelligent, this is an example. He tells us that at 2:50 A. M., a female *P. americana* began to scar and roughen with her mandibles the surface of a pasteboard slab, which was placed in the cage to serve as material upon which to oviposit. "She chewed and munched at the upper surface of the pasteboard until she made quite an appreciable groove there, not dropping the bits of pasteboard upon the bottom of the cage, but mixing them by means of the mouth parts with a secretion from the mouth until they became a damp mass. This mass of finely chewed pasteboard stuck to the surface of the board from which it was chewed. At about 3.20 A. M., she crawled forward over the scar and with her abdomen bent anteriorly and ventralward, probing about with the protruding ootheca until she located the scar which she had made. Then she dragged the ootheca into it, but the scar being too shallow the ootheca rolled out and fell to the floor of the cage. The female turned about and with her palpi sought for the ootheca. Finding it missing, immediately she ran down the paste-board, seized the ootheca by its flanged edge with her mandibles, straddled it with her front legs and thus carrying it, returned to the scar. "Again she was unsuccesful in keeping it there and for a second time, she ran down, seized it as she previously had done and set out to locate the scar. She ran almost up to it, then becoming confused ran around to the opposite side of the pasteboard, stopping at intervals and holding the ootheca clasped between the femur and tibia of one

* Ent. News 31: 190-193, 1920.

front leg. Again it slipped from her grasp and bounced to the far end of the cage. She promptly located it, but "seemed to have decided that it was futile to attempt to place it in the originally selected location." She coated the exposed side and ends with a secretion from her mouth and from the bottom of the cage picked up loose bits of trash, attempting to conceal the ootheca by covering it over with them. "Next she attempted to cover the ootheca with a piece of paper. It did not suit her so she discarded it."

Covering these egg-cases certainly saves them from the onslaughts of the voracious adults as I know from my own observations, but it seems to me that hungry cockroaches should find them in spite of their protective coloration, and they should do so by the sense of smell rather than that of sight. The sense of smell is supposedly highly developed in these insects but, after all, how do we know but that the egg-cases may be odorless?

The senses of smell and sight need to be worked out more fully in an experimental way than it has so far been done. It seems to me that the sense of sight is a great factor in the lives of the roaches, but only at night. During day-light hours, and at night with artificial light, one may bring a glass rod to a point a few millimeters from their eyes without startling them; one may also with a tooth-pick place a drop of paint upon their bodies without arousing them; one may even approach a cockroach with a scissors and remove the antennae, and get no reaction until the blades come together. The sense of sight, however, must be an important factor in their lives at night or how could they, in the dark, procure bits of debris, carry it to and locate a distant egg-case, or how could they locate an egg-case that bounces to the far side of the cage, or how, again, could they find decayed wood at a distant point and make repeated trips to it for the bits of wood they need to cover an egg-case?

(To be continued.)

A New Species of Helodes from Marin County, California (Coleoptera: Dascillidae).

By Frank E. Blaisdell, Sr., Stanford Medical School and Associate in Research, California Academy of Sciences, San Francisco, California.

The species described below was collected under conditions which revealed some very unusual and interesting habits. A colony was discovered on the under surface of a rather large flat rock, that projected out of and over the surface of the water, at an angle of few degrees, in a rather swiftly flowing stream. When the rock was lifted up the beetles were disturbed, most of them falling upon the water. As soon as they struck the water, they began to swim briskly and to gyrate as do the Gyrinids; they dove beneath the surface and swam rapidly under the surface, all endeavoring to return to the rock.

Helodes aquatica new species.

Form oblong-oval, about two and one-half times as long as wide, pronotum and head narrowing moderately anteriorly. Color black to more or less piceous; pronotum testaceous and often tinged with rufous and with a varying black area at center; two basal segments of antennae, meta-trochanters, procoxae more or less pale. Luster somewhat shining. Pubescence short, dense, recumbent and not wholly obscuring the surface, dull cinereous, with a tinge of fuscous, depending on the angle of view and illumination; that of the pale areas yellowish, that of the body beneath shorter, finer, less abundant and appressed. Hairs of the antennae ashy, short and erect especially in the male.

Head relatively small, front evenly and rather moderately convex, shining, densely punctate, punctures small and finely asperate; epistoma transversely arcuate and prominent, apex truncate in moderate circular arc. Labrum transverse, strongly deflexed beneath the epistomal apex. Eyes large, round, strongly convex, facets small and numerous. Antennæ long and slender, segments elongate; second segment very small, short, about as long as wide; remaining segments elongate, third obconical and longest, five times as long as the second and one-fifth of its length longer than the fourth; other segments subequal in length; fifth to eighth inclusive somewhat compressed, more prominent anteriorly than posteriorly, nine to ten more cylindrical, the latter slightly shorter.

Pronotum transverse, about two-thirds wider than long, sides strongly and broadly arcuate, converging and continuous with the slightly arcuate apex; base moderately and arcuately lobed in middle two-fourths, thence broadly sinuate and transverse to the rounded basal angles. Disk rather evenly and more strongly convex in the central area than laterally; lateral margins thin and narrowly explanate, subdiaphanous and feebly reflexed; apical margin scarcely or very slightly reflexed, bead very fine, that of the base distinct; rather densely punctate, punctures small, slightly asperate, separated by a distance equal to one or two times their diameter.

Elytra oblong, moderately and evenly convex; sides parallel and slightly arcuate, rather broadly rounded apically; humeri well rounded and not in the least tumid or prominent; surface rather densely punctate, punctures small, slightly asperate, with a tendency to arrangement in transverse rows, separated by a distance equal to two or three times their diameter, Scutellum triangular.

Under surface of body densely punctate, punctures small. Legs somewhat elongate and slender; fifth tarsal segments and claws small. Outer surfaces of the tibiae invested with slender spinules.

♂.—Usually smaller and narrower. Anterior tibiae moderately constricted in basal third and there more cylindrical. Fifth ventral abdominal segment with a small triangulo-oval emargination at middle, the medial margins of the apical lobes moderately arcuate.

♀.—Broader and stouter. Anterior tibiae not constricted. Abdomen very finely punctate; fifth ventral arcuate at apex.

Measurements.—(Types) Length 4.5 to 5 mm.; width 2 to 2.4 mm.

Holotype.—Male, No. 4965, and *allotype*, female, No. 4966; in the author's collection, Museum of the California Academy of Sciences; collected June 4, 1911, at Lagunitas, Marin County, CALIFORNIA (*vide supra*).

Paratypes.—17. Distributed as follows: Author's collection, Mus. Calif. Acad. Sci., 6; Colln. Amer. Ent. Soc. of Phila., 4; Colln. of Edwin C. Van Dyke, Mus. Calif. Acad. Sci., 7, with same data.

Notes on North American Bostrichidae (Coleoptera).

By JOHN N. BELKIN, Cornell University, Ithaca, New York.

The following changes appear to be necessary in the nomenclature of North American Bostrichidae.

Sinoxylon floridanum Horn has been considered a distinct species and has been placed in *Xylobiops.* I have examined Horn's type at the Academy of Natural Sciences of Philadelphia and find that it is a female of *Xylomeira torquata* (Fab.). I have seen other specimens of the same species from Florida. *Xylomeira torquata* (Fab.) is of general distribution in the West Indies.

Lichenophanes mutchleri new name.

Bostrichus angustus Casey (Jour. N. Y. Ent. Soc., 1898, 6: 72) is preoccupied by *Bostrychus angustus* Steinheil (Atti Soc. Ital. Sc. Nat., 1872 [1873], 15: 574). Casey's species is a *Lichenophanes,* as was pointed out by Lesne (Coleopt. Cat., Pars 161., 1938, p. 33). Therefore I propose the above name for *Bostrichus angustus* Casey *nec* Steinheil.

CORRECTIONS TO THE LENG CATALOGUE.

A number of other changes have been made in past years by Pierre Lesne. Those that have not been incorporated in the Leng Catalogue I take the opportunity of listing here, together with corrections in bibliographical citations.

Tetrapriocera longicornis (Oliv.). This name should remain, as Lesne (Bull. Soc. Ent. Fr., 1937, p. 239) has found that *Apate tridens* Fab. is not this species but probably a male *Xylomeira torquata* (Fab.), although the condition of the type does not permit final identification. The reference for *? Apate tridens* Fab. as a possible synomyn of *Xylomeira torquata* (Fab.) should read 92-362.[1]

Xylobiops basilaris (Say), *X. texanus* (Horn), *X. sextuberculatus* (Lec.), and *X. parilis* Lesne are the correct spellings for these names.

Dendrobiella aspera (Lec.) is a distinct species. *D. pubescens* Casey is a synonym of *D. sericans* (Lec.).

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[1] This method of reference to year and page of the author quoted is that used in the Leng Catalogue of Coleoptera.

Amphicerus cornutus (Pallas). The reference should be 72-8. *Amphicerus bicaudatus* (Say), *A. aspericollis* (Germ.), and *Bostrichus serricollis* (Germ.), are synonyms of *Amphicerus hamatus* (Fab.). The reference to *A. aspericollis* (Germ.) should read 24-465, and to *A. hamatus* (Fab.), 87-33.

Lichenophanes lucanus (Web.). I have not been able to locate a description of this species nor any other reference to it. It appears, therefore, to be a *nomen nudum*. The reference to *Lichenophanus californicus* (Horn) should read 78-546.

Bostrichus bicornis (Web.) is a *Lichenophanes*. *Apate bicornis*, described by Thomas Say in Jour. Acad. Nat. Sci. Phila., 1823, 3: 319-320, is a synonym of *Lichenophanes bicornis* (Web.). *Bostrichus capucinus* (L.) is the only species of the genus *Bostrichus*. The reference to it should read 58-355.

Dinoderus brevis (Horn) is an Indo-Malaysian species and distinct from *D. minutus* (Fab.).

Exops Curtis (Trans. Linn. Soc. London, 1839, 2: 204) should be added as a synonym under *Polycaon* Castelnau, together with *Allacocnemis* Lec. but not *Exopioides* Guér. nor *Heterarthron* Guér. (see below). Lesne regards *Polycaon punctatus* Lec. as a distinct species with *P. pubescens* Lec. as the female form. I have not seen enough material to form an opinion whether or not this is correct.

Heterarthron Guér. is believed to be a valid genus by Lesne with *Exopioides* Guér. a synonym. *Heterarthron femorale* (Fab.), *H. gonagrum* (Fab.), and *H. exesum* (Lec.) are all distinct species. *H. exesum* (Lec.) occurs in Lower California and Central America in general. *H. femorale* (Fab.) and *H. gonagrum* (Fab.) are both reported from the West Indies and probably are not to be found in North America. The Texas record in the Leng Catalogue is probably based on a misdetermination.

Psoa sexguttata Lesne (Ann. Soc. Ent. Fr., 1906, 75: 393) is an aberration of *P. quadrisignata* (Horn). *Psoa cleroides* Lesne (Bull. Mus. Hist. Nat. Paris, 1913, p. 273) should be added as a distinct species.

A New Gomphus from Louisiana (Odonata, Gomphidae).

By E. M. Walker, University of Toronto, Canada.

(Plate V).

Among some dragonflies from the southern United States, sent to the writer for identification by Mr. John Standish of the University of Oklahoma, were seven males of an apparently new species of *Gomphus* from Hammond, Louisiana, taken by Mr. Standish on March 26, 1938.

Drawings of the appendages and genitalia were sent to Dr. Septima Smith and Mrs. H. K. Gloyd but neither was able to place the species. It is very close to *G. exilis*, but differs somewhat in the form of the anal appendages and in coloration. It is certainly not closely related to any other species in Needham's Handbook of North American Dragonflies and, in fact, appears to be new.

Gomphus flavocaudatus n. sp.

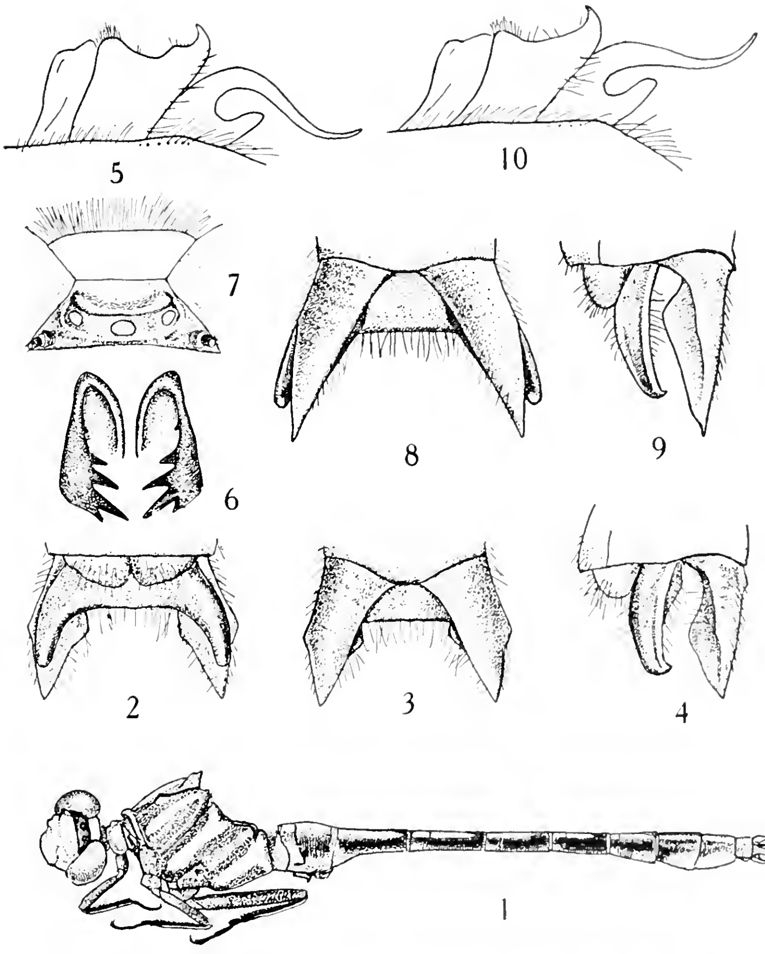
♂ (♀ unkown). Occiput and entire face, including labrum and mandibles, greenish yellow; labium and venter of head pale yellowish drab; vertex black; rear of head dark brown above, grading into ochraceous below.

Prothorax pale dull brownish, front lobe, sides and median tubercles of middle lobe, and most of hind lobe pale yellow. Synthorax reddish brown, the paler markings yellowish green, viz., the antehumeral bands, which extend from the ante-alar sinus to the anterior transverse carina, diverging somewhat cephalad, the intervening space at base nearly twice as wide as one of the bands; a narrow humeral line, not always distinguishable; the lateral thoracic bands, which are straight, the first (mesepimeral) about 1 mm. broad, nearly equal but widening slightly towards the upper ends; and the metepimeral bands which are more expanded above. Interalar area green.

Femora dark brown; tibiae nearly black with the extensor surfaces pale yellowish; tarsi black, the first two segments of the metatarsi sometimes with a dorsal yellowish streak.

Wings with costal veins yellowish, the venation otherwise blackish, pterostigmata reddish brown.

Abdomen dark brown with the following parts yellow: a mid-dorsal longitudinal stripe, extending the entire length but more or less interrupted posteriorly on each segment and intersegmentally, sometimes becoming less distinct on segments



GOMPHUS FLAVOCAUDATUS N. SP., 1-7; G. EXILIS 8-10.—Walker

7 and 8 and then widening on 9 to include the whole dorsum or most of it, the yellow of the dorsum merging more or less with that of the sides, narrowing again on 10; also the auricles, anterolateral spots on segments 3-7 and large lateral areas on 7-9, which are especially large and conspicuous on the expanded parts of 8 and 9, where the yellow appears to be of a deeper and brighter shade than elsewhere on the abdomen.

Hind margin of occiput slightly convex, or nearly straight in the middle, straight as viewed edgewise. Hind femora more than three fourths as long as the synthorax, hind tibiae a third shorter. Abdomen about one fourth longer than the wings, three and one-half times as long as synthorax, slender, segments 7-9 moderately expanded, 7 slightly shorter than 6 but about one-half deeper, 8 and 9 successively a little shorter, their lateral margins slightly flaring and their posterior angles a little produced; segment 8 broadest and deepest of the distal segments, its hind margin slightly oblique, slightly longer on the dorsal than the ventral side. Viewed from above the abdomen is widest at the distal end of 8, being here nearly twice as broad as the narrowest part, narrowing again rapidly on 9. Auricles subangulate with sides and apex well rounded.

Accessory genitalia on segment 2 very similar to those of *G. exilis*, the anterior hamuli parallel-sided, the apices with the concavity directed meso-caudad; the inner margin bearing 4 or 5 sharp, black teeth of various sizes (fig. 6), which are longer than those of *G. exilis;* posterior hamuli similar to those of *exilis* but with a slight prominence at the base of the terminal hook (fig. 5).

Venation as in *G. exilis.* Antenodals: fore wings 10-13, usually 12, the first and fifth (rarely fourth) thickened; hind wings 8-9, the first and fifth (rarely fourth) thickened. Postnodals: fore wings 7-11, usually 9 or 10; hind wings 7-10, most frequently 9.

Measurements: total length (mm.) 45-47; abd. excl. apps. 32-34; hind wing 25, 26; hind femur 7; pterostigma 2.75-3.

Holotype ♂, Hammond, Louisiana, March 26, 1938, to be deposited in the U. S. National Museum. *Paratypes* in Royal Ontario Museum of Zoology, Toronto, Ontario, and the Academy of Natural Sciences of Philadelphia.

Explanation of Plate V.

Figs. 1-7 *Gomphus flavocaudatus* n. sp. ♂. 1. Dorsolateral view, showing colour pattern; 2, anal appendages ventral view; 3, same, dorsal view; 4, same, profile; 5, accessory genitalia, left profile; 6, apices of anterior hamuli; 7, occiput and vertex.

Figs. 8-10, *Gomphus exilis* Selys. 8, Anal appendages, dorsal view; 9, same, profile; 10, accessory genitalia, left profile.

A New Geranium Aphid (Homoptera: Aphididae).[1]

By George F. Knowlton.[2]

The following report deals with aphids known to attack *Geranium* sp. in Utah or nearby. One species is described as new and the previously undescribed alate vivipara of *Macrosiphum aetheocornum* S.-K. is briefly described and figured.

Key to Intermountain Geranium Aphids.

1. Cornicles swollen ....*Amphorophora geranii* (G.-P.)
   Cornicles cylindrical 2
2. Head without prominent antennal tubercles, *Aphis rumicis* L
   Head with prominent antennal tubercles...............3
3. Hairs on vertex conspicuously capitate ....
   Capitophorus cefsmithi n. sp.
   Hairs on vertex not conspicuously capitate............4
4. Hairs absent from cornicles
   Macrosiphum solanifolii (Ashm.)
   Hairs present on cornicles 5
5. Cornicles reticulated....*Macrosiphum aetheocornum* S.-K.
   Cornicles without reticulations
   Macrosiphum crenicornum S.-K.

Capitophorus cefsmithi n. sp.[3] Figs. 1-4.

Apterous vivipara: Size 3.2 mm. long, 1.9 cross the abdomen and 0.63 mm. width of head through eyes; antennal III, 0.83 to 0.89 mm. with 3 to 4 sensoria; IV, 0.75 mm.; V, 0.36; base of VI, 0.14 mm., unguis 0.5 plus (broken); rostrum reaching third coxae, rostral IV plus V, 0.19 mm., slenderly obtuse; legs rather stout, hind tibiae 2.6; hind tarsi 0.14; cornicles pale, 0.92 to 0.98, and armed with several capitate hairs; cauda pale, 0.44 mm.; cuticula of body rather rugulose, especially on sides of thorax.

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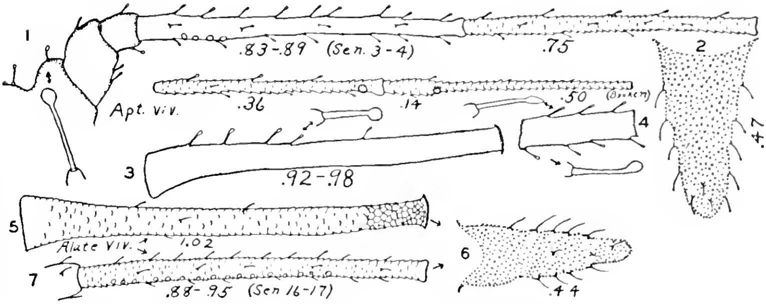
[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

[2] Research associate professor.

[3] The writer is indebted to Dr. C. F. Smith for his opinion concerning this species and for making the drawings.



Capitophorus cefsmithi n. sp. Aptera, 1-4. *Macrosiphum aetheocornum* S.-K. Alate, 5-7.

Collection: On wild *Geranium* in Cowley Canyon of Logan Canyon, Utah, May 31, 1934 (T. O. Thatcher).

Type: In the collection of the writer.

Taxonomy: This species resembles *Macrosiphum crenicornum* S.-K. (which also occurs on wild *Geranium* in Utah) but differs in having conspicuously capitate hairs on head and cornicles.

MACROSIPHUM AETHEOCORNUM S.-K. Figs. 5-7.

Alate vivipara: Body 2.65 mm. long antennae dusky beyond base of III; antennal III, 0.88 to 0.95 with 16 to 17 sensoria; V, 0.84; rostral IV plus V, 0.176 mm. long, slenderly obtuse; cornicles 0.96 to 1.02, distal 0.16 reticulated; cauda 0.44 mm. long, pale.

One alate female of this species was present among material collected upon wild *Geranium* at Tony Grove Ranger Station in Logan Canyon, Utah, July 18, 1939 (Knowlton). This species may be separated from *Macrosiphum solanifolii* (with which it often occurs) by the presence of hairs on the cornicles.

Rocky Mountain Conference of Entomologists

The sixteenth Rocky Mountain Conference of Entomologists will be held at the Cameron Pass Camp, a rebuilt CCC camp about 75 miles west of Fort Collins, Colorado, August 18 to 23, 1940.

This meeting will again be informal in nature, with arrangements such that the entire family can enjoy a mountain outing during the period. The accommodations will be comfortable with the meals being furnished at actual cost.

The principle symposium topic will be "Insect taxonomy, its fundamental principles, methods, and relations to other branches of biological science." This, however, will not exclude the many other subjects that come up for discussion. Ample time will be given for collecting, which is especially good for high altitude forms in this immediate area.

The camp is located at an altitude of 9500 feet and is readily accessible on a through mountain highway.

Additional information can be secured by writing the chairman, Dr. R. H. Painter, Manhattan, Kansas, or the secretary, Dr. Geo. M. List, Colorado State College, Fort Collins, Colorado.

George M. List, Secretary, Rocky Mountain
Conference of Entomologists.

Description of a New Water Beetle from Florida (Coleoptera; Dytiscidae).[1]

By Frank N. Young.

On April twelfth, 1934, the late Mr. H. T. Townsend collected a series of six hydroporid beetles in the debris along the shore of Kingsley Lake, Clay County, Florida. The series represents a new species for which I suggest the name

Hydroporus floridanus sp. nov.

Diagnosis: An aberrant species which keys in H. C. Fall's revision[2] of the genus to his "*pulcher-undulatus*" Group, but does not show close affinities to any of the other members of the group known to me. The thinnish elytra and elongate form suggest some species of the genus *Coelambus*, and in some other respects the species resembles some of the *Deronectes* subgenus, of *Hydroporus*. The closely punctate, rugulose upper surface and the peculiar pubescence along with the acuminate elytra and abdomen should separate this species from all others in the genus.

[1] Contribution from the Department of Biology, University of Florida, Gainesville.

[2] Fall, H. C., A Revision of the North American Species of *Hydroporus* and *Agaporus*, John D. Sherman, Mt. Vernon, N. Y., 1923, pp. 1-129.

Holotype, Male: Elongate, 3.8 mm. long by 1.8 mm. wide, rather acuminate behind. Markedly convex beneath but with the upper surface slightly flattened. *Pronotum* narrowly margined with the margins anteriorly broader; sides subparallel; much broader than long and not greatly narrowed anteriorly; widest about the base; median area with a broad, but rather vague impression; densely and rather finely punctate throughout. *Elytra* thin and acuminate behind, the tips angularly truncate; broadest near the base; densely, rather finely punctate and in part rugulose. *Head* above, finely, densely and irregularly punctate. *Legs*: Anterior and middle tarsi dilated; the anterior claw of each fore and middle tarsus more slender and more strongly hooked than the posterior one; posterior coxal plates irregularly undulate and with a more or less pronounced ridge traversing the distal third. *Abdomen* rather abruptly tapering to the acute last segment and appearing much like a lopsided cone; second abdominal sternite longer than the next three combined; epipleurae of elytra not making contact with the abdomen. *Upper surface* of elytra and pronotum covered with a dense coat of rather coarse, short, prostrate whitish hairs which give the whole upper surface a silvery gray appearance. *Venter* strongly convex; prosternal protuberance well developed; hind coxal processes conjointly produced with a slight emargination at the tip.

Color: Head light fuscous; clypeus light testaceous; pronotum uniformly light fuscous except that the anterior marginal angles are lighter; elytra (beneath the pubescence) almost uniformly light fuscous, except for four lighter spots on the bases, one pair at the margins and the other on either side of the suture; undersurface, legs, antennae, mouthparts, and epipleurae almost uniformly light testaceous.

Allotype Female: Very similar to the male except in the unmodified anterior claw of the fore and middle tarsi, and in the narrower fore and middle tarsi.

Variation: There appears to be little variation in the series before me, except in the secondary sexual characters mentioned above. The thinnish elytra have a tendency to warp when dried after having been in alcohol.

The *holotype* and one *paratype* will be deposited in the United States National Museum, the *allotype* and two *paratypes* will remain in my collection, and one *paratype* is in the collection of the late Dr. H. C. Fall, which is now in the Museum of Comparative Zoology at Harvard College, Cambridge, Massachusetts.

Tenth Meeting of the Biological Photographic Association.

The tenth annual convention of the Biological Photographic Association will be held at the Hotel Schroeder, Milwaukee, Wisconsin, September 12, 13 and 14, 1940. This society is interested in the further study of photography as applied to the biologic sciences, and the improvement of its technic. Scientific photographers from all parts of the country will meet to exchange ideas and information on still and motion picture photography as well as the latest developments in color work. Formal papers will be presented outlining new methods of technic, and there will be informal round-table discussions which will be especially instructive. Commercial firms specializing in the manufacture of scientific photographic apparatus and materials will exhibit and explain the use of their products. A salon consisting of natural color and monochrome prints of biologic and clinical subjects will illustrate a very fine degree of perfection in biologic photography.

During the past year the B.P.A. has offered its cooperation to the United States War Department in connection with a plan to organize clinical illustration units in the medical division in time of war. A questionnaire formulated by the War Department has already been distributed and a complete discussion will be in order at the September meeting.

The membership of the Biological Photographic Association is composed of professional clinical and biologic photographers as well as physicians, dentists and scientists who are interested in this specialized branch of photography. A quarterly journal is published containing articles of vital interest to the biologic photographer. The society also circulates albums dealing with specialized photographic technics and travelling salons for exhibition purposes. These travelling salons are made up of selected prints from the annual meetings and make excellent exhibit material for various scientific conventions. At the end of a year the prints are returned on request to exhibitors.

In view of the growing interest in medical and biologic photography the next annual meeting promises to be especially stimulating and successful. Anyone interested in this subject is welcome to attend the meetings and to submit prints for the salon.

Further information concerning the convention program, salon specifications and membership in the society may be had by writing to the Secretary of the Biological Photographic Association, University Office, Magee Hospital, Pittsburgh, Pa.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within ( )**follows; then **the** pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Anon.—The Charles Robertson Collection to be at Urbana. [12] 33: 423. E. Graywood Smyth establishes laboratory in California. [12] 33: 423. **Barnes, H. F.**—Fluctuations in insect numbers [VI Congr. Int. Ent. Madrid] 1: 181-186, ill. **Berland, L.**—Exploration entomologique de l'atmosphère en avion. [VI Congr. Int. Ent. Madrid] 1: 29-31. **Bryson, H. R.**—The identification of soil insects by their burrow characteristics. [Trans, Kansas Acad. Sci.] 42: 245-253, ill. **Cousin, G.**—Sur une formule permettant l'estimation exacte et la comparaison des indices biométriques, chez des hybrides interspécifiques de Gryllides et chez des criquets de phases différentes. [Comp. Rend. Sea. Acad. Sci.] 210: 583-586. **Garcia del Cid, F.**—Insectos bibliófagos y sus enemigos en las bibliotecas de Cataluña. [VI Congr. Int. Ent. Madrid] 1: 399-404, ill. **Goodrich, A. L.**—Starling attacks upon warble infested cattle in the Great Plains area. [103] 13: 33-40. **Gregson, J. D.**—The importance of phenological notations during insect ecological studies. [Pro. Ent. Soc. Brit. Col.] No. 34: 46-47. **Hoffmann, C. H.**—Additions to annotated list of insects reared from elm bark and wood. [19] 35: 54-63. **Horn, W.**—Obituary by K. B. Lal. [Current Sci.] 8: 384-385. **Imhof, O. E.**—Pteronologica. [VI Congr. Int. Ent. Madrid] 1: 393-397, ill. **Jordan, H. E. K.**—Where subspecies meet. [VI Congr Int. Ent. Madrid] 1: 145-151.

Kennedy, C. H.—Definitions of the animal family and the animal society. [VI Congr. Int. Ent. Madrid] 1: 33-44. **Mello-Leitão, C.**—Notes sur la systématique des Palpigrades. [VI. Congr. Int. Ent. Madrid] 1: 143-144. **Nuttall, G. H. F.**—Notes on the preparation of papers for publication on the Journal of Hygiene and in Parasitology. [116] 32: 1-62. **Park, Barden & Williams.**—Studies in Nocturnal Ecology, IX. Further analysis of activity of Panama rain forest animals. [84] 21: 122-134, ill. **Richmond, H. A.**—Some notes on the periodicities of certain insects in relation to the sun spot cycle. [Pro. Ent. Soc. Brit. Col.] No. 34: 49-52, ill. **Simpson, G. G.**—Types in modern taxonomy. [Amer. Jour. Sci.] 238: 413-431. **Spencer, G. J.**—Ectoparasites of birds and mammals of British Columbia. [Pro. Ent. Soc. Brit. Col.] No. 36: 16-23. **Spencer, W. P.**—See under Diptera. **Valentine, J. M.**—A major cycle in insect flights. [68] 91: 544. **Wishart, G.**—An adaptation of a standard bi-metallic thermo-regulator to control variable temperatures. [4] 72: 78-81, ill. **Zimmerman & Read.**—List of available publications of the United States Department of Agriculture, January 2, 1940. [U. S. Dept. Agric.] Misc. Publ. No. 60: 212 pp.

ANATOMY, PHYSIOLOGY, ETC.—Britton, E. B.—A note on the structure of the eye in Aepus (Coleo.: Carabid.). [8] 76: 73. **Carothers, E. E.**—A cytological study of X-rayed grasshopper embryos. [Journ. Morph.] 66: 529-559, ill. **Cerruti, M.**—See under Coleoptera. **Chopard, L.**—La nervation de l'elytre chez les Gryllides males et la formation du miroir. [VI Congr. Int. Ent. Madrid] 1: 81-85, ill. **Clare & Tauber.**—Circulation of hemolymph in the wings of the cockroach Blattella germanica in normal wings. [Iowa State Coll. Jour. Sci.] 14: 107-127, ill. **Dallas, E. D.**—(see under Coleoptera). **Eberle, G.**—Litomastix truncatellus (Encyrtid.) ein polyembryonaler Schmarotzer von Goldeulen (Plusia)—Raupen. [18] 53: 362-371, ill. **Ebner, R.**—(see under Orthoptera). **Ferris, G. F.**—The morphology of Plega signata (Mantispid.). [Microent.] 5: 33-56, ill. **Gohrbandt, I.**—Phyletische korrelationen bei flügelreduzierten und rüsselreduzierten Syntomiden. [89] 73: 313-338, ill. **Guibe, J.**—Contribution a l'etude d'une espece Apterina pedestris. [Bull. Biol. France Suppl.] 26: 112 pp., ill. **Haydak & Palmer.**—Vitamin content of bee foods. [12] 33: 396-397. **Hayrak, M. H.**—The length of development of the greater wax moth. [68] 91: 525. **Henson, H.**—The structure and postembryonic development of Vanessa urticae (Lep.).—The malphigian tubules of the pupa and imago. [93] B, 109: 357-372, ill. [**Hilton, W. A.**—Nervous System and Sense Organs] LXXXII: Lepidoptera. [13] 32: 23-29, ill. **Hodge, C.**—The anatomy and histology of the alimentary tract of Radenotatum carinatum var. peninsulare (Orth.: Acridid.). [Journ. Morph.] 66: 581-603, ill. **Hoffmann, C. E.**—The relation of Donacia larvae (Coleo.: Chrysomel.) to dissolved oxygen. [84] 21: 176-183. **James, M. T.**—Duplication of antennae in Diptera. [19] 35: 50. **Kemner, N. A.**—(see under Diptera). **Kozhantschikov, I. W.**—Die physiologische charakteristik des temperatur-optimums der insekten-entwicklung. [VI. Congr. Int. Ent. Madrid] 1: 59-72. **Mellanby, K.**—Low temperature and insect activity. [Pro. Ry. Soc. London] 127, (B): 473-487. **Ochmann, A.**—Die Eientwicklung der Palpenmotte Semioscopis avellanella. [18] 53: 349-352, ill. **Pospelov, W.**—Fertility of certain obnoxious Lepidoptera in connection with meteorological conditions. [VI Congr. Int. Ent. Madrid] 1: 195-202, ill. **Pryor, M. G. M.**—On the hardening of the ootheca of Blatta orientalis. [Pro. Ry. Soc. London] 128, (B): 378-393. On the hardening of the cuticle of insects. [Pro. Ry. Soc. London] 128, (B): 393-407, ill. **Rawlinson, R.**—Studies on the life history and breeding of Ecdyonurus venosus (Ephemerida). [93] B, 109: 377-450, ill. **Sick, H.**—Beitrag zur Kenntnis der Dioptidae, Notodontidae und Thaumetopoeidae und deren Verwandtschaftsbeziehungen zueinander. [89] Abt. Anat., 66: 263-290, ill. **Spencer, C. J.**—Upon the function of the pseudosternite in the Acridiidae. [Pro. Ent. Soc. Brit. Col.] No. 35: 3-5. **Storey, H. H.**—Investigations of the mechanism of the transmission of plant viruses by insect vectors. [Pro. Ry. Soc. London] 127, (B): 526-542, ill. **Sundermeier, W.**—Der Hautpanzer des Kopfes und des Thorax von Myrmeleon europaeus und seine Metamorphose. [89] Abt. Anat., 66: 291-348, ill. **Tiegs, O. W.**—The embryology and affinities of the Symphyla, based on a study of Hanseniella agilis. [53] 82: 225 pp., ill. **Tonnoir, A. L.**—(see under Diptera). **Zernoff, V.**—L'immunité et la sérothérapie chez les insectes. [VI Congr. Int. Ent. Madrid]. 1: 153-161.

ARACHNIDA AND MYRIOPODA.—Grandjean, F.—L'evolution des Ongles chez les Oribates. [Bull. Mus. Nat.

Hist. Nat.] 11: 539-546. **Gregson, J. D.**—Notes on some phenomenal feeding of ticks. [Pro. Ent. Soc. Brit. Col.] No. 34: 8-12, ill. (1938). **Holland, G. P.**—Notes on the ecology of Dermacentor andersoni in southern Alberta. [Pro. Ent. Soc. Brit. Col.] No. 36: 8-11. **Hubbard, W. E.**—Observations on Entonyssus ewingi. [Trans. Amer. Micro. Soc.] 59: 243-247, ill. **Keifer, H. H.**—Eriophyid Studies VIII. [Bull. Dept. Agr. Calif.] 29: 21-46, ill. (k*). **de Mello-Leitao, C.**—Aranas de la Provincia de Buenos Aires y de las gobernaciones de la Pampa, Neuquén Rio Negro y Chubut. [Rev. Mus. de la Plata] 2: 62 pp., ill. (*s). Notes sur la famille Ctenidae et sa distribution géographique. [VI Congr. Int. Ent. Madrid] 1: 103-109. (sk*). **Tiegs, O. W.**—(see under Anatomy).

THE SMALLER ORDERS OF INSECTS.—Andre, F.—The Nearctic spp. of Elaphrothrips (Thysanoptera.) [10] 42: 75-90, ill. (K). **Buckell, E. R.**—Some locality records of British Columbia dragonflies. [Pro. Ent. Soc. Brit. Col.] No. 34: 55-62. **Crawford, J. C.**—The male of Heliothrips haemorrhoidalis (Thysanoptera). [10] 42: 90-91, ill. **Ferris, G. F.**—(see under Anatomy). **Holland, G. P.**—New records of Siphonaptera for British Columbia. [Pro. Ent. Soc. Brit. Col.] No. 36: 11-12. Phenomenal infestation of ectoparasites on marmot, weasel & packrat. [Pro. Ent. Soc. Brit. Col.] No. 35: 27-28, ill. **Hubbard, C. A.**—American mole and shrew fleas [Pacific Univ. Bull.] 37: 12 pp., ill. (*). West Coast Catallagias. [Pacific Univ. Bull.] 37: 4 pp., ill. (*). **Jacob, J. K.**—Mass collecting of Labia minor, the small earwig. [Pro. Ent. Soc. Brit. Col.] No. 34: 18-19. (1938). **Quadri, M. A. H.**—A suggested modification of the mallophagous genus Colpocephalum. [Ind. Jour. Ent.] 1: 65-67, ill. (*). **Ricker, W. E.**—A preliminary list of stoneflies from the vicinity of Cultus Lake, British Columbia. [Pro. Ent. Soc. Brit. Col.] No. 35: 19-23. **Rohdendorf, B. B.**—Body structure of Archodonata and position of this order in the system of Palaeoptera. [Comptes Rendus Acad. Sci. U. S. S. R.] 26: 108-110, ill. **Scourfield, D. J.**—The oldest known fossil insect (Rhyniella praecursor)—further details from additional specimens. [Proc. Linn. Soc. London] 1940: 113-131, ill. **Spencer, G. J.**—Further notes on the fleas of British Columbia. [Pro. Ent. Soc. Brit. Col.] No. 34: 36-38. (1938). (see under Diptera).

ORTHOPTERA.—Chopard, L.—(see under Anatomy). **Ebner, R.**—Veränderungen an Orthopteren durch parasitische Würmer. [VI Congr. Int. Ent. Madrid] 1: 341-347, ill. **Fox-Wilson, G.**—The sexual ratio of the common earwig, Forficula auricularia (Dermaptera), as observed in trap bands. [107] A, 15: 17-20, ill. **Gregson, J. D.**—Notes on the occurrence of Grylloblatta campodeiformis in the Kalmoops District. [Pro. Ent. Soc. Brit. Col.] No. 35: 29-30. **La Greca, M.**—Su alcuni Mantidi dell'America Centrale e Meridionale. [Ann. Mus. Zool. R. Univ. Napoli] 7: 1-4. **Spencer, C. J.**—See under Anatomy. **Thorne, G.**—The hairworm, Gordius robustus, as a parasite of the mormon cricket, Anabrus simplex. [91] 30: 219-231, ill.

HEMIPTERA.—Beamer, R. H.—The gen. Cochlorhinus and some related genera of leafhoppers (Cicadell.). [103] 13: 51-57, ill., (K*). **Brittin, G.**—The validity of the coccid genus Eulecanium. [Trans. & Proc. Ry. Soc. New Zealand] 69: 410-412. **Bueno, J. R. de la Torre.**—Additions and corrections to a "synopsis of the Hemiptera-Heteroptera of America north of Mexico", Pt. I. [19] 35: 51-53, (k). A new record from New Mexico (Pentatomid.: Brochymena dilata). [19] 35: 63. Food plant of a Coreid bug [Thasus acutangulus]. [19] 35: 45. **Heriot, A. D.**—Biological and morphological differences between Eriosoma crataegi and Eriosoma lanigera. [Pro. Ent. Soc. Brit. Col.] 34: 22-32, ill. (1938). **Jordan, K. H. C.**—Einige Bemerkungen uber Cryptostemmatidae. [18] 53: 341-344, ill. **Knowlton & Bischoff.**—Studies of Western Aphid [Contr. Dept. Ent., Utah Agric. Exp. Sta.] p. 69. **Lameere, A.**—Évolution des Hémiptères. [VI Congr. Int. Ent. Madrid] 1: 17-22. **Sailer, R. I.**—A n. sp. of Thyreocorinae. [103] 13: 62-63, ill. **Strickland, E. H.**—Additional Fulgoridae taken in Alberta. [4] 72: 87-88. **Venables, E. P.**—The scale insects of British Columbia. [Pro. Ent. Soc. Brit. Col.] No. 35: 23-24.

LEPIDOPTERA.—Berio, E.—Nuonyo genere e specie di Erastriinae dell 'Argentina (Noctuid.). [27] 71: 186-187, ill. **Chermock & Chermock.**—Some new diurnal Lepidoptera from the Riding Mts., and the Sand Ridge, Manitoba. [4] 72: 81-83. **Clark, A. H.**—Butterflies of Virginia. [Smiths Inst.] Publ. 3586: 63-66, ill. **Field, W. D.**—Distributional notes on Copaeodes aurantiaca (Hesperiid.). [103] 13: 50. A distribution note on Grais stigmaticus (Hesperiid.). [103] 13: 57. A new skipper record for the

United States. [103] 13: 57. **Fletcher, T. B.**—New generic names for Microlepidoptera. [21] 52: 17-19. **Gohrbrandt, I.**—(see under Anatomy). **Johnson, J. W.**—The allotype of Calosaturnia albofasciata (Saturniid.). [19] 35: 46-50, ill. **Lange, W. H.**—An apparently new Alaskan Platyptilia (Pterophor.). [4] 72: 84-85, ill. **Llewellyn-Jones, J. R. J.**—A brief note on an attempt to hybridize Notolophus antiqua badia and Hemerocampa pseudotsugata. [Pro. Ent. Soc. Brit. Col.] No. 36: 14-15. Some food plants of lepidopterous larvae. [Pro. Ent. Soc. Brit. Col.] No. 34: 20-21: No. 35: 24-27; No. 36: 13-14. **Maheux, G.**—Le liparis du saule (Stilpnotia salicis) in Quebec. [98] 67: 73-77. **Schwanwitsch, B. N.**—On some general principles observed in the evolution of the wing-pattern of palaearctic Satyridae. [VI Congr. Int. Ent. Madrid] 1: 1-8, ill. **Sick, H.**—See under Anatomy.

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LIVING LIGHT. By E. NEWTON HARVEY. Princeton University Press 1940. Pp. xv, 328, frontispiece in colors (Dragonfish pursuing luminescent squid), 88 figures, $4.00. The Introduction to this very attractive volume opens with this paragraph: "Twenty-five years have passed since the author first started investigation of living light and twenty years since the publication of *The Nature of Animal Light*. From 1920, much progress has been made in our knowledge of light emission by living things—bioluminescence. "Living Light" includes this new work but is much more than a second edition of the older book. New chapters dealing with the morphology and physiology of light production in various groups of luminous animals have been introduced and other aspects completely rewritten to include the recent experiments. Special attention is devoted to various types of non-living luminescence. The historical approach has been adopted and each chapter will be found complete in itself, presenting the subject matter of interest to biologist, chemist or physicist." The titles of the chapters are: I. Cold Light (pp.3-22), II. Light-producing Organisms (23-87), III. Types of Luminescence (88-121), IV. Chemistry of Light Production (122-159), V. Physiology of Light Production (160-193), VI. Physical Nature of Animal Light (194-226). A classified, selected bibliography occupies pp. 227-256, an author index 311-318, a subject index 319-328. The great majority of the often wonderful illustrations, mostly half-tones from many sources and many now published for the first time, are massed on pp. 257-307. The light-producing organisms are found in two groups of plants, bacteria and fungi, and in 11 of 17 phyla of the animal kingdom. This review is concerned chiefly with the luminous terrestrial arthropods— there are light-producing spiders (reported but not caught or identified), myriopods, spring-tails, flies, moths and beetles. Luminous bacterial maladies of living mayflies, midges, mole-crickets and caterpillars have been described. Some investigators have supposed that the light of practically all luminous animals, even the fire-flies, is of symbiotic bacterial origin, but Prof. Harvey thinks it would be "an exaggeration to consider that *all* bioluminescence is bacterial in origin." He tells us in two different places (pp. 33, 160) that steady luminescence in an animal can be attributed *a priori* to the presence of symbiotic bacteria; "the only possible exception is the beetle *Phengodes* whose light is continuous, although it has not been studied sufficiently to state that is contains luminous bacteria." Luminescence, or "cold light," is distinguished from incandescence, or "hot light," in that the former is not due to temperature radiation while the latter is so caused (pp. 3, 93). In some cases the luminescence is produced by the oxidation of a substance, luciferine, in the presence of an enzyme, luciferase. These two have been found only in beetles (both elaterids and lampyrids), molluscs, ostracods, certain worms and decapods, but not in the other numerous groups of luminescent organisms, (pp. 133-134). Luminescence may be under nerve or hormone control in fireflies, the elaterid beetle *Pyrophorus* and the fly larva *Boletophila* (p. 161). Theories of the flashing of fireflies are discussed (pp. 165-171), but "the physiology of flashing is in a very unsatisfactory state;" "flashing itself is always induced by a definite light intensity" (p. 179). In chapter VI there are various physical measurements of firefly light. It is pointed out that "generally, luminescence has appeared sporadically in the living world, with a few luminous species scattered here and there among structurally very close non-luminous relatives. This again means that luminescence can be readily developed in the course of evolution by some slight change in mechanism *already existing* within all cells, I believe this mechanism is the respiratory one" (p. 159). Two slight entomological slips have been noticed: *Fulgora*, the lantern-fly, whose luminous claims are rejected, is referred to as a beetle (p. 13), and the name of the elaterid mentioned in the footnote on page 70, should be *Melanactes*. It is a pleasure to recommend this book to all interested in a subject which its author has found and has made so fascinating.—P. P. CALVERT.

OBITUARY

Science for June 7, 1940, announces the deaths of Dr. WILLIS STANLEY BLATCHLEY, on May 28, and of Dr. RALPH VORIS on May 9.

Dr. Blatchley, who was State Geologist of Indiana 1894-1911, has done more for the interests of taxonomic entomologists of eastern North America, especially of those beginning serious study, than any other single individual, by his composition and publication of the four manuals: *Coleoptera of Indiana* (1910), *Rhynchophora of North Eastern America* (with C. W. Leng, 1916), *Orthoptera of Northeastern America* (1920) and *Heteroptera of Eastern North America* (1926). They testify to his tremendous mental and physical energy. He was author also of books on general natural history. He was born at North Madison, Connecticut, October 6, 1859. He published two collections of autobiographical and bibliographical data: *Blatchleyana I* (1930) and *II* (1939—Indianapolis, The Nature Publishing Co.) which record the salient events of his career. No. II states that his entire collection of mounted insects, including holotypes of 470 new species which he described, was disposed of to the Dept. of Entomology, Purdue University, Lafayette, Indiana, in June, 1935, and that his unmounted duplicates had previously been sent to the British Museum, London. Dr. Blatchley, at the time of his death, was one of ten honorary fellows of the Entomological Society of America, an honorary fellow of the Indiana Academy of Science, a Correspondent of the Academy of Natural Sciences of Philadelphia and a Corresponding Member of the American Entomological Society.

Dr. Voris was born at Newkirk, Oklahoma, June 23, 1902, received a Ph.D. from the University of Indiana in 1928, and in the same year became professor of biology in Southwest Missouri State Teachers College at Springfield, a position held to the time of his death. He studied the immature stages of the Staphylinid beetles, on which he published in the *Transactions of the Academy of Sciences of St. Louis* (1934), *Annals of the Entomological Society of America* (June, 1939) and ENTOMOLOGICAL NEWS (June, July, 1939).

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

60 Cocoons, carefully fed, of **Samia nokomis** for Comstock's California Butterflies and 40 for Holland's Butterflies, Vol. 2. Both either new or second, or will exchange **nokomis** cocoons for desirable butterflies, **Papilio, Argynnis or Megathymus.** Jack Dennis, Beulah, Manitoba, Canada.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request: very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted.—Blatchley's Coleoptera of Indiana at reasonable price. W. W. Chapman, 308 Custom House, New Orleans, Louisiana.

Lepidoptera—Polyphemus cocoons for Cecropia, Luna, etc., also Georgia Butterflies for others. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange against Col. or all other insects from Bolivia. Walter Wittmer, Casilla 219, Oruro, Bolivia, S. America.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 65 cents; three or four pages, twenty-five copies, $1.05; five to eight pages, twenty-five copies, $1.75; nine to twelve pages, twenty-five copies, $2.35; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates up to 100 copies; over 100 copies prices on application direct to printer. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

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ENTOMOLOGICAL NEWS

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The Anatomy and Histology of the Digestive System of a Supposedly Non-Feeding Adult Moth, Callosamia promethea Dru. (Lepidoptera: Saturniidae).[1]

By Robert W. Pyle.

(Continued from page 185.)

Histology in the System.

The inner surface of the *buccal cavity* is lined with chitin; next to this there is a layer of flat epithelial cells. Outside the epithelial cells is a layer of loose connective tissue and several layers of muscle cells. At certain points, namely the most ventral and dorsal parts, the muscles which extend from the walls of the cavity to the head capsule are attached directly to the chitin. The chitin on the floor of the cavity is thick and stains like that of the exoskeleton, whereas that of the sides and roof of the cavity stains differently and is much more delicate in structure.

The ducts from the *salivary glands* to the exterior are lined with chitin, around which is a thin layer of flat epithelial cells, but the glands proper are not chitin-lined. They are composed of large epithelial cells that are similar in shape to those of the Malpighian tubules. They possess large, branching nuclei.

The *oesophagus* is composed of three layers. The innermost one is a thin layer of chitin. This is surrounded by a layer of flat epithelial cells, a single layer of circular muscles, and a few longitudinal muscles.

The *sucking stomach* is lined with chitin which is surrounded by a layer of extraordinarily thin epithelial cells. These cells are so thin that it is difficult to determine their presence. Supporting these cells is a layer of widely separated muscle fibers. (fig. 2). This condition may have been caused by the inflation of the sucking stomach with air as suggested above.

The *oesophageal valve* is composed of two layers of cells. The inner is that of the oesophagus, and the outer that of the mid-gut. The chitinous lining persists as far as the hind end of the oesophagus where it abruptly ceases. (fig. 8).

The *mid-gut* is composed of a layer of columnar epithelial cells, which have granular inclusions in the cytoplasm. This layer is surrounded by longitudinal and transverse muscles in varying amounts (depending upon the particular place examined) (fig. 5).

The *Malpighian tubules* at their junction with the alimentary tract are composed of columnar cells, but in the tubes proper the cells are cuboidal. Their inner surface has a brush border; no evidence of chitin was found. They do not, however, seem to possess distinct cilia such as has been figured by Bordas (1920) for the specimens which he examined.

The *intestine* is composed of an inner layer of cuboidal epithelial cells, a layer of circular muscles, and a few longitudinal muscles. It is lined with a layer of chitin (fig. 6).

The *rectum* is composed of a layer of cuboidal cells, transverse and longitudinal muscles. There are many gland-like structures present. These are disc-or cup-shaped, varying from fifty to one hundred micra in diameter. That part of the "gland" which is next to the rectal wall is composed of small epithelial cells which form the base and sides of the cup. The surface directed toward the lumen of the rectum is composed of a thin layer of chitin (as is the rest of the rectum) under which there is a layer of large cells (fig. 7). some of these contains inclusions which look like secretory or absorbed material. In the center of the "gland" is a lumen.

Comparison with Feeding Forms of Lepidoptera.

There is a vast difference between the external mouth parts of *Callosamia promethea* and the feeding Lepidoptera studied (*Epargyeus tityrus, Protoparce carolina, Haemorrhagia thysbe*). There is less development of the rudimentary mandibles in *C. promethea* than in *P. carolina*. In fact *C. promethea* lacks so much in the form of external mouth parts that there is no comparison between its mouth parts and those of the feeding forms.

The buccal cavity of all four species is superficially similar in structure. *P. carolina* and *H. thysbe* possess powerful muscles which are used in imbibing food. Schmitt (1938) describes the Sphingidae as having the most highly developed type of musculature in the buccal cavity and states for the Saturniid, *Samia cecropia*—"There is a single pair of pharyngeal dilators, still recognizable by means of the frontal ganglion. Laterally, there are two pairs of muscles which might be functional. No salivarium muscles could be found." The same statements are true for *C. promethea*.

The greatest difference between the salivary glands of the different species seem to be in their length as is shown by the number of folds. *P. carolina* has by far the longest; those of *H. thysbe* are slightly longer, and those of *E. tityrus* much shorter, than those of *C. promethea*. Otherwise the salivary glands of the four species examined seem to be quite similar. No difference in the number of salivary glands was observed.

In cross section the oesophagus of the feeding forms shows several folds. This apparently is to permit the dilation of the oesophagus during feeding. These folds are lacking in *C. promethea*. The musculature is somewhat more deveolped in the oesophagus of the feeding forms; otherwise they are all similar.

The sucking stomach, or food reservoir, Malpighian tubules, and intestine do not present any striking differences between *C. promethea* and the other three species compared.

The oeseophageal valve presents one of the outstanding differences. In *C. promethea* the oesophagus enters the mid-gut dorsad and curves down opening ventrally in the interior of the mid-gut. Structurally it shows no adaptation for functional use, and the cells are rather large (figs. 3, 4, 8). In *P. carolina*, however, there is a different condition. The heavily-muscled oesophagus has a definite opening; the oesophageal valve is a much more definite structure. The cellular structure of the tissue is different. The epithelial cells of the oesophagus at the oesophageal valve are almost negligible; in *C. promethea* they are prominent.

The mid-guts of three feeding forms examined are somewhat similar to that of *C. promethea*. In *C. promethea* the cells are large and loosely joined together, whereas in the feeding forms they are proportionally thinner and very compact. In *P. carolina* there are four to five times as many cells per one hundred micra as in *C. promethea*.

The rectal "glands" differ most in size in the species compared. In the case of *P. carolina* the chitinous layer seems thicker, but the epithelial layer seems thinner. Comparisons with the other forms showed that the differences were in amount rather than in the types of cells present.

Summary.

1. The digestive system of *Callosamia promethea*, a non-feeding adult, has been compared with those of three feeding adults—*Epargyeus tityrus, Protoparce carolina, Haemorrhagia thysbe*—and found to be made up of parts possessed by Lepidoptera in general.

2. The external mouth parts are very much atrophied and wanting.

3. The musculature of the buccal cavity is weak.

4. The oesophageal valve shows the most divergence from the feeding forms studied, being composed of large, loosely joined cells; the opening into the mid-gut is small.

5. There is little difference between the four forms studied as to the Malpighian tubules, salivary glands and intestine.

6. Many rectal "glands" are present.

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Explanation of Plate IV.

Unless otherwise stated all figures are camera lucida drawings of *Callosamia promethea*.

Fig. 1. Diagram of the entire digestive system showing the salivary glands extending along the oesophagus, the sucking stomach, mid-gut, a portion of the Malpighian tubules on one side, the intestine, and rectum.

Fig. 2. A portion of the sucking stomach showing the layer of chitin, very thin epithelial cells, and scattered muscle fibers. Diagrammatic.

Fig. 3. A cross section of the anterior portion of the mid-gut showing the oesophagus completely enclosed within it.

Fig. 4. A section showing the opening of the oesophagus within the mid-gut.

Fig. 5. A section of wall of the mid-gut showing the granular inclusions.

Fig. 6. A portion of a cross section of the intestine showing the inner chitinous layer, the cuboidal epithelial cells, a trachea and muscle fibers.

Fig. 7. A portion of the rectum showing a rectal "gland".

Fig. 8. A Frontal section showing the oesophageal valve. Diagrammatic.

The Generic Name Lethus (Orthoptera and Hymenoptera).

By JAMES A. G. REHN and JOHN W. H. REHN,
The Academy of Natural Sciences of Philadelphia.

In 1934 we described a new genus of Central American Eumastacinae to which was applied the name *Lethus*[1]. This had been checked in Scudder's "Nomenclator Zoologicus", the supplements to the same and the lists of new generic names proposed as recorded in the volumes of the "Zoological Record". Recently our colleague, Dr. B. P. Uvarov, of the British Museum (Natural History), in tallying up Orthoptera generic names which he considers to be preoccupied, has replaced our generic name *Lethus* by the newly proposed *Mayamastax*[2], on the grounds that it is preoccupied "by Lethus Say (1837) (Hymenoptera)".

Regardless of what force one may give to the recent ruling of the International Commission on Zoological Nomenclature that, in proposing substitute names for those said to be preoccupied, full and exact references (to pages where numbered) must be given by the proposer for both the name to be replaced and that which causes the replacement,[3] the logic of these situations would seem to demand such full citation of essential requirements.

We have carefully examined the Sayian use of the name *Lethus* with very interesting results. In the first volume of the Boston Journal of Natural History there appeared as one of the last of Say's contributions, the descriptions of a number of new species of North American Hymenoptera. Apparently the manuscript of this paper was sent to the Boston Society of Natural History either by Say shortly before, or by some one else shortly after, his death on October 10, 1834. The paper was published in two parts, the first appearing in May, 1836, its date of communication to the Society being given as

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[1] Mem. Amer. Entom. Soc., no. 8, pp. 5, 37.

[2] Ann. Mag. Nat. Hist., (11) XI, p. 176, (Feb., 1940).

[3] Comptes Rendus XII Congrès Intern. Zool., Lisbonne, I, pp. 186-187.

February, 1835.[4] The second part is printed in the section of the Journal bearing the date of May, 1837. The important point is that Say never saw proof of at least the second part of this paper, as he had been dead nearly three years when it appeared. In addition, the distance of New Harmony, Indiana, where he lived, from Boston, Massachusetts, and the time needed in 1834 for mail to pass between, makes it quite probable that none of the proof was ever read by the author.

In the second part of the paper we find the generic heading "LETHUS F. Latr[5]". From this it is evident Say never intended to propose *Lethus* as a new generic name, and that whatever he wished to use had previously been proposed. Under the genus he described but a single species, *L. spinipes*, which he compared with "*L. cyanipennis* F." The genus *Zethus* is of course a very well-known hymenopterous entity, dating from Fabricius, 1804, and was used by virtually all students at that time including Latreille. To it, in a broad sense, belongs the species *spinipes* described by Say in conjunction with the supposedly preoccupying *Lethus*, and also the compared *cyanipennis* Fabricius, which is usually considered to be a synonym of *Z. mexicanus* (Linnaeus).

Cataloguers of the Hymenoptera, such as Dalla Torre, apparently have considered Say's use of *Lethus* a purely typographical slip for *Zethus*, and so give *Zethus spinipes* as the original proposed combination for that species without comment. In addition the use of *Lethus* as a valid generic name in the Hymenoptera for *spinipes*, which clearly Say never intended it to be, would probably synonymize Saussure's subgeneric name *Zethusculus*, as well as invalidate the properly proposed use of *Lethus* in the Orthoptera.

The key to the whole situation is apparently before us at this time in the priceless series of original letters from Thomas Say to the Rev. J. F. Melsheimer, our early coleopterist, now in the archives of the Academy of Natural Sciences of Philadelphia. In the many lists of technical names contained in

[4] Boston Journ. Nat. Hist., I, p. 209.

[5] Idem, p. 387.

these interesting letters, which cover a period from 1813 to 1825, we find very frequent use of the capital letter "L" and a few of "Z". The former is unmistakable in meaning, but the latter, as used for "Zonitis", has the upper arm of the letter so concave that it could readily be mistaken for the first stroke in making certain handwritten capital "Ls", the remainder of the letter fully carrying out the resemblance, which is not shared by Say's quite sigmoid capital letter "L".

To summarize; Say never proposed *Lethus* as a new genus, he clearly never read the proof of at least the part of his paper in which it appeared, his reference to prior authors showed he had *Zethus* in mind, and his handwriting demonstrates beyond question the marked probability of confusion of his capital letter "Z" for an "L". In our opinion *Lethus* as credited to Say is a clearly evident typographical error, and without validity to preoccupy *Lethus* Rehn and Rehn, 1934.

We might mention that in the same paper as that in which he replaces *Lethus* of Rehn and Rehn, Dr. Uvarov[6] has this to say in re a virtually parallel case: "*Habra* Brunner, 1891 (Tettigoniidae), appears to be preoccupied by *Habra* Agassiz, 1846 (Mollusca), but the latter name is merely an emendation of *Abra* Lamarck, 1818, and therefore itself not valid." Certainly a clearly evident typographical error has no more weight than a puristic emendation.

Unfortunately in the same paper Dr. Uvarov has failed to note a prior replacement of the preoccupied generic name *Dicellura* Rehn and Hebard, 1915, and has renamed it[7], although the original authors several years past detected the preoccupation and renamed it *Dicellurina*,[8] which by particular misfortune is the same word later selected for this use by Dr. Uvarov. The substitution by Rehn and Hebard was properly noted in the body of the "Zoological Record" for 1938, [9] but omitted in the accompanying list of new generic names proposed during the year and abstracted in the volume.

[6] Ann. Mag. Nat. Hist. (11) XI, p. 174.
[7] Idem, p. 173.
[8] Entom. News, XLIX, p. 150, (May, 1938).
[9] Vol. LXXV, p. 417.

How Many Insects are there in the World?

By Z. P. Metcalf, North Carolina State College of Agriculture and Engineering of the University of North Carolina.

This being census year it is perhaps not amiss to take a census of our insect population. The possible number of insects in the World has always been a subject of great interest to me. I, of course, refer to the number of kinds of insects or species and not to the number of individuals. No one has been foolhardy enough to attempt to make a world census of insect individuals so far as I am aware. Wolcott (1937a) has recently given us a list of the number of invertebrates collected from one hundred square feet of grassland in New York State. If this figure were taken as the average for the land area of the world, it would be fairly easy to multiply the land surface of the earth by the number of animals per one hundred square feet and arrive at a figure that would be utterly meaningless to any one save an astronomer. Before we get into such figures, however, let us inquire as to the estimated number of kinds of animals in the World. Text-book statements range from 250,000 to 1,000,000 and some hardy soul has recently suggested that there must be at least 10,000,000 species of animals living in the World at the present time. This figure was based upon the maintenance of the present rate in description of new species for another 150 years. Before we condemn such figures as completely fantastic, let us look at the past record. In 1758 Linnaeus established binomial nomenclature and described 312 genera and 4,203 species of animals of all classes, or a ratio of 13 species to each genus. The insects comprised 74 genera and 2,102 species, or a ratio of 28 species to each genus. Of these 1 genus and 42 species were included in what we speak of today as the Homoptera-Cicidina and Fulgorina. This gives a ratio of species of Homoptera to all other animals of 1:100.

Sherborn (1902a) lists all the animals that were described between the years 1758 and 1800. This list includes 3,234 genera and 58,833 species, or a ratio of 18 species to each genus.

Fabricius (1803a) redescribes all the known species of Homoptera. He includes 14 genera and 452 species, a ratio of 13 species to each genus; and a ratio of known Homoptera to all animals of 1:130.

Sherborn (1922a-1933b) lists all the animals described from 1800 to 1850. This list includes 52,214 genera and 363,588 species or a ratio of 8 species to each genus, or a total population of the Animal Kingdom from 1758 to 1850 of 55,448 genera and 422,421 species.

Dohrn (1859a) catalogs the known Hemiptera of the World. He includes 222 genera and 3,259 species or a ratio of 13 species to each genus. If we compare the species of Homoptera listed in 1859 to the rest of the Animal Kingdom, we find a ratio of 1:130; and a ratio of genera to species of 1:8.

Since 1850 the only reliable source of information in regard to the number of new species is found in the Zoological Record. Counting the number of new species every 10 years as recorded in this publication gives us an average of 10,542 new species of insects described each year, 249 species of Homoptera, and 7,253 species of animals not insects.

If these averages are substantially correct they would give us a grand total of 948,780 species of insects since 1850 and a total of 652,770 species of animals not insects. A grand total of 1,601,550 species of animals described since 1850, or a total since 1758 of 2,023,951 species of animals.

There are two methods that we may use to check these figures. In the first place, a careful count shows that we now have in our card catalog of the Homoptera of the World 2,544 genera and 19,882 species. These figures do not include any synonyms. This catalog may be considered complete up to the end of 1937. Our calculations based on the above figures would give us 23,179 species of Homoptera, including synonyms; showing that our calculations are substantially correct. Now if the Homoptera represent 1/125 of the Animal Kingdom, as our figures would seem to indicate, then the total number of described species of animals in the World would be 2,898,625.

There is a second method that may be used. The new Nomenclator Zoologicus will list 225,000 genera. The ratio of species to genera was 8:1 in 1850. If this ratio is maintained today as would be indicated also by the ratio of species to genera in the Homoptera, we would have 1,822,500 described animals in the World.

Averaging the three sets of calculated figures we get an estimated number of 2,500,000 animals and 1,500,000 insects described from 1758 to 1940.

I recognize the limitations of these figures and the many inaccuracies in them, at the same time I believe that they are more accurate than the figures current in most text books. At least they have done this; they have occupied my thoughts on a hazy Indian summer day; their calculations have kept an otherwise idle adding machine busy; and last by no means least important, I hope they have stimulated your thoughts in this field. I trust also, that they will make those of us who profess to be systematists more systematic as we go about our daily business of describing new genera and species, so that those who come after us will not have to do too much counting and recounting, too much learning and unlearning.

And one final conclusion perhaps best expressed in the lines of the ancient limerick:

From figures astronomical
And pains gastronomical
May the good Lord deliver us,
But there's no hope for any of us
As long as so many of us
Have thought quite hysterical.

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The Cockroach Supella supellectilium in California (Orthoptera: Blattidae).

Information published in the last few years has shown that this circumtropical cockroach has been rapidly extending its distribution within the more austral parts of the United States. Bach (Proc. Entom. Soc. of Wash., XXXIX, pp. 205-213, text figs. 1 and 2, pls. 18 and 19, (1937)) has given a good summary of the subject. Hebard (Trans. Amer. Entom. Soc., LXI, p. 273, (1935)) further reported it from Tucson, Arizona, and Rehn (Entom. News, XLIX, p. 143, (1938)) added Pennsylvania to its distribution.

Recently three immature individuals of this species, representing several instars including that preceding maturity, have been sent to me for determination by Mr. V. E. Williams, Entomologist to the Agricultural Commissioner of Los Angeles County, California. These specimens were collected in a residence at San Bernardino, California, by Mr. John R. Coy, Agricultural Commissioner of San Bernardino County, April 8, 1940.

This record extends the range of the species within the United States to California, thus giving it a distribution extending from Pennsylvania to southern California, northward in the interior to Nebraska, Missouri, Illinois (Chicago and Urbana) and Indiana (Indianapolis). It was first recorded from the United States at Miami, Florida, by the present author in 1903 (Entom. News, XIV, p. 125)) as the synonymic *Phyllodromia cubensis.*

James A. G. Rehn, Academy of Natural Sciences of Philadelphia.

The Life History of the American Cockroach, Periplaneta americana Linn. (Orthop.: Blattidae).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 189.)

Period of Incubation.

A hundred adult American cockroaches arrived from New Orleans in June, 1937, egg-cases began to protrude from the bodies of some females two to three days later. Forty of these were placed in separate vials as they were deposited, during the months of June and July for the purpose of noting the number of days required for the hatching of the eggs.

Incubation No. of days	Frequency
38	2
39	1
40	1
41	6
42	7
43	5
44	9
45	2
46	2
47	0
48	3
49	2
Total	40

Thus we see that the period of incubation varied from 38 to 49 days, the greatest frequency being between 40 and 45 days (two-thirds of the number having hatched in that length of time.) The figures are computed from the time the egg-cases are dropped by the mothers. The egg-cases, as already stated, are carried by the mothers for from one-half day to four days and development undoubtedly starts when the egg-case is first protruded; therefore, the period of incubation for each egg-case may be anywhere from one-half to four days greater than the figures in the table show. Nigran* in India, finds the period of incubation for this species to be 27 to 28

* Indian Journ. Agric. Sci. 3: 530-543, 1933.

days when egg-cases are kept in a warm moist place. He cites Haber in Minnesota who finds that at a temperature of 77 degrees it requires 70 days. By way of comparison it is interesting to know that the period of incubation for the oriental roach is from 45 to 56 days (Trans. Acad. Sci. St. Louis 25: 66, 1924), and that of the Woodroach *P. pennsylvanicus* is from 30 to 41 days (Ent. News 51: 8, 1940).

THE NUMBER OF YOUNG TO HATCH FROM EACH EGG-CASE.

The number of young to hatch from each egg-case is actually the number of eggs deposited since there is usually no mortality. This study was made on the 40 egg-cases mentioned under the heading "Period of Incubation" with the following results:

No. of Eggs in Egg-Case	Frequency
6	2
8	3
9	2
10	6
11	2
12	8
13	1
14	11
15	2
16	3
Total	40

In the foregoing table we see that the number of eggs contained in 40 egg-capsules varied from 6 to 16, the greatest frequency being those containing 10 to 16—three-fourths of them having that number. Nigran, in India, found 16 eggs to the egg-capsule and cites Laing who mentions the maximum number as 14. He also cites Haber, in Minnesota, who "found 18 to 28 eggs in the egg-cases, 20 to 24 being common." Comparing the normal number, 10 to 16 eggs per egg-capsule, with those of *B. orientalis* and *P. pennsylvanica*, we find orientalis depositing 12 to 18 eggs per capsule (Rau *loc. cit.*, p. 70) and pennsylvanica, 18 to 30 eggs per capsule (Rau, *loc. cit.*, p. 8).

NUMBER OF EGG-CASES DEPOSITED BY EACH MOTHER.

No. of egg-cases deposited by each mother.	Frequency
6	1
7	2
8	5
9	3
10	3
11	2
12	3
14	1
Total	20

These egg-cases deposited by 20 mothers covered a period from June 5 to August 29; the smallest number of egg-cases deposited by any one mother was 6, the largest number was fourteen, and the average number was 9½ per mother. In the Woodroach (Rau, *loc. cit.*, p. 6-7) we find mothers depositing from 3 to 11 egg-cases, and in the oriental roach from 1 to 4 egg-cases (Rau, *loc. cit.*, p. 63).

LAPSE OF TIME BETWEEN DEPOSITING EGG-CASES.

Records were kept on the number of days that intervened between the dropping of egg-cases by the same 20 mothers referred to in the previous paragraphs. The data on the period of time which elapsed between layings in 133 instances are recorded in the table below.

No. of days interval between two egg-cases.	Frequency
2	9
3	18
4	19
5	17
6	15
7	13
8	7
9	9
10	1
11	5
12	4
13	4
14	1
15	3

16	2
17	1
19	2
31	1
40	1
53	1
Total	133

Thus we see that the time interval between deposition of egg-cases varies from 2 days to 19 days with three extraordinary exceptions in which the period was 31, 40 and 53 days. However, out of the 133 records, 107 or nearly two-thirds of them have a time interval between layings of from 2 to 9 days.

Lapse of Time between Arrival at Kirkwood and Deposition of First Egg-Case.

The 20 mothers considered in this study began egg-laying after a lapse of the following number of days:

No. of Days	Frequency
3	2
4	2
6	5
7	2
8	5
11	1
12	2
21	1

The lapse of time according to the table varied from 3 to 21 days, but since they were adults when they arrived from New Orleans, I have no way of knowing if these were the first egg-cases deposited by the mothers.

Lapse of Time between Deposition of Last Egg-Case and Death of Mother.

Records were kept on the number of days ten mothers lived after depositing their last egg-case.

No. of Days	Frequency
4	1
10	2
29	1
34	1
39	1
42	1
45	1

48	1
65	1

Thus we see the length of life is quite variable after deposition of the last eggs, but we do not know whether they died after depositing the last eggs or whether, had they lived longer, more egg-cases would have been deposited.

PARASITES OF THE EGG-CASES.

Concealing the egg-cases by covering them with bits of surrounding material was an almost 100% factor in saving them from being devoured by other roaches; concealing them, however, did not save them from the onslaughts of certain hymenopterous parasites, who found them in spite of their protective coloration. One parasite that found two of the concealed egg-cases, after entering the glass-covered fish globe, was the Chalcid-wasp, *Melittobia chalybii* Ash. [A. B. Gahan det.]. The parasites emerged from the egg-cases of *P. americana* in mid-October, 1938. These egg-cases were among a few which I had placed in separate vials for other studies, but how many more were parasitized that missed my attention, I do not know. The parasites were probably brought into the laboratory with mud nests of *Sceliphron caementarium,* and this, I think, is the first record of *Melittobia* parasitizing the egg-cases of a cockroach.

(To be continued.)

The Occurrence of Gryllus domesticus L. in Maine (Orthop.: Gryllidae).

Early in the autumn of 1939, *Gryllus domesticus* was apparently introduced into Coburn Hall on the University of Maine campus. By the middle of May large numbers were present in the warm basement, where their sharp chirping was to be heard at almost any time during day or night. As the presence of this insect in Maine apparently has not been recorded before, the following records in addition to Orono are listed: Augusta, Bath, Biddeford, and Portland. The writer acknowledges the receipt of these records from Mr. H. B. Peirson and Dr. C. O. Dirks.

MERLE W. WING.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )**follows; then the pagination follows the colon :

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L. R.—Malófagos da cigana. [Opisthocomus hoazin]. [Arq. Zool. Est. São Paulo] 1: 283-317, ill. **Herman, C. M.**—(see under Neuroptera). **Martin, H. M.**—Ticks. [Forest Leaves] 1940: 3, 11-13, ill. **de Mello-Leitão, C.**—Algumas Arañas nuevas de la Argentina. [Rev. Mus. de la Plata] 1: 89-118, ill. (*). Une araignée argentine type d'une sous famille nouvelle (Corinoctenus anomalostomus n. sp.). [69] 17: 137-142, ill. A propos d'un nouveau Oonopide myrmeciphile de l'Argentine. [69] 17: 143-145, ill. Les arachnides et la zoogeographie de l'Argentine. [69] 17: 601-630. (*). Sete generos e vinte e oito especies de Gonyleptidae. [Arq. Zool. Est. Sao Paulo] 1: 1-51, ill. Sur une phryne cavernicole de Bahia-Trichodamon froesi, sp. n. [An. Acad. Brasileira Sci.] 12: 131-135, ill. Mais alguns novos opilioes Sul-Americanos. [An. Acad. Brasileira Sci.] 12: 93-107. **Moreno, A.**—Contribucion al estudio de los escorpionidos cubanos. Fam. "Buthidae", Addendus. [115.] 14: 161-164, ill. (*k). Pedipalpida emmendata [Mem. Soc. Cubana Hist. Nat.] 14: 167-168. (*). **Plomley, N. J. B,**—Notes on the systematics of two species of Heterodoxus (Boopid.). [Pap. & Proc. Roy. Soc. Tasmania] 1939: 19-26, ill. **Prado, A.**—Contribuicao ao conhecimento dos escorpioes Sul-Americanos. [Mem. Inst. Butantan] 13: 25-36, ill. **Prado y Rios-Patino.**—Contribucion al estudio de los escorpiones de Colombia. [Mem. Inst. Butantan] 13: 41-43, ill. **Schmidt, F. L.**—Entonyssus vitzthumi, a new Ophidian lung mite. [Jour. Parasit.] 26: 309-313, ill. **Schuhardt, V. T.**—A "ticktorium" for the propagation of a colony of infected Ornithodoros turicata. [Jour. Parasit.] 26: 201-206, ill. **de Toledo Piza, S.**—Novos Gonyleptidae do Brazil. [Arq. Zool. Est. São Paulo] 1: 53-64, ill.

THE SMALLER ORDERS OF INSECTS—**Adamson, A. M.**—New termite intercastes. [Pro. Ry. Soc., London] 129 (B): 35-53, ill. (s) **Arlé, R.**—Quelques Collemboles de l'etat d'Espirito Santo. [69] 17: 125-131, ill. (*). **Buxton, P. A.**—The biology of the body louse (Pediculus humanus corporis: Anoplura) under experimental conditions. [116] 32: 303-312. **Coutinho, J. O.**—Observações sôbre algumas espécies de Flebótomos com a descrião do macho de Flebotomus lloydi. [Arq. Zool. Est. São Paulo] 1: 331-338, ill. **Deoras, P. J.**—Comparative morphology and evolutionary trends in Trichoptera. [31] 145: 976. **Fox, I.**—Siphonaptera from western United States. [91] 30: 272-276, ill.

(*). **Herman, C. M.**—Parasites obtained from animals in the collection of the New York Zoological Park during 1938. [Zoologica] 24: 481-485. **Navas, R. P. L.**—Comunicaciones Entomologicas. 4. Insectos exoticos nuevos, criticos o poco conocidos. [Rev. Acad. Exac. Nat., Zaragoza] 6: 12-13. (*s). **Scourfield, D. J.**—(see under General).

ORTHOPTERA.—**Bruch, C.**—Algunas observaciones biologicas sobre "Schistocerca infumata." [Rev. Mus. de la Plata] 1: 209-216, ill. **Deoras, P. J.** — See under Anatomy. **Gunther, K.**—Revision der Acrydiinae, III. [Abhandl. Ber. Staatl. Mus.] 20, (A): 16-329, ill. (k). **Hubbell & Cantrell.**—A new species of Appalachia from Michigan (Acridid; Cyrtacanth.). [Occas. Pap. Mus. Zool., Univ, Mich.] No. 389, (1938): 22 pp., ill. **de Mello-Leitao, C.**—Estudia monográfico de los Proscópidos. [Rev. Mus. de la Plata] 1: 279-449, ill. (k*s). **de Toledo Piza Jumior, S.**—Phasmidas do Museu Argentino de Sciencias Naturaes. [69] 17: 113-116. (*). **Uvarov, B. P.**—Twenty-four new generic names in Orthoptera. [75] 6: 112-117.

HEMIPTERA.—**Blanchard, E. E.**—Estudio sistematico de los Afidoideos argentinos. [69] 17: 857-1003, ill. (*). **da Costa Lima, A.**—Novo Hemiptero Reduviideo da subfamília Vesciinae. [Arq. Zool. Est. São Paulo] 1: 485-490, ill. **Drake & Poor.**—Some Tingitidae from the Republic of Argentina. [69] 17: 95-98, ill. (*). **Lallemand, V.**—Description de deux nouveaux cercopides provenant de l'Argeñtine. [106] 129: 186-187. (*).

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"Speocropia". (Acronyct.). [69] 17: 311-316, ill. Contribución al conocimiento de las "Riodinidae" argentinas. [69] 17: 317-374. (*). Ropalóceros de las Yungas de Bolivia. [69] 17: 375-384. **Henne, C.**—Two new species of Lepidoptera from California. [38] 39: 71-74. (*). **Hoffmann, C. C.**—Lepidopteros nuevos de Mexico. [An. Inst. Biol. Mex.] 11: 275-284, ill. **Klots, A. B.**—The silvery-striped species of California (Pyralidid.). [38] 39: 53-70, ill. (k*). **Koehler, P.**—Especies nuevas de "Satyridae" y complemento a mi "Prodromus". [69] 17: 443-447. Contribución al estudio de los "Noctuidae" argentinos. [69] 17: 449-455. Notas sobre "Psychidae" argentinos. [69] 17: 457-471, ill. Parásitos de "Psychidae" argentinos. [69] 17: 473-494, ill. **Maria, H. A.**—Miscelanea entomologica. [Rev. Acad Colombiana Cien. Exact., Fis. y Nat.] 3: 332-336, ill. (k). **Moore & Rawson.**—A new Noctuid from Michigan. [Occas. Pap. Mus. Zool., Univ. Mich.] No. 395: 2 pp., ill. **Schaus, W.**—Insects of Porto Rico and the Virgin Islands. Moths of the family Noctuidae [Sci. Surv. Porto Rico & Virgin Ids.] 12: 177-290. (*k).

DIPTERA.—Carrera, M.—Novas espécies do género Rachicerus. [Arq. Zool. Est. São Paulo] 1: 387-398, ill. **Edwards, Oldroyd & Smart.**—(see under Special). **da Fonseca & da Silva Ramos.**—Novo subgenero e novas especies de Anofelinas neotropicas. (Culicid). [Mem. Inst. Butantan] 13: 383-387, ill. **Fraga, A.**—El género "Listriosca" de la subfamilia "Pangoniinae". [69] 17: 149-155, ill. **Goncalves, C. R.**—Biologia de uma ("Pseudiastata" depredadora de "Pseudococcus brevipes" Diastatid.). [69] 17: 103-112, ill. **Hering, E. M.**—Neue alt-und neuweltiche bohrfliegen. (Trypetidae). [109] 7: 50-57, ill. (*). **Hertig, M.**—See under General. **Del Ponte, E.**—Revision de los "Oestridae" argentinos. [69] 17: 525-534. (*). **Reid, W. J.**—Biology of the seed-corn maggot in the coastal plain of the South Atlantic States. [U. S. Dept. Agric.] Tech. Bull. 723: 43 pp., ill. **de Souza Lopes, H.**—Sobre alguns Sarcophagideos de Misiones. [69] 17: 117-123, ill. (*). **Steyskal, G. C.**—New Stratiomyidae and Tetanoceridae from North America. [Occas. Pap. Mus. Zool., Univ. Mich.] No. 386, (1938): 10 pp., ill. **Vargas, L.**—Aedes bimaculatus, del estado de Campeche, Mexico. Descripcion del Macho. [Rev. Soc. Mex. Hist. Nat.] 1: 103-107, ill.

COLEOPTERA.—Blackman, M. W.—The scolytid beetles of the genus Renocis, with descriptions of nine new species. [50] 88: 373-401, ill. (k*). **Campau, E. J.**—(see under Anatomy). **Cazier, M. A.**—New American Diplotaxis (Scarab.) [Great Basin Nat.] 1: 127-137. **Chapin, E. A.**—New genera and species of lady-beetles related to Serangium (Coccinell.). [91] 30: 263-272, ill. (sk). **Dallas, E. D.**—Monografia de "Calosoma argentinense (Carabid.). [69] 17: 771-789, ill. (*). **Denier, P. C. L.**—Descripcion de dos especies nuevas de "Bichos Moros" del Gran Chaco (Meloid.). [106] 129: 179-185, ill. (*s). **Hustache, A.**—Curculionides nouveaux. [106] 129: 112-144; 272-284. (s). **John, H.**—Eine neue species von Holophygus (Notiophygid.). [109] 7: 71-75, ill. (s). **Linsley, E. G.**—A generic revision of the tribe Methiini. (Cerambycid.). [38] 39: 28-38. (k). **Monte, O.**—Notas sôbre alguns Tingitideos do ? Brasil. [Arq. Zool. Est. São Paulo] 1: 375-381. Hem **Ogloblin, A. A.**—Un Oedemérido perjudicial a la "yerba mate" (Copidita argentina). [69] 17: 227-244, ill. **Pierce, W. D.**—The dune case-bearer beetles of the genus Exema, with review of the genus. [38] 39: 6-27, ill. (*k). **Saylor, L. W.**—Ten new West Indian scarab beetles of the genus Phyllophaga, with two new names. [J. Wash. Acad. Sci.] 30: 305-314, ill. (*). **Voris, R.**—The relationships among the Staphylininae as expressed by their larval forms, Coleoptera, Staphylinidae. [Pro. Missouri Acad. Sci.] 5: 115-116. **Voss, E.**—Ueber neue und wenig bekannte russlerarten aus der neotropischen region, vorwiegend aus Brasilien. [109] 7: 1-16, ill. **Zimmerman, E. C.**—Synopsis of the genera of Hawaiian Cossoninae with notes on their origin and distribution (Curculion.). [Occas. Pap. B. P. Bishop Mus.] 15: 271-293, ill.

HYMENOPTERA.—Blanchard, E. E.—Los Sarcofágidos argentinos. Contribucion a su conocimiento. [69] 17: 791-856, ill. (*). **Burks, B. D.**—Revision of the chalcid-flies of the tribe Chalcidini in America north of Mexico. [50] 88: 237-354, ill. **Cristobal, U. L.**—"Calliephialtes argentinus". Icneumonoideo de la serie parasitica enemigo del gusano de las frutas, nuevo para la ciencia apto para la lucha biologica. [69] 18: 477-486, ill. **Maa, T.**—On the nomenclature of certain Xylocopa-species. [Notes d'Ent. Chinoise] 7: 131-138. (*). **Ogloblin, A. A.**—Sobre la sinonimia del Mimarido parasito del gorgojo de Eucalyptus (Mymarid.). [Mem. Jardin Zool. La Plata] 9: 143-144. (*s). Descripción de un género nuevo de la familia "Mymaridae". [69] 17: 217-225, ill. **Sandhouse, G. A.**—A review of the nearctic wasps of the genus Trypoxylon. (Sphecidae). [Amer. Mid. Nat.] 24: 133-176, ill. **de Santis, L.**—Sobre un nuevo afelinido Argentino (Chalcid.). [Not. Mus. de la Plata] 5: 23-29, ill. (*). **Taylor, L. H.**—The hornets and yellow-jackets (Vespinae) of West Virginia. [West. Va. Univ. Bull.] 13: 33-36. **Viana, M. J,**—Notas sobre la biologica de "Parapechthis bazani". [69] 17: 261--264.

SPECIAL NOTICES.—British Blood-sucking Flies. By Edwards, Oldroyd & Smart. Brit. Mus. Nat. Hist. 1939. 156 pp., ill.

THE FABRICIAN TYPES OF INSECTS IN THE HUNTERIAN COLLECTION AT GLASGOW UNIVERSITY. COLEOPTERA, Part II, by ROBERT A. STAIG, M.A., Ph.D., F.R.S.E., Lecturer in Zoology (Entomology) University of Glasgow. Cambridge: at the University Press. New York: The Macmillan Co., 1940. $7.60. This, the second volume in a series, has 164 pp. of text, a two page introduction, an index and a supplement to volume I. There are colored plates of the thirty one species described in the Families Endomychidae, Coccinellidae, Helodidae, Buprestidae, Elateridae, Tenebrionidae, Oedemeridae, Rhipiphoridae, Meloidae and Pyrochroidae.

The descriptions of the 28 Fabrician and 3 Olivierian types are very full and as good as can be expected, considering the condition of the material examined. In addition to the above there are notes on other species contained in the Hunterian collection. The only criticism I can offer is that the author did not designate lectotypes in the cotypic series; if this had been done the types would have been fixed for all time. The colored plates are all full-paged drawings by Miss Margaret Wilson, D.A. (G.S.A.) and the detail and coloring are much better than in the usual illustrations of this kind.

The following fourteen species figured, are found in the United States fauna: 56. *Aphorista (Tritoma) vittata* (Fab.), Mant. Ins. I, p. 44, No. 4 (1787). 57. *Brachyacantha (Coccinella) ursina* (Fab.), Mant. Ins. I, p. 61, No. 98 (1787). 58. *Ceratomegilla (Chrysomela) 10-maculata* (Fab.), Syst. Ent. p. 105, No. 60 (1775). 59. *Hippodamia (Coccinella) glacialis* (Fab.), Syst. Ent. p. 80, No. 12 (1775). 73. *Buprestis fasciata* (Fab.), Mant. Ins. I, p. 177, No. 13 (1787). 78. *Agrilus (Buprestis) ruficollis* (Fab.), Mant. Ins. I, p. 184, No. 85 (1787). 80. *Hemirrhipus (Elater) fascicularis* (Fab.), Mant. Ins. I, p. 171, No. 2 (1787). 84. *Hoplocephala (Hispa) bicornis* (Fab.), Gen. Ins. p. 215, No. 3-4 (1776). 8. *Macrosiagon (Mordella) dimidiatum* (Fab.), Sp. Ins. I, p. 332, No. 5 (1781). 89. *Macrosiagon (Mordella) limbata* (Fab.), Sp. Ins. I, p. 332, No. 6 (1781). 90. *Macrosiagon (Mordella) sexmaculata* (Fab.), Syst. Ent. p. 263, No. 4 (1775). 92. *Epicauta (Lytta) atrata* (Fab.), Syst. Ent. p. 260, No. 4 (1775). 93. *Epicauta (Lytta) vittata* (Fab.), Syst. Ent. p. 260, No. 3 (1775). 97. *Neopyrochroa (Pyrochroa) flabellata* (Fab.), Mant. Ins. I, p. 162, No. 2 (1787).

In addition to the above there are many other species from Central and South America.

The present European conditions increase the value of books of this character and it is to be hoped that Dr. Staig will be able to finish his series on the Hunterian collection before too much time has elapsed.—Mark Robinson.

A New Generic Name to Replace Sigmoidella Hebard, Not of Cushman and Ozana (Orthoptera: Blattidae).

Our colleague Dr. B. P. Uvarov, of the British Museum (Natural History), has kindly called my attention to the fact that the generic name *Sigmoidella*, proposed by me in 1929 for a Malayan member of the Blattidae (Proc. Acad. Nat. Sci. Phila., LXXXI, pp. 39, 55, (April 15, 1929)) is preoccupied by *Sigmoidella* Cushman and Ozana in Foraminifera (Contrib. Cushman Labor. Foramin. Research, IV, p. 18, (March 3, 1928)). This unfortunate duplication to due to nearly contemporaneous work, and the fact that the list of new generic names in the "Zoological Record" for 1928 was not available in Philadelphia until December 4, 1929. To replace my preoccupied *Sigmoidella* of 1929 I propose the name *Sigmella*. —Morgan Hebard, Philadelphia, Penna.

IN MEMORIAM

Kenneth J. Morton

[A note of five lines in the News for March, 1940, page 73, announced the death of Mr. Kenneth J. Morton. Lt.-Col. F. C. Fraser, well-known for his work on the Odonata of British India and an intimate correspondent of Mr. Morton, voluntarily and kindly sent us the following notice.]

Entomology and British entomology in particular, has suffered a great loss in the death of Mr. Kenneth J. Morton which occurred on January 29th of this year, at Edinburgh. Robust and full of vigour to the last, although in his 82nd year, his sudden end naturally came as a great shock to his many friends. With his passing, we see the last of an old and eminent school of British entomologists, whose names will ever be household words in the world of entomological science.

Mr. Morton was born at Carluke, Lanarkshire, Scotland, in 1858 and it was there that he received his education. At the early age of sixteen he entered the British Linen Bank, being first employed at their Glasgow branch. Rather than be divorced altogether from his beloved country-side, he travelled to and from Carluke daily by train. In 1897 he was transferred to Edinburgh where he remained until his retirement in 1922. The remaining years of his life were devoted entirely to the study of entomology, a taste for which he had evinced from his earliest youth.

Like many other entomologists, his first love was for the Lepidoptera of which he acquired a fine collection of British species. At about the age of eighteen however, he began to extend his interests to other orders, which quickly eclipsed that for the Lepidoptera. He believed in generalising in all orders but specializing in a few, a sound principle which enabled him to follow the work of other entomologists even if they were concerned with orders which he did not himself specially study. He was extremely conservative in his views on nomenclature and also preferred to employ the old venational notation and formulae in preference to more modern ones; although not questioning the correctness of these latter, he abhorred constant changes and thought these only tended to confusion. More especially was he jealous of the nomenclature of the ancient entomologists and of the British in particular. The substitution of the names *Boriomyia betulina* Strom and *Sympetrum danae* Sulzer on the strength of crude figures, one of which was admitted to be *quite impossible to identify with certainty* by the sub-committee responsible, he regarded as "utterly unscientific" and "a gross scandal". He considered that a greater use of the *nomen conservandum* should have been employed, even where there was good reason for a change in the names.

Those who knew him best and longest, as did the writer for some twenty-five years, can testify to his genial character and charm of manner. No better epitaph could be written of him than this passage from a letter by his daughter: "he led a peaceful and good life as a citizen, husband and father".

Some have said that it was impossible to get an opinion from him, but nothing could be further from the truth. Like most Scots, he was extremely cautious and would weigh long and carefully all arguments for and against before expressing an opinion, so that when it was forthcoming, it could be relied upon as sound and his judgment accepted. He was the "perfect correspondent"; no letter went unanswered and all were answered at great length; indeed he had marked talent in this respect and many of his letters read like pages from Gilbert White.

The orders in which he specialized were the Odonata, Trichoptera, Neuroptera, Plectoptera, Mecoptera and the Apoidea of the Hymenoptera. The fine collections which he made in all these and of which some are rich in types, and most of his books have gone to the Royal Scottish Museum. Of his field work in these, perhaps the best remembered was his rediscovery of *Macromia splendens* Pictet, in France, after it had defied the efforts of all continental collectors for nearly fifty years.

In his early days, his favorite collecting grounds were the banks of the Clyde, and Scotland always remained his preferred country for this purpose, yet he made numerous excursions to the Continent of Europe to collect Odonata, Neuroptera and

Trichoptera: France was visited on four occasions, Switzerland twice, and Norway, Italy, Corsica, Austria and Spain on other trips. On all these expeditions he wrote valuable papers which were supplemented by others on collections made for him by many willing helpers. The most valuable of these latter dealt with the Odonate fauna of the Near and Middle East and Yunnan, China. His contributions to the literature of the orders in which he specialized ran into well over sixty papers and lengthy notes.

Mention must be made of two long and close associations which he formed with McLachlan and Dr. Ris. The former he first corresponded with in 1883 although he did not actually make his acquaintance until McLachlan visited Scotland in 1886. The author has come into possession of the McLachlan-Morton correspondence, and some 750 letters lie before him to testify to the close cooperation between these two entomologists. It was McLachlan who introduced Morton to Dr. Ris, urged to do this by their common love of the Odonata. This was in 1893, and he first met Ris when he visited Switzerland in 1904. This association lasted until Ris's death in 1931 and during that time some 250 letters passed between them, dealing mainly with the classification of the Odonata.—F. C. F.

Mr. Morton corresponded with Professors Needham and Kennedy, the late E. B. Williamson, the writer and perhaps others in the United States on Trichoptera and Odonata. His letters to me run from March 6, 1904, to December 4, 1939, and I had the great and enjoyable privilege of spending some days at his home in Edinburgh, in July, 1912. For many years it was our custom to exchange fairly lengthy letters at about Christmas, if not more frequently, and it is a keen source of sorrow to me that I can no longer look forward to his welcome and cheery greetings. From his letter of April 17, 1931, referring to the then recent death of Dr. F. Ris, I take this passage:

"The remarks about Ris's early school days recall my own. In rural villages in Scotland nearly all boys and girls went to the Parish School. The teachers as a rule were excellent. My own teacher was capable of giving tuition in the classics and mathematics which enabled pupils to pass direct to the Universities. There was, however, no University for me as I began my career at the Bank at 16 and retired in 1922."

Dr Cornelius Betten, in the bibliography to his "Caddis Flies or Trichoptera of New York State" (Bull. 292, N. Y. State Museum, 1934), lists forty-five papers by Morton, from 1883 to 1930, on these insects. Two of them deal especially with American species. One is "North American Hydroptilidae" (Bull. 86 of the same Museum, pp. 63-75, 1905), in which eleven new species and one new genus, *Neotrichia*, are described. The other is a note of eight lines, "A Bromeliadicolous Caddis-worm" (Ent. News 22: 411, 1911) referring to material received from Fritz Müller in Brazil.

The fifty papers by Morton dealing with Odonata are concerned chiefly with the Palaearctic and Ethiopian faunas, but include the descriptions of two remarkable new genera: *Chorismagrion* (1914) from North Queensland, resembling *Hemiphlebia*, also from Australia, in lacking the proximal side of the quadrilateral on the front wing, and *Coryphagrion* (1924) from Tanganyika Territory, East Africa, approaching *Mesopodagrion* of Thibet and western China and *Nesolestes* of Madagascar.—P. P. Calvert.

OBITUARY

Edward Payson Van Duzee

Science for August 2, 1940, prints a brief notice of the life of this eminent author of the Catalogue of the Hemiptera of America north of Mexico (1897), who died June 2, 1940. He was born in New York City, April 6, 1861, and had been curator of the department of entomology of the California Academy of Sciences since 1916, and editor-in-chief of the *Pan-Pacific Entomologist* from 1924 to within a few months of his death. In *Science* for August 9, it is stated that the regular meeting of the California Academy on July 10, was devoted to a commemoration of his life and work, at which a number of well-known entomologists and other associates spoke.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being ongest in) are discontinued.

Desired—Dolichopodidae of western United States and Canada. Will determine for privilege of retaining duplicates. F. C. Harmston, Entomology Dept., Utah Agric. College, Logan, Utah.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange again t Col. or all other insects from Bolivia. Walter Wittmer, Casilla 219, Oruro, Bolivia, S. America.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

Wanted—To hear from collectors who desire extra good cocoons of Michigan **Platysamia columbia**, that will emerge June, 1941. W. S. McAlpine, 575 Townsend St., Birmingham, Michigan.

Wanted—Specimens of the genus Trox from North America. Will exchange or determine for duplicate material. Mark Robinson, 231 Cherry St., Sharon Hill, Pennsylvania.

Lepidoptera—From the South, including P. palamedes, T. halesus and E. jucunda to exchange for fauna from other localities. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

Subscriptions for 1941 are now due

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NOVEMBER, 1940

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CONTENTS

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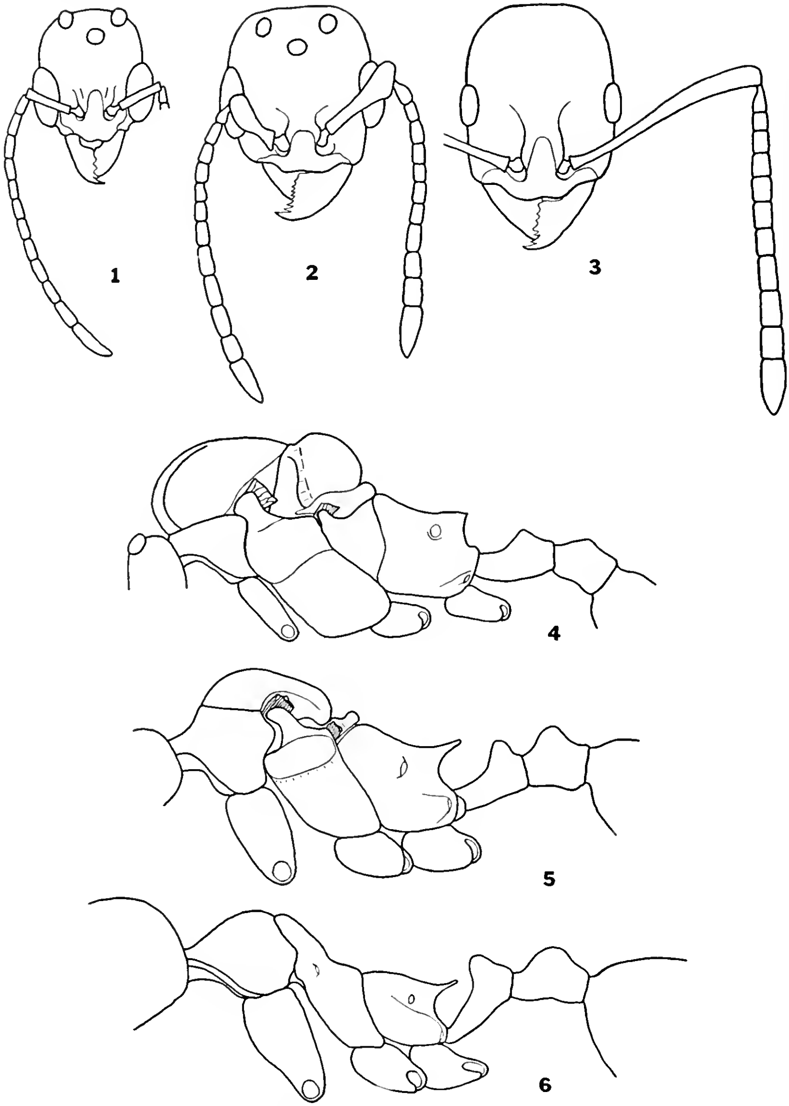

APHAENOGASTER FULVA AQUIA.
1, 4, MALE; 2, 5, GYNANDROMORPH; 3, 6, WORKER.—Wesson.

ENTOMOLOGICAL NEWS

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A Gynandromorph of Aphaenogaster fulva subsp. aquia Buckley (Hymenoptera: Formicidae).

By Laurence G. Wesson, Jr., Jackson, Ohio.

(Plate VI).

The following is another in a long list of ant sex mosaics, descriptions of which have appeared from time to time in the literature[1].

The specimen in question was taken early in July, 1937, a few inches from the entrance to a nest of *Aphaenogaster aquia,* in Jackson, Ohio.

Description (Plate VI, figs. 2, 5): length, 4.0 mm.

Resembling a typical worker of *Aphaenogaster aquia,* from which it differs in the following particulars:

1. Head, excluding mandibles, about as broad as long, broadly rounded behind.

2. Clypeus smaller than in the worker, less convex, and not extending as far back between the frontal carinae which are lower and closer together.

3. Eyes very large, oval and convex, closer to the mandibular border than in the worker; ocelli well developed.

4. Mandibles shaped as in the worker, but somewhat feebler; more heavily developed than in the male.

5. Left antenna 12-jointed as in the worker, right antenna 13-jointed as in the male, but the joints of both proportioned as in the male; funiculi short, reaching scarcely half the distance to the posterior border of the head, thickened, strongly incrassated at their tips.

6. Thorax stouter and shorter than in the worker, showing traces of having borne wings; the sutures of pro- and mesonotum, scutellum and pleurae distinct.

[1] Wheeler, W. M. Concerning some ant gynandromorphs. Psyche 38, pp. 80-85, 1931. Mosaics and other anomalies among ants. Harvard Univ. Press 1937.

Epinotum, petiole, postpetiole, gaster, legs, pilosity, sculpture and color as in the worker.

The specimen resembles a worker body bearing an extraordinarily male-like head. But contrary to what would be expected in a blastomeric mosaic, none of the characters are pure male; the eyes are more flattened than in the normal male; the frontal carinae longer; the antennae heavier, especially the scapes, and one antenna comprising 12 instead of 13 joints; the mandibles and head more robust. All of the differences are suggestive of the female sex. The differences in the thorax are rather more like the queen in appearance, and may be correlated with the development of wings. In general, the composition of the specimen would seem to be most easily explained by the theory of intersexes as recently extended by Whiting[2] to certain ant mosaics.

PLATE VI. *Aphaenogaster fulva aquia.* Fig. 1. Head of male, Fig. 2. Head of gynandromorph, Fig. 3. Head of worker, Fig. 4. Thorax of male from the side, Fig. 5. Thorax of gynandromorph from the side, Fig 6. Thorax of worker from the side.

Diptera of Michigan.

"A List of the Diptera or Two-winged Flies of Michigan", critically compiled as to nomenclature, authority and distribution, is nearing completion by the undersigned. The list already totals over 2100 species, with several large families still in the hands of specialists. In order that the published list may be as complete and as informative as possible, the cooperation of specialists, student, collectors, and institutions is earnestly invited and deired. Any pertinent information, records or material will be welcomed and duly acknowledged.—GEORGE C. STEYSKAL, CURTIS W. SABROSKY, Dept. of Entomology, Michigan State College, East Lansing, Michigan.

[2] Whiting, P. W. Anomalies and caste determination in ants. J. of Hered. 29: pp. 189-193. 1938.

New Mycetophilidae from North Carolina (Diptera).

By Elizabeth G. Fisher, Academy of Natural Sciences of Philadelphia.

Dr. B. B. Fulton[1] of the North Carolina State College has reared three new species of Mycetophilidae, the first from web-spinning larvae, the second from luminous larvae, the third from pupae found in rotten wood. Since he hopes to publish a detailed account of the life histories it seems well to publish descriptions of the adults at this time.

I wish to thank Dr. O. A. Johannson for the loan of his Pennsylvania *"Ceroplatus bellulus"*, Dr. F. W. Edwards for information about Williston's type and Mr. B. B. Fulton for the privilege of retaining the types of the new species.

Ceroplatus (Cerotelion) johannseni new species.

This species is conspecific with Johannsen's Pennsylvania specimen of *Ceroplatus bellulus*[2] nec Williston[3]. Williston's type from Mexico belongs to the subgenus *Euceroplatus*[4].

These specimens belong to the subgenus *Cerotelion;* the tibial setulae are irregularly arranged, the face is broad, the spurs are black, the eyes are emarginate and the ocelli are removed from the eye margins by about the width of an ocellus.

The specimens of this species are quite variable in color and in size, as seems to be true of other species of this genus. The North Carolina males are predominately brown and yellow, the females black (Fulton reared them together). A Connecticut male and female (in copula) are both predominately brown and yellow. Another Connecticut male and an Iowa male differ in having black abdomens approaching the North Carolina females in color. Structually they are alike as far as I am able to find. The male terminalia are all alike and resemble somewhat *Ceroplatus (Cerotelion) lineatus* Fabricius. The wings have no brown marks. The North Carolina females of this

[1] J. Elisha Mitchell Society 55: 289-293, pl. 27. 1939.

[2] Maine Agr. Exp. Sta. Bull. 172: 240. 1909.

[3] Biol. Centr. Amer. Dipt. 1: 219. 1900. Maine Agr. Exp. Sta. Bull. 172: 239. 1909.

[4] Proc. Linn. Soc. N. S. Wales 54 (3): 174. 1929.

species apparently resemble *Ceroplatus (Ceroplatus) carbonarius* Bosc in coloration, but lack the prominent wing spots, lack the white at the tips of the antennae, possess stripes on the mesonotal disk, and R_4 ends in C not R_1.

♂: Total length 7 mm.; wing 4 mm. Head black above, face and mouthparts yellow. Thorax yellow; mesonotum with a median triangular brown stripe which is divided by a median yellow line anteriorly, the apex of the triangle is directed posteriorly where it becomes obsolete before the scutellum. Lateral mesonotal stripes darker, not reaching the anterior margin and leaving the humeral angles yellow, widened posteriorly above the wing bases so that a yellow V-shaped line is left between the lateral and median stripes. Scutellum yellow. Pleura yellow, pleurotergites, postnotum and hypopleurites brownish. Halteres with the knob black and the stalk yellow. Legs yellow, the bases of the middle and hind femora slightly brownish. Abdomen brown with the bases of the segments broadly yellow. Posterior portion of the pronotum and the propleura with setae. Anterior spiracular membrane without setae. Dorso-anterior angle of the anepisternite with fine setae. Postnotum bare.

Wings hyaline. C extends one-third the distance between the tips of Rs and M_{1+2}; Sc ends in C at the level of the end of the basal cell; Sc_2 absent; R_4 ends in C; R_4 short and only slightly oblique; R_4 origin at the level of the tip of R_1; stalk of M one and a half to twice as long as the coalesced portion of M with Rs; anal vein reaches the wing margin.

A male specimen from Iowa differs in being smaller and darker in color. Total length 5mm. Mesonotum brownish yellow with black stripes. Pleura dark brown. Scutellum and postnotum black; setae black. Stalk of halteres whitish, knob black. Legs whitish yellow; tips of the middle and hind coxae blackish and the bases of the middle and hind femora blackish. Abdomen black; setae black.

A Connecticut male also has a black abdomen, another has the abdomen brown with the bases of the third, fourth and fifth segments yellow.

♀: Total length 5.75 to 9 mm. Head black above, face and palpi yellow. Antennae black, Thorax mainly black; mesonotum yellow with lateral black stripes abbreviated anteriorly and a median black triangle with its apex directed posteriorly but not reaching the scutellum. Scutellum black. Pleura and postnotum black. Abdomen black.

The Connecticut female differs in having a brown thorax and abdomen.

Holotype:—♂; Raleigh, Wake County, NORTH CAROLINA. Reared from larva by B. B. Fulton; adult emerged April 25. [Acad. Nat. Sci. Phila. No. 6488].

Allotype:—♀; ten miles north of Southport, Brunswick County, NORTH CAROLINA. Reared from larva by B. B. Fulton; adult emerged April 11.

Paratypes:—1 ♀; ten miles north of Southport, Brunswick County, NORTH CAROLINA; reared April 24 (B. B. Fulton). 2 ♀; Raleigh, Wake Co., North Carolina; reared April 25 (B. B. Fulton). 1 ♂; Black Mts., Buncombe and Yancey Counties, North Carolina (W. G. Deitz). 1 ♂; Pottstown Montgomery County, PENNSYLVANIA (C. W. Johnson) [Johannsen Collection]. 2 ♂; 1 ♀; Redding, Fairfield County, CONNECTICUT, June 10-26 (A. L. Melander). 1 ♂; Muscatine County, IOWA, August 28, (B. Berger).

Platyura (Rutylapa) fultoni new species.

This species runs to *Platyura genualis* Joh. in Johannsen's key[5] but differs in terminalial structure. I place this species in the subgenus *Rutylapa*, although it lacks the posterior spiracular hairs, because it agrees in the other characters of the subgenus.

♂:—Total length 5 mm. Head brown, deep black about the three ocelli, face yellow; palpi dark brown, the remainder of the mouthparts yellow. Thorax light yellow; mesonotum brownish yellow with two narrow stripes arising at the ends of the rudimentary transverse suture, uniting behind and obsolete before reaching the scutellum; lateral stripes broad, obsolete anteriorly leaving the humeral angles yellow. Mesonotum uniformly setose. Scutellum with its margin broadly black. Pleura with two prominant brown spots, one on the anepisternite, the other on the pleurotergite. Anepisternite with minute setae above. No spiracular setae. Postnotum yellow; its dorsal surface brown and setose.

Wings with a central spot and the tips dusky. C extends half way to M_{1+2}, Sc ends in C over the origin of Rs, base of Rs faint, R_1 arises under the tip of Rs, Rs and M fused for approximately one-half the length of the stalk of M.

[5] Maine Agr. Exp. Sta. Bull. 172: 250. 1909.

Tibial spurs 1-2-2. Abdominal tergite one brown, second, third, and fourth with the basal half to two-thirds yellow and the distal portion brown, the remainder of the abdomen black. The male terminalia with simple styles unevenly bifurcate at their tips. Legs yellow; trochanters with black spots below on the meso- and metathoracic legs and brown on the prothoracic legs. Meso- and metafemora dusky above.

♀ :—Differs from the male in having R_4 slightly shorter, in having the central wing spot reaching into the fork of M. Abdomen a dusky yellow with narrower greyish posterior margins.

Holotype:—♂ ; Glenville, Jackson County, NORTH CAROLINA; June 10. (B. B. Fulton). [Acad. Nat. Sci. Phila. No. 6489].

Allotype:—♀ ; Glenville, Jackson County, NORTH CAROLINA; June 13. (B. B. Fulton).

Paratypes:—6 ♂ ; Glenville, Jackson County, North Carolina; June 10-14 (B. B. Fulton). 3 ♀ ; same locality, June 16-19 (B. B. Fulton). 2 ♂ ; Lewis Falls, Shenandoah National Park, VIRGINIA, July 4 (A. L. Melander).

Phthinia carolina new species.

This species is close to *Phthinia catawbiensis* Shaw and *Phthinia tanypus* Loew. It differs in having vein C hardly extended beyond the tip of Rs, in having the Cu fork almost under the M fork.

♂ : Total length 7 mm.; wing 4.5 mm.; fore tibia 1.70 mm., fore basitarsus 3.80 mm. Head black; face and mouthparts brown. Antennae deep brown except the scape and the base of the flagellum which are yellow. Thorax brown; mesonotum with black vittae.

Wings hyaline, the apex with macrotrichia on the membrane. C hardly extended beyond the tip of Rs; Sc ends in C before the level of the origin of Rs; Sc_2 just before the middle of Sc; stalk of M subequal to r-m; Cu fork practically under the M fork; Cu_2 sinuate. Halteres yellow, knob brownish black.

Legs yellow. Tibial spurs 1-2-2. Abdomen black, bases of segments especially ventrally brown. Each style of male terminalia with two unequal spines as in *Phthinia catawbiensis* Shaw but with the mesally directed slightly sclerotized lobe more compact, broader and almost triangular.

♀ :—Similar to the male. Fore tibia 1.80 mm., fore basitarsus 3.40 mm.

Holotype:—♂ ; Raleigh, Wake County, NORTH CAROLINA; April 4. (B. B. Fulton). [Acad. Nat. Sci. Phila. No. 6490].

Allotype:—♀ ; Raleigh, Wake County, NORTH CAROLINA; April 6. (B. B. Fulton).

Some Neotropical Syrphid Flies (Diptera).

By FRANK M. HULL, University of Mississippi.

This paper presents descriptions of some species of neotropical Syrphids that have been received from several sources. The author is indebted to Mr. J. Lane of Sao Paulo, Brazil, for the privilege of studying many interesting South American species, two of which are described here. Unless otherwise stated, types are in the author's collection.

Microdon hondurania n. sp.

♂. Length 5.5 mm.; antennae 1.5 mm. Head: eyes not approximated above, without pile and the front barely narrower than the parallel-sided face, both of which are broad. Front and upper part of occiput, except the posterior margin along the dorsum, shining dark brown. Face and cheeks pale shining yellow and a pair of similarly colored rectangular spots placed transversely across the middle of the front, barely separated in the middle. Pile of the face and lower part of occiput and the extreme posterior margin of the upper part of the occiput pale yellow. Antennae black, the third joint a little more than twice as long as the first joint.

Thorax: widely dark shining brown over the mesonotum, except narrowly along the sides and for a short distance upon the anterior margin inside of the humeri. The broad, dark central area with faint narrow violaceous vittae. Pleurae and the lateral margin of the mesonotum, the humeri and the scutellum light yellowish brown, the disc of the scutellum slightly darker, its extremely blunt, closely approximated nodulate spines blackish.

Abdomen: short and broad, the whole of the first segment and whole of the second, except for an obscure lateral brown spot, light brownish yellow. The third segment extensively dark brown, its posterior margin narrowly light yellow, extending broadly forward in the middle but not bisecting the anterior brown band. The fused fourth and fifth segments light brownish yellow with the broad, somewhat diagonal, brown stripe located a little before the middle of the segment, the outer ends of the spot somewhat curved. There are traces of a median brown vitta reaching almost to the posterior margin; hypopygium and venter pale yellow. Pile of the abdomen fine and delicate, dark brown in color, rather thick.

Legs: more or less uniformly brown, the apical third of all of the tibiae barely darker in some lights.

Wings: strongly infuscated with brown, the cross veins still more heavily margined. Subapical cross vein nearly straight, slightly recurrent, the last portion quite rectangular.

One *holotype* male. On small, low growing herbage along the Salada River, fifteen miles inland from Ceiba, S. HONDURAS. (F. M. Hull collector).

Mesogramma croesus n. sp.

♂. Length 6.5 mm. Head: front, face and antennae pale yellow, cheeks brownish, the narrow occiput steel blue, the upper part of the front of the triangle greyish pubescent, the upper two-thirds of the occiput golden brown pubescent, the lower portion greyish.

Thorax: with continuous pale yellow margin confluent with the pale yellow humeri, mesonotum with a prominent metallic grey median vitta margined by a violaceous or coppery brown stripe outside of which is a golden stripe. Between the golden stripe and the yellow margin is a wide violet vitta. Pleurae shining metallic with pale yellow stripes on the posterior half of the mesopleurae and conspicuous spot on the upper part of the sternopleurae. Scutellum metallic golden throughout.

Abdomen: somewhat slender, black marked with yellow on the basal corners; second segment brownish yellow, with a wide, black posterior margin and in the middle of the basal two-thirds a narrowly interrupted brown band that reaches the sides of the segment. Third segment black and shining, the posterior margin yellowish brown, not quite reaching the corners, produced forward as a slender medial stripe to reach the base of the segment. A similarly colored oval spot in the anterior corners but entirely surrounded by black almost confluent basally with a larger brownish yellow spot which itself is drawn out medially and has its two expanded ends turned inward in the direction of the median stripe. Its basal end touches the base of the segment. Fourth segment with almost identical pattern. The submedial, attenuated spot is basally but narrowly confluent with the median stripe. Fifth segment with a broad median oval spot, widest basally and on either side an equally large subtriangular spot with rounded corners, widest posteriorly where it reaches the posterior corner of the segment. Hypopygium shining black on the right half.

Legs: pale yellow, a broad brownish black band on the outer half of the hind femur and a similar one on the middle half of the hind tibiae.

Wings: elongate, slightly brownish, the stigma dark brown.

Holotype male. Sao Paulo, BRAZIL (J. Lane col.) April 6-8, 1939.

Mesogramma polygraphica n. sp.

♀. Length 6 mm. Head: front black, the sides narrowly pale yellow to the middle of the front, the vertex obscurely violaceous, face pale yellow with a light brown band on the upper half of the middle of the face. Antennae pale brown, cheeks black on posterior two-thirds.

Thorax: black with mesonotal margins and the humeri pale yellow. Pleurae black, a yellow stripe on the posterior half of the mesopleurae and the upper part of the sternopleurae. Scutellum brown on the disc with yellow margins.

Abdomen: black with yellow markings. First segment extensively black posteriorly, the sides and anterior corners yellow. Second segment black with a narrow transverse yellow band from margin to margin, interrupted in the middle and each half of this yellow band semi-interrupted. Third segment with a median yellow stripe, slightly swollen on the base and posteriorly not quite reaching the margin. Three spots lie on either side of this vitta, the group extending two thirds or more the length of the segment. There is a yellow spot in the anterior corners of the segment extended posteriorly and medially to barely connect with a broad and oval postero-medially pointed spot which is narrowly separated from the median vitta and which may, or may not connect with a slightly smaller, vertical and posteriorly pointed yellow spot lying on the basal margin. Fourth segment with practically similar coloration except that the connection of the three spots on each lateral half is slightly broader and the median stripe slightly expands posteriorly and reaches the posterior margin. Fifth segment brownish yellow, the posterior margin black, extending over the posterior two-thirds of the lateral margin, produced forward medially to the base of the segment before reaching which it produces a black L-like arm on either side, which also reaches the bases of the segment.

Legs: yellow, with an obscure, narrow subapical brown band on the hind femora and a similar one before the middle of the hind tibiae. Hind tarsi brown.

Wing: stigma of wing rather dark brown.

One female. Sao Paulo, Batea, Brazil, September, 1937 (J. Lane collector).

Salpingogaster stigmatipennis n. sp.

♀. Length 15 mm. Head: face and cheeks pale yellow with a pale obscure reddish spot about the tubercle. Front and vertex brownish black, the former becoming light brown above the antennae and sharply pale yellow narrowly along the eye margin. Antennae orange brown, black pilose.

Thorax: mesonotum dull light reddish brown with a broad dark brown or blackish vitta in the center, but only upon the anterior two-thirds. Humeri and metanotum light reddish; scutellum similarly colored, except its narrow base, a narrow fascia and its extreme posterior margin, which are yellow. Notopleurae, a vertical somewhat oblique stripe and a spot on the anterior part of the metapleurae pale yellow; pleurae elsewhere light red.

Abdomen: almost wholly pale brownish orange, the posterior margin of the third and fourth segment somewhat diffusely darker. Anterior corners of the second segment and basal corners of first pale yellow. First segment posteriorly with a wide dark brown fascia.

Legs: light yellow, the tarsi and the hind tibiae, except a middle annulus, light brown. Pile of legs chiefly brown, darker brown upon the tarsi and hind tibiae and femora.

Wings: pale brown, nearly hyaline, the anterior margin dark brown, confined to stigmal and marginal and the end of submarginal cell. The costal cell is somewhat paler and a brown triangular spot covers the origin of the second and third veins.

Two *cotypes,* Lindig, Venezuela: in the Vienna Museum and in the author's collection.

A New Diplotaxis and A New Synonym (Coleoptera: Scarabaeidae).

By Mont A. Cazier, University of California, Berkeley.

Diplotaxis dahli new species.

Medium sized, robust; head and pronotum black, elytra piceous; elytra sparsely clothed with long brown hair; head without occipital smooth space; labrum shallowly emarginate; clypeal angles not dentiform; tooth of claws post median in position, much shorter than superior portion of claw; strial punctures without hair; clypeal suture distinct.

Head with punctures on vertex separated by about their own widths, those on front large, coalescent and contiguous; front with shallow convex ridge above clypeal suture, anterior surface of ridge more sparsely punctate than front; clypeus with anterior angles evenly, obtusely rounded, anterior margin shallowly emarginate medially, side margins nearly straight to end of canthi, surface with large punctures contiguous, clypeal suture distinct except for small median portion; antennae ten-segmented; mentum abruptly cleft at anterior third, row of erect setae on ridge along summit of declivity.

Pronotum with side margins prominent; widest just behind middle; surface with large punctures separated by about one to one and one-half times their own widths, spaces between punctures finely, sparsely punctate.

Elytra with costae evident but not prominent; first intercostal space on disk with punctures separated by about twice their own widths, setigerous, spaces between punctures finely punctate.

Beneath sparsely clothed with long brown pile; surface densely punctate laterally, sparsely punctate medially; basal segment of hind tarsus more than twice as long as broad. Length 12 mm., width 6 mm.

Holotype in the writer's collection, taken seven miles west of Coalinga, Fresno County, California, March 20, 1940, by R. G. Dahl, after whom the writer takes pleasure in naming the species. Two *paratopotypical* specimens deposited in Mr. Dahl's collection. All specimens were collected at night on *Juniperus californicus* Carr.

Both paratype specimens are somewhat smaller than the holotype and one is dark reddish-brown, due probably to its newly emerged condition when collected.

Diplotaxis dahli is apparently most closely allied to *D. muricata* Schaeffer and *D. hispida* Fall of the previously described pilose species. It can, however, be distinguished from *D. muricata* by its larger size, more elongate clypeus, by having the anterior clypeal margin shallowly emarginate, by its smaller pronotal punctuation, more angulate pronotal margins, by its glabrous pronotal surface, by its longer elytral pile and shining appearance. From *D. hispida* it can be distinguished by its elongate clypeus which has the anterior margin shallowly emarginate, by the convexity on the front of the head, by the shining surface throughout and by having the elytral pile about three-fourths as long as the width of the scutellum. In general appearance *D. dahli* closely resembles *D. falli* Saylor and both species are collected on the same host at the same locality during the same season. It can, however, be distinguished from *D. falli* by the presence of the elytral pile, the straight side clypeal margins, the densely punctate convexity on the front of the head, the more densely placed pronotal punctures, by its shining appearance and by its abruptly declivous mentum with setae along posterior margin of declivity.

DIPLOTAXIS CRIBRULOSA Le Conte.

Diplotaxis cribrulosa Le Conte, 1856, Jour. Acad. N. S. Phila., (2) 3:270.

Diplotaxis popino Casey, 1885, Contrib. to Desc. and System. Col. of N. Amer., pt. 2, p. 179. (New Synonym).

An examination of the types of these two forms has shown that they are conspecific. The differences given in Fall's revision do not set aside two distinct species as these characters (punctuation, clypeal angles, labrum, etc.) are extremely variable in this common species. All gradations between types are found in series from a single location.

There is, however a variation of this species in Arizona that may represent a subspecies. This is a large dark form. The writer has examined a series of forty-five specimens collected at Phoenix, Arizona (R. Flock) but was unable to find any structural difference that would separate it from the smaller specimens of *D. cribrulosa*. Additional data will probably clarify its position.

Notes and Descriptions of West American Cerambycidae - IV[1] (Coleoptera).

By E. Gorton Linsley, University of California, Berkeley.

Orthosoma and *Derobrachus* are distinct genera and have been incorrectly regarded as synonymous by recent workers. The wing venation of the latter is similar to that of *Prionus* and *Tragosoma* in the possession of two unconnected post-cubital veins. Some of the more important differences between *Orthosoma* and *Derobrachus* may be summarized as follows:

Antennae with third segment about as long as first two segments together, distinctly shorter than fourth and fifth segments together; maxillary palpi short; posterior wings with but a single post-cubital vein; abdomen of male with fifth sternite narrowly emarginate, sixth sternite concealed. (Genotype: *Prionus cylindricus Fab.*) .... *Orthosoma*

Antennae with third segment distinctly longer than first two segments together, about as long as fourth and fifth segments together; maxillary palpi elongate; posterior wings with two unconnected post-cubital veins; abdomen of male with fifth sternite broadly emarginate, sixth sternite exposed (Genotype: *Derobrachus brevicollis* Serv.) .... *Derobrachus*

Phymatodes vilitatis new name.

Callidium vile LeConte (nec Newman), 1873, Smithson. Misc. Coll., XI, 264: 172.

When LeConte described this species he was unable to see the stridulatory plate of the mesonotum and he assumed that it was coarsely punctate. Actually, however, it is finely punctulate and tessellate as in typical *Phymatodes*, and the size and form is more nearly that of the latter genus than of *Callidium*. In the writer's opinion, not only this species, but *Callidium hardyi* Van Dyke, and *C. hirtellum* LeConte should be referred to *Phymatodes*. However, whatever may be the ultimate disposition of these species, LeConte's name is unfortunately pre-occupied (by *Callidium vile* Newman, 1842, Entomologist, 1: 223) and the above alternative is proposed to replace it.

[1] The previous papers in this series appeared in Ent. News, 1934, 65: 161-165, 181-185; 1935, 66: 161-166; and 1937, 68: 63-69.

CALLIDIELLUM new genus.

Form moderately robust, somewhat flattened. Head small; frons short; vertex scarcely impressed between antennal bases; antennae slender, longer than the body in male, eleven segmented in both sexes, second segment nearly twice as long as broad, outer segments not flattened or expanded; palpi unequal in length, last segment triangular, apex truncate; eyes finely facetted, deeply emarginate but not embracing antennal insertion. Pronotum evenly rounded at sides; surface weakly or sparsely punctate, discal callosities feeble; anterior coxae transverse, broadly angulate externally, open posteriorly, intercoxal process narrow in the male, broad in the female, apex subtruncate; mesonotum with a large, undivided, finely tessellate, impunctate stridulatory plate; mesosternum with intercoxal process broad, emarginate posteriorly. Legs moderately short; femora strongly clavate; posterior tarsi slender, first segment a little longer than following two together.

Genotype: *Semanotus cupressi* Van Dyke.

This genus is proposed for two species related to *Semanotus* but differing in the strongly clavate femora, slender, cylindrical antennae with the second segment elongate, and the evenly rounded pronotum with the surface weakly or sparsely punctate and the discal callosities feebly developed. In addition to the genotype species from California, *Callidiellum* will contain *Callidium rufipenne* Motschulsky, from Japan.

Genus ARHOPALUS Serville.

Arhopalus Serville, 1834, Ann. Soc. Ent. France, 3: 77.

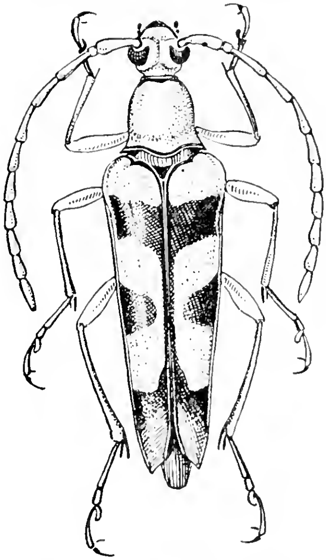
Criocephalum Dejean, 1835, Catal. Coleopt., 2nd ed., p. 328.

Criocephalus Mulsant, 1839, Coleopt. France, Longic., p. 63.

Among the species included by Serville in his genus *Arhopalus,* the first was *Cerambyx rusticus* Linn. and this was designated as the type by Westwood (1840), Dejean's genus *Criocephalum* included only one described species, the same *Cerambyx rusticus* Linn., which becomes *ipso facto* the genotype. In 1864, *C. rusticus* was designated as the type of *Criocephalus* Mulsant, by J. Thomson. Thus the three genera are isogenotypic and synonymous. *Arhopalus* apparently has priority and should be applied to those species which in recent lists appear under the name of *Criocephalus*.

Strangalia pacifica new species (Figure 1).

Form elongate, slender, attenuated; color testaceous, eyes and pronotal and elytral markings black, apical one-third of elytra ferrugineous; pubescence short, testaceous. Head with upper frons and vertex obscurely, shallowly punctured; antennae testaceous, surpassing middle of elytra, pubescence testaceous, darker on basal segments. Pronotum with a narrow



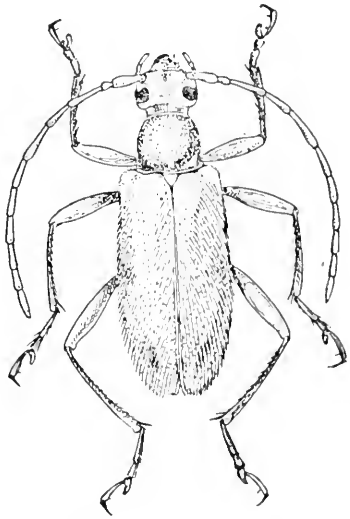


Fig. 1. *Strangalia pacifica* n. sp. Fig. 2. *Anoplodera jacintana* n. sp.

black margin at base and apex; punctation obscure, shallow, disk scarcely punctate; pubescence short, testaceous; scutellum black; metasternum and metepisterna with a black band along anterior margin, surfaces closely, shallowly punctate. Elytra with apical one-third ferrugineous, base margined with a narrow black line, subbasal black band broad, transverse, equally wide from lateral margin to suture, connected along suture with the inverted V- shaped subapical black band, median band broad at sides, narrowed toward, and not attaining, suture; punctures sparse, shallow, moderately fine, pubescence short, testaceous; apices obliquely emarginate. Legs slender, testaceous, shallowly punctate, clothed with testaceous pubescence. Abdomen testaceous; sternites finely, sparsely puncate, clothed with pale testaceous pubescence. Length 12 mm., breadth 3.5 mm.

Holotype female (No. 5011, Calif. Acad. Sci., Ent.) collected at Pinon Flats, San Jacinto Mountains, CALIFORNIA, on June 27, 1939, by Mr. William J. Perry. The specimen was beaten from *Quercus*.

This fine species is the first representative of the genus to be found on the Pacific Coast. It is related to *S. sexnotata* (Haldeman) but differs at once in the very shallow, obscure punctation of the head, pronotum and elytra and the short pubescence. The elytral markings are also quite different. The subbasal bands are transverse, not oblique, and meet broadly at the suture, the subapical band is in the form of an inverted "V" and is connected along the suture with the subbasal band, and the apical third of the elytra is ferrugineous (elytra tricolored).

Anoplodera jacintana new species (Figure 2).

Form short, robust; color reddish-brown, eyes dark brown; pubescence short. Head shining; upper frons and vertex coarsely, closely punctured; antennae brownish to brownish testaceous, apices attaining middle of elytra. Prontoum about as long as broad; sides broadly and rather evenly rounded at middle, not angulate, but little wider at middle than base; transverse basal impression feeble, interrupted at middle; posterior angles short, subacute; disk coarsely, closely punctate, clothed with short, brown pubescence. Elytra about one and one-half times as wide as pronotum at base, reddish brown, with vague darkened spots at middle of base and apex and at sides just behind the middle; surface coarsely, closely punctured, clothed with short, brown pubescence; apices subtruncate. Legs reddish brown to brownish-testaceous, finely, closely punctured, clothed with short, pale pubescence; first segment of posterior tarsi without a pubescent sole. Abdomen reddish brown; sternites moderately finely, closely punctured, clothed with long, fine, pale pubescence. Length 6-9 mm.

Holotype female (No. 5012, Calif. Acad. Sci., Ent.) from

Pinon Flats, San Jacinto Mountains, CALIFORNIA, May 24, 1939, on flowers of *Encelia farinosa* collected by Mr. E. S. Ross, and one *paratype*, also a female, from the same locality, May 28, 1939, taken by Dr. R. M. Bohart.

This species appears to belong in the group of *6-spilota* LeConte but may be distinguished from the other members of that series by the feeble basal impressions of the pronotum and the absence of definite elytral maculations. From *6-spilota* and *scapularis,* both of which occur in the same general territory, it further differs in the coarser, closer, elytral punctation, feeble basal angles of the pronotum, and the short, dark pubescence of the pronotum and elytra.

ANOPLODERA SCAPULARIS (Van Dyke).

Leptura scapularis Van Dyke, 1920, Bull. Brooklyn Ent. Soc., 15: 43.

Leptura isabellae R. Hopping, 1922, Can. Ent., 54: 162. (*new synonymy*).

In a series of several hundred examples of this species taken by Mr. E. R. Ross and the writer at Pinon Flats, San Jacinto Mountains, CALIFORNIA in May and June, 1939, every intergradation was found between the two extremes described by Dr. Van Dyke and Mr. Hopping. The form described by Mr. Hopping is the more typical but Dr. Van Dyke's name is older. In their key to *Anoplodera* (Nat. Mus. Canada, Bull. 52: 39-40, 1928) Swaine and Hopping incorrectly place *scapularis* with *swainei* in the group with the metasternum simple in both sexes. Actually, the metasternum of the male is carinate and produced apically as a dentiform process, as in *6-spilota* LeConte.

Eburia falli new name.

Eburia semipubescens Fall (nec Thomson), 1909, Can. Ent., 41: 163.

This species appears to be very rare and has not been recorded in the literature since the original description of the unique type. Recently, however, while identifying some material collected in ARIZONA by Mr. J. O. Martin, an example was discovered from Gila Bend, August 20, 1924. The name applied to this species by the late Dr. Fall is unfortunately pre-occupied and it is re-named in dedication to his memory.

MEGANOPLIUM new genus.

Form elongate, subparallel, depressed; thinly clothed with long, erect, flying hairs. Head deeply impressed between antennal bases; maxillary palpi longer than labial palpi, last segment of each triangular; eyes deeply emarginate, coarsely facetted, scarcely embracing antennal insertion; antennae longer than the body in the male, shorter than the body in the female, segments without apical spines, basal segments ciliate along inner margin, outer segments ciliate at apex. Pronotum rounded at sides, disk with three smooth callosities, the median elongate, the two anterolateral, oval; prosternum with intercoxal process narrow, anterior coxal cavities broadly angulate and open externally; intermediate coxal cavities open to epimera; metasternum with distinct odoriferous pores. Elytra subparallel; apices rounded or subtruncate, unarmed. Legs moderately long; femora clavate, robust, unarmed at apex.

Genotype: *Elaphidion imbelle* LeConte.

This genus is proposed for a species which has been provisionally included in *Anoplium* Haldeman because of the unarmed antennae, femora, and elytra. It differs at once, however, by the widely angulate, open, anterior coxal cavities, clavate femora, and the type of vestiture which is sparse and consists of long, flying hairs. These same characters will also separate it from *Aneflomorpha* Linsley.

(To be continued.)

Research on Insect-borne Diseases.

The annual report for 1939, of the International Health Division (Wilbur A. Sawyer, M. D., Director) of the Rockefeller Foundation, published at New York, 1940, devotes 66 pages to recitals of work done on human diseases carried by insects, 22 to yellow fever, 44 to malaria.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume**, and in some cases the part, heft, &c., the latter **within ( )** follows; then **the pagination** follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Barnes, H. F.—Fluctuations in insect numbers. [6 Congr. Internat. Ent. Madrid] 1: 181-186, ill. **Berland, L**—Exploration entomologique de l'atmosphere en avion. [6 Congr. Internat. Ent. Madrid] 1: 29-31. **Blatchley, W. S.**—Obituary by J. R. Watson. [39] 23: 24-25. **Bodenheimer, F. S.**—The ecology of Aphids in a subtropical climate. [6 Congr. Internat. Ent. Madrid] 1: 49-58, ill. **Borgmeier, T.**—Arthur Neiva; a proposito do seu 60°. anniversario natalicio. [105] 11: 1-104, ill. **Flanders, S. E.**—Environmental resistance to the establishment of parasitic Hymenoptera. [7] 33: 245-253. **Jordan, K.**—Where subspecies meet. [6 Congr. Internat. Ent. Madrid] 1: 145-151. **Kennedy, C. H.**—Definitions of the Animal Family and the Animal Society. [6 Congr. Internat. Ent. Madrid] 1:33-44. **Mas, P. F.**—In memoriam R. P. Longinos Navas, S. J. [Rev. Soc. Iberic Cien. Nat.] 36: 6pp. **Morton, K. J.**—Obituary. [8] 76: 141-142. [9] 73: 143-144. **Mumford, E. P.**—Taxonomic notes on insects of the Marquesas Islands. [6 Congr. Internat. Ent. Madrid] 1: 263-274. **Patino-Camargo, L.**—See under Diptera. **Van Duzee, E. P.**—Obituary by R. L. Usinger. [55] 16: 123. **Wene & Wickliff.**—Modification of a stream bottom and its effect on the insect fauna. [4] 131-135. **Williams, C. B.**—An analysis of four years captures of insects in a light trap. Part II. The effect of weather condition on insect activity; and the estimation & forecasting of changes in the insect population. [36] 90: 227-306, ill. **de Worms, C. G. M.**—Introduction to a discussion on "Sugaring". [Pro. & Trans. So. Lond. Ent. & Nat. Hist. Soc.] 1939-40: 62-64.

ANATOMY, PHYSIOLOGY, ETC.—Bridarolli, A.—Morfologia externa de la Clitelloxenia hemicyclia en sus tres primeros estados (Dipt., Term.). [6 Congr. Internat. Ent. Madrid] 1: 163-171, ill. **Bushnell & Boughton.**—Longevity and egg production in the common bean weevil, Acanthoscelides obtectus. [7] 33: 361-370, ill. **Chopard, L.**—La nervation de l'elytre chez les Gryllides males et la formation du miroir. [6 Congr. Internat. Ent. Madrid] 1: 81-85, ill. **Dallas, E. D.**—Monstruosidad doble, bilateral y simetrica en un carabido y consideraciones etiologicas. [6 Congr. Internat. Ent. Madrid] 1: 129-136, ill. (S). **Ebner, R.**—See under Orthoptera. **Eckert, J. E.**—Studies on the poison system of the honeybee. [7] 33: 258-268, ill. **Henson, H.**—The structure and post-embryonic development of Vanessa urticae. The malpighian tubules of the pupa and imago. [93] 109, (B): 357-372, ill. **Kemner, N. A.**—Die Flugel der Termitoxenien. [6 Congr. Internat. Ent. Madrid] 1: 275-294, ill. **Kennedy, J. S.**—The visual responses of flying mosquitoes. [93] 109; (A): 221-242, ill. **Kozhantschikov, I. W.**—Die physiologische Charakteristik des Temperaturoptimums der Insektenenentwicklung. [6 Congr. Internat. Ent. Madrid] 1: 59-72. **Ludwig & Abercrombie.**—The growth of the head capsule of the Japanese beetle larva. [7] 33: 385-390, ill. **Metalnikov, S.**—Facteurs de l'immunite contre la tuberculose chez les mites des abeilles. [6 Congr. Internat. Ent. Madrid] 1: 113-128. **Miller, A.**—Embryonic membranes, yolk cells, and morphogenesis of the stonefly, Pteronarcys proteus (Plecop.). [7] 33: 437-477, ill. **Nannetti, A.**—Osservazioni sugli ovari di operaie normali ed ovificatrici di Apis m. ligustica. [27] 18: 259-267. **Parr, T.**—See under Hemiptera. **Pospelov, W.**—Fertility of certain obnoxious Lepidoptera in connection with meterological conditions. [6 Congr. Internat. Ent. Madrid] 1: 195-202, ill. **Potter, E.**—A gynandromorph specimen of Anacridium moestum (Acridid.). [107] 15: 41-46, ill. **Quadri, M. A. H.**—On the development of the genitalia and their ducts of orthopteroid insects. [36] 90: 121-175, ill. **Ross, H. H.**—The Rocky Mountain "Black Fly", Symphoromyia atripes (Rhagionid.). [7] 33: 254-257, ill. **Sawaya, P.**—Sobre a histophysiologia dos orgãos excretores de alguns insectos. [105] 11: 231-252, ill. **Schwanwitsch, B. N.**—See under Lepidoptera. **Snipes, T. B.**—Experiencias preliminares com arseniato de chumbo e arseniato de calcio no combate ao curuquere, Alabama argillacea (Noctuid.). [105] 11: 501-532. **Tonnoir, A. L.**—See under Diptera. **Zernoff, V.**—L'immunite et la serotherapie chez les insectes. [6 Congr. Internat. Ent. Madrid] 1: 153-161.

ARACHNIDA AND MYRIOPODA.—Adams, C. F.—A preliminary list of the Chironomidae of Missouri. [Pro. Missouri Acad. Sci.] 5: 124-127. **Denier, P. C. L.**—Lista de los artrópodos dañinos o útiles a los algodonales argentinos. [69] 17: 553-567. **da Fonseca, F.**—Notas de Acariologia. Dasyponyssus neivai, gen. n., sp. n., acariano parasita de Euphractus sexcinctus (Dasyponyssid. fam. n.). [105] 11: 104-119, ill. (s). **Gertsch, W. J.**—Five new wolf-spiders from Florida. [39] 23: 17-23, ill. **Keifer, H. H.**—Eriophyid Studies IX. [Bull. Dept. Agric. Calif.] 29: 112-117, ill. (*). **Kelley, T. F.**—Ornithodoros turicata in California. [55] 16: 106-107. **Malkin, B.**—Two new spiders on Staten Island. [19] 35: 89. **de Mello-Leitao, C.**—Notes sur la famille Ctenidae et sa distribution geographique. [6 Congr. Internat. Ent. Madrid] 1: 103-109, (K*). Notes sur la systematique des Palpigrades. [6 Congr. Internat. Ent. Madrid]. 1: 143-144. **Peterson, A. G.**—A brief survey of the Araneida [Pro. Missouri Acad. Sci.] 5: 120-122. **Peyronel, B.**—Alcune osservazioni sui rapporti fra Diplopodi e Funghi microscopici [Atti Reale Accad. Sci. Torino] 75: 12-16. **Thompson, G. B.**—The distribution of Heterodoxus spiniger. [Pap. & Proc. Roy. Soc. Tasmania] 1939: 27-31.

THE SMALLER ORDERS OF INSECTS.—Bailey, S. F.—A review of the genus Ankothrips. [55] 16: 97-106, ill. (k*). **Berner, L.**—Baetisca rogersi, a new mayfly from northern Florida. [4] 72: 156-160, ill. **Emerson, K. C.**—A new Trimenopon from Panama (Mallophaga). [7] 33: 339-342, ill. **Fraser, F. C.**—A note on the classification of Zacallites balli (Upper Eocene) (Odonata). [107] B. 9: 62-64, ill. **Gloyd, L. K.**—On the status of Gomphaeschna antilope. [Occas. Pap. Mus. Zool. Univ. Michigan] No. 415: 14 pp., ill. **Guimaraes, L. R.**—Sobre uma nova especie de Paragoniocotes (Philopterid.). [105] 11: 369-373, ill. **Handschin, E.**—Diplura. Doppelschwanze. [Biol. der Tiere

Deutschlands] Lief. 41: 57-66, ill. **Hood, J. D.**—A century of new American Thysanoptera. [105] 11: 540-583, ill **Kennedy, C. H.**—The Miocora-like dragonflies from Ecuador with notes on Cora, Miocora, Kalocora, Josocora and Stenocora (Odon.: Polythorinae). [7] 33: 406-436, ill. (S*). **Leonard, J. W.**—Lanthus albistylus, a new record for Michigan, with ecological notes on the species (Gomphinae). [Occ. Pap. Mus. Zool. Univ. Michigan] No. 414: 6 pp., ill. **Milliron, H. E.**—The emergence of a Neotropical Mantispid from a spider egg sac. [7] 33: 357-360. **Del Ponte & Riesel.**—Notas sobre "Siphonaptera" argentinos. [69] 17: 543-551. **LaRivers, I.**—A preliminary synopsis of the dragonflies of Nevada. [55] 16: 111-123. **Spieth, H. T.**—The genus Ephoron. [4] 72: 109-111. The North American Ephemeropteran species of Francis Walker. [7] 33: 324-338, ill. **Geijskes, D. C.**, also **Valle, K. J.**—See Orthoptera.

ORTHOPTERA.—Chopard, L.—See under Anatomy. **Ebner, R.**—Veranderungen an Orthopteren durch parasitische Wurmer. [6 Congr. Internat. Ent. Madrid] 1: 341-347, ill. **Geijskes, D. C.**—Notes on Odonata of Surinam. Rimanella arcana and its nymph. [105] 11: 173-179, ill. **Gurney, A. B.**—A revision of the grasshoppers of the gen. Orphulella from America north of Mexico (Acrid.). [70] 20: 85-156, ill. (k). **Kato, M.**—Feeding activity of a grasshopper, Prumna sp., widely distributed at Mts. Hakkoda. [Sci. Rep. Tohoku Imp. Univ.] 15: 191-201, ill. **King, R. L.**—New Iowa records of Acrididae. [Proc. Iowa Acad. Sci.] 46: 417-418. **Liebermann, J.**—El alotipo macho de Marellia remipes y una probable sinonimia. (Acrid.). [Ciencia] 1: 205-206. Las "Tropidacrini" de la Región neotropical (Cyrtacanth.). [69] 17: 589-600, ill. **deMello-Leitao, C.**—Quatro novos Tetigonioides do Brasil. [105] 11: 150-158, ill. **Pettit, L. C.**—A roach is born. [N. Eng. Nat.] 1940, No. 7: 15-18, ill. **Quadri, M. A. H.**—See under Anatomy. **Rehn, J. A. G.**—A new genus of Blattidae from Brazil. [Notulae Naturae] No. 58: 6 pp., ill. A new Ecuadorian species of Orpacophora (Tettigoniid.). [Notulae Naturae] No. 58: 5 pp., ill. **Rosas Costa, J. A.**—El genero Marellia (Pauliniid.) en la Argentina. [Notas del Museo de la Plata] 5: 139-147. ill. (s). **Saez, F. A.**—Estado de las investigaciones sobre citologia de las variedades de "Schistocerca paranensis". [69] 17: 253-259, ill. **Sawaya, P.**—See under Anatomy. **Uvarov, B. P.**—Twenty-four new generic names in Orthoptera. [75] 6: 112-117. **Valle, K. J.**

—Epiophlebia superstes ja sudenkorentojen polveutuminen. [Luonnon Ystävä] 43: 129-139, ill. **Zeuner, F. E.**—Fossil Orthoptera Ensifera. 2 Volumes. British Museum (Nat. Hist.).

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THE BUTTERFLIES OF THE NIAGARA FRONTIER REGION and Beginners' Guide for Collecting, Rearing and Preserving Them, By WILLIAM WILD. Buffalo Museum of Science Press, Buffalo, New York. $1. 56 pages; 12 figures, 8 plates carrying 88 illustrations; 1939.—Such publications as this are to be heartily approved as a stimulus to the study of Entomology, especially in the younger generation, when, as is the case here, the illustrations are well made, enabling the amateur to correctly identify the species involved. If enough of these brochures are published at the Museums in our country, we will learn the distribution of the Butterflies in the United States and it will encourage the study of the life history and habits of the most colorful and obvious of the insects. Holland's Butterfly book was for years the standard, but the price of the new edition has made it more inaccessible to the youngsters. His nomenclature is also rather oldfashioned, for he refused to abide by the rules of the Congress. This is however, constantly changing, mostly due to the deep research being made by our friend Hemming in London.—ROSWELL C. WILLIAMS, JR.

AN INTRODUCTION TO ENTOMOLOGY by JOHN HENRY COMSTOCK. Ninth edition, revised, Ithaca, New York. Comstock Publishing Co. 1940. Preface by GLENN W. HERRICK. Pp. xxi, 1064. Portrait of Prof. Comstock, 1228 figs. $5.00—The pages of this new edition of this well-known work seem so familiar that on making a comparison with the original edition of 1924, one finds that approximately 1012 pages and all of the 1228 figures of the edition of 1940 have been reproduced without change from that of 1924. That leaves about 52 pages, plus 2 unnumbered ones between pages 205 and 206 and 463 and 464, in which alterations are to be found. Some of these first appeared in the edition of 1936, as indicated in the preface thereto by Dr. Herrick, here reprinted. Most of the other changes are in the chapter on the Hymenoptera, where Dr. H. K. Townes has furnished new keys to the families of this order (pp. 891-894) and has rewritten the sections on the Ichneumonoidea (pp. 917-931), Proctotrupoidea (pp. 931-934) and Chalcidoidea (pp. 939, 941-943, 944-949). Dr. J. C. Bradley's table of families of the Clistogastra (pp. 908-917) also is retained from the first edition. The bibliography (pp. 1008-1027) is unchanged from the edition of 1924, except for additions on the lower half of page 1027 which, we believe, were made in the edition of 1936. Except in the new sections by Dr. Townes, there are no references in the text or footnotes to literature later than 1924, except, perhaps, the date (1931) of the second edition of Holland's Butterfly Book (p. 739). Indeed such important works by Cornell men as Needham and Claassen's Stoneflies of America north of Mexico (1925) and Betten's Caddisflies of New York State (1934) are referred to, as they were in the edition of 1924, as still to be published (pp. 327, 559). No mention is made of any work on venation later than Comstock's Wings of Insects of 1918; of Needham, Travers and Hsu's volume on Ephemerida (1935); of Needham and Heywood's Handbook of Dragonflies (1929); of Garman on the Odonata of Connecticut (1927); of Wheeler's Demons of the Dust (1930); of recent, especially the Californian, work on the Termites (1934, etc.); of Blatchley's Heteroptera of Eastern North America (1926), although his three earlier manuals are included in the bibliography (p. 1009); of the great work of Korschelt and his students on *Dytiscus* (1924); of Forbes' volume on the Lepidoptera of New York State (1923); of Curran's Families and Genera of North American Diptera (1934), although Williston's Manual (1908) is cited (p. 1027); of anything on mosquitoes later than Dyar (1922). These and other uncited omissions are regrettable, since they deprive the user of this admirable text of the knowledge of the advances of the last sixteen years, which he might naturally expect to be included, and give him no hint of the existence of a large and more recent literature. The text itself is still valuable and useful to students of insects.—P. P. Calvert.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted.—Chrysididae and Cleptidae of the world for cash or for exchange and determination, especially Nearctic and Neotropical material, for revisional purposes. W. G. Bodenstein, Dept. of Entomology, Cornell University, Ithaca, N. Y.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange against Col. or all other insects from Bolivia. Walter Wittmer, Casilla 219, Oruro, Bolivia, S. America.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

Wanted—To hear from collectors who desire extra good cocoons of Michigan **Platysamia columbia,** that will emerge June, 1941. W. S. McAlpine, 575 Townsend St., Birmingham, Michigan.

Wanted—Specimens of the genus Trox from North America. Will exchange or determine for duplicate material. Mark Robinson, 231 Cherry St., Sharon Hill, Pennsylvania.

Lepidoptera—From the South, including P. palamedes, T. halesus and E. jucunda to exchange for fauna from other localities. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

Wanted—Egg cases of preying mantids. Correspondence desired with those who will collect. Osmond P. Breland, Department of Zoology, The University of Texas, Austin, Texas.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1940, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December. Communications are solicited.

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 65 cents; three or four pages, twenty-five copies, $1.05; five to eight pages, twenty-five copies, $1.75; nine to twelve pages, twenty-five copies, $2.35; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates up to 100 copies; over 100 copies prices on application direct to printer. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

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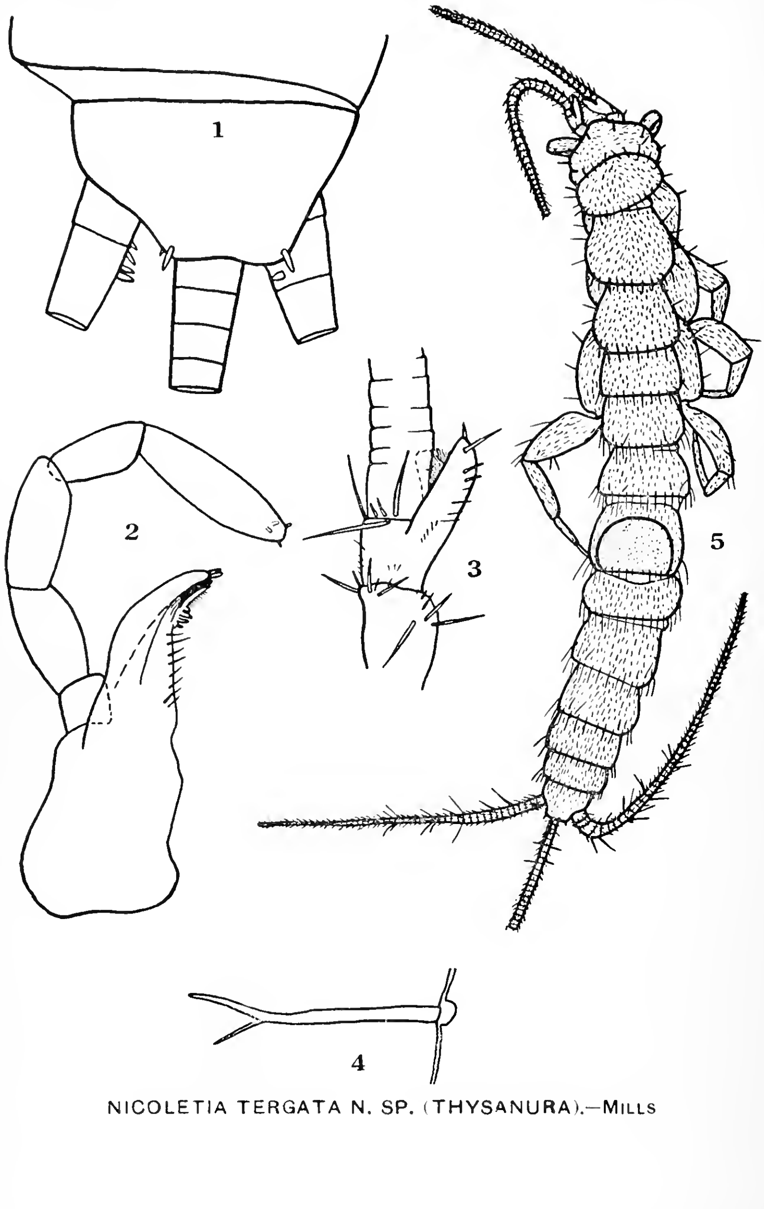


NICOLETIA TERGATA N. SP. (THYSANURA).—MILLS

ENTOMOLOGICAL NEWS

VOL. LI DECEMBER, 1940 No. 10

A New Nicoletia (Thysanura, Lepismatidae) from Florida.

By HARLOW B. MILLS, Montana State College,
Bozeman, Montana.

(Plate VII.)

Through the kindness of Dr. T. H. Hubbell of the University of Florida, I have been allowed to study specimens of a peculiar subterranean bristle-tail of the genus *Nicoletia*. This species has proven to be new and the description follows.

Nicoletia tergata n. sp. (Plate VII, figures 1-5).

Body color pale yellow, becoming deeper posteriorly. Appendages nearly white. Body campodeiform, very long and slender (figure 5). Thorax about half the length of the abdomen. Clothing of rather fine reclinate setae, and a row of longer stiff bristles on the margins of the pronotum and the posterior margin of all tergites from the mesothorax to the 9th abdominal segment inclusive. Antennae long and slender, first segment subcylindrical, second segment (male) with a peculiar inner appendage consisting of an elongate finger bearing a number of bristles, and a dorsal pubescent lobe. (figure 3). Maxillary palp 5-segmented, the apical segment bearing 6 slender sensory papillae. Galea flap-shaped, with two large apical sensory papillae. Lacinia with an acute apical tooth and an inner process bearing a fine comb-like structure distally, 4 or 5 heavy teeth medially, and a series of heavy spines basally (figure 2). Labial palp clavate, the last segment large, oval with six compound sensory papillae apically.

Pronotum elliptical, the posterior margin less arcuate than the anterior. Meso—and metanotum bell-shaped. Fourth abdominal tergite remarkably raised and bearing a large semicircle which is flat, more heavily sclerotized, scarcely pubescent, covered with minute punctures in small group, and honey yellow in color. Tenth tergite rather large, trapezoidal, and slightly concave on the posterior and postero-lateral margins. The posterior-lateral margins of the 10th tergite each bear two small, heavy pegs, the larger above and the smaller beneath (figure 1). Styli present on sternites 2 to 9 inclusive, each rather hairy and terminating in a strong pinnate bristle. Ventral sacs on segments 2 to 8 (?). Male parameres fingerlike, with numerous short setae. Cerci with the usual segmental bristles, long slender sensory hairs, and several whorls of larger bristles. The base of each cercus bears about 4 inner pegs similar to those on the angles of the 10th tergite (figure 1). Pseudocerus with whorls of shorter bristles, sensory hairs, and ventrally long branched vertical bristles (figure 4). Integument reticulate. Body length 7.5 mm., pseudocercus and cerci 4 mm.

This species, known only from males, is distinct in several respects. It is remarkable in the excessive development of the 4th abdominal tergite, which may, howver, be a secondary sexual characteristic. The shape of the basal appendix of the antenna, body setae, armature of the 10th abdominal tergite, and long slender shape separate it from *N. subterranea* Silv., to which it is related in some respects.

Habitat. Newman's Lake, Alachua County, FLORIDA, December 18, 1939, 1 male; December 21, 1939, 2 males, B. A. Barrington. From the burrows of the gopher *Geomys floridanus*. Cotypes in the collection of the University of Florida, and in that of the author.

EXPLANATION OF PLATE VII.

Figure 1, Tenth abdominal tergite, X 48.

Figure 2, Left Maxilla, X 226.

Figure 3, Ventral view right antennae, X 226.

Figure 4, Ventral bifid bristle from pseudocercus, X 226.

Figure 5, Dorsal view of a cotype, X 12.

Blatchley Memorial Meeting.

The W. S. Blatchley Club, formerly the Hamilton County Nature Study Club, held a memorial meeting on October 11, for the late Dr. Blatchley, formerly State Geologist of Indiana [and well-known entomologist], for whom the club was named. The meeting was held at Noblesville and the memorial tribute was given by Dr. J. J. Davis, of Purdue University.—*Science*, Nov. 8, 1940.

The Life History of the American Cockroach, Periplaneta americana Linn. (Orthop.: Blattidae).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 227.)

The second species of parasitic wasp to affect the egg-cases of *P. americana* was *Tetrastichus hagenowi* Ratz. [A. B. Gahan det.] On October 18, 1938, 25 individuals emerged from one egg-case of this cockroach. The egg-case had been deposited on August 1, 1938 and was properly covered by the mother roach with rust. It is of course not known when the egg-case was parasitized, but since the parasites could not have affected the egg-case before it was deposited, the duration of life from egg to adult must have been less than 78 days. It is not known if there are other records of this Hymenopteron parasitizing cockroach egg-cases, but a record of various species belonging to the genus *Tetrastichus* in "Insects of New York" (Cornell Agric. Exp. Stat. Memoir 101, p. 984, 1926) shows that it is parasitic on insects other than Orthoptera. Two species, *T. juniperi* and *T. marcovitchi* are recorded as having been reared from juniper berries; *T. agrile* from *Agrilus sinuatus; T. rapae* from *Apanteles glomeratus;* and *T. malacosomae* from the eggs of the apple-tree tent-caterpillar. In the "Hymenoptera of Connecticut" (pp. 453-454, 1916) I also find records of members of the genus parasitizing a still wider range of insects, some of which indicate hyperparasitism: *T. modestus* were reared from cocoons of *Apanteles edwardii* on *Vanessa atlanta; T. semidiae* from *Oeneis norma; T. productus* from the Hessian fly; *T. saundersi* and *T. thecla* from a butterfly of the genus Thecla; *T. caerulescens* is parasitic on *Habrobracon gelechiae*, a primary parasite on *Conarsia hammondi* while two other unknown species have been reared from various other species of insects.

Enemies.

Early in the work on *P. americana*, I was under the impression that roaches required a damp environment and for a while I gave them not only a damp environment but often a very wet one. Later observations showed that this species thrives equally well in a dry environment if it have a shallow tin of water, or a supply of succulent vegetables such as lettuce or cabbage. Moisture caused heavy fungus growths on the food supply, and was responsible for the appearance of enormous populations of the mites, *Rhizoglyphus tarsalus* Banks [H. E. Ewing det.]. These became so numerous at times that the glass vessels became opaque with their numbers. They undoubtedly were responsible, when they became too numerous at times, for the curtailment of life of the roaches. They would attack the dead and dying and sometimes living cockroaches. When the numbers in the jars were small they remained pretty close to the items of starchy food and left the cockroaches alone. A few mites on a roach would seem not to affect it. Some jars, strange to say, would be entirely unaffected by them, and often when infected cockroaches were placed in clean jars their length of life was comparable with those that had no infestation. "To the genus *Rhizoglyphus*," says Banks, (U. S. Dept. Agric. Report 108, p. 116, 1915) "belong a number of species found on the ground, in decaying matter, on roots of plants and in bulbs."

Another insect that seemed to breed well in the jars containing American cockroaches was the dipterous insect, *Rhegmoclema atrata* Say [Alan Stone det.]. The flies fed and bred in the stale food and filth, and in so far as I could see they did not at all affect the life of the cockroaches.

Roaches as Food for Other Animals.

No doubt the American roach serves as food for many other animals, but the records are very meager. The American as well as the Oriental roach was the principal item of diet for several years of a pet tarantule belonging to a friend. In Frank Cowan's "Curious Facts in the History of Insects" (1865, chapter 3), are listed many curious items of the medicinal uses of cockroaches, the use of cockroaches as food for hedgehog, monkey and lemur, and the superstitious practices to rid houses of roaches.

The Duration of Life of Adults.

There is a general opinion abroad that roaches of the house hold are extremely long-lived, and statements to that effect often creep into entomological literature. As an example, I may cite David Sharp (Insects, Part I, p. 229, 1895) who says that the common black beetle, *Blatta orientalis*, requires several years to attain the adult stage and it is probable that the life of an individual may extend to five years. In *B. orientalis* (Trans. Acad. Sci. St. Louis 25: 59-60, 1924) the length of life from the hatching of the egg to the death of the adult is about one year, and the same length of time was observed in the woodroach *Parcoblatta pennsylvanica* (Ent. News 51: 4-9, 33-35, 1940). For the American roach I have gathered data on the length of life of 17 males and 35 females, as tabulated below.

Males Days	Duration of Life Frequency	Females Days	Duration of Life Frequency
25 to 30	3	30 to 35	4
50 to 55	2	40 to 45	4
56 to 60	2	46 to 50	1
70 to 75	6	80 to 85	9
85 to 90	2	90 to 95	2
105 to 110	2	100 to 105	4
		106 to 110	3
		115 to 120	3
		135 to 140	2
		150 to 155	2
		173	1
	Total 17		Total 35

The figures are for the duration of life after the cockroaches arrived from New Orleans on June 3, 1937. They came as adults and I do not know how long they had lived as adults before they arrived. The figures are, therefore, not for the total period of adult life, but only for that portion of which they lived in confinement. The data given above, show that 17 males lived from 25 to 110 days and 35 females lived from 30 to 173 days. The length of life was so varied that an average would not be a true picture of conditions. However, the figures do indicate a long life for some of the adults, 5 to 6 months for a few females and 2½ to 3 months for males. the males had a shorter duration of life than the females;

however, the same is not true for other material given in later pages.

In a lot of 5 American adult roaches trapped at St. Louis on April 22, 1938, the females lived 61, 91 and 101 days in confinement and the males lived 124 and 234 days respectively. These figures in terms of months give the maximum for females of 3 to 3½ months; for the males 4 to 7-2/3 months.

The following data are more accurate and significant, since the figures show the actual length of life of the adult from the time of its last moult to its death. The roach nymphs in the last instar came from New Orleans and as they changed into adults they were isolated and a record kept of each individual:

Females Days	Duration of Life Frequency	Males Days	Duration of Life Frequency
60 to 70	2	30 to 40	4
140 to 150	2	50 to 60	3
160 to 170	3	70 to 80	9
		80 to 90	1
		130	1
		170 to 180	3
Total	7	Total	21

Here we see that the maximum length of adult life for both sexes is nearly the same, approximately 170 days or about six months.

In material reared from the hatching of the egg to the death of the adult, I have notes on the duration of adult life (from the last moult to the death of the adult) on 5 insects, 3 females and 2 of unrecorded sex. This lot differs from the material in the table above, in that the insects had spent their entire nymphal life in confinement.

Became Adult	Died	Length of Life
Sept. 30, 1938	June 30, 1939	8-2/3 months
Aug. 8, 1938	June 18, 1939	10-1/3 months
Sept. 7, 1938	Sept. 8, 1939	12 months
Oct. 10, 1938	Sept. 6, 1939	11 months
Oct. 8, 1938	Sept. 4, 1939	11 months

These five records probably give us a truer picture of adult length of life than the data in the foregoing pages. Here we find that as adults they lived from 8-2/3 months to one year,* a length of life far greater than that recorded for adults either of *B. orientalis* which averaged for the males 40.2 days and for the females 43.5 days (loc. cit., p. 62) and for females of *Parcoblatta pennsylvanica* which varied from 35 to 160 days (Rau, *loc. cit.*, p. 33).

Length of Life from the Time of Hatching to the Death of the Adult.

Records were kept on the entire length of life—from birth to death. The experiment started with a great many cockroaches but the infant mortality was great and only 11 insects reached adulthood.

Sex	Date of Hatching	Date Became Adult	Date Died	Length of Life from Hatching to Last Moult; Months	Length of Life from Last Moult to Death; Months	Total Length of Life; Months
F	Aug. 17/37	Nov. 2/38	Jan. 10/39	14-1/2	2-1/2	17
F	Aug. 15/37	Oct. 15/38	Mar. 2/39	14	4-1/2	18-1/2
F	Aug. 17/37	Oct. 12/38	Feb. 20/39	14	4-1/4	18-1/2
F	Aug. 14/37	Sept. 19/38	Aug. 30/39	13-1/6	11-1/4	24-1/2
M	Aug. 17/37	July 28/38	Jan. 12/39	11-1/2	5-1/2	17
M	Aug. 14/37	Oct. 10/38	Sept. 3/39	13-3/4	10-3/4	24-1/2
M	Aug. 14/37	Aug. 31/38	Aug. 20/39	12-1/2	12	24-1/2
M	Aug. 14/37	Sept. 17/38	Sept. 12/39	13-1/6	12	25-1/6
?	Aug. 14/37	Sept. 19/38	Feb. 10/39	13-1/3	4-2/3	18
?	Aug. 17/37	Oct. 1/38	Jan. 30/39	13-1/2	4	17-1/2
?	Aug. 15/37	Sept. 1/38	Jan. 27/39	12-1/2	4	16-1/2

Here, the record shows that the larval length of life of 11 roaches varied from 11 to 14 months, and length of adult life varied from 2½ months to a year; four of the latter group living from 10 to 12 months while seven of them lived from 2½ to 5½ months; but the combined length of life of nymph and adult (from hatching to death) is from 16½ to 24½ months. This is quite a long siege of living for a roach in confinement,

* It is interesting to note in this connection that an egg-case obtained from a female when nearly one year old proved good and gave forth 14 young.

and whether the same condition holds for roaches in their natural haunts, I do not know; however, these figures are in line with Nigran's (Indian Journ. Agric. Science 3: 530-543, 1933) who finds that *americana* requires from 13 to 15 months to become adult but under conditions of moisture, darkness and rich food the period is about 10 months and Marlatt, (U. S. Dept. Agric. Cir. 51, 1908) has recorded the total nymphal period as 11 months.

Of all roaches with which I am acquainted, *P. americana* with a total length of life reaching a maximum of about two years, comes nearest Sharp's statement of a five year duration of life for cockroaches.

ERRATUM. Page 186, third line of text should read: and usually requires more than 24 hours for completion.

International Commission on Zoological Nomenclature.

The International Commission on Zoological Nomenclature has commenced the publication of the Opinions rendered by the Commission, Volume 2. Opinions 134-136, with the following titles, have been published, and are available to purchasers. Copies may be obtained from the Commission, c/o The Royal Entomological Society of London, 41, Queen's Gate, South Kensington, London, S. W. 7. Further opinions are in the press and will be published shortly.

OPINION 134. On the method to be adopted in interpreting the Generic Names assigned by Freyer to species described in his *Neuere Beiträge zur Schmetterlingskunde,* 1833-58. Price 8d.

OPINION 135. The suppression of the so-called "Erlangen List" of 1801. Price 8d.

OPINION 136. Opinion supplementary to Opinion 11 on the interpretation of Latreille's *Considérations générales sur l'ordre naturel des animaux composant les classes des Crustacés, des Arachnides et des Insectes avec un tableau methodique de leurs genres disposés en familles,* Paris, 1810. Price 1s. 0d.

Flight Records of Phyllophaga (Coleoptera: Scarabaeidae).

By H. K. Henry, Biology Department, Haverford College, and C. E. Heit,* New York State Conservation Department.

Due to a heavy infestation of white grubs, larvae of *Phyllophaga* and other phytophagous Scarabaeidae, in the seed beds and transplant areas of the Saratoga Forest Tree Nursery, Saratoga Springs, New York, the Conservation Department of the State authorized a study to be made of the biology of the species present with the hope that improved methods of control might be obtained. From a count of adults taken in light traps flight records were obtained more complete than any others seen by the authors and are given here for the use of those working in the same field.

The original equipment for the study consisted of 16 light traps of the electrocutor type. The traps were hung from wooden uprights with the light source, a 75 watt inside frosted bulb, about 7 feet from the ground. The traps were set out in two rows 75 feet apart each way and covered approximately 2 acres of seed beds. After the first year funnel type traps were substituted for the electrocutor type and either 100 or 150 watt daylight bulbs for the 75 watt. At the beginning of the 1937 season each alternate trap was removed, reducing the number of traps to 8 but giving approximately the same coverage to the seed beds.

During the five years covered by this record 14 species of *Phyllophaga* were taken in the traps of these one species, *P. longispina*, has not been recorded previously from the state and three others, *P. gracilis*, *P. forsteri* and *P. hirsuta* were listed only from stations in the vicinity of New York City. The species and number of each taken are given in Table 1.

The traps were operated intermittently during the first warm weather of spring and continuously after the first catch. They then remained in continuous nightly operation until no beetles were taken. The traps were examined each morning and the

* Mr. Heit is at present connected with the N. Y. State Agric Experiment Station at Geneva, N. Y.

Table 1.

YEARLY RECORD OF PHYLLOPHAGA.

Species	1934	1935	1936	1937	1938
P. gracilis	8719	1279	3141	[3] 54	[2]1790
P. tristis	[1]532	266	6790	187	888
P. crenulata	[1]509	857	552	[2]797	[2]297
P. fusca	[1]237	1470	29	161	272
P. fraterna	[1]364	274	49	[2]1050	[2]102
P. anxia	[1] 14	463	59	105	49
P. longispina	10	30	13	10	38
P. marginalis	2	5	9	2	2
P. hirticula	7	0	0	10	0
P. drakei	0	5	9	1	0
P. hirsuta	6	0	0	0	0
P. fosteri	1	0	0	0	0
P. balia	1	0	0	0	0
P. ilicis	0	0	0	1	0
	10402	4649	10651	2378	3438

sex and species of each beetle determined. Difficult specimens were identified by Dr. R. D. Glasgow, New York State Entomologist. The flight period at Saratoga Springs of the 14 species as determined by light trapping is given in Table 2.

Table 2.

FIRST AND LAST DATES OF CAPTURE AND LONGEST FLIGHT.

Species	First	Last	Longest Flight Period No. of Days	Year
P. crenulata	May 6	Aug. 21	101	'36
P. fusca	April 27	July 19	78	'38
P. fraterna	May 8	Aug. 9	84	'34
P. anxia	April 27	July 9	74	'35
P. tristis	May 6	July 7	63	'38
P. gracilis	July 7	Sept. 4	62	'34
P. longispina	May 11	July 10	45	'35
P. marginalis	June 6	July 21	40	'35
P. hirticula	June 4	July 21	39	'37
P. drakei	April 10	June 18	39	'36
P. hirsuta	June 16	June 18	3	'34
P. balia	June 2	June 2	1	'34
P. fosteri	July 5	July 5	1	'34
P. ilicis	July 3	July 3	1	'37

[1] Trapping not begun until after probable beginning of flight period.
[2] Trapping discontinued before probable end of flight period.

The extreme length of the flight periods indicated in Table 2 is in a way misleading, as throughout part of the period only stragglers were taken. The bulk of each species was captured in a relatively short time. Table 3 shows the period during which ninety per cent of the individuals of the six most numerous species was taken.

Table 3.

PERIOD DURING WHICH NINETY PER CENT OF THE FLIGHT OCCURRED.

Species	Period	Length in Days
P. crenulata	5/10-7/10	51
P. fraterna	5/22-6/30	40
P. anxia	5/4 -6/9	37
P. fusca	5/20-6/14	25
P. tristis	5/8 -5/28	21
P. gracilis	7/11-7/31	21

With a view to possible control of grubs through capture of females the sex of each specimen was determined and a record kept for each species. Table 4 gives the data for the six most numerous species.

Table 4.

TOTAL CATCH.

Species	Males	Females	Per Cent Males	Per Cent Females
P. fraterna	1666	173	90	10
P. gracilis	13285	1698	88	12
P. tristis	5881	2782	78	22
P. crenulata	2364	648	77	23
P. fusca	1023	1146	47	53
P. anxia	327	363	47	53

An apparent difference in reaction to light is shown between the species of *Phyllophaga*, but here again the table may be somewhat misleading. The species in which a slightly greater number of females than males were taken were the species whose grubs occurred in greatest numbers near the traps. The greater number of males taken for the other species may well be an indication of the tendency of the males to aimless and greater flight than the females, rather than a greater phototropic response in the males. It is certainly true that although some grubs of all the species were found in the lighted area, the number of grubs of the first four species of table 4 were never present in the abundance which the catch of the adults would have suggested.

In a light trapping experiment over a period of five years at Saratoga Springs, New York, 14 species of *Phyllophaga* were taken. Their flight periods varied from 101 days to 39 days with a total flight of over four months. In two of the species, *P. anxia* and *P. fusca* females were taken in slightly greater numbers than the males.

Four New Polydesmoid Millipeds from North Carolina (Myriapoda).

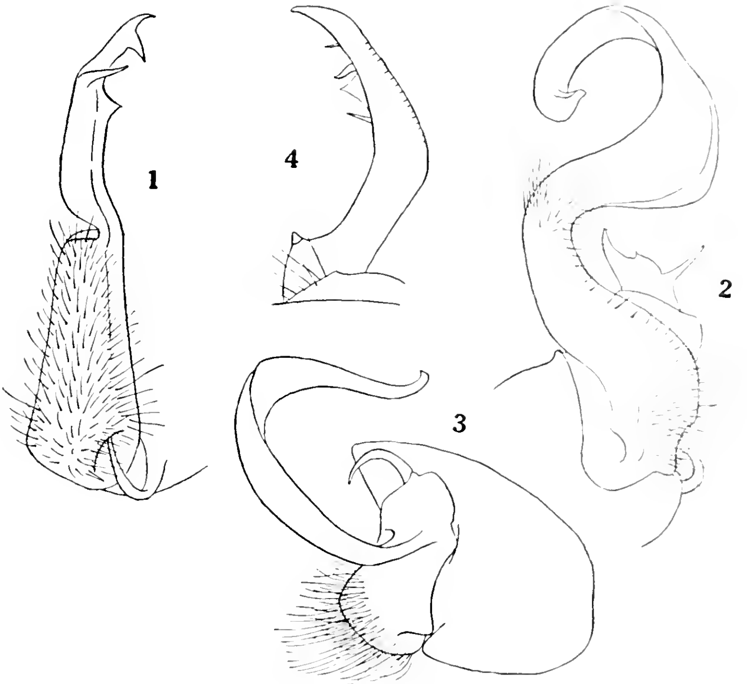
By Ralph V. Chamberlin, University of Utah, Salt Lake City.

Of the four species described in the present paper, the first three are based upon material collected by Prof. A. S. Pearse in the Pisgah National Forest, North Carolina, in 1933. The *Brachydesmus* is based upon specimens collected by Dr. Wm. S. Cornwell in 1934 and by Mrs. Nelle B. Causey in 1939 on the Duke University grounds. The holotypes are retained by the author. Paratypes of *Mimuloria furcifer* and of *Apheloria waccamana* are deposited at the Philadelphia Academy of Sciences.

Mimloria furcifer new species (Fig. 1).

A clearly larger species than *ducilla*, distinguishable at once in having the spots of the middorsal line shorter, subcircular, instead of extended along caudal border and ordinarily reaching light areas of the keels; dorsum in types dark chocolate to nearly black except for the median spots and the subquadrate spots on the keels which are yellow. In the preserved specimens the legs are yellow, the antennae chocolate brown.

This species in the form of the gonopods of the male is very similar to *ducilla*, but is at once to be separated by the presence of a distinct angulation on the upper edge of the telopodite whereas in *ducilla* that edge is smoothly curved. See further figure 1.



Explanation of Figures. 1. *Mimuloria furcifer*, sp. n. Right gonopod of male, mesoventral view. 2. *Sigmoria brachygon*, sp. n. Right gonopod of male, subventral view. 3. *Apheloria waccamana*, sp. n. Left gonopod, subventral view. 4. *Brachydesmus dux*, sp. n. Left gonopod, ectal view.

Width of male 8.2 mm., as against 6.25 mm. in *ducilla*.

Locality—North Carolina: Pisgah National Forest, Asheville. Four specimens taken by Prof. A. S. Pearse, June 3, 1933.

Sigmoria brachygon new species (Fig. 2).

A robust form with wide keels continuing the slope of the dorsum.

Dorsum in the preserved types a dull grayish brown, with the keels in part more yellowish, but the color not sharply defined or set off. Legs yellow. Types probably not in full color.

No sternal or coxal processes. Charcterized by the form of the broad, laminate gonopods as illustrated.

Length, 43 mm.; width, 11 mm.

Locality—North Carolina: Pisgah National Forest, Glen Bald. Male and female taken by Prof. A. S. Pearse, June 3, 1933.

Apheloria waccamana new species (Fig. 3).

Dorsum from dark chocolate to black; keels yellow over entire length, the dorsal black extending outward in an angle just back of anterior corner; a median dorsal series of yellow spots, one spot in front of caudal margin of each tergite; collum with entire keels yellow, but dark color extending outward along each border, and with two spots on median line, one larger one at anterior border and a smaller one at caudal; cauda yellow; antennae dark; legs yellow.

Gonopods of male as drawn in fig. 3.

Length of male *holotype*, 36 mm.; width, 9.8 mm.

Locality.—North Carolina: Lake Waccamana. Types taken by Prof. A. S. Pearse, April 16, 1933, in "Pisgah National Forest" and in the Duke University Forest.

Brachydesmus dux new species (Fig. 4).

General color of dorsum and antennae a somewhat horn brown, the keels not lighter. Legs a paler brown.

Head clothed with short erect setae, these not dense. Sulcus across vertex of head distinct.

Collum distinctly wider than head proper, but narrower than head with mandibles and narrower than second tergite. A row of small setigerous nodules or tubercles followed by a series of intermediate size along caudal border.

Ordinary tergites with keels on about level with mid-dorsal region, two transverse rows of large distinct tubercles and a row of small ones along caudal border; keels with three lateral teeth.

The species is best indentified from the structure of the gonopods of the male of which a drawing is given, fig. 4.

Length, 10 mm.

Locality.—North Carolina: Duke University campus.

Notes and Descriptions of West American Cerambycidae - IV (Coleoptera).

By E. Gorton Linsley, University of California, Berkeley.

(Continued from page 258.)

Methia robusta new species.

♂: Form short, robust; color dark brownish, elytra with pale vittae; pubescence short, pale, subrecumbent, with an intermixture of longer, erect, pale hairs in certain areas.

Head wider than elytra at base; eyes rather broadly rounded beneath and extending below mouthparts, more widely separated below than above, separated on vertex by about half the width of the third antennal segment, on underside of head by about the greatest diameter of the antennal scape, dorsal and ventral lobes approximate, connected posteriorly by a double row of facets; vertex, behind the eyes, finely rugulose; neck coarsely, distinctly punctured, the punctures varying from less than one to one puncture width apart; antennae more than twice as long as body, scape stout, about three times as long as its greatest width, apical tooth feeble, second segment short, more than twice as broad as long, third segment a little more robust than, not as long as, fourth segment.

Pronotum a little broader than long, sides rounded, widest behind the middle, base slightly constricted, as wide as apex; anterior margin feebly, finely, irregularly carinulate; disk finely rugulose, without evident punctures; surface sparsely clothed with long, erect and suberect, pale hairs; stridulatory plate of mesonotum feebly, evenly convex, sides narrowed in front of scutellar base, surface without a median, longitudinal ridge.

Elytra about three times as long as pronotum, two and one-fourth times as long as broad, sides straight, slightly attenuated apically; costae scarcely evident, surface finely scabrous, clothed with short, pale, subrecumbent hairs, longer, but not erect, on basal margin; apices rather broadly, separately rounded.

Legs clothed with moderately long, pale hairs, posterior tibiae feebly sinuate before apex; posterior tarsi with first segment a little longer than the two following together.

Abdomen shining, sternites coarsely punctured, clothed with long, pale, prostrate and suberect hairs. Length: 6.5mm.

Holotype: male (No. 5013, Calif. Acad. Sci. Ent.), from Claremont, California, June 28, 1931, collected and presented to the writer by Mr. H. L. McKenzie.

This species is perhaps the most robust of the known forms. It is related to *M. brevis* Fall, but differs in having the eyes more narrowly separated on the vertex, more widely separated and more broadly rounded beneath, the pronotum broader than long, and the elytra with pale vittae. The antennal scape is more robust than in any of the specimens of *brevis* which I have seen, and the color is brownish rather than black.

Methia dubia new species.

♂: Short, moderately robust; color dark brownish; pubescence short, pale, recumbent, intermixed with longer erect hairs. Head nearly as wide as base of elytra; eyes broadly rounded beneath, more widely separated below than above, separated on vertex by nearly the greatest diameter of the antennal scape, on the underside of head by at least the greatest width of scape, dorsal and ventral lobes connected by a single row of facets; vertex coarsely, distinctly punctured behind the eyes; antennae one-and-two-thirds times as long as body, scape moderately stout, apex with a short blunt tooth, second segment nearly as long as broad, third segment distinctly stouter than, and barely longer than, fourth segment.

Pronotum slightly broader than long, widest behind the middle, sides rounded, base not constricted, as wide as apex; surface clothed with short, pale, recumbent pubescence sparsely intermixed with longer, erect hairs; stridulatory plate of mesonotum more or less evenly, feebly convex, without a median longitudinal ridge.

Elytra three times as long as pronotum, a little more than twice as long as broad, sides straight; surface clothed with short, pale, recumbent pubescence with a few erect hairs at base; costae distinct; apices broadly, separately rounded.

Legs slender, clothed with pale, suberect hairs; posterior tibiae straight; posterior tarsus with first segment as long as two following together.

Abdomen with sternites feebly shining, finely sparsely clothed with short, pale hairs. Length: 5 mm.

Holotype: male (Knull collection) taken at Wickenberg, ARIZONA, June 16, D. J. and J. N. Knull, collectors.

This species is apparently related to *M. brevis* Fall, but differs in the more widely separated eyes, connected posteriorly by a single row of facets, distinctly costate elytra, and the shorter, sparser, erect hairs of the pronotum.

Methia acostata new species.

♂ : Robust, short; color black, opaque, elytra with a large, pale testaceous fascia before apex; pubescence short, pale, recumbent, intermixed with longer, erect hairs.

Head nearly as wide as elytra at base; eyes broadly rounded beneath, more widely separated below than above, separated on vertex by nearly the greatest width of antennal scape, on underside by at least the greatest width of scape, dorsal and ventral lobes connected posteriorly by a single row of facets; vertex behind the eyes rough, coarsely, shallowly, indistinctly punctured; antennae about twice as long as body, scape moderately stout, apex with a feeble tooth, second segment nearly as long as broad, third segment thicker than, and barely longer than, fourth segment.

Pronotum wider than long, sides rounded, widest behind the middle, base not constricted, about as wide as apex; surface clothed with moderately long, erect, pale hairs in addition to the shorter recumbent pubescence; disk opaque, obscurely punctured; anterior margin feebly shining, closely, transversely carinulate; stridulatory plate of mesonotum very feebly, evenly convex, without a median, longitudinal ridge, sides straight, parallel, suddenly widened at base of scutellum.

Elytra three times as long as pronotum about twice as long as broad, attenuated apically; surface rough, scabrous, clothed with short, pale, recumbent hairs, slightly longer than basal margin but not erect; costae not evident; apices rather narrowly, separately rounded.

Legs slender, clothed with long, erect, pale hairs; posterior tibiae straight; posterior tarsi with first segment equal to the two following together. Abdomen feebly shining, sternites sparsely clothed with fine, pale hairs. Length: 4.75 mm.

Holotype male (Knull collection), from Hualpai, Arizona, July 3, collected by D. J. and J. N. Knull.

This species is related to *M. brevis* Fall and *M. dubia* Linsley, from both of which it differs in having the eyes more widely separated on the vertex (by nearly the greatest diameter of antennal scape) elytra with a large pale fascia before apex, and the narrowly rounded elytral apices. From *M. dubia* it further differs in the absence of elytral costae. From *M. subarmata* it may be distinguished by the punctation of the neck, the feeble apical tooth of the antennal scape, the less prominent elytral humeri, the shorter, sparser antennal cilia, and the long, erect hairs of the pronotum.

Methia knulli new species.

♀ : Elongate, slender; color pale testaceous, head and abdomen darker, eyes black, pubescence modtrately long, suberect, brownish, intermixed with pale hairs. Head nearly as wide as base of elytra; eyes broadly rounded below, more widely separated below than above, separated on vertex by less than the greatest width of the antennal scape, on underside of head by at least the greatest width of the scape, dorsal and ventral lobes connected posteriorly by a single row of facets, more or less broken at middle; vertex coarsely, distinctly punctured behind the eyes; antennae one and one-third times as long as the body, densely hairy, scape slender, apical tooth feeble, second segment distinct, twice as wide as long, third segment scarcely more robust than, about one-fourth longer than, fourth segment.

Pronotum slightly broader than long, sides rounded, base shallowly but distinctly constricted, about as wide as apex; surface clothed with moderately long, erect and suberect, brownish hairs; stridulatory plate of mesonotum more or less evenly, feebly convex, without a narrow, elevated longitudinal, median ridge.

Elytra about four times as long as pronotum, a little less than three times as long as broad, sides straight, not expanding laterally toward apex; surface clothed with moderately long, suberect, brownish and pale hairs; costae distinct; apices broadly, separately rounded.

Legs slender, clothed with long, erect, brownish hairs; tibiae straight; posterior tarsi with first segment equal in length to the two following together.

Abdomen feebly shining, first four sternites shallowly punctured, tessellate, sparsely pubescent, brownish, fifth sternite pale testaceous, more densely clothed with suberect, brownish hairs. Length: 8.5 mm.

Holotype: female (Knull collection), from Hualpai, ARIZONA, July 3, collected by D. J. and J. N. Knull.

This species is closely related to *aestiva* Fall, with which it agrees in general form and the type and arrangement of pubescence. It differs, however, in having the eyes more widely separated on the vertex, in the shorter elytra, which in the female are less than three times as long as broad, in the feeble apical tooth of the antennal scape, and the dark brownish pubescence.

Methia carinata new species.

♀: Elongate, slender; color testaceous, head and abdomen darker; eyes black; pubescence short, recumbent, pale, without an intermixture of long, pale, erect hairs. Head nearly as wide as base of elytra; eyes broadly rounded beneath, more widely separated below than above, separated on vertex by the greatest width of antennal scape, on underside by nearly one-and-one-half times the greatest width of the scape, dorsal and ventral lobes connected posteriorly by a double row of facets; neck rough and indistinctly punctured behind eyes; antennae one-and-one-third times as long as body, sparsely hairy, scape slender, apical tooth not evident, second segment distinct, wider than long, third segment scarcely more robust than, and about one-fifth longer than, fourth segment.

Pronotum slightly broader than long, sides rounded, base not constricted, as wide as apex; surface clothed with short, recumbent, pale hairs, without an intermixture of longer, erect hairs; stridulatory plate of mesonotum with a strongly elevated, narrow, median, longitudinal ridge.

Elytra less than four times as long as the pronotum and about two and one-half times as long as broad, sides bent outward toward apex; surface clothed with very short, recumbent, pale hairs, without an intermixture of longer, erect hairs; costae distinct at base, evanescent apically; apices broadly, separately rounded.

Legs clothed with short, recumbent, pale hairs; posterior tibiae straight; posterior tarsus with first segment a little longer than the two following together.

Abdomen shining; first four sternites piceous, fifth sternite testaceous, clothed with fine, short, silky, pale pubescence. Length: 8 mm.

♂: Short, slender; color dark brownish, antennae and elytra paler; eyes narrowly rounded beneath, equally separated above and below by about the diameter of the third antennal segment; antennae one and one-third times as long as the body; elytra nearly three times as long as pronotum, twice as long as broad; posterior tibiae slightly sinuate. Length: 6 mm.

Holotype female and *allotype* male (both in Knull collection), from Hualpai, Arizona, July 2 and July 6 respectively, collected by D. J. and J. N. Knull.

This species is related to *M. falli* Martin, with which it agrees in the ridged mesonotal stridulatory plate and type of pubescence, but the latter differs by its uniform brown color, the shallowly punctured neck, shorter third segment of the antennae, feebly basally constricted pronotum, and by having the eyes more widely separated below than above. It superficially resembles *M. aestiva* Fall and *M. knulli* Linsley, but may be immediately separated by the uniform, short recumbent pubescence and the structure of the stridulatory plate. In the type of pubescence, *carinata* agrees with *pusilla* Newman, but differs from the latter in having the eyes more widely separated on the vertex (in *pusilla* they are nearly contiguous) and the dorsal and ventral lobes connected posteriorly by a double row of facets, in the evenly rounded pronotum without a basal constriction, and in the distinct second segment of the antennae (in *pusilla* the second segment is very short, usually concealed within the apex of the scape).

New Cicadellidae (Homoptera).

By Dorothy Johnson Knull, Columbus, Ohio.

Carneocephala balli n. sp.

Smaller than *C. floridana* (Ball) near which it should be placed, due to its long vertex which exceeds the pronotum in median length in both sexes. Smaller too than *C. gillettei* (Ball) which it otherwise resembles. Length: male, 4.3 mm.; female, 5 mm.

♂. Head, including eyes, wider than pronotum. Vertex swollen apically, concave behind middle, and decidedly excavated laterad of ocelli; coarsely granulated; including eyes a little less than twice as broad as long; lateral margins convex, apex bluntly angulate; ocelli large, slightly closer to posterior than to lateral margin. Pronotum coarsely granulate, distinctly shorter than vertex, sides almost parallel, posterior margin faintly emarginate with sides broadly rounded; scutellum small, somewhat granulate. Elytra longer than abdomen, nervures distinct, apical reticulations sparse.

Last ventral segment twice as long as preceding, valve small, triangular, three times as wide as long; plates as long as last ventral segment, tubular, closely appressed, inner margins divergently rounded at apex, exceeded in length by pygofer.

Vertex pale yellow, a dark brown square at apex, irregular blotches below, and a narrow fuscous line extending from middle to base; frontal sutures irregularly mottled with light brown, dark lines extending from ocelli, sparse discal mottling, a dark impressed point on each side on posterior margin midway between median line and lateral margin. Scutellum pale yellow with a small dark point within each basal angle, black median impressed line, and black hair-line along margins. Elytra dark green with minute brown punctures, veins pale green. Face yellow, darker toward middle, frontal arcs distinct, thorax and legs chiefly yellowish green, abdomen bright red, pygofer and last ventral segment tinged with green.

♀. Vertex not definitely concave behind middle, nor as swollen apically as in male. General color pale straw with irregular fuscous mottling on vertex, leaving only basal median line distinct. Below pale straw but for dark tarsal claws. Last ventral segment more than twice as long as preceding, posterior margin with emarginated lobe on median fourth, deeply sinuated to produced lateral angles.

Male *holotype* and female *allotype* taken at Holbrook, ARIZONA, July 28, 1938, by D. J. and J. N. Knull. Types in collection of The Ohio State University.

Named for Dr. E. D. Ball, originator of the genus.

Alebra interrogata n. sp.

This small species with its extensive pale green markings seems quite distinct in character from any previously described member of this genus.

♂. Vertex a little more than half-length of pronotum, scarcely produced at apex, margins about parallel, eyes large, occupying more than two-thirds surface; pronotum posteriorly wider than vertex, hind margin very obtusely angulate; scutellum large, equilaterally triangular with the apex swollen, especially noticeable from side; elytron with appendix extending from base of cell M_4 just beyond M_2; apical cells R_1 and R_3 triangular, about equal in size. M_2 elongate, twice as long as wide, with anterior third bent feebly toward costa. M_4 apically not quite as wide as M_2 but a third longer and almost twice as wide basally. Wing with three closed apical cells and submarginal vein. But for the extended appendix, the venation approximates that of *Protalebra similis* Baker as illustrated by McAtee.*

Front long, narrow, tapering toward clypeus which is also long, a little broader at middle and narrows to bluntly rounded apex; no distinct suture between front and clypeus. Last ventral segment as long at middle as preceding segment, but a third longer at sides as posterior margin is angulately excavated. No valve visible; plates widest at base, distinctly indented near inner margin before middle, produced more than twice width and gradually narrowing to acute tips; seven coarse white hairs and numerous fine ones toward outer apical margins.

♀ similar in structure, a little more robust, with last ventral segment three times as long as preceding, bluntly produced on posterior margin, with median portion above ovipositor narnarowly embrowned, ovipositor stout, slightly exceeding pygofer.

Eyes brown, median vitta of vertex white with rounded knob at apex, remainder sordid yellow darkened interiorly; pronotum with pale median vitta and humeral angles, remainder sordid yellow with underlying dark coloring producing greenish cast; scutellum sordid yellow with brown transverse median impressed line, narrow yellow longitudinal median vitta between darker basal angles, apex pale, darkened around swollen area; elytron chiefly pale green with basic milky white appearing on clavus in small oval area bordering scutellum and angulate stripe across middle; corium pale at base, middle, and before crossveins; costa pale green to hyaline, dusky bordered plaque; apical veins and sectors approaching apex broadly yellowish white definitely outlined by dark brown blotches, centers of cells hyaline, apices fumose. Veins bordering inner apical cell form a large pale question mark. Appendix smoky semihyaline. Dorsum dark brown, face and venter mostly yellow with dark tarsal claws, bases of spines of hind femora, and a dark brown area below center of male plates extending narrowly along inner margins.

Length, both sexes, 3 mm.

Male *holotype,* female *allotype,* 36 *paratypes,* Starr County, TEXAS, June 2, 1939, D. J. and J. N. Knull; 2 *paratypes,* Zapata County, Texas, June 2, 1939, D. J. and J. N. Knull.

Holotype, allotype and paratypes in collection of author, paratypes in Collection of The Ohio State University, U. S. National

* W. L. McAtee, Jour. N. Y. Ent. Soc. 34: Fig. 4, p. 173, 1926.

Museum and Academy of Natural Sciences of Philadelphia. Tha host plant is *Cordia biossieri* DC., as determined by Dr. F. W. Pennell of the Philadelphia Academy. I am grateful to Mr. P. W. Oman for his examination of specimens.

The Effect of Isolation on Growth in the Cockroach Blattella germanica (L.) (Orthoptera Blattidae).

Investigators who employ the common household roach, *Blattella germanica* (*L.*), for studies on growth and nutrition, often isolate the nymphs to prevent cannibalism.

When nymphs reared in isolation are compared with others from the same litter which have been reared in groups, it is found that a longer time elapses before the isolated nymphs accomplish equivalent molts. As would be expected, the longer stadia of the isolated nymphs delay the attainment of maturity. Comparisons between animals reared in isolation and those reared in groups must thus be made with caution.

This slower growth of isolated nymphs may be ascribed to the absence of jostling and mutual stimulation. Similarly, Faure* and others have noted differences between migratory locusts reared under crowded conditions and those reared in isolation; but in Faure's experiments the increased activity gave rise to structural and colorational differences. In *Blattella germanica,* differences of this sort have not been detected; the altered metabolism, under conditions of crowding and resulting stimulation, appears merely to affect the time required to reach maturity. Such differences in growth rate are detectable up to 23 to 25° C., but are less noticeable as the temperature increases because the nymphal period and the differences are similarly reduced.

When large-sample experiments now in progress have been subjected to analysis of variance for such factors as sex-ratio (males appear to mature earlier than females) and possible variation among litters, fuller data will be presented.—LINCOLN C. PETTIT, Washington and Lee University, Lexington, Virginia.

* Faure, Jacobus C. The phases of locusts in South Africa. Bull. Ent. Res., 23 pp 293-405, 25 pl., 1 map. 1932.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and E. G. FISHER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of Entomological News for 10c. The number of, or annual volume, and in some cases the part, heft, &c., the latter within ( )follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—**Blackwelder, R. E.**—Some aspects of modern taxonomy. [6] 43: 245-257. **Böttcher, F. K.**—Pflanzenschutz und Bienenzucht. [Forsch. und Fortsch., Berlin] 16: 229-230. **Chagnon, G.**—A preliminary list of the insects collected in the Laurentide Provincial Park. Montmorency County, Quebec. [70th Ann. Rep. Ent. Soc. Ontario] 1939: 83-87. **Cumley, R. W.**—Comparison of serologic and taxonomic relationships of Drosophila species. [6] 43: 265-274, ill. **Davis, W. T.**—Natural History records from the meetings of Staten Island Nature Club. [Proc. Staten Island Inst. Arts & Sci.] 9: 23-51. **Fletcher, F. C.**—See under Coleoptera. **Heikertinger, F.**—Was jeder Zoologe von den nomenklaturfragen wissen soll. [34] 130: 139-155. **Hutchins, R. E.**—Insect activity at a light trap during various periods of the night. [12] 33: 654-657, ill. **Leitinger-Micoletzky, E.**—Die Tiersukzession auf Fichtenschlägen. [89] 73: 467-504, ill. **McKeown, K. C.**—Insect habitat groups. [Aust. Mus. Mag.] 7: 116-119, ill. **Williams, C. B.**—An analysis of four years captures of insects in a light trap. Part II. The effect of weather conditions on insect activity and the estimation and forecasting of changes in the insect population. [36] 90: 227-306, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Bowers & McCay.**—Insect life without Vitamin A. [68] 92: 291. **Butenandt, Weidel & Becker.**—Kynurenin als Augenpigmentbildung auslosendes Agens bei Insekten. [Die Naturwissen., Berlin] 28: 63-64, ill. **Cope, O. B.**—The morphology of Psocus confraternus (Psocid.). [Microent.] 5: 91-115, ill. **v. Frankenberg, G.**—Putzapparate. [Mikrokosmos] 33: 145-148, ill. **Frisch, K. V.**—See under Hymenoptera. **Frolova, S. L.**—Peculiarities of maturation of unfertilized eggs of Bombyx mori activated by high temperature. [Comptes Rendus, Acad. Sci. USSR] 27: 601-603, ill. Cytology of development of parthenogenetic eggs of Bombyx mori activated by high temperature. [Comptes Rendus, Acad. Sci. USSR] 27: 604-606. **Köhler, W.**—Erbliche ausfallserscheinungen und regulationen am pupalen flügeltracheensystem von Ephestia kükniella. [97] 60: 348-367, ill. **Mendes, L. O. T.**—See under Hemiptera. **Piepho, H.**—Ueber die hemmung der verpuppung durch Corpora allata. Untersuchungen an der wachsmotte Galleria mellonella. [97] 60: 367-393, ill. **Podesta, T.**—Ueber ein neues organ an der basis des abdomens von Acidalia. [34] 129: 266-268, ill. **Prelinger, Dr.** — Champagnerpfropfen-und Flaschenorgane bei den Ameisen. [Mikrokosmos] 33: 125-127, ill. **Rakshpal, R.**—See under Hemiptera. **Schwan, H.**—Beitrag zur kenntnis der atmung holometaboler insekten wahrend der metamorphose. [83] 32 (A): 15 pp., ill. **Sendler, O.**—Vorgange aus dem bienenleben vom standpunkte der entwicklungsphysiologie. [94] 153: 39-82, ill. **Timoféeff-Ressovsky, N. W.**—Spontane und strahleninduzierte Mutabilität in geographisch verschiedenen Stämmen von Drosophila melanogaster. [97] 60: 267-275. **Tomohiro, M.**—On the chromosomes of the harvester, Gagrellopsis nodulifera. [Jour. Sci. Hirosima Univ.] 7 (B): 157-168, ill. **Uhmann, E.**—See under Coleoptera.

ARACHNIDA AND MYRIOPODA.—Blanchard, E. E.—Tres Ácaros Dañinos para los cultivos Argentinos. [Rev. Fac. Agron. La Plata 24: 11-18, ill. (*). **Chamberlin, R. V.**—A new trap-door spider from Texas. [95] 52: 5-6. A new arachnid of the order Pedipalpida. [95] 52: 123-124, ill. Two new geophiloid chilopods from Mexico and Texas. [95] 53: 65-66. On six new lithobiid centipeds from North Carolina. [95] 53: 75-77. New American Tarantulas of the family Aviculariidae. [Bull. Univ. Utah] Biol. Ser. Vol. 5: 39 pp. (k). On some Diplopods of the family Fontariidae. [Bull. Univ. Utah.] Biol. Ser. Vol. 5: 19 pp., ill. (*). On a diplopod collection from Barro Colorado Island, Panama. [Bull. Univ. Utah] Biol. Ser. Vol. 5:

16 pp. (*). New genera and species of North American Paraiulidae. [Bull. Univ. Utah] Biol. Ser. Vol. 5: 39 pp. ill. (*). **Chamberlin & Gertsch.**—Descriptions of new Gnaphosidae from the United States. [40] No. 1068: 19 pp., ill. **Chamberlin & Ivie.**—New Tarantulas from the southwestern states. [Bull. Univ. Utah] Biol. Ser. Vol. 5: 17 pp., ill. Agelenid spiders of the genus Cicurina. [Bull. Univ. Utah] Biol. Ser. Vol. 5: 108 pp., ill. (k*). **Fichter, E.**—Studies of North American Solpugida. The true identity of Eremobates pallipes. [Amer. Midl. Nat.] 24: 351-360, ill. **Marshall, R.**—On the occurrence of water mites in the food of turtles. [Amer. Midl. Nat.] 24: 361-364, ill. **Riley, W. A.**—The tropical rat mite, Liponyssus bacoti in Minnesota. [Jour. Parasit.] 26: 433. **Schulze, P.**—Eine neue Ornithodoros-Art aus Brasilien. [34] 130: 131-135, ill. **Simon, F.**—See under Neuroptera.

THE SMALLER ORDERS OF INSECTS.—**Cope, O. B.**—See under Anatomy. **da Costa Lima, A.**—Nota sobre as especies de "Tunga". (Tungid.). [Acta Medica] 5: 4 pp. (k). **Davis, C.**—Taxonomic notes on the order Embioptera. The genus Rhagadochir and genera convergent to it. [Pro. Linn. Soc. N. S. Wales] 65: 171-191, ill. (k s*). **Eichler, W.**—Notulae Mallophagologicae. I. [34] 129: 158-162. (*). Notulae Mallophagologicae. IV. [34] 130: 97-103, ill., cont. **Leigh, W. H.**—Preliminary studies on parasites of Upland game birds and fur-bearing mammals in Illinois. [Div. Nat. Hist. Surv. Ill. Bull.] 21: 185-194, ill. **Roesler, R.**—Neue und wenig bekannte Copeognathengattungen I. [34] 129: 225-243, 130: 1-25, ill. (s). **Simon, F.**—The parasites of the sage grouse, Centrocercus urophasianus. [Univ. Wyom. Publ.] 7: 77-100, ill. **Thompson, G. B.**—Anoplura (Siphunculata & Mallophaga) from Juan Fernandez hosts. [Nat. Hist. Juan Fernandez & Easter Id.] 3: 639-642. (s). **Trembley & Bishopp.**—Distribution and hosts of some fleas of economic importance. [12] 33: 701-703. **Werneck, F. L.**—Oito especies novas de Mallophaga encontradas em mammiferos. [Brasil-Medico] 49: 5 pp. (s).

ORTHOPTERA.—**Davis, W. T.**—(see under General). **Rosillo, A. M.**—Primeras observaciones biologicas sobre Marellia. [Mem. Mus. de Entre Rios] 1940, No. 15: 20 pp. (s).

HEMIPTERA.—**Bruner, S. C.**—A new tingitid from

Cuba. [Mem. Soc. Cubana Hist. Nat.] 14: 245-248, ill. (k). **da Costa Lima, A.**—Novo Hemiptero Reduviideo da subfamilia Vesciinae. [Arq. Zool. Est. Sao Paulo] 1: 485-490, ill. (s). **Funkhouser, W. D.**—New Peruvian Membracidae. [6] 43: 275-292, ill. (*). **Harris, H. M.**—New and little-known species of Alloeorrhynchus (Nabidae). [103] 13: 115-123, ill. **Mendes, L. O. T.**—Consideracoes sobre o desenvolvimento post-embrionario do labium de Dysdercus mendesi e referencia ao seu mecanismo de alimentacao. [15] 12: 159-177, ill. **Rakshpal, R.**—The morphology of the genitalia in the Aleurodidae and their mode of working. [Indian Jour. Ent.] 2: 27-43, ill.

LEPIDOPTERA.—Chermock, F. H.—New Melanic moths from southwestern Pennsylvania. [Proc. Penna. Acad. Sci.] 14: 138-140. **Chermock & Chermock.**—A new race of Euphydryas phaeton. [Pro. Penn. Acad. Sci.] 14: 140. A new sphinx from eastern United States. [Pro. Penna. Acad. Sci.] 14: 137-138. **Field, W. D.**—A distributional note on Achalarus Lyciades. [103] 13: 114. A distributional note on Heterochroa bredowii (Nymphalid.). [103] 13: 123. A note on Argynnis cybele krautwurmi (Nymphalid.). [103] 13: 129. **Fox, R. M.**—A generic review of the Ithomiinae (Nymphalid.). [1] 66: 161-207, ill. (s*). **V. Frankenberg, G.**—Schmetterlingseier. [Mikrokosmos] 33: 153-156, ill. **Hayward, K. J.**—Enumeracion sistematica de los Lepidopteros de Entre Rios. [Mem. Mus. de Entre Rios] 1940, No. 13: 17 pp. **Maxwell & Lord.**—Notes on Lampronia rubiella, a raspberry pest new to North America. [70th Ann. Rep. Ent. Soc. Ontario] 1939: 49-51. **Moore, S.**—A list of the butterflies of Michigan. [114] No. 411: 23 pp., ill. **Sanford, L. J.**—A new record for Connecticut. [6] 43: 244. Atrytone logan. [6] 43: 258.

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393-398, ill. (s). **Obenberger, J.**—Los tapones vivos. [Flora y Fauna Peruanas] 1: 14-16, ill. (s). **Prelinger, Dr.**—See under Anatomy. **de Santis, L.**—Sinopsis del genero "Physcus". [Rev. Fac. Agron. La Plata] 24: 29-44, ill. (*k). **Udine & Pinckney.**—Some egg parasites of Oecanthus quadripunctatus and of a species of Orchelimum. [Pro. Penna. Acad. Sci.] 14: 81-84. **Walley, G. S.**—A revision of the ichneumon-flies of the genus Campoplegidea occurring in America north of Mexico. [Sci. Agric.] 20: 647-734, ill. (*k).

INTRODUCING INSECTS: A Book for Beginners. By JAMES G. NEEDHAM. The Jacques Cattell Press, Lancaster, Pa. 1940. 129 p. $1.50. — No subject in natural history offers greater variety, greater numbers, more remarkable color and form, and more readily available material for observation and for collection than insects. And we have seen no book which tells how to get acquainted with insects more simply than this one. It is written with authority, but in language anyone can understand. Its illustrations are drawings which for this purpose are definitely preferable to photographs. Surprisingly much is told in so short a space of the habits of many kinds of insects and their way of life. Useful information on insect control methods and directions for making an insect collection are welcome features of the book. Insects are called by their common names.—CHARLES E. MOHR.

ABOUT SPIDERS; INTRODUCING ARACHNE. By ELAINE V. EMAUS. E. P. Dutton Co., New York. 1940. 177 pp. $2.50.—"This book is for all who do not know about, and so do not care about, spiders." And it is the work of a charming young author who started out knowing "scarcely anything about spiders". So it is only natural that her viewpoint should be that of the interested amateur naturalist and that she should avoid unessential technicalities. Interestingly illustrated with photographs and 22 line drawings, printed in rather large, easily read type, and written in a delightful, conversational style, this little book should be attractive to children and grown-ups alike. Most readers will find a new appetite for information about spiders whetted by the all too brief accounts in this book and will likely go on to other popular and technical publications so frequently and interestingly reported upon in the text.—CHARLES E. MOHR.

THE BIOLOGY AND CONTROL OF WIREWORMS. A review of the literature By C. T. THOMAS. Bulletin 392 Pennsylvania State College School of Agriculture and Experiment Station. May, 1940. 90 pp.—Prof. Thomas says: "In 1930, the writer summarized in Bulletin 259 of the Pennsylvania Agricultural Experiment Station practically all of the control literature which had been published up to that date . . . that bulletin has been out of print for several years, and since 1930, about 400 more papers on wireworm biology and control have been published. The present bulletin is an attempt to bring together all of the available wireworm literature of the past 10 years, and to present it in such a form that it may be readily usable by growers, extension workers or researchers on this group of insects." The data here brought together are grouped under the headings: Biology, Life History and Ecology; Environment; Biological control of wireworms; Insecticides used against Elaterid larvae; Attachments and repellents; Planting practices; Cultivation practices; Crop rotation and Miscellaneous control methods. A bibliography occupies pp. 78-90. This bulletin will surely fulfill the purpose for which it has been planned.—P. P. CALVERT.

OBITUARY

Science for November 8, 1940, announces the deaths of Dr. ADOLFO LUTZ, of the Oswaldo Cruz Institute of Rio de Janeiro, on October 6, at the age of 84 years, and of Dr. GUSTAVUS AUGUST EISEN, of the California Academy of Sciences, on October 29, at the age of 93 years.

Dr. Lutz was the author of many entomological papers, especially on the medical side.

Dr. Eisen was born in Stockholm, Sweden, August 2, 1847, came to the United States in 1873 and was naturalized in 1887. He explored Mexico and Central America, 1880-1903, during part of which time (1893-1900) he was curator of the California Academy of Sciences. Entomologists will remember him for the collections of insects which he made in Baja California, and in Tepic, Mexico, and for articles on the caprification of the fig. Biographical data concerning him are to be found in *American Men of Science* and (longer) in *Who's Who in America.*

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being ongest in) are discontinued.

Wanted.—Nitidulidae for determination or exchange. Correspondence desired with those who will collect. H. R. Dodge, 78 Anne Street, Clintonville, Wisconsin.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Onpo, Korea, Japan.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange against Col. or all other insects from Bolivia. Walter Wittmer, Casilla 219, Oruro, Bolivia, S. America.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

Wanted—To hear from collectors who desire extra good cocoons of Michigan **Platysamia columbia,** that will emerge June, 1941. W. S. McAlpine, 575 Townsend St., Birmingham, Michigan.

Wanted—Specimens of the genus Trox from North America. Will exchange or determine for duplicate material. Mark Robinson, 231 Cherry St., Sharon Hill, Pennsylvania.

Lepidoptera—From the South, including P. palamedes, T. halesus and E. jucunda to exchange for fauna from other localities. H. W. Eustis, 2230 McDowell St., Augusta, Georgia.

Wanted—Egg cases of preying mantids. Correspondence desired with those who will collect. Osmond P. Breland, Department of Zoology, The University of Texas, Austin, Texas.

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